



File OF-Surv-OpAud-E101-2014-2015 03  
31 March 2015

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Enbridge Pipelines Inc.  
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Facsimile [REDACTED]

Dear Mr. Jarvis:

**Enbridge Pipelines Inc. (Enbridge) and its Board-Regulated Subsidiaries – *National Energy Board Onshore Pipeline Regulations, (OPR) Final Audit Report – Integrity Management Program***

The Board has completed its Final Report for its audit of Enbridge's Integrity Management Program.

A Draft Report documenting the Board's evaluation of Enbridge's Integrity Management Program was provided to Enbridge on 4 February 2015 for review and comment. On 6 March 2015, Enbridge submitted its response.

The Board has considered Enbridge's comments and has made changes to the Final Audit Report and its Appendices as it determined to be appropriate.

The findings of the audit are based upon an assessment of whether Enbridge was compliant with the regulatory requirements contained within:

- *National Energy Board Act*;
- *National Energy Board Onshore Pipeline Regulations*; and
- Enbridge's policies, programs, practices and procedures.

Enbridge was required to demonstrate the adequacy and effectiveness of the methods selected and employed within its Programs to meet the regulatory requirements listed above.

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The Board has enclosed the Final Audit Report and associated appendices with this letter. The Board will make the Final Audit Report public on the Board's website.

Within 30 days of the issuance of the Final Audit Report by the Board, Enbridge is required to file a Corrective Action Plan (CAP), which describes the methods and timing for addressing the Non-Compliant findings identified through this audit, for approval.

The Board will make the CAP public and will continue to monitor and assess all of Enbridge's corrective actions with respect to this audit until they are fully implemented. The Board will also continue to monitor the implementation and effectiveness of Enbridge's Integrity Management Program and management system through targeted compliance verification activities as a part of its on-going regulatory mandate.

If you require any further information or clarification, please contact Ken Colosimo, Lead Auditor, Operations Business Unit at 403-292-4926 or toll-free at 1-800-899-1265.

Yours truly,

*Original signed by*

Sheri Young  
Secretary of the Board

Attachment – Final OPR Audit Report documents

cc: Mr. Al Monaco, President and CEO, Enbridge Inc.

National Energy  
Board



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*National Energy Board Onshore Pipeline Regulations (OPR)*  
**Final Audit Report of the Enbridge Pipelines Inc. Integrity Management Program**

**File OF-Surv-OpAud-E101-2014-2015 03**

Enbridge Pipeline Inc. and National Energy Board-Regulated Subsidiaries (Enbridge)  
3000 Fifth Avenue Place  
425 -1st Street S. W.  
Calgary, Alberta T2P 3L8

31 March 2015

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## Executive Summary

Companies regulated by the National Energy Board (NEB or the Board) must demonstrate a proactive commitment to continual improvement in safety, security and environmental protection. Pipeline companies under the Board's regulation are required to incorporate adequate, effective and implemented management systems into their day-to-day operations. These systems and associated technical management programs include the tools, technologies and actions needed to ensure NEB regulated pipelines are safe and remain that way over time. In the public interest, the Board holds companies accountable for safety and environmental outcomes.

This report documents the Board's comprehensive audit of Enbridge's management system and Integrity Management program applicable to its facilities that are regulated by the NEB. The audit was conducted using the *National Energy Board Onshore Pipeline Regulations* (OPR) as amended on 21 April 2013. This amendment clarified the Board's expectations for establishing and implementing a documented management system and integrity management program. Before issuing the amendment, the Board consulted and communicated with its regulated companies with respect to the new requirements; therefore, an implementation grace period was not given when the OPR was promulgated. As a result, when evaluating compliance, this audit did not consider any extra time Enbridge may have needed to implement changes associated with the formalized management system requirements. As indicated in the amendments, companies must have an effective and well-documented integrity management program as a key component of their management system.

The Board conducted the audit following its published audit protocol, which identifies five management system elements. These five elements are broken into 17 sub-elements. Each sub-element reflects several regulatory requirements. Companies must comply with 100 per cent of the regulatory requirements of each sub-element being assessed. If a company's program is found to be deficient with respect to any regulatory requirement, the entire sub-element will be found Non-Compliant. This report also includes an assessment of Enbridge's management system against the requirements of OPR, section 6.1.

The Board's audit of Enbridge's regulated facilities found that Enbridge is in the process of establishing and implementing a management system that reflects its commitment to applying a formal management structure to all of its business functions and departments. Enbridge has not limited its management system to the technical programs required by the Board and was implementing a corporate management system, not merely an operations management system as many companies have done in response to the Board's regulatory requirements.

The Board noted that Enbridge's records indicate that it started developing its management system after the Board's Integrity Management and Safety Management program audits in 2009. This was before Enbridge was notified of the intended OPR changes.



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Regardless of when Enbridge started its management system development, its commitment to establishing and implementing a corporate management system for all of its Board regulated business and facilities is a large, complex undertaking. The Board therefore identified that Enbridge's management system is in a transitory state between the program-based management practices it used in the past and its new management system approach. This has contributed to a Non-Compliant finding related to establishing and implementing a compliant management system. It is important to understand that the Board's finding regarding Enbridge's management system primarily reflects the company's stage in developing and applying its management system. It does not necessarily reflect the lack of technical management activities being undertaken to ensure the safety of the pipeline.

The Board's audit of Enbridge's management system included an assessment of the individual management system processes as described in the OPR and the Board's audit protocol. As documented in this report, the Board found that Enbridge has documented many of the required processes within its Integrated Management System. However, the Board found that some of Enbridge's management system processes were not sufficiently systematic, explicit, comprehensive and proactive to meet the OPR requirements.

The Board notes that, regardless of the reasons for non-compliance, companies were required to be compliant with the Board's management system requirements when the OPR was updated in 2013. Enbridge will need to develop and implement corrective actions to ensure establishment and implementation of its management system.

In addition to evaluating Enbridge's management system and associated processes, the Board's audit also included an evaluation of Enbridge's integrity management program to determine the applicability and integration of the management system within it and to assess whether Enbridge is meeting its requirements to develop, implement and maintain an integrity management program that anticipates, prevents, manages and mitigates conditions that could adversely affect safety or the environment during the operation and maintenance of its pipeline. The Board found that, notwithstanding the documentation issues relating to its management system processes, the processes and practices presently used by Enbridge identified the majority, and most significant, of its integrity related hazards and that Enbridge has developed and implemented the operational controls and inspection and monitoring programs to address these hazards. The Board notes that Enbridge's Integrity Management program has been in existence for many years, thus its integrity related practices and procedures are well established within the organization. The Board did identify some deficiencies not related to management system process development. All of the Board's findings are documented in Appendix I of this audit report.

In analyzing the results of its audit as a whole, the Board notes that it has made a significant number of Non-Compliant findings. The majority of these findings fall into three general categories:

- Non-compliances relating to management system process development;
- Non-compliances relating to Enbridge's interpretation of OPR requirements; and

- Non-compliances relating to technical content.

The Board notes that the majority of all of the Non-Compliant findings made by the Board relate to management system process development.

The Board has determined that enforcement actions are not immediately required to address the Non-Compliant findings identified in this audit. Within 30 days of the Final Audit Report being issued, Enbridge must develop and submit a Corrective Action Plan for Board approval. The Corrective Action Plan must detail how Enbridge intends to resolve the non-compliances identified by this audit. The Board will assess implementation of the corrective actions to confirm they are completed in a timely manner and applied consistently across Enbridge's regulated system. The Board will also continue to monitor the overall implementation and effectiveness of Enbridge's management system and Integrity Management program through targeted compliance verification activities as part of its ongoing regulatory mandate.



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## 1.0 Audit Terminology and Definitions

*(The Board has applied the following definitions and explanations in measuring the various requirements included in this audit. They follow or incorporate legislated definitions or guidance and practices established by the Board, where available.)*

**Adequate:** The management system, programs or processes complies with the scope, documentation requirements and, where applicable, the stated goals and outcomes of the NEB Act, its associated regulations and referenced standards. Within the Board's regulatory requirements, this is demonstrated through documentation.

**Audit:** A systematic, documented verification process of objectively obtaining and evaluating evidence to determine whether specified activities, events, conditions management systems or information about these matters conform to audit criteria and legal requirements and communicating the results of the process to the company.

**Compliant:** A program element meets legal requirements. The company has demonstrated that it has developed and implemented programs, processes and procedures that meet legal requirements.

**Corrective Action Plan:** A plan that addresses the non-compliances identified in the audit report and explains the methods and actions that will be used to correct them.

**Developed:** A process or other requirement has been created in the format required and meets the described regulatory requirements.

**Effective:** A process or other requirement meets its stated goals, objectives, targets and regulated outcomes. Continual improvement is being demonstrated. Within the Board's regulatory requirements, this is primarily demonstrated by records of inspection, measurement, monitoring, investigation, quality assurance, audit and management review processes as outlined in the OPR

**Established:** A process or other requirement has been developed in the format required. It has been approved and endorsed for use by the appropriate management authority and communicated throughout the organization. All staff and persons working on behalf of the company or others that may require knowledge of the requirement are aware of the process requirements and its application. Staff has been trained on how to use the process or other requirement. The company has demonstrated that the process or other requirement has been implemented on a permanent basis. As a measure of "permanent basis", the Board requires the requirement to be implemented, meeting all of the prescribed requirements, for three months.

**Finding:** The evaluation or determination of the compliance of programs or elements in meeting the requirements of the *National Energy Board Act* and its associated regulations.





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**Implemented:** A process or other requirement has been approved and endorsed for use by the appropriate management authority. It has been communicated throughout the organization. All staff and persons working on behalf of the company or others that may require knowledge of the requirement are aware of the process requirements and its application. Staff have been trained on how to use the process or other requirement. Staff and others working on behalf of the company have demonstrated use of the process or other requirement. Records and interviews have provided evidence of full implementation of the requirement, as prescribed (i. e. the process or procedures are not partially utilized).

**Inventory:** A documented compilation of required items. It must be kept in a manner that allows it to be integrated into the management system and management system processes without further definition or analysis.

**List:** A documented compilation of required items. It must be kept in a manner that allows it to be integrated into the management system and management system processes without further definition or analysis.

**Maintained:** A process or other requirement has been kept current in the format required and continues to meet regulatory requirements. With documents, the company must demonstrate that it meets the document management requirements in OPR, section 6.5(1)(o). With records, the company must demonstrate that it meets the records management requirements in OPR, section 6.5 (1)(p).

**Management System:** The system set out in OPR sections 6.1 to 6.6. It is a systematic approach designed to effectively manage and reduce risk, and promote continual improvement. The system includes the organizational structures, resources, accountabilities, policies, processes and procedures required for the organization to meet its obligations related to safety, security and environmental protection.

*(The Board has applied the following interpretation of the OPR for evaluating compliance of management systems applicable to its regulated facilities.)*

*As noted above, the NEB management system requirements are set out in OPR sections 6.1 to 6.6. Therefore, in evaluating a company's management system, the Board considers more than the specific requirements of section 6.1. It considers how well the company has developed, incorporated and implemented the policies and goals on which it must base its management system as described in section 6.3; its organizational structure as described in section 6. 4; and considers the establishment, implementation, development and/or maintenance of the processes, inventory and list described in section 6.5(1). As stated in sections 6.1(c) and (d), the company's management system and processes must apply and be applied to the programs described in section 55.*

**Non-Compliant:** A program element does not meet legal requirements. The company has not demonstrated that it has developed and implemented programs, processes and procedures that meet the legal requirements. A corrective action plan must be developed and implemented.



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**Practice:** A repeated or customary action that is well understood by the persons authorized to carry it out.

**Procedure:** A documented series of steps followed in a regular and defined order thereby allowing individual activities to be completed in an effective and safe manner. A procedure also outlines the roles, responsibilities and authorities required for completing each step.

**Process:** A documented series of actions that take place in an established order and are directed toward a specific result. A process also outlines the roles, responsibilities and authorities involved in the actions. A process may contain a set of procedures, if required.

*(The Board has applied the following interpretation of the OPR for evaluating compliance of management system processes applicable to its regulated facilities.)*

*OPR section 6.5(1) describes the Board's required management system processes. In evaluating a company's management system processes, the Board considers whether each process or requirement: has been established, implemented, developed or maintained as described within each section; whether the process is documented; and whether the process is designed to address the requirements of the process, for example a process for identifying and analyzing all hazards and potential hazards. Processes must contain explicit required actions including roles, responsibilities and authorities for staff establishing, managing and implementing the processes. The Board considers this to constitute a common 5 w's and h approach (who, what, where, when, why and how). The Board recognizes that the OPR processes have multiple requirements; companies may therefore establish and implement multiple processes, as long as they are designed to meet the legal requirements and integrate any processes linkages contemplated by the OPR section. Processes must incorporate or contain linkage to procedures, where required to meet the process requirements.*

*As the processes constitute part of the management system, the required processes must be developed in a manner that allows them to function as part of the system. The required management system is described in OPR section 6.1. The processes must be designed in a manner that contributes to the company following its policies and goals established and required by section 6.3.*

*Further, OPR section 6.5(1) indicates that each process must be part of the management system and the programs referred to in OPR section 55. Therefore, to be compliant, the process must also be designed in a manner which considers the specific technical requirements associated with each program and is applied to and meets the process requirements within each program. The Board recognizes that single process may not meet all of the programs; in these cases it is acceptable to establish governance processes as long as they meet the process requirements (as described above) and direct the program processes to be established and implemented in a consistent manner that allows for the management system to function as described in 6.1.*

**Program:** A documented set of processes and procedures designed to regularly accomplish a result. A program outlines how plans, processes and procedures are linked; in other words, how each one contributes to the result. A company regularly plans and evaluates its program to check that the program is achieving the intended results.

*(The Board has applied the following interpretation of the OPR for evaluating compliance of programs required by the NEB regulations.)*

*The program must include details on the activities to be completed including what, by whom, when, and how. The program must also include the resources required to complete the activities.*

## 2.0 Abbreviations

CLC: *Canada Labour Code Part II*

COHSR: Canada Occupational Health and Safety Regulations

CSA Z662-11: CSA Standard Z662 entitled *Oil and Gas Pipeline Systems*, 2011 version

Enbridge: Enbridge Pipelines Inc. and its NEB-regulated subsidiaries regulated by the NEB

IMP: Integrity Management program

NEB: National Energy Board

OPR: *National Energy Board Onshore Pipeline Regulations*

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### 3.0 Introduction: NEB Purpose and Audit Framework

The NEB's purpose is to promote safety and security, environmental protection, and efficient energy infrastructure and markets in the Canadian public interest within the mandate set by Parliament in the regulation of pipelines, energy development and trade. In order to assure that pipelines are designed, constructed, operated and abandoned in a manner that ensures: the safety and security of the public and the company's employees; safety of the pipeline and property; and protection of the environment, the Board has developed regulations requiring companies to establish and implement documented management systems applicable to specified technical management and protection programs. These management systems and programs must take into consideration all applicable requirements of the NEB Act and its associated regulations, as well as the *Canada Labour Code* (CLC). The Board's management system requirements are described within OPR, sections 6.1 through 6.6.

To evaluate compliance with its regulations, the Board audits the management system and programs of regulated companies. The Board requires each regulated company to demonstrate that they have established and implemented, adequate and effective methods for proactively identifying and managing hazards and risks.

As part of the audit, the Board reviews the compliance and incident history of the company as recorded in NEB files. This helps the Board determine the appropriate scope for the audit. During the audit, the Board reviews documentation and samples records provided by the company in its demonstration of compliance and interviews corporate and regionally-based staff.

The Board also conducts separate but linked technical inspections of a representative sample of company facilities. This enables the Board to evaluate the adequacy, effectiveness and implementation of the management system and programs. The Board bases the scope and location of the inspections on the needs of the audit. The inspections follow the Board's standard inspection processes and practices. Although they inform the audit, inspections are considered independent of the audit. If unsafe or non-compliant activities are identified during an inspection, they are actioned as set out by the Board's standard inspection and enforcement practices.

After completing its field activities, the Board develops and issues a Final Audit Report. The Final Audit Report outlines the Board's audit activities, provides evaluations of the company's management system and programs, identifies deficiencies and communicates compliance findings. The audit report follows the format of the Board's published Audit Protocol. Once the Board issues the Final Audit Report, the company must submit and implement a Corrective Action Plan to address all Non-Compliant findings. Final Audit Reports are published on the Board's website. The audit results are integrated into NEB's risk-informed lifecycle approach to compliance assurance.

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## 4.0 Background

Enbridge operates approximately 10,733 km of pipeline in six Canadian provinces and territories. These pipeline facilities include pump stations, tankage and associated operational assets. All of these facilities are within the definition of a “pipeline” as included in the NEB Act. Enbridge also has a considerable amount of non-federally regulated infrastructure in Alberta and across the United States, which complete its North American system. Enbridge’s system allows it to transport liquids from northern and western Canada to end-users in the Eastern regions of Canada and the United States. In order for Enbridge to operate its pipelines effectively, it has developed a management structure that reflects its safety and security management, and environmental obligations, as well as its corporate, national, regional and international needs. Enbridge Pipelines Inc. controls and uses several entities that hold NEB-issued certificates for operating in Canada. The entities included within the scope of this audit are identified in Section 5.0, Audit Objectives and Scope of this report.

During audit planning, company staff indicated that Enbridge and its subsidiaries operate the pipelines and facilities using a common management system and technical programs. In order to effectively evaluate compliance of such an expansive system within a reasonable timeframe, the Board chose to conduct individual, comprehensive audits of Enbridge’s required technical programs and management system. This report documents one of six management system and program audits. The audits are titled:

- *Enbridge Integrity Management Program Audit;*
- *Enbridge Safety Management Program Audit;*
- *Enbridge Environmental Protection Program Audit;*
- *Enbridge Emergency Management Program Audit;*
- *Enbridge Third-Party Crossings Program Audit; and*
- *Enbridge Public Awareness Program Audit.*

Audit results confirmed that Enbridge operates its facilities using a common organizational structure to implement a common governance management system that applies to all of its business and operational activities. Some findings are therefore similar in each audit and the individual audit reports reflect this.

## 5.0 Audit Objectives and Scope

The objective of the audit was to determine the establishment and implementation of Enbridge’s management system, and the adequacy and effectiveness of its Integrity Management program. Enbridge was audited against the requirements contained within the following:

- *National Energy Board Act;*
- *National Energy Board Onshore Pipeline Regulations; and*
- Enbridge’s policies, programs, practices and procedures.



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This audit was conducted using the *National Energy Board Onshore Pipeline Regulations (OPR)* as amended on 21 April 2013. This amendment clarified the Board's expectations for establishing and implementing a documented management system and integrity management program. Before issuing the amendment, the Board consulted and communicated with its regulated companies with respect to the new requirements; therefore, an implementation grace period was not given when the OPR was promulgated. As a result, when evaluating compliance, this audit did not consider any extra time Enbridge may have needed to implement changes.

Section 40 of the OPR indicates that regulated companies "shall develop, implement and maintain an integrity management program that anticipates, prevents, manages and mitigates conditions that could adversely affect safety or the environment during the design, construction, operation, maintenance or abandonment of a pipeline." However, the Board notes that construction and abandonment activities are usually regulated and managed through practices and programs developed and approved for each project or application. Using this audit to evaluate the application of the program and practices for managing activities that have not been fully described and approved would be neither efficient nor in the interest of Canadians. The Board has therefore not included construction and abandonment activities in the scope of this audit. The Board will evaluate these program requirements during separate Board compliance assurance activities.

As noted, Enbridge Pipelines Inc. companies hold a number of certificates to operate in Canada. The Board has included the following companies within the scope of this audit:

- Enbridge Pipelines Inc.;
- Enbridge Bakken Pipeline Company Inc. on behalf of Enbridge Bakken Pipeline Limited Partnership;
- Enbridge Southern Lights GP Inc. on behalf of Enbridge Southern Lights LP;
- Enbridge Pipelines (NW) Inc.; and
- Enbridge Pipelines (Westspur) Inc.

For more Enbridge facility information, refer to Appendix II of this report.

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## 6.0 Audit Process and Methodology

In undertaking this audit, the Board has applied its standard audit practice following its published protocols. The Board's standard practice and audit activities include:

- Formal notification of the Board's intent to audit by letter;
- Interactive planning processes with the company;
- Information gathering;
- Documentation and record review;
- Program presentations by company personnel and interviews with company personnel;
- Associated inspections and facility reviews;
- Close-out discussions and meetings;
- Developing and Issuing Draft Audit Report to Enbridge
- Developing, finalizing and issuing the Final Audit Report;
- Reviewing and approving any required Corrective Action Plans;
- Reviewing implementation of Corrective Action Plans; and
- Issuing closure letters.

These audit activities allow the company to demonstrate whether its management system and programs comply. They also allow the Board to evaluate the company with respect to: assuring compliance to regulatory requirements; and assuring appropriate safety, security and environmental outcomes as described in OPR, section 6.

As noted, Enbridge Pipelines Inc. operates an expansive liquids pipeline system using a common management system and Integrity Management program. Furthermore, Enbridge divides its Canadian assets into five operational regions: Northern Region, Western Region, Central Region, Southern Prairie Region and Eastern Region. The Board therefore developed its audit plan to evaluate Enbridge's management system and Integrity Management program and to assure that it was appropriate to manage and applied to all of its regulated facilities regardless of location. To this end, the Board conducted interviews, inspections and documentation and record reviews in each region as well as the Edmonton office. It is the Board's expectation that any audit Non-Compliant findings made and corrective actions required by the Board must be applied across all of Enbridge's Board regulated systems and subsidiaries.

## 7.0 Audit Activities

The Board informed Enbridge Pipelines Inc. of its intent to audit its NEB regulated facilities in a letter dated 19 December 2013. Following the issuance of that letter, Board audit staff met with Enbridge staff on a regular basis to arrange and coordinate this audit. The Board also provided Enbridge with an information guidance document to help Enbridge prepare for the audit, and provide access to documentation and records to demonstrate its compliance. Enbridge established a digital access portal for Board staff to review documentation and records.



On 5 May 2014, an opening meeting was conducted with representatives from Enbridge in Edmonton, Alberta to confirm the Board's audit objectives, scope and process. The opening meeting was followed by Edmonton office interviews from 5 to 16 May 2014, and various field level audit activities as described in the table below. Throughout the audit, Board audit staff gave Enbridge daily summaries with action items, where required.

On 21 and 22 October 2014, the Board held an audit pre-close-out meeting with Enbridge. At this meeting Board staff and Enbridge staff discussed potential deficiencies identified during field activities and discussed additional information that could be of value to the Board prior to compiling its draft audit report. An audit close-out meeting was held on 17 December 2014 to provide Enbridge with a description of the recommendations that staff would be bringing to the Board for decision.

<b>Integrity Management Program Audit Office and Field Activities</b>
<ul style="list-style-type: none"> <li>• Audit opening meeting (Edmonton, AB) – 5 May 2014</li> <li>• Edmonton office interviews (Edmonton, AB) – 5-28 May 2014</li> <li>• Field verification activities:               <ul style="list-style-type: none"> <li>• Interviews – Sherwood Park, AB – 29 May 2014</li> <li>• Interviews – Estevan, SK – 9-11 June 2014</li> <li>• Interviews – Regina, SK – 12 June 2014</li> <li>• Interviews – Sarnia, ON – 24-26 June 2014</li> <li>• Inspection – Ontario, ON – 15-17 July 2014                   <ul style="list-style-type: none"> <li>▪ Line 9 and Line 11 dig sites</li> <li>▪ Keyser Pump Station</li> <li>▪ Sarnia Terminal</li> </ul> </li> <li>• Inspection – Hardisty Area, AB – 28-30 July, 2014                   <ul style="list-style-type: none"> <li>▪ Line 3 and Line 4 dig sites</li> <li>▪ Kingman Pump Station</li> <li>▪ Strome Pump Station</li> </ul> </li> <li>• Inspection – Saskatchewan and Manitoba – 25-28 August, 2014                   <ul style="list-style-type: none"> <li>▪ Line 2 and Line 3 Dig sites</li> <li>▪ Kelso Valve site on Line 13</li> <li>▪ Rowatt and White City Pump Stations</li> <li>▪ Cromer Terminal</li> </ul> </li> </ul> </li> <li>• Edmonton office interviews (Edmonton, AB) – 14-17 October 2014</li> <li>• Audit pre-close-out meeting of information gaps (Edmonton, AB) – 21-22 October 2014</li> <li>• Audit close-out meeting (Edmonton, AB) – 17 December 2014</li> </ul>

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## 8.0 Management System Evaluation

OPR, section 6.1 outlines the Board's management system requirements as follows:

A company shall establish, implement and maintain a management system that

- (a) is systematic, explicit, comprehensive and proactive;
- (b) integrates the company's operational activities and technical systems with its management of human and financial resources to enable the company to meet its obligations under section 6;
- (c) applies to all the company's activities involving the design, construction, operation or abandonment of a pipeline and to the programs referred to in section 55;
- (d) ensures coordination between the programs referred to in section 55; and
- (e) corresponds to the size of the company, to the scope, nature and complexity of its activities and to the hazards and risks associated with those activities.

In assessing Enbridge's management system the Board applied the definitions and guidance as described in Section 1.0 Audit Terminology and Definitions of this report. The Board's audit results indicated that Enbridge was in the process of establishing and implementing a management system that reflects its commitment to applying a formal management structure to all of its regulated business operations. Enbridge has not limited its management system to the technical programs required by the Board. The company appeared to be committed to implementing a corporate management system and not merely an operations management system as many companies do.

Enbridge's records appeared to indicate that it started developing its management system after the Board's Integrity Management and Safety Management program audits in 2009 and prior to the Board's identification of its intended OPR changes.

Regardless of when Enbridge started its management system development, establishing a corporate management system applicable to all of its business and facilities is a large, complex undertaking. The Board's audit therefore identified that Enbridge's management system was in a transitory state between the program-based management practices it used in the past and its new management system approach.

In determining Enbridge's compliance with respect to establishing and implementing a management system, the Board reviewed the audit results of Enbridge's Integrity Management program processes along with the audit results of other Board program audits completed concurrently. This aided the Board in evaluating Enbridge's systematic practices and deficiencies.



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The Board found that Enbridge has not met the requirements for establishing and implementing a management system. For the most part, this reflected the transitory nature of its management system as applied to the Integrity Management program. The issues related to designing and establishing processes as described below and in Appendix I also contributed to the Board's Non-Compliant finding. This is especially true with respect to Enbridge's Quality Assurance Program and auditing process design.

The Board notes that it is important to understand that the Board's management system reflects the company's stage in developing and applying its management system. It does not necessarily reflect the lack of technical management activities being undertaken to ensure the safety of the pipeline.

The Board notes that, regardless of the reasons for non-compliance, companies were required to be compliant with the Board's management system requirements when the OPR was updated in 2013. Enbridge will need to develop and implement corrective actions to ensure establishment and implementation of its management system.

The Board has further detailed its evaluation below in order for Enbridge to understand the nature of the Board's management system finding to aid in development of its Corrective Action Plan.

The Board has found Enbridge Non-Compliant with OPR, section 6.1 (a).

This section requires management systems to be systematic, explicit, comprehensive and proactive. Enbridge's documentation that describes its governance management system requirements clearly stated that the company's management system is intended to meet these outcomes. The Board's audit determined that Enbridge's management system did meet the requirements for to being systematic, explicit, comprehensive and proactive at an over-arching, system design level. However, as described below, the design of its processes, interpretation of some of the OPR requirements, lack of clarity with respect to some of the specific requirements, such as OPR section 6.3(a) and (b) policies and goals and its definition of risks vs hazards, did not meet the OPR requirements. This resulted in the Board determining that the present management system processes will not ensure that the company's management system is systematic, explicit, comprehensive and proactive throughout all levels of the organization.

The Board found that Enbridge's governance processes for their management system aligned with most of the Board's process requirements by description. However, as described in Appendix I, there were issues associated with many of Enbridge's processes. Enbridge has not designed all of its processes in a way that ensures the OPR process requirements are consistently met at the management system and program level. For example, the Board found that many of the processes did not include clear links to or include tier 2 and 3 procedures where inclusion would ensure appropriate or consistent implementation of the processes at the program level. This has led to some of the company's processes being comprised of commitment statements rather than activity descriptions. Additionally, many of the company's documented processes lacked full descriptions of the input and output processes and the products associated with each

process. The Board found that Enbridge generally mitigated these process design deficiencies from an integrity management perspective; however, this was accomplished by program-level management practices and procedures. As well, Board documentation and record reviews and interviews with staff responsible for developing processes or programs indicated that many of the missing process components were actually being done by practice but have not been documented in Enbridge's management system processes.

As part of Enbridge's Corrective Action Plan to address its management system Non-Compliant finding, the Board is of the opinion that, Enbridge must develop and implement a compliant document control processes that meet OPR requirements for all new and existing documents in the company's management system. This will serve to assure that the management system processes are designed appropriately and that existing or referenced documents fully meet the OPR requirements.

In reviewing Non-Compliant findings across the programs being audited concurrently by the Board, it is noted that several of the Non-Compliant findings related to Enbridge's interpretation of OPR requirements. Enbridge provided specific information with respect to these interpretations during the audit. The Board notes that all regulations are subject to interpretation; however, many of Enbridge's interpretations in this category did not reflect the wording of the regulations or standard management system practices. Examples of Enbridge's interpretation issues can be found in the Board's evaluation of the company's quality assurance program, auditing, hazard identification and management of change processes, all of which are outlined in Appendix I of this document.

During its audit, the Board noted that Enbridge colour coded some process steps red in its governance process diagrams. According to the legend provided, red indicated that the process step should be considered aspirational. When interviewed, Enbridge staff indicated that aspirational refers to steps considered above regulatory requirements. The Board has given Enbridge and its regulated industry consistent information with respect to aspirational management practices. If a company identifies a practice as "above regulatory requirements, aspirational or stretch", the Board will not hold that company accountable for implementing the practice as per OPR, section 4. This is to allow and encourage companies to include aspirational goals or practices in their overall management practices without fear of non-compliance when aspirational goals are not met. The Board found that some of the process steps Enbridge identified as aspirational were actually legally required. Examples of this included steps for identifying and verifying competencies in Enbridge's IMS 01, 4.14 Workforce Competency and Qualification Process.

All of the comments above contribute to the Board's Non-Compliant finding with respect to OPR section 6.1(a).

Based on the information from Enbridge and interviews with its staff, the Board's audit did not identify any non-compliant issues related to OPR, sections 6.1(b) through (e).

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Based on the Board's evaluation of Enbridge's management system against the OPR requirements, the Board has determined that Enbridge is Non-Compliant with section 6.1. Enbridge will have to develop a Corrective Action Plan to address the described deficiencies.

## 9.0 Program Summary

NEB-regulated companies must demonstrate a proactive commitment to continual improvement in safety, security, and environmental protection. Pipeline companies under the Board's regulation are required to incorporate Integrity Management programs into their day-to-day operations. These programs must include the tools, technologies and actions needed to ensure that pipelines are safe and remain that way over time. Integrity Management programs enable pipeline companies to predict and prevent failures.

During the audit Enbridge indicated that the Board's required integrity management program requirements correspond to the company's Integrity Management System. The Board identified that Enbridge's Integrity Management System (IMS- 09) is one of 19 management systems included in Enbridge's Integrated Management System (IMS). Further review of Enbridge's IMS indicated that it is actually comprised of 17 subordinate management systems, governed by two governance management systems, IMS – 01, Governing Policies and Processes Management System and IMS – 02, Compliance and Ethics Management System. These governance management systems outline minimum corporate requirements to be incorporated into each subordinate management system of which IMS-09 is one. As noted previously in section 8.0 of this report, at the time of the audit the Board found that Enbridge has not yet established and implemented its required management system.

The Board has identified that primary responsibility for Enbridge's integrity management program resides within its Integrity Management department. This department is comprised of subject matter experts who are responsible for providing integrity leadership, promotion and direction in organizational activities through management system development and maintenance, stewardship, technical knowledge and support for Enbridge employees and contractors.

The Board identified that responsibility for implementation of the Integrity Management program resides with a number Enbridge's functional departments. The Board therefore considered the sum of the Integrity Management department and all other departments' integrity related responsibilities as comprising the Integrity Management program for the purposes of this audit.

Due to the transitory nature of Enbridge's corporate management system, the Board found that Enbridge's Integrity Management program framework was comprised of a mix of IMS processes and historically established and implemented processes and practices. It was noted during the audit that this transition has created gaps in continuity and consistency.



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The Board found that the processes presently used by Enbridge identified the majority, and most significant, of its hazards and that Enbridge has developed and implemented the operational controls and inspection and monitoring programs to address these hazards. The Board also found that Enbridge's Integrity Management program has been in existence for many years, thus the integrity related practices and procedures are well established within the organization. Notwithstanding these practices and procedures, the audit identified several non-compliant findings. The majority of the findings fall into three general categories:

- Non-compliances relating to management system process development;
- Non-compliances relating to Enbridge's interpretation of OPR requirements; and
- Non-compliances relating to technical content.

The Board has determined that no enforcement actions are immediately required to address the Non-Compliant findings identified in this audit. Within 30 days of the Final Audit Report being issued, Enbridge must develop and submit a Corrective Action Plan for Board approval detailing how it intends to resolve Non-Compliances identified by this audit. The Board will assess the implementation of the corrective actions to confirm that they are completed in an expedient manner, and on a system-wide basis. The Board will also continue to monitor the overall implementation and effectiveness of Enbridge's management system and Integrity Management program through targeted compliance verification activities as a part of its on-going regulatory mandate.

## **10.0 Non-compSummary of Audit Findings**

The Board's audit was conducted following its Audit Protocol, which identifies five Management System elements. These five elements are further broken down into 17 sub-elements. Each sub-element reflects a number of regulatory requirements. The NEB requires companies to be compliant with one hundred percent of the regulatory requirements of each of the Management System sub-elements being assessed. If a company's program is found to be deficient with respect to any regulatory requirement, the entire sub-element will be found in Non-Compliance. A Corrective Action Plan will be required in order to demonstrate to the Board that appropriate actions will be taken to achieve full compliance.

The following summary represents a high-level overview of the Board's audit findings for Enbridge's Integrity Management program based on information provided for the audit.

**Details of how each of the audited elements impacts the Integrity Management program and a full description of the Board's assessment for each of its Management System sub-elements can be found in Appendix I of this report.**

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## Element 1.0 – Policy and Commitment

### Sub-element 1.1 – Leadership and Accountability

This sub-element of the audit requirements states that the company must appoint an Accountable Officer and notify the Board of the appointment.

Enbridge had submitted a written notice to the NEB indicating that it had appointed an Accountable Officer. In its submission, Enbridge confirmed that its Accountable Officer had authority over the human and financial resources required to meet the Board's substantive expectations.

Based on the information provided by Enbridge, the Board has not identified any non-compliance issues. The Board has therefore assessed this sub-element as Compliant.

### Sub-element 1.2 – Policy and Commitment Statements

This sub-element of the audit requirements states that the company must have documented policies and goals to ensure the safety and security of the public, workers, and the pipeline and ensure protection of property and the environment. Further, as these policies and goals are to be used to establish and implement the management and programs, the Board requires that the policies and goals be explicit from the perspective of design, content and communication.

The Board found that Enbridge had corporate and program level policies and goals that related to the Integrity Management program.

Notwithstanding the many policies, processes, principles, programs and initiatives that Enbridge had developed to direct and support its integrity management program, the Board identified two areas of non-compliance in the Policy and Commitment Statements sub-element.

Enbridge did not demonstrate that it had a policy that explicitly describes internal reporting of hazards, potential hazards, incidents and near-misses and describes the conditions under which a person making a report will be granted immunity from disciplinary action.

Enbridge did not demonstrate that it had an explicit management system policy specific to the integrity management program as required by OPR, sections 6.3(1) and (2).

Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

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## Element 2.0 – Planning

### Sub-element 2.1 – Hazard Identification, Risk Assessment and Control

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for identifying and analyzing all hazards and potential hazards, assessing the degree of risk associated with the hazards, and implementing control measures to minimize or eliminate risk.

The Board found that Enbridge had developed program level processes, practices and programs for identifying the majority of its hazards as prescribed in CSA Z662-11 Annex H, Clause H 2.6, and ASME B31.8S. Enbridge had developed risk assessment and management programs to evaluate and manage and mitigate the risks associated with safety, health and the environment. The Board found that Enbridge's Liquid Pipelines (LP) Pipeline Integrity and Facilities Integrity each compile and maintain a list (Hazard and Risk Registers) of integrity related hazards (risks) which pose a potential risk/liability to the organization. Risk Registers include planned actions, status of planned actions, action owners and planned and actual completion dates for risks requiring action(s).

While Enbridge had implemented its hazard processes and procedures, the Board's audit of Enbridge's integrity management program identified two areas of non-compliance in the sub-element of hazard identification, risk assessment and control.

The Board found that, regardless of the practices implemented at the program level, Enbridge's management system processes did not meet the Board's OPR process requirements.

Additionally, the Board has found that Enbridge had not appropriately accounted for CSA-Z662-11 *Oil and Gas Pipeline Systems*. Specifically, Enbridge did not demonstrate that it had adequately identified the potential hazard associated with hydrogen sulfide in its transported crude. While Enbridge routinely monitors its crude for constituents to determine compliance with its General Terms and Conditions, including total sulfur content, Enbridge did not monitor for dissolved hydrogen sulfide gas. This is a non-compliance with the requirements of CSA Z662-11, clauses 16.2.1(b) and 9.10.1.5.

Based on the Board's evaluation of Enbridge's Management System and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies

### Sub-element 2.2 – Legal Requirements

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for identifying and monitoring compliance with all legal requirements applicable to the company. Also, the company must maintain a list of the legal requirements that apply to it.





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The Board found that Enbridge had developed management system and program level processes for identifying and monitoring its legal requirements. The management system level process included requirements for development of compliance registers at both levels. The Board found that Enbridge's management system level processes and compliance registers did not meet the OPR requirements with respect to design and content. Further, the Board was not provided with the required corporate (Master) compliance register during the audit.

At the program level, Enbridge provided copies of various procedures and practices for identifying, listing and monitoring of its legal requirements. Following the review of the provided documentation and records, the Board found that Enbridge had identified the majority of its legal requirements and had developed a legal list and was undertaking activities to monitor compliance with its legal requirements. The Board, however, also found that the level of detail and the process design were inadequate to meet the OPR requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

### Sub-element 2.3 - Goals, Objectives and Targets

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for developing and setting goals, objectives and specific targets for the risks and hazards associated with the company's facilities and activities.

At the management system and program levels the Board found that Enbridge had established and implemented a process that meets the Board's requirements for establishing goals, objectives, targets and performance measures.

The Board also found that , although Enbridge had established and implemented a process for developing and setting, goals, objectives and targets, Enbridge did not have an explicit policy for establishing goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries as required by OPR, section 6.3(1)(b). The Board found evidence that Enbridge had other strategic business planning documents that could be interpreted to meet these specific requirements; however, as noted, these practices did not meet the OPR requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.



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## Sub-element 2.4 – Organizational Structure, Roles and Responsibilities

This sub-element of the audit requirements states that the company must have a documented organizational structure that enables it to meet the requirements of its management system. The company must also complete an annual documented evaluation to demonstrate that there is adequate human resourcing to meet these obligations.

The Board found that Enbridge was meeting the Board's requirements with respect to organizational structure and roles and responsibilities.

The Board also found that Enbridge had developed and implemented mechanisms for evaluating the adequacy of its human resources required to meet its management system and integrity management program obligations. The Board, however, found deficiencies with Enbridge's evaluation of need practices. Specifically, Enbridge did not appropriately account for staff outside of its Integrity Management department in evaluating the resourcing requirements for its integrity management program nor did it sufficiently account for resources required to develop and implement its management system.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

## Element 3.0 – Implementation

### Sub-element 3.1 – Operational Control-Normal Operations

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for developing and implementing corrective, mitigative, preventive and protective controls for the hazards and risks identified in Elements 2.0 and 3.0. This sub-element also states that the company must have an established, implemented and effective process for coordinating, controlling and managing the operational activities of employees and other people working with or on behalf of the company.

The Board found that Enbridge had developed and implemented programs to control (prevent, manage and mitigate) the majority, and most significant, of its integrity management hazards and risks

The Board also found two issues related to the development and implementation of Enbridge's mitigation programs. The Board found that, at the time of the audit, Enbridge's Geohazard Management Program was in development. Enbridge acknowledged status of this program. Additionally the Board found that Enbridge did not have a program to manage the threat of seismic activity and was developing a program to address the issue. As these issues relate to specific requirement of CSA Z662-11, they are found to be non-compliances.

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Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

### Sub-element 3.2 - Operational Control-Upset or Abnormal Operating Conditions

This sub-element of the audit requirements states that the company must establish and maintain plans to identify the potential for upset or abnormal operating conditions, accidental releases, incidents and emergency situations. This sub-element also included requirements for companies to establish and implement a process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.

The Board found that Enbridge demonstrated that it had developed plans to address the abnormal operating conditions identified within its integrity management program.

The Board also found that Enbridge does not have a management system process for developing contingency plans that meets the requirements of the OPR.

Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

### Sub-element 3.3 - Management of Change

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for identifying and managing any change that could affect safety, security or protection of the environment.

The Board found that, at the program level, Enbridge had implemented a number of practices for management of change applicable to its integrity management program. Additionally, the Board found that the program level processes did not meet all of the OPR requirements with respect to applicability and design.

The Board also found that Enbridge's management system level management of change process did not meet the OPR requirements with respect to design, content and establishment and implementation.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

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### Sub-element 3.4 - Training, Competence and Evaluation

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for developing competency requirements and training programs for its employees and contractors. These competency requirements and training programs must enable employees and contractors to perform their duties in a manner that is safe, ensures the security of the pipeline, and protects the environment.

The Board found that Enbridge had established and implemented a training program for its employees and contractors. The Board also found that, while Enbridge had implemented some practices for reviewing the competencies of its workers, it had not established and implemented processes consistent with the requirements of OPR.

The Board notes that it brought this deficiency to Enbridge's attention early in its audit process as a matter requiring urgent attention. Enbridge responded by developing a documented process that it provided to the Board's auditors prior to the close-out of the field activities. Due to the early stage of development and implementation, Enbridge could not demonstrate the adequacy, effectiveness, establishment and implementation of the new process.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

### Sub-element 3.5 - Communication

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for internally and externally communicating safety, security and environmental protection information.

The Board found that Enbridge was undertaking a high number of internal and external communication activities as part of its integrity management program activities.

At the program level, the Board found that Enbridge had developed a communication, participation and engagement process that lists a variety of methods that it uses to communicate integrity related information and issues internally and externally.

The Board also found that, although Enbridge had several initiatives and programs that provide for external and internal communication of information related to safety, security and environmental protection, Enbridge did not demonstrate a documented communication process that meets the OPR requirements. Enbridge's management system was limited to requiring the development of departmental communications plans. The Board found that Enbridge had not developed the required communication plan. This is a non-compliance with the OPR and CSA Z662-11 3.1.2 (d).

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Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies

### Sub-element 3.6 – Documentation and Document Control

This sub-element of the audit requirements states that the company must have an established, implemented and effective process for identifying and managing the documents required to meet the company's obligations for conducting activities in a manner that ensures the safety and security of the public, company employees and the pipeline, and that protects property and the environment.

At the program level, the Board found that Enbridge had procedures to prepare, review, revise and control documents for its integrity management program.

The Board also found that Enbridge did not demonstrate that it had implemented a process for identifying the documents required for the company to meet its obligations under section 6 and as required by OPR, section 6.5(1)(n). Enbridge was also unable to demonstrate that it had a process for preparing, reviewing, revising and controlling the documents required by OPR, section 6.5(1)(o).

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

### Element 4.0 – Checking and Corrective Action

#### Sub-element 4.1 – Inspection, Measurement and Monitoring

This sub-element of the audit requirements states that the company must establish and implement an effective process for inspecting and monitoring its activities and facilities. This is so that the company can evaluate the adequacy and effectiveness of the protection programs and take corrective and preventive actions if deficiencies are identified.

The audit sub-element also requires the company to have an effective process for:

- Evaluating the adequacy and effectiveness of the company's management system;
- Monitoring, measuring and documenting the company's performance in meeting its obligations; and
- Using an effective data management system to monitor and analyze the trends in hazards, incidents and near-misses.

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The Board found that, at the program level, Enbridge's Pipeline Integrity department had processes for inspecting, conducting surveillance and monitoring activities to evaluate the adequacy and effectiveness of the company's protection programs. Further, the Board found that Enbridge had implemented surveillance and condition monitoring activities through various programs that detect the presence of threats, monitor threat progression, and reduce or eliminate the threats or hazards at their source. The company used various techniques to monitor its system, verify pipeline and facility integrity, and confirm that its prevention mechanisms are effective.

The Board found that, while Enbridge was undertaking many of the activities that would normally be undertaken as part of surveillance and monitoring program, it had not developed or implemented them in a manner that meets the Board's program requirements.

The Board found that, while Enbridge's procedures and training programs for aerial ROW patrols include the requirement for observing the conditions and activities set out in CSA Z662-11, the company's patrol reports did not include requirements to develop records that demonstrate verification that each required condition and activity was surveyed or assessed during the ROW patrols. As such, Enbridge did not demonstrate that its aerial surveillance programs comply with the requirements of OPR and CSA Z662-11.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

#### Sub-element 4.2 - Investigating and Reporting Incidents and Near-Misses

This sub-element of the audit requirements states that the company must establish and implement an effective process for reporting hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions to address them. This includes investigating if the hazards, potential hazards, incidents and near-misses have or could have resulted in the safety and security of the public, employees and the pipeline, and protection of property and the environment. This sub-element also requires a company to have an established, maintained and effective data management system for monitoring and analyzing the trends in hazards, incidents and near-misses.

The Board found that Enbridge had developed and implemented the processes and procedures at the program level for documenting and investigating events that include hazards, incidents and near-misses and for taking corrective and preventive actions, including steps to manage imminent hazards.

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The Board also found that, at the governance level, Enbridge's IMS-01, section 4.10 Event Investigation Processes, dated 11-December 2013 had been documented and included in its Governing Policies and Processes Management System manual and that key activities were being implemented within its programs. These processes were, however, identified as "In Progress" and therefore not established and implemented.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

#### Sub-element 4.3 - Internal Audit

This sub-element of the audit requirements states that a company must establish and implement an effective quality assurance program for its management system and for each protection program, including a process for conducting regular inspections and audits and for taking corrective and preventive actions if deficiencies are identified.

The Board found that Enbridge was undertaking many of the activities that are normally associated with quality assurance program. The Board found, however, that Enbridge had not organized them within a program as required by the OPR.

With respect to developing a process for conducting audits as required by OPR section 53, Enbridge indicated that it used a number of different methods used in combination to meet these requirements. Upon reviewing the individual processes and practices the Board found that they do not meet the OPR requirements by design and practice. The Board also found that Enbridge was not able to demonstrate that it has undertaken audits consistent with the OPR requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

#### Sub-element 4.4 – Records Management

This sub-element states that a company must establish and implement an effective process for generating, retaining, and maintaining records that document the implementation of the management system and its protection programs.

The Board found that, at the program level Enbridge had established and implemented processes for the generation, retention and maintenance of records related to the implementation of its Integrity Management program.

The Board also found that, at the management system level, Enbridge had not established and implemented a process that meets the requirements of the OPR.

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Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

#### Element 5.0 – Management Review

##### Sub-element 5.1 - Management Review

This sub-element states that a company must establish and implement an effective process for conducting an annual management review of the management system and each protection program and for ensuring continual improvement in meeting the company's obligations. This sub-element also requires a company to complete an annual report for the previous calendar year, signed by the accountable officer, describing the performance of the company's management system in meeting its obligations.

The Board found that Enbridge had established and implemented processes to address the stated requirements and had undertaken the activities associated with its processes. The Board also found, however, that Enbridge's processes did not fully meet all of the OPR requirements. As a result the management reviews completed by Enbridge were also found to be non-compliant.

Additionally, the Board found that some of the Non-Compliant findings made in this audit fall within the responsibility and accountability of Enbridge's senior management. These relate to direction, management and oversight and, as such, have contributed to the Non-compliant finding for this element.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

## **11.0 Conclusions**

Companies regulated by the NEB must demonstrate a proactive commitment to continual improvement in safety, security and environmental protection. Pipeline companies under the Board's regulation must establish and implement effective management systems and Integrity Management programs in their day-to-day operations. This includes the tools, technologies and actions needed to ensure pipelines are safe and remain that way over time. An Integrity Management program enables the pipeline companies to predict and prevent failures.

During this audit Enbridge was required to demonstrate the adequacy and effectiveness of its management system and Integrity Management program to the Board. The Board reviewed documentation and records provided by Enbridge, conducted inspections and interviewed Enbridge staff.



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Based on its review, the Board found that Enbridge was in a transitory period in terms of establishing and implementing its management system. Additionally, the Board found that some of Enbridge's management system processes were not designed or established and implemented in a manner that allowed its management system to meet the requirements of OPR section 6.1. Consequently, the Board has found that Enbridge's management system is Non-Compliant.

The Board has found that Enbridge's Integrity Management program also reflected the transitory nature of Enbridge's management system and process issues as noted. The Board found, however, and most importantly, that, regardless of the design and implementation status of its management system, Enbridge's Integrity Management program and the processes and practices being used, identified and controlled the majority and most significant of the company's hazards and risks. Enbridge's Integrity Management System is closely aligned with the OPR requirements at the program level.

In analyzing Enbridge's Non-Compliant findings the Board has found that most of them fall into three general categories:

- Non-compliances relating to management system process development;
- Non-compliances relating to Enbridge's interpretation of OPR requirements; and
- Non-compliances relating to technical content

The Board notes that the majority of all of the Non-Compliant findings made by the Board relate to management system process development.

The Board has determined that while no enforcement actions are immediately required to address these non-compliant findings, as per the Board's standard audit practice, Enbridge must develop and submit a corrective action plan describing its proposed methods to resolve the non-compliances identified and the timeline in which corrective actions will be completed. Enbridge will be required to submit its corrective action plan for approval within 30 days of the final Audit Report being issued by the Board.

The Board will assess the implementation of all of Enbridge's corrective actions to confirm they are completed in a timely manner and on a system wide basis until they are fully implemented. The Board will also continue to monitor the overall implementation and effectiveness of Enbridge's Integrity Management program and management system as a whole through targeted compliance verification activities as a part of its ongoing regulatory mandate.

The Board will make its final Audit Report and Enbridge's approved corrective action plan public on the Board's website.

## APPENDIX I:

### INTEGRITY MANAGEMENT PROGRAM AUDIT EVALUATION TABLE<sup>1</sup>

#### 1.0 POLICY AND COMMITMENT

##### 1.1 Leadership Accountability

**Expectations:** The company shall have an accountable officer appointed who has the appropriate authority over the company's human and financial resources required to establish, implement and maintain its management system and protection programs, and to ensure that the company meets its obligations for safety, security and protection of the environment. The company shall have notified the Audit Team of the identity of the accountable officer within 30 days of the appointment and ensure that the accountable officer submits a signed statement to the Audit Team accepting the responsibilities of their position.

##### References:

OPR section 6.2

##### Assessment:

###### Accountable Officer

The Board requires the company to appoint an accountable officer. The accountable officer must be given appropriate authority over the company's human and financial resources for ensuring that the company meets its obligations for safety, security and protection of the environment.

On 31 March 2014, Enbridge submitted written notice to the Board indicating that its President, Guy Jarvis, had been appointed as the accountable officer for Enbridge Pipelines Inc. and all of its subsidiaries regulated by the Board. In its submission, Enbridge confirmed that it's accountable officer has the authority over the human and financial resources required to meet the Board's substantive expectations.

###### Summary

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has not found any issues of Non-Compliance. The Board has determined that Enbridge is Compliant with this sub-element.

**Compliance Status: Compliant**

## 1.2 Policy and Commitment Statements

**Expectations:** The company shall have documented policies and goals intended to ensure activities are conducted in a manner that ensures the safety and security of the public, workers, the pipeline, and protection of property and the environment. The company shall base its management system and protection programs on those policies and goals. The company shall include goals for the prevention of ruptures, liquids and gas releases, fatalities and injuries and for the response to incidents and emergency situations.

The company shall have a policy for the internal reporting of hazards, potential hazards, incidents and near-misses that includes the conditions under which a person who makes a report will be granted immunity from disciplinary action.

The company's accountable officer shall prepare a policy statement that sets out the company's commitment to these policies and goals and shall communicate that statement to the company's employees.

### References:

OPR section 6.3

### Assessment:

#### Governance Level Policies and Goals and Commitment Statement

The Board requires the company to document its policies and goals for ensuring its activities are conducted in a manner that ensures the safety and security of the public, workers and pipeline, and the protection of property and the environment.

The NEB OPR does not include any specific management system process requirements for developing policies and goals. However, Enbridge has established clear management system guidance with respect to its process for developing policies and goals. At a governance level, Enbridge's IMS-01, *Governance Documentation* outlines the company's expectations for documenting key corporate policies, such as the *Strategic and Business Planning Processes*. The *Governance Documentation* also explains the company's "Planning Cascade" and associated documentation. This Planning Cascade document explains how the company links its policies and corporate vision to its performance targets and metrics. The practices described within the *Governance Documentation* process align with the Board's requirements for establishing policies, goals, objectives, targets and performance measures. While not an absolute alignment between the Board's requirements and Enbridge's internal processes it does reflect integration of the Board's requirements into Enbridge's business management practices.

*(Note: While “goals” are included in this sub-element’s description, for clarity and organization, the review of goals is documented in sub-element 2.3 Goals, Objectives, Targets, below)*

### Governance Policy

Enbridge’s IMS-01, section 4.2.1, *Strategy and Objectives Development Process* describes the company’s process for establishing objectives, setting targets, and maintaining a dashboard of scorecard metrics. The executive management team uses the *Strategy and Objectives Development Process* to direct department priorities and activities. Section 4.3.2, *Scorecard* and section 4.3.4, *Dashboard Reporting Process* define the departmental processes for monitoring and measuring its performance against the Liquids Pipelines Business Plan and Enbridge targets.

### Governance Commitment Statement

With respect to the OPR requirements relating to developing “a policy statement that sets out the company’s commitment to these policies and goals and shall communicate that statement to the company’s employees”, the Board identified that Enbridge’s IMS-01 included a compliant statement signed by the company’s Accountable Officer. The Board noted that this statement had not been updated in the documents it received at the time of the audit. The Board notes, however, that the documents were provided to the Board before the company notified the Board of its new Accountable Officer. Therefore, the Board will not be making a Non- Compliant finding based on this lack of endorsement.

*(Note: During its audit the Board noted that Enbridge’s Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the “program” level follows.)*

### Integrity Management Program Policy and Commitment Review

At the department level, Enbridge’s IMS-09 section 2.0, *Policy* is comprised of one sentence which states that “*This management system is guided by the governing Policies set out in IMS-01 (Section 3) and is designed to anchor Safety Management and Operational Reliability expectations for all business functions.*”

Enbridge’s *Integrity Principles* describe the fundamental values in how it manages its Integrity Management program. Although implied by the *Integrity Principles*, Enbridge does not clearly state its goals for preventing ruptures, liquid and gas releases, fatalities and injuries. It also does not clearly state its goals for responding to incidents and emergency situations.

According to OPR, section 6.3(1)(a), this policy must also describe the conditions under which a person making a report will be granted immunity from disciplinary action. Enbridge policies indicate that persons will be granted immunity from disciplinary action, depending on the situation. However, the company's policies do not make this explicit. Also, immunity from disciplinary action is not integrated into the policy for internal reporting of hazards, potential hazards, incidents and near-misses as specifically required.

At the governance level, IMS-01, section 1.2.4, *Compliance Assurance* Enbridge states that “*management will ...provide an open and confidential method for the Workforces to report non-compliant, unethical, or unlawful behavior, without fear of retaliation.*” This statement does not specifically say that members of its workforce will be granted immunity from disciplinary action when internally reporting hazards, potential hazards, incidents and near-misses.

IMS-02, section 1.4.1, *Leadership and Management Responsibility* states that “*Management will create a positive and frank atmosphere to encourage timely reporting, discussion, and resolution of Events and ethical concerns. They will strongly encourage and support the Workforce to report compliance and ethical issues to their supervisors, management, Human Resources, Compliance OPC, the ECO, or via the Enbridge Ethics and Conduct Hotline. Management will be accountable to understand and apply the no retaliation policy within their span of control over the Workforce that report to them.*” While this statement largely meets the requirements of 6.3(1)(a), it does not guarantee all members of Enbridge's workforce immunity from discipline at all levels of management within the organization.

Enbridge has developed and posted compliance policy statements on its intranet site including its *Statement on Business Conduct* signed by the President and CEO, dated October 2012. Both the *Integrated Management Policy* and *Risk Management Policy* have been signed by the company's president of Liquids Pipelines and Major Projects. The company's commitment to following its policies and achieving its goals is communicated to the company's employees through the various means discussed in Sub-element 3.5 *Communication* in this audit report.

### Summary

The Board found that Enbridge has developed many policies, processes, principles, programs and to guide and support its Integrity Management program.

The Board also found the following areas of non-compliance in the Policy and Commitment Statements sub-element:

- Enbridge did not demonstrate that it has a policy that explicitly describes internal reporting of hazards, potential hazards, incidents and near-misses as required by OPR, section 6.3(1)(a);

- Enbridge did not demonstrate that its policies include the conditions under which a person who reports a hazard, potential hazard, incident or near-miss will be granted immunity from disciplinary action as required by OPR, section 6.3(1)(a); and
- Enbridge did not demonstrate that it has a management system policy for its Integrity Management program that meets the requirements of OPR, section 6.3(1) and (2).

Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 2.0 PLANNING

### 2.1 Hazard Identification, Risk Assessment and Control<sup>1</sup>

**Expectations:** The company shall have an established, implemented and effective process for identifying and analyzing all hazards and potential hazards. The company shall establish and maintain an inventory of hazards and potential hazards. The company shall have an established, implemented and effective process for evaluating the risks associated with these hazards, including the risks related to normal and abnormal operating conditions. As part of its formal risk assessment, a company shall keep records to demonstrate the implementation of the hazard identification and risk assessment processes.

The company shall have an established, implemented and effective process for the internal reporting of hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions, including the steps to manage imminent hazards. The company shall have and maintain a data management system for monitoring and analyzing the trends in hazards, incidents, and near-misses.

The company shall have an established, implemented and effective process for developing and implementing controls to prevent, manage and mitigate the identified hazards and risks. The company shall communicate those controls to anyone exposed to the risks.

#### References:

OPR sections 4(2), 6.5(1)(c),(d),(e),(f),(r),(s),39, 40 and 41

CSA Z662-11, Clauses 3.1.2(f), 3.2(a), 3.2(b), 10.5.1.1(d) and 16.2

#### Assessment:

##### Governance Level Hazards and Potential Hazards Identification

At a governance level, Enbridge's IMS-01, section 4.3, *Risk Management Process* describes the company's process for identifying hazards, assessing risks and developing and implementing controls. The process includes written descriptions and the steps required for identifying hazards, assessing

<sup>1</sup> Hazard: Source or situation with a potential for harm in terms of injury, ill health, damage to property, damage to workplace and environment, or a combination of these. Risk: Combination of the likelihood and consequence(s) of a specified hazardous event occurring.

risks, planning risk responses, monitoring, reviewing and reporting risks. At a high level, the risk management steps identified in Enbridge's *Risk Management Process* correspond to the legal requirements of this sub-element. However, in its review of this process, the Board noted deficiencies in the design and implementation of this process.

Enbridge's *Risk Management Process* outlines broad, inter-related requirements and commitments; however, it does not meet the Board's process requirements as outlined in Section 1.0 Audit Terminology and Definitions of the Board's attached Audit Report.

#### Governance: Hazard vs Risk

In the governance *Risk Management Process* and related practices, Enbridge uses the terms "risk" and "hazard" interchangeably; this is inconsistent with the Canada Labour Code and the OPR and common practice definition or use of the terms. The Board has provided the following definition of hazard and risk in the past. Hazard: Source or situation with a potential for harm in terms of injury, ill health, damage to property, damage to workplace and environment, or a combination of these. Risk: Combination of the likelihood and consequence(s) of a specified hazardous event occurring.

Although the Board reviewed Enbridge's program with this terminology issue in mind, the discrepancy has led to some gaps being identified in the overall Risk Management Process.

#### Governance Hazards Inventory

Enbridge's governance Risk Management Process requires that each sub-ordinate management system develop risk registers which is non-compliant with the requirements of OPR both in name and intent. The Board requires companies to develop an inventory of identified hazards and potential hazards.

#### Governance Risk Evaluation

Enbridge's governance Risk Management Process includes a risk evaluation practice within it. The Board reviewed Enbridge's Risk Evaluation practice. The method used to evaluate the risk of hazards (Enbridge – risks) was fully developed and appropriate if it was implemented as designed. The Board's audit also assessed the implementation of the risk evaluation process. This assessment determined that, while it was being implemented consistently across all of Enbridge's programs, it was being utilized in a manner inconsistent with OPR requirements. Through interviews and



document and record reviews, it was determined that Enbridge was implementing a practice whereby it applies the risk evaluation process to risks (hazards) taking into consideration the controls that may apply to the risk prior to the assessment. The result of this practice would be the identification of “residual” risk and assumes that the controls are directly applicable and appropriate to the hazard and that the control is being implemented fully on a consistent basis. The OPR process indicates that the risk evaluation should be applied directly to the hazard. This will determine “inherent” risk. This allows companies to fully identify the significance of the hazard and appropriately communicate, establish and implement controls and monitor it as required in the OPR.

In evaluating the establishment and implementation of the Enbridge’s Risk Management Process, the Risk Management Process Map provided in IMS-01 section 4.3, was noted to contain process steps that were colour-coded red and yellow. According to Enbridge, yellow colour coding indicates that the activities required to execute the process step are not adequately documented or not fully implemented in a consistent manner. Red colour coding indicates that the process step is aspirational and is not being executed by the organization. Several process steps within the Risk Management Process Map were colour coded red yet are regulated requirements within the overall Risk Management Process. For example, process step 16 – “identify, assess and prioritize risks” is a process step that is required to meet the requirements of OPR section 6.5(1)(e.). The Board has previously communicated that it recognizes aspirational practices as part of sound continual improvement practices. If a company clearly demonstrates that its practices are above the legal requirements and proactively communicates them as such within its overall programs, the Board will not find them non-compliant with OPR section 4.

#### Governance Developing and Implementing Controls

The Board also reviewed Enbridge’s governance process for developing and implementing controls to prevent, manage and mitigate the identified hazards and risks. The Board found that Enbridge’s process did not meet the Board’s requirements with respect to the design of a process. As well, the Board was unable to see evidence of clear requirements and directions for considering and applying the hierarchy of controls when developing controls.

*(Note: During its audit the Board noted that Enbridge’s Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the “program” level follows.)*

#### Integrity Management Hazard Identification, Risk Assessment and Control

#### Identification of Hazards and Potential Hazards

The Board found that the processes for identification and analysis of hazards and potential hazards are established and implemented at the Departmental level.

### Pipeline Hazards

At the departmental level, Enbridge's Pipeline Integrity management system (IMS-09, Section 4.5.2) includes programs, plans and procedures for identifying, analyzing, and managing hazards and potential hazards. Enbridge has developed programs for identifying most of the hazards prescribed in CSA Z662-11 Annex H, Clause H2.6, and ASME B31.8S, and has identified specific hazards that are considered to be threats to the integrity of its system. Enbridge has also developed additional programs for identifying hazards that present specific threats to its pipeline such as: the pressure cycling program, inline inspection uncertainty reviews, and internal stress corrosion cracking (specific to Line 21).

In reviewing the documents and records provided by Enbridge, the Board did identify one issue with respect to Enbridge's hazard identification program. The Board found that it has not included hydrogen sulfide (H<sub>2</sub>S) gas as hazard or potential hazard. Although Enbridge provided background information challenging the requirements within CSA Z662-11 Section 16, the information does not provide adequate reasoning as to why H<sub>2</sub>S should not be considered a hazard or potential hazard. The Board notes that CSA Z662-11 requires a company to have a program to sample and analyze hydrogen sulfide (H<sub>2</sub>S) gas in its crude. While Enbridge routinely monitors its crude for constituents to determine compliance with its General Terms and Conditions, including total sulfur content, Enbridge does not monitor for dissolved H<sub>2</sub>S. Although Enbridge's pipeline system does not normally contain a gas phase, H<sub>2</sub>S gas may be present in Enbridge's pipeline and facilities particularly during slack flow conditions, downstream of pressure reduction valves, and in dead-legs. In the absence of a program to sample and analyze H<sub>2</sub>S in its crude oil, or a documented engineering assessment, or ANSI/NACE MR0175/ISO 15156-2, Annex C, to assess the hazard or potential hazard of H<sub>2</sub>S, Enbridge has not demonstrated that it complies with CSA Z662-11, Clause 9.10.1.5, and CSA Z662-11, Clause 16.2.1(b).

The corrective action plan developed with respect to this sub-element associated with H<sub>2</sub>S as a potential hazard must explicitly include any resultant changes to other management system processes and requirements that may be required. Examples of these changes include, but are not limited to, changes to Hazard and Risk Registers, lists of legal requirements and the hazard management processes.

### Facility Hazards

Enbridge's procedure FI-01, Facilities Integrity Identification of Hazards and Threats outlines its processes identifying all hazards and potential

hazards to its facility assets. The company assigns appropriate functional groups within its organization to address the hazards identified. The Facilities Integrity group develops programs for preventing, mitigating and inspecting time dependent damage mechanisms (hazards) in its tanks, piping and piping components that contain shipped products.

Enbridge also identifies hazards through right-of-way (ROW) monitoring, field operations, control centre operations, using inline inspection contractors, and the processes entailed in designing new construction and acquiring assets. Although these sources of hazard identification are not within Enbridge's Integrity Management Program, they do support Enbridge's hazard identification programs.

Based on the information provided during the audit, the Board did not identify any issues associated with this area.

### Inventory of Hazards and Potential Hazards

Enbridge Liquid Pipelines (LP), Pipeline Integrity and Facilities Integrity departments at Enbridge each maintain a list of hazards and potential hazards that pose a potential risk to the organization. These inventories of hazards and potential hazards are maintained within what Enbridge refers to as its IMP Hazard and Risk Registers. The IMP Hazard and Risk Registers identify hazards and potential hazards, potential consequences, controls, risk rating, planned actions, status of planned actions, action owners, and planned and actual completion dates for risks that require action. Enbridge's Hazard and Risk Registers demonstrate that Enbridge has established and maintained an inventory of identified hazards and potential hazards, as required.

### Evaluation of Risk

The Board identified that, at the departmental level, Enbridge has developed specific IMS-09 requirements to address IMP risk management requirements. Enbridge indicated that its departmental processes are based on and linked with the Risk Management Process in IMS-01. Enbridge's processes included analysis of information gathered in the risk identification stage to understand what the risks were and to evaluate any potential controls used to mitigate the risks to an acceptable level. The company practices incorporated the use of a risk matrix (Heat Map) to identify and categorize risks into four groupings. Enbridge presented evidence that demonstrated it had set its acceptable risk tolerance as Level II (Medium Risk). According to the information provided by Enbridge, risk response plans are required to be developed for Level III and Level IV risks to reduce the risks to acceptable levels (Level II or below). Further, Enbridge demonstrated it had developed and utilized a Risk Exposure Index (REI)

to show the relative number of risks that exceed Enbridge's established risk tolerance level. The REI allowed Enbridge to compare and manage risks departments. During the audit Enbridge demonstrated that it was updating its risk index models to move from primarily qualitative to more quantitative practices. Review of the information provided to demonstrate the improvements indicated that the (two) processes that observed to be in development are the Mainline Risk Assessment model and the Facilities Risk Model.

#### Records to Demonstrate Hazard Identification and Risk Assessment Process

The Board was provided information indicating that, at a minimum, Enbridge monitors its risks quarterly and at the end of each year. Further documentation and record review indicated that process owners or project managers are responsible for monitoring risks within processes or projects and that the Enbridge Management Team monitored the risks documented within the Risk Registers to ensure that corrective actions and mitigation plans were being completed as scheduled. Further, it was noted that Enbridge's Compliance department conducted quarterly and annual reviews on behalf of the executive management team to confirm that risks were being effectively mitigated.

Documentation indicated that the Enbridge Liquids Pipelines Risk Management group is responsible for internal reporting of hazards and potential hazards through the annual Liquids Pipelines Risk Report, the Corporate Risk Assessment and the quarterly Operational Risk Management Report. These reports were supported by the data in the risk registers and the Risk Exposure Index. Enbridge posted this information on its intranet.

#### Reporting Hazards, Potential Hazards, Incidents and Near-misses

Enbridge's process for internally reporting risks on an annual basis is outlined in IMS-01 and associated process documents. The Risk Management department compiles information and generates risk reports including the annual Liquid Pipelines Risk Report, the Corporate Risk Assessment and the quarterly Operational Risk Management report. Department risk registers track the proposed corrective and preventative actions. The Risk Management department is responsible for internal reporting of hazards and potential hazards at a governance level.

Hazards, potential hazards and threats identified through aerial and land-based ROW inspections are communicated immediately to Enbridge Operations personnel followed by daily reports to Enbridge Operations that summarize all hazards and threats. Employees can access these reports on a database.

As a member of One-Call systems in each province, reports of hazards, potential hazards and threats (including potential third-party strikes) are provided to key Enbridge personnel for immediate action and mitigation. Hazards and potential hazards related to integrity are communicated to the Pipeline Integrity department and Field Operations. All leaks are reported through Enbridge's online Leak Reporting System which is accessible by all employees. The Leak Reporting System automatically disseminates reports to key personnel.

### Monitoring and Analyzing Trends

Enbridge uses its data management system for monitoring and analyzing trends in hazards, incidents, and near-misses. The company monitors the failure mechanisms and failure rates for its mainline system on a per-km per-yr basis. Enbridge defines a failure as an undesired event that results in any loss of containment. Enbridge's Event Learning Process which includes hazards, incidents and near-misses, documents and manages corrective and preventive actions. The Event Learning Process provides procedures for documenting and investigating events, developing and completing corrective action plans, and documenting learnings. Enbridge provides the records and resources that support the Event Learning Process to its employees on the Pipeline Integrity SharePoint site.

To facilitate change in response to the analysis of trends in hazards, incidents, and near-misses, Enbridge's Leak Reduction Team monitors and analyzes causes of systemic leaks, and makes recommendations for system-wide initiatives for reducing leaks on the Liquid Pipelines system. To capture a wide range of experience and knowledge, this team is comprised of personnel from several functional areas with roles in leak reduction.

### Developing and Implementing Controls

The Pipeline Integrity department is responsible for identifying, assessing and managing threats to the pipeline system. By common integrity management practice, "threats" align with the Boards "hazards" requirements. IMS-09, section 4.5 describes the processes, activities and decisions for developing and implementing controls to prevent, manage and mitigate the identified threats/hazards and risks. Based on its interviews and documents review, the Board noted that these processes include practices and procedures for developing and implementing controls, as well as mitigation strategies for preventing, managing and mitigating hazards and risks.

The Board has found that, although Enbridge did not demonstrate that it has a process to identify, assess and manage hazards (threats) to the pipeline system at a governance level, based on the information reviewed and interviews conducted, Enbridge has demonstrated that it has developed and implemented programs at a Department level which meet the requirements of OPR section 6.5(1)(f).

## Communication of Controls

Enbridge communicates its controls to prevent, manage and mitigate the identified hazards and risks through various means. Enbridge's Risk Management department is responsible for the processes used to communicate controls to anyone exposed to the risks. This department compiles Enbridge's risks and information on the status of these risks in the annual Liquid Pipelines Risk Report, the Corporate Risk Assessment and the quarterly Operational Risk Management Report. The Operational Risk Management Plan communicates progress in managing or mitigating operational hazards and risks to senior management. Enbridge also communicates controls through signage, tailgate meetings, safety meetings, in its procedures and manuals and through safety bulletins. Further, Enbridge's Hazard and Risk Registers provide a summary of controls implemented, and planned to be implemented, to manage and mitigate hazards and risks. These registers are communicated to Enbridge personnel via its intranet. An overall assessment of Enbridge's compliance with the OPR management system communication process requirements is included in sub-element 3.5.

### Summary

The Board found that, at a program level, Enbridge had established practices and processes for identifying and managing the majority and most significant of its hazards and potential hazards.

The Board also found that Enbridge did not demonstrate that it has established and implemented management system processes for identifying, analyzing and managing all hazards and potential hazards and associated risks that meet the Board's requirements. Within its governance document IMS-01, Enbridge's Risk Management Process focuses on managing risks for the company, however, the process does not identify and analyze hazards and potential hazards as required by OPR section 6.5(1)(c).

Additionally, the Board found that Enbridge did not demonstrate that it has included H<sub>2</sub>S as a potential hazard within its processes. In the absence of a program to sample and analyze H<sub>2</sub>S in its crude oil, or a documented engineering assessment, or ANSI/NACE MR0175/ISO 15156-2, Annex C, to assess the hazard or potential hazard of H<sub>2</sub>S, Enbridge has not demonstrated that it complies with CSA Z662-11, Clause 9.10.1.5, and CSA Z662-11, Clause 16.2.1(b).

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

<b>Compliance Status: Non-Compliant</b>
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## 2.2 Legal Requirements

**Expectations:** The company shall have an established, implemented and effective process for identifying and monitoring compliance with all legal requirements that are applicable to the company in matters of safety, security and protection of the environment. The company shall have and maintain a list of those legal requirements. The company shall have a documented process to identify and resolve non-compliances as they relate to legal requirements, which includes updating the management and protection programs as required.

### References:

OPR section 6.5(1)(g),(h),(i)

CSA Z662-11, Clause 3.2

### Assessment:

#### Governance: Identifying Legal Requirements

At a governance level, Enbridge's IMS-01, *Governing Policy and Process Management System* and IMS-02, *Compliance and Ethics Management System* describe the company's processes for identifying and monitoring its compliance with legal requirements. The IMS-02, Compliance and Ethics Management System, section 4.5.1 indicates that the company is required to develop a master corporate compliance register and departmental compliance registers. The compliance registers link to the company's verification processes, which are described in IMS-01, section 4.4, *Health Checks* and IMS-01, section 4.5, *Internal Reviews*. IMS-02, section 5.2, *Performance Measurement and Management* describes the company's governance processes for measuring and monitoring its compliance.

The OPR requires a company to establish and implement a process to identify its legal requirements and establish and maintain a legal list of the identified requirements. IMS-02 section 4.5.1 outlines Enbridge's processes for identifying its legal requirements and outlines requirements to develop master and departmental compliance registers. Review of this process indicated that it aligns with the OPR process requirements for identifying legal requirements and establishing and maintaining a legal list. Review of the process as documented identified that, by description it should lead to a compliant process. For example the process includes steps requiring monitoring of legal changes, updating compliance registers, etc. It also establishes roles and responsibilities. However, the Board's audit of this process identified that it was limited to description of the requirements and did not meet the Board's management system process requirements. Further, the process does not require the development of a single legal list. The process includes requirements to develop a master compliance register; however, this register specifically excludes certain



requirements such as in orders and permits. These are to be tracked in individual departmental compliance registers.

The Board also reviewed the linked compliance verification processes that Enbridge indicated were used to monitor compliance. The Board's review indicated that some of the processes are not designed to meet the Board's requirements. For example, both the Health Check and Internal Review processes are specifically not expected to be comprehensive with respect to evaluating departmental or management functions or departmental or project performance. Additionally, as described in the Internal Audit sub-element 4.3 below, the Internal Review process has not been established and implemented at the time of the audit and Health Checks are limited to reviewing the existing identified requirements that have been integrated within its existing processes and practices.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

### Integrity Management Program Legal Requirements

#### Identifying and Monitoring Compliance

At the governance level, Enbridge addresses its legal requirements in IMS-01 and IMS-02. IMS-01, section 4.5, *Internal Review Process* states that internal reviews will be conducted every 12 to 18 months using a standardized compliance review protocol. The *Internal Review Process* does not state that the internal review will be a zero-based assessment against the legal requirements, however, this process states that compliance deficiencies will be noted and tracked using an Event Report and that non-compliance with regulatory requirements typically constitutes an event.

At the department level, the PI-14, *Event Learning Process* procedure, section 5.2, *Event Classification* includes "an error or interpretation issue related to regulatory compliance" as an event, and classifies the event as an "internal failure". While the PI-14 process includes regulatory non-compliance as an event, PI-14 Section 3.1 "*Regulations, Codes and Standards*", refers only to *CSA Z662 Oil and Gas Pipeline Systems* and the *National Energy Board - Onshore Pipeline Regulations*. This section does not include reference to other applicable or adopted codes and industry standards. A non-compliant event associated with these missing codes and standards, or new versions of CSA Z662 or the OPR would not be identified by the Event Learning Process.

#### Establishing and Maintaining a List of Legal Requirements

At the department level, the IMS-09 *Compliance Register (Master)* has been developed to maintain a list of legal requirements that are applicable to the integrity management department in matters of safety, security and protection of the environment as required in OPR section 6.5(1)(h). In a

review of this document, the Board noted that the list of legal requirements was incomplete and did not address the level of specificity required to enable the company to monitor its compliance with the legal requirements. The *IMS-09 Compliance Register (Master)* did not include a complete list of applicable or adopted codes and standards, and reference documents such as; American Petroleum Institute, American Society of Mechanical Engineers, National Association of Corrosion Engineers, Canadian General Standards Board, Canadian Gas Association and Alberta Boilers Safety Association. Further, it did not include Enbridge's integrity documents, standards, processes and procedures that reference industry standards.

Based on the review of Enbridge's *IMS-09 Compliance Register (Master)* and applicable procedures, Enbridge did not demonstrate that it has established and maintained a list of legal requirements that meets the requirements of OPR section 6.5(1)(h).

### Monitoring Compliance

The Pipeline Integrity department is responsible for assessing compliance to current and pending regulations and maintaining a list of legal requirements for that department. The PI-83, *Pipeline Integrity Health Check* procedure applies to the Integrity Management System and related documents controlled and owned by the Pipeline Integrity department. Health Checks are to be completed regularly to measure the compliance, conformance and performance of Enbridge's programs, and to identify improvement opportunities. The company defines compliance as adhering to laws, regulations and legal requirements in all jurisdictions where Enbridge operates, and adhering to Enbridge's internal policies and procedures. PI-83 references regulatory compliance requirements in the OPR; CSA Z662, *Oil and Gas Pipeline Systems* (2011); API 1160, *Managing System Integrity for Hazardous Liquids Pipelines*; ASME B31.8S, *Managing System Integrity of Gas Pipelines*; and CSA Z662-11, *Annex N, Guidelines for Pipeline Integrity Management Programs*. The Board's review of procedures and practices indicated that the content and the practices would not assure that a full or exhaustive review of compliance would or was being undertaken.

### Identifying and Resolving Non-Compliances

During the audit, Enbridge demonstrated that, subject to the limitations identified above, it had developed several processes and procedures designed to identify and resolve non-compliances as they relate to its identified legal requirements at the program.

### Summary

The Board found that Enbridge had developed a number of governance and program level processes and practices for identifying and monitoring its legal requirements.

The Board also found that Enbridge's management system processes and requirements did not meet the OPR requirements. Enbridge did not provide its Master Compliance Register referred to in IMS-02 for review by the Board during the audit and therefore did not demonstrate that it has established and maintained a list of legal requirements as required by the OPR. Further, at the department level, the *IMS-09 Compliance Register (Master)* list of legal requirements was incomplete and did not address the level of specificity required to enable the company to monitor its compliance with the legal requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 2.3 Goals, Objectives and Targets

**Expectations:** The company shall have an established, implemented and effective process for developing and setting goals, objectives and specific targets relevant to the risks and hazards associated with the company’s facilities and activities (i.e., construction, operation and maintenance). The company’s process for setting objectives and specific targets shall ensure that the objectives and targets are those required to achieve its goals, and shall ensure that the objectives and targets are reviewed annually.

The company shall include goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries, and for the response to incidents and emergency situations. The company’s goals shall be communicated to employees.

The company shall develop performance measures for assessing the company’s success in achieving its goals, objectives, and targets. The company shall annually review its performance in achieving its goals, objectives and targets and the performance of its management system. The company shall document the annual review of its performance, including the actions taken during the year to correct any deficiencies identified in its quality assurance program, in an annual report, and signed by the accountable officer.

### References:

OPR sections 6.3, 6.5(1)(a),(b), 6.6

### Assessment:

#### Governance: Goals, Objectives and Targets for Risks and Hazards

The OPR does not include any specific management system process requirements for developing policies and goals. However, Enbridge has established clear management system guidance with respect to its process for developing policies and goals. At a governance level, Enbridge’s IMS-01, *Governance Documentation* outlines the company’s expectations for documenting key corporate policies, such as the *Strategic and Business Planning Processes*. The *Governance Documentation* also explains the company’s “Planning Cascade” and associated documentation. This Planning Cascade document explains how the company links its policies and corporate vision to its performance targets and metrics. The practices described within the *Governance Documentation* process align with the Board’s requirements for establishing policies, goals, objectives, targets and performance measures. While not an absolute alignment between the Board’s requirements and Enbridge’s internal processes it does reflect integration of the Board’s requirements into Enbridge’s business management practices.

*(Note: During its audit the Board noted that Enbridge’s Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the “program” level follows.)*

### Integrity Management Program Goals

*(Enbridge demonstrated that its program level Goals, Objectives and Targets aligned with the governance requirements; therefore, this section will focus on the specific goal requirements found in the OPR which apply to this program.)*

The OPR identifies that a company must have goals for preventing ruptures, liquid and gas releases, fatalities and injuries, as well as for responding to incidents and emergency situations. Although implicitly included within its *Integrity Principles*, Enbridge did not demonstrate that it had an explicit statement of goals for preventing ruptures, liquid and gas releases, fatalities and injuries, and for responding to incidents and emergency situations as required in OPR section 6.3 (1)(b). It was noted that Enbridge’s *Integrity Principles* described the company’s fundamental values with respect to how it manages its integrity management program. Further, The Liquids Pipelines Priorities in the annual Product Integrity *Department Plan* include a measurable end result and objectives to be achieved within a set timeframe. Priority (1) for Liquids Pipelines states that company intends to “*Eliminate ruptures and reduce leaks.*” This implies preventing ruptures, liquid and gas releases, fatalities and injuries. However, it does not explicitly state that the company’s goal is to prevent leaks, not just to reduce leaks. Based on the Board’s review of documentation provided, Enbridge’s did not demonstrate that it has a policy at the governance level that explicitly establishes goals for preventing ruptures, liquid and gas releases, fatalities and injuries.

Although Enbridge did not demonstrate that it has explicit goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries, and for the response to incidents and emergency situations, Enbridge does communicate its existing goals and priorities to its employees through a variety of means including presentations, emails, eLink advisories, documents, scorecards, and department plans.

### Summary

The Board found that Enbridge has demonstrated an alignment between its governance processes and with the OPR requirements; the Board has not identified non-compliance with them.

The Board also found that, while Enbridge demonstrated that it had developed its *Integrity Principles*, and Enbridge’s Liquids Pipelines Priority (1) that both imply prevention of ruptures, liquid and gas releases, fatalities and injuries; neither establishes explicit goals for the prevention of ruptures,

liquid and gas releases, fatalities and injuries as required by the OPR.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 2.4 Organizational Structure, Roles and Responsibilities

**Expectations:** The company shall have a documented organizational structure that enables it to meet the requirements of its management system and its obligations to carry out activities in a manner that ensures the safety and security of the public, company employees and the pipeline, and protection of property and the environment. The documented structure shall enable the company to determine and communicate the roles, responsibilities and authority of the officers and employees at all levels. The company shall document contractors' responsibilities in its construction and maintenance safety manuals.

The documented organizational structure shall also enable the company to demonstrate that the human resources allocated to establishing, implementing and maintaining the management system are sufficient to meet the requirements of the management system and to meet the company's obligations to design, construct, operate or abandon its facilities to ensure the safety and security of the public and the company's employees, and the protection of property and the environment. The company shall complete an annual documented evaluation in order to demonstrate adequate human resourcing to meet these obligations.

### References:

OPR sections 6.4, 20, 31

CSA Z662-11, Clauses 3.1.1, 3.1.2(b) and 3.2

### Assessment:

#### Governance Organizational Structure and Roles and Responsibilities

At a governance level, Enbridge demonstrated that it has a single, over-arching management system process that describes the organizational structure and responsibilities for the ongoing development and implementation of its management system. The IMS documents defined the roles and responsibilities regarding occupational health and safety of all employees and contractors.

The governance management system documents indicated that Enbridge's executive management was responsible for upholding the management system policies, process, standards and requirements. They were also responsible for ensuring that appropriate resources are available to monitor compliance and implement continuous improvement of the management system. Further the documentation identified that Enbridge's President's responsibilities include allocating the resources necessary for management system compliance.

## Governance Annual Evaluation of Resource Need

Enbridge demonstrated that it has developed a number of corporately required or supported mechanisms for evaluating its resourcing needs.

Enbridge did not; however, provide specific documentation and records to demonstrate it evaluates the need for human resources allocated to establishing, implementing and maintaining its management system and explicitly meeting its OPR section 6 obligations at a corporate or program level.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

## Integrity Management Program Organizational Structure and Roles and Responsibilities

The Board identified that Enbridge's Integrity Management Program is supported by approximately 250 integrity personnel mostly based in Edmonton; 150 are Enbridge employees and 100 are provisional contractors. Enbridge has integrity specialists in each of its regional offices that liaise with the Pipeline Integrity team in Edmonton. These individuals are supported by field technicians, pipeline maintenance personnel and contracted specialists.

Enbridge's integrity management organizational structure is documented in IMS-09, and supported by organizational charts for each region and supporting department or functional group. Enbridge documents the organizational structures of all of its business units and functional areas using an online tool called *OrgPlus*. These organizational structures align with the activities required to ensure the safety and security of the public, company employees and the pipeline, as well as the protection of property and the environment.

The Integrity Management program is executed through three functional groups: Pipeline Integrity, Operations and Engineering. The Pipeline Integrity department is part of Enbridge Pipelines Inc. - Liquids Pipelines. The Vice President of Pipeline Integrity leads the department and is supported by directors, senior managers, managers and a workforce. The Vice President of Pipeline Integrity reports to the Chief Operating Officer, who reports to the President - Liquids Pipelines and Major Projects. The Vice President of Pipeline Integrity is accountable for pipeline integrity management. The following three directors administer the programs: Director of Integrity Programs, Director of Integrity Systems and Director of Infrastructure Integrity. This organizational structure is documented in the Pipeline Integrity Functional Organization Chart dated 15 March 2013.



Roles, responsibilities and authorities that support the implementation of the Facilities Integrity Management program are detailed in *Facilities Integrity Roles, Responsibilities and Authorities – Guideline Document Version 3.7* (19 April 2013). This document lists known threats to facilities, and outlines the responsibilities and deliverables of Facilities Integrity and other departments in managing these threats. It also identifies the responsibilities and authorities of each Facility Integrity position to ensure that employees understand what they are expected to deliver.

Roles, responsibilities and authorities for Pipeline Integrity functions are detailed in IMS-09, section 1.8, *Functional RASCI*. This chart details the roles for Pipeline Integrity, Facilities Integrity and supporting departments. Roles and Responsibilities are also documented in program documents related to specific threats.

As components of the gathering system require integrity management approaches different from those used for the mainline pipeline system, Enbridge clarified these responsibilities in IMP-00-02-02, *Organizational Lines of Responsibility*. IMP-00-02-02 details the responsibilities of each supporting group within the Gathering group of companies, including Enbridge Pipeline Integrity and Enbridge Pipeline Saskatchewan Inc.

### Roles and Responsibilities

The Board identified the following practices processes being implemented within Enbridge’s integrity management department for establishing and communicating roles and responsibilities of company employees and workers.

Enbridge hiring leaders work with Human Resources to develop job profiles for each position within the Integrity Management Program including positions that support normal and abnormal operations. Job profiles outline the roles and responsibilities of each position. Job ladders describe the work done at each level. Although these job ladders do not detail the specifics of positions; they do define the knowledge, skills and abilities required at each level on the job ladder.

Enbridge links individual development plans and performance targets to its department plans, and to the overall business performance measured on the company’s scorecard and through initiatives tracking. Interviews with Enbridge personnel confirmed that the company is committed to ensuring that adequate and appropriate resources are in place to meet its obligations for designing, constructing, operating and abandoning its facilities to ensure the safety and security of the public and the company’s employees, and the protection of property and the environment.

The Board requires the company to determine and communicate the roles, responsibilities and authority of its officers and employees at all levels within the company. *Department Plans* outline each department’s objectives, initiatives, performance targets and priorities for the upcoming year, and is communicated to all stakeholders to ensure support and understanding. The company also communicates roles and responsibilities through

discussions and meetings with employees, on its SharePoint sites, by email, and on the company's intranet.

The Board requires the company to document contractors' responsibilities in its construction and maintenance safety manuals. Enbridge defines two types of contractors: provisional contractors and contractors. Enbridge treats provisional contractors like employees and includes them in the company's organizational structure. Provisional contractors must follow the same requirements as Enbridge employees. They include contract technical specialists that work within Enbridge departments alongside Enbridge employees. In contrast, contractors are personnel that typically provide a specified term of services or supply a product to Enbridge. Contractors are supported by specific written contracts that outline their responsibilities and the services or products they will provide. As stated in these written agreements, contractors work under the supervision of Enbridge personnel. Contractors acknowledge that they understand the terms and conditions to which they have committed, as documented on a work order or within a master service agreement.

Enbridge's *Contractor Safety Manual* (January 2012) outlines the company's rules, safe work practices and procedures for pipeline and facility construction and maintenance activities. Contractors work under the oversight of a company site inspector or operations representative. In contrast, provisioned contractors work under the direct supervision of an Enbridge employee and must follow the company's operating and maintenance procedures. Workers hired for a set period of time under the direct supervision of a company operations representative must also follow Enbridge's operating and maintenance procedures. The *Contractor Safety Manual* is part of the contract document. Enbridge gives the contractor copies of the manual before the contractor starts to work on any of the contracted activities. Documented in Enbridge's *Operations and Maintenance Manual* (OMM), Book 2: Safety 01-02-04, the Contractor Safety Management Program provides direction for managing contractor health and safety. It describes identifying hazards, implementing controls and preventing losses that arise from contractor work. The Contractor Safety Management Program applies to all contractors and contract personnel performing construction and maintenance work for Enbridge.

#### Annual Evaluation of Resource Need

Enbridge did not provide documentation or records to demonstrate it specifically evaluates and demonstrates that the human resources allocated to establishing, implementing and maintaining its management system and meeting its OPR section 6 obligations are sufficient.

With respect to its integrity management program evaluation of need, Enbridge demonstrated that it uses several mechanisms to evaluate its human resources needs. Key examples include:

- Liquids Pipelines priorities and objectives review and planning – (The leadership team defines the key priorities and objectives for Liquids Pipelines in alignment with the *Strategic Plan*; the *Strategic Plan* defines the focus and priorities for the company as a whole);

- Integrity Management Department Plan development – (IMS-01 processes based);
- Workforce planning – (Enbridge Human Resources department led to identify the job types and the number of each job type required to ensure there are sufficient resources to meet management and protection requirements; and
- Annual Work Plan update and development – (The Integrity Management department develops a detailed annual work plan that takes into account the priorities, objectives and Liquids Pipelines business unit planning).

The Board found these mechanisms were being implemented within Enbridge’s Integrity Management department.

The Board’s review of Enbridge’s processes and practices being used to evaluate its human resource needs identified that it did not specifically account for requirements related to staff outside of the department that have integrity management responsibilities, such as Field Operations and Maintenance staff.

### Summary

At the department level, the Integrity Management program organizational structure is documented in IMS-09 and supported by organizational charts for each region and supporting department or functional group. Based on the documents reviewed, the Board found that Enbridge’s organizational structure enables the company to meet the requirements of its management system and its obligations for carrying out activities in a way that ensures the safety and security of the public, company employees and the pipeline and protection of property and the environment. The Board found that has developed and implemented a number of corporately required or supported mechanisms for evaluating its resourcing needs.

The Board also found that Enbridge did not demonstrate that it explicitly evaluates the need for human resources allocated to establishing, implementing and maintaining its management system and meeting its OPR section 6 obligations at a corporate or program level. Further, the Board found that Enbridge’s program level evaluation of need did not specifically account for integrity management program activities that were conducted by staff outside of the department that have Integrity Management responsibilities.

Based on the Board’s evaluation of Enbridge’s management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

### 3.0 IMPLEMENTATION

#### 3.1 Operational Control-Normal Operations

**Expectations:** The company shall have an established, implemented and effective process for developing and implementing corrective, mitigative, preventive and protective controls associated with the hazards and risks identified in elements 2.0 and 3.0, and for communicating these controls to anyone who is exposed to the risks.

The company shall have an established, implemented and effective process for coordinating, controlling and managing the operational activities of employees and other people working with or on behalf of the company.

#### References:

OPR section 6.5(1)(e),(f),(q)

CSA Z662-11, Clause 3.1.2(f), 3.2 and 10

#### Assessment:

##### Governance Developing and Implementing Operational Controls – Normal Operations

At a governance level, Enbridge's IMS-01, section 4.3, *Risk Management Process* describes the company's process for developing and implementing controls for addressing its hazards and risks. As noted in sub-element 2.1 of this audit, the Board found that this Enbridge process is non-compliant for several reasons, including the process design and implementation of the hierarchy of controls. Since the Board has already identified that Enbridge will have to develop corrective action plans for sub-element 2.1, the Board will not assign additional non-compliances for the governance process in this sub-element; however, Enbridge must specifically consider and include any corrective actions associated with this sub-element within the corrective action developed plan developed for sub-element 2.1.

##### Governance Processes for Coordinating, Controlling and Managing the Operational Activities of Employees and other People Working With or On Behalf of the Company

These management system process requirements are described in OPR section 6.5 (1) (k) and (q). During the audit Enbridge indicated that these requirements were described within its IMS-01 sections 2.4 *Management System Development and Implementation Requirements* and 4.14 *Workforce Competency and Qualification Management Process* and in its OMMs and various other program level processes.

Review of the IMS processes indicated that they did not address the requirements identified in the sub-element directly and that, as noted elsewhere in this report the IMS-01 4.14 *Workforce Competency and Qualification Management Process* has not been demonstrated to be established or implemented. Review of the OMM processes indicated that they were not considered as governance management system process within the company. Enbridge is therefore non-compliant with respect to its OPR management system process requirements.

*(Note: During its audit the Board noted that Enbridge’s Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the “program” level follows.)*

#### Integrity Management Program Developing and Implementing Operational Controls – Normal Operations

##### Developing and Implementing Controls

At the governance level, Enbridge’s Liquids Pipelines Risk Management department focusses on quantifying (As stated in IMS-09 section 4.5.2, “*mitigation actions are carried out in consideration of high consequence areas such as waterways and populated areas.*”)

The Board found that Enbridge’s Integrity Management department was developing and implementing controls that address the hazards, threat and risks identified within its integrity management program. During the audit Enbridge identified that it has focused on quantifying the consequences of a loss of containment along the length of the pipeline and has developed a consequence profile for each segment of the mainline pipeline system. Enbridge also identified that its mitigation actions (controls) are carried out in consideration of high consequence areas such as waterways and populated areas.

As assuring the control of pipeline and facility hazards is of primary importance to the Board, this audit included an in-depth examination of Enbridge’s Operational Controls. A description of the controls developed and implemented by Enbridge has been included in this sub-element. Unless otherwise noted, based on the information provided by Enbridge, no issues of non-compliance were noted during the Board’s audit of the controls.

At the department level, Enbridge develops and implements controls for preventing, managing and mitigating the identified hazards through three types of programs: prevention, monitoring and mitigation.

The company uses its IMS-09, section 4.5.2, *Pipeline Integrity Threat Management Process* to:

- Identify potential integrity hazards or degradation mechanisms that could lead to failure;
- Characterize risks, and assess the consequences and likelihood of occurrence of risk events; and

- Manage hazards in accordance with the company's asset management requirements through prevention, monitoring and mitigation.

After identifying actual and potential threats and assessing their risks, the company develops prevention, mitigation and monitoring actions to control the threats. Enbridge documents the threats, risks, and planned actions to control threats in *Hazard and Risk Registers* for the Pipeline Integrity and Facilities Integrity departments, the annual Pipeline Integrity *Department Plan* and the Field Operations *Department Plan*. The company measures the status of the planned actions for controlling hazards and communicates the results as part of its improvement cycle. In addition to department plans and risk registers, Enbridge also uses its 2014 *Liquids Pipelines Scorecard* to track and communicate the performance of the Liquids Pipelines business unit.

### Threat Management

Enbridge has designed and implemented a threat management process that includes activities, processes and procedures for ensuring the safety and integrity of pipelines and facilities. As part of this process, Enbridge manages control of identified threats through various methods of prevention, monitoring and mitigation.

Enbridge has developed processes, plans and procedures for managing the following threats to its pipeline system:

- fatigue and stress corrosion cracking;
- internal and external corrosion;
- coating degradation;
- welding defects;
- AC interference;
- geotechnical; and
- deformation and strain.

Enbridge's Damage Prevention department, Operations group and Control Centre Operations manage other threats, such as third-party damage, improper operations and control system malfunctions.

### Threat Mitigation Programs

Enbridge has three primary methods in its Integrity Management program for mitigating threats: in-line inspections, pressure tests and direct assessments. The company relies primarily on in-line inspections to manage and monitor the hazards of internal corrosion, external corrosion, cracking, dents and mechanical damage. The company's dig program is based primarily on the probability of failure. Based on Enbridge's

presentations and audit interviews, the Board found that the Integrity Management Program has applied a very conservative approach in its integrity programs to reduce the probability of failures to such a low level that the risks will remain low throughout the company's pipeline system. The Board identified that Enbridge does not evaluate the consequences of failure when establishing dig schedules, but rather considers all possible consequences as "high" and focusses on reducing the probabilities to very low levels. The Board notes that Enbridge's activities and conservative assumptions have been maintaining a very low probability of failures, which meets the company's intention of achieving an acceptably low level of risk. This conservative approach is based on; less time between inline inspection re-assessments; reduced pressure cycling; and using very conservative crack growth rates and internal or external corrosion growth rates in deterministic modelling.

Enbridge categorizes its threat control and risk reduction programs into the following five categories:

- surveillance and condition monitoring (measures to identify, and reduce or eliminate risks and hazards at their source);
- mitigative measures;
- preventive measures;
- protective measures; and
- remedial measures.

#### Surveillance and Condition Monitoring

Enbridge uses surveillance and condition monitoring to detect the presence of threats, monitor threat progression, and reduce or eliminate the threats or hazards at their source. Enbridge has developed various techniques and programs to monitor its system, verify pipeline and facility integrity, and confirm that prevention mechanisms are effective. Pipeline threat monitoring includes inline inspection, online pressure monitoring, pressure cycling monitoring, active slope monitoring, aerial and ground-based pipeline ROW monitoring, hydro-testing, non-destructive examination and direct assessment techniques. Threat monitoring for Enbridge's facilities focusses on its; above-ground and below-ground station piping; above-ground storage tanks, laterals, small diameter piping, underground sumps, and flanges.

Additionally, to ensure that its monitoring programs are effective and that mitigations are being designed and implemented, a team (Leak Reduction Team) of subject matter experts from Pipeline Integrity, Operations and Engineering reviews all integrity related failures for each monitoring program.

#### Mitigative Measures to Address Risks and Hazards

Enbridge applies mitigative measures and activities to reduce the likelihood of failures and minimize the consequences if a failure occurs. IMS-09,

section 4.5.5 provides an overview of the company's mitigation process for managing potential pipeline threats and threats that have been identified through in-line inspections and other means. Enbridge's mitigation measures include:

- repairing or replacing pipe;
- stabilizing slopes on pipeline ROWs;
- using cathodic protection for external corrosion control;
- reducing pipeline pressure;
- controlling pressure cycling;
- increasing overburden over pipelines;
- using corrosion inhibitors for internal corrosion control;
- secondary containment around tankage; and
- a maintenance pigging program.

#### Preventive Measures to Address Risks and Hazards

As described in IMS-09, section 1.7.2, preventing threats requires an integrated team approach that includes the Pipeline Integrity department, Operations and the Risk Management group. Preventive measures at Enbridge include:

- selective pipeline routing;
- proper construction and material selection;
- limiting operating stress through design;
- quality pipeline installation; and
- quality control programs during construction of tanks, piping and associated equipment.

Preventive measures for Operations include applying cathodic protection and using chemical inhibitors to help prevent threats and manage defects identified through monitoring. These programs are primarily managed by Enbridge's Field Operations and Maintenance department and are supported by technical expertise within the Pipeline Integrity department.

Enbridge's damage prevention activities also include programs such as *Pipeline Depth Monitoring* and right-of-way (ROW) patrols to monitor threats that may pose a threat, risk or hazard. Other preventive measures include signage, line locating and One-Call systems, and communicating with landowners, the public, excavators and contractors to prevent third-party damage



### Protective Measures to Address Risks and Hazards

Enbridge's protective measures to guard pipeline and facilities equipment against damage and failure are largely based on its coating integrity and cathodic protection programs.

Enbridge has a dedicated coating integrity program to address any coating of Enbridge's steel assets. Protective coatings are used on almost all of Enbridge's steel assets that are exposed to corrosive environments including immersion, buried service and atmospheric conditions. Enbridge records the type of coatings used on each of its pipelines on line summary documents and route sheets.

Enbridge has also developed, implemented and documented a cathodic protection program to mitigate external corrosion on its pipelines and below-grade station piping. Routine monitoring and maintenance of its cathodic protection systems is completed as per the regulatory requirements.

### Remedial Measures

Remedial measures are activities completed to correct known issues, such as pipeline defects. Defects that do not meet Enbridge's established acceptance levels are removed or repaired or otherwise mitigated through maintenance activities. Remedial activities include pipeline reinforcement, cut out, repair and temporary pressure reduction. They also include facility equipment repair, replacement or refurbishment. Pipeline Integrity works closely with Operations, Engineering project teams and other supporting departments to ensure remedial measures are completed according to plan and that resources are allocated appropriately.

Enbridge's threat management process includes various programs for preventing, monitoring and mitigating threats to its pipeline system. The Board reviewed several key threat management programs as discussed below.

### Crack Management Program

Enbridge stated that the most common time-dependent cracking mechanisms experienced in its pipeline systems are fatigue cracking and stress corrosion cracking. Enbridge has developed a crack management program for addressing crack threats on its pipelines which applies to all liquid mainlines that fall within Pipeline Integrity's responsibility. The *Crack Management Plan* is a continuous cycle that consists of assessing crack susceptibility, determining the reassessment interval and monitoring conditions.

### Crack Susceptibility Assessment Process

This process applies to pipeline segments that have not had a susceptibility assessment or have experienced a change in probability during condition

monitoring. Enbridge's *Crack Susceptibility Guideline* provides guidance on determining susceptibility for fatigue cracking and stress corrosion cracking. Once susceptibility is determined, a mitigation plan is prepared. Enbridge's *Crack Threat Assessment Guideline* provides guidance on choosing the best crack assessment method for a comprehensive assessment. Crack assessment methods include crack inline inspection, pressure tests and direct assessment.

#### Re-assessment Interval Process

Enbridge uses this process to determine the intervals at which the crack susceptibility and crack threat of the relevant pipeline segment should be re-assessed. This process applies to all pipeline segments within Pipeline Integrity's responsibility. Procedure PI-41, *Crack Inline Inspection Interval Determination* outlines the company's process for determining re-assessment intervals. Section 4.1, *Susceptibility*, describes the factors that affect failure susceptibility for fatigue cracking and stress corrosion cracking; however, Section 4.1 fails to address corrosion fatigue. The Board noted that corrosion fatigue is also not addressed in Enbridge's *Crack Susceptibility Guideline* document.

#### Crack Inline Inspections

According to Enbridge's documentation, crack inline inspection is the most common crack threat assessment method used by Enbridge. Inline inspection is considered the most informative form of crack threat assessment because it provides detailed information about axial cracks and crack-like features. At the time of the audit, the only NEB regulated mainline pipeline that was not piggable and had not had a crack inline inspection was Line 24.

#### Corrosion Fatigue

As part of its audit, the Board specifically examined Enbridge's crack management program for information with respect to how Enbridge manages the threat of corrosion fatigue.

As a result of the Board's Integrity Management Program audit of Enbridge in 2008, Enbridge committed to applying its learnings from the 2007 Glenavon failure to its corrosion fatigue model. Enbridge committed to develop and implement a method that includes local corrosion wall loss as well as crack depth when performing engineering assessments of crack defects occurring in areas of corrosion. Enbridge also committed to develop and implement a corrosion fatigue model for pipelines under cyclic loading that estimates growth rates for cracks occurring in areas of corrosion to be used when determining re-inspection intervals.

In light of the 2010 failure in the United States referred to as the "Marshall, Michigan rupture and release", corrosion fatigue was considered a critical

component of Enbridge's crack management program. The National Transportation Safety Board, in its PB2012-916501 report dated June 2012, determined that "*the probable cause of the pipeline rupture was corrosion fatigue cracks that grew and coalesced from crack and corrosion defects under dis-bonded polyethylene tape coating...*". In response to the 2010 Marshall failure, Enbridge submitted its newly developed and implemented crack management program for corrosion fatigue to its US regulators to address the recommendations made by the NTSB. Enbridge was required to develop and implement a methodology that included local corrosion wall loss in addition to the crack depth when performing engineering assessments of crack defects coincident with areas of corrosion. As well, it was to develop and implement a corrosion fatigue model for pipelines under cyclic loading that estimates growth rates for cracks that coincide with areas of corrosion when determining re-inspection intervals. Enbridge stated that it had addressed the recommendations by modifying its Integrity Management Program and Crack Management Program.

### Direct Assessment

Enbridge uses this threat assessment method on pipelines for which the target threat is stress corrosion cracking. Direct assessment involves gathering and analyzing dig results from sites likely to have stress corrosion cracking. During audit interviews, Enbridge stated that it has developed its own procedures for direct assessments based on Inline Inspection data. NEB inspections of Enbridge's dig sites carried out in support of this audit confirmed that the direct assessment methodology used by Enbridge was adequate.

### Stress Corrosion Cracking (SCC)

Enbridge's OMM, Book 3: 05-03-02, *Evaluating Stress Corrosion Cracking Clusters* documents this method of assessing SCC. With this method, clusters of crack-like indications are evaluated to determine whether the clusters have significant stress corrosion cracking. Enbridge's assessment method for SCC, as determined during NEB inspections, was considered to be adequate.

### Threat Management of New Construction

The Board saw evidence that subject matter leads from Enbridge's Corrosion Programs department within Pipeline Integrity participate in new construction activities. These staff members help develop hydro-test plans, identify the need for chemical inhibitors, and are responsible for the cathodic protection design standards applicable to new construction. Once the pipeline is transitioned to the Pipeline Integrity department, an internal corrosion control program is developed and implemented for each new pipeline to prevent and control internal corrosion threats. No issues were identified during the review of this practice.

## Geohazard Management Program

At the time of the audit, Enbridge's geohazard management program was in development.

The Board was advised that the procedures for slope management, river crossing management, longitudinal stress management, the Inertial Monitoring Unit, longitudinal strain evaluation and seismic load management are under development. Enbridge currently monitors slopes and water crossings using ROW patrols conducted every two weeks and ground inspections conducted on intervals based on the threat at each site. The geohazard management program manages approximately 500 slopes and 700 watercourse crossings for NEB regulated pipelines.

Enbridge's current geohazard management program addresses most geotechnical hazards and the associated monitoring and mitigation requirements. However, the Board identified that Enbridge does not, currently have a formal program for managing the threat of seismic activity. At the time of the audit, Enbridge was developing a program for managing the threat of seismic activity. As the program was still in development at the time of the audit, Enbridge did not demonstrate that the program meets the requirements included in this sub-element.

## Mechanical Damage Management Program

Enbridge's Mechanical Damage Management Program (MDMP) integrates the company's geometry Inline Inspections (ILI) with its corrosion program Inline Inspections. During the audit presentations, interviews and responses to follow-up information requests, Enbridge's MDMP team provided documents and records to verify that high resolution geometry inline inspection tools have been run in all of Enbridge's NEB regulated pipelines.

The Mechanical Damage Management Program is supported by Pipeline Integrity (PI) procedures that address ILI mechanical damage data review and assessment, data trending and integration and developing and executing a dig program to investigate ILI features related to mechanical damage.

The auditors did not identify any issues with the current state of how the MDMP s addresses the hazards due to mechanical damage, as well as the monitoring and mitigation requirements from a technical standpoint. Enbridge's MDMP corresponds to the current industry practices and available technical methodologies. However, in terms of management system requirements, Enbridge's Pipeline Integrity Management System document (IMS-09), Section 4.5.5 Mitigate Pipeline Threats Process Overview, and specifically Figure 4.5.5-1 the Process Overview Map, does not contain a documented process step for the MDMP.

During the audit presentations and interviews, Enbridge MDMP subject matter experts indicated that the MDMP had yet to be integrated into the IMS-09 process requirements. While the MDMP, from a program level technical practice standpoint, does address the hazards related to mechanical damage, the Board determined that the MDMP cannot be assessed as compliant because of its current state of formal incorporation into the Pipeline

Integrity Management System process.

### Inline Inspections Data Integration

During the audit, Enbridge gave a presentation outlining its Inline Inspections Data Integration tool that it uses to identify where possible multiple anomalies identified by ILI, may be located in the pipelines. Since each inline inspection tool is not able to detect every feature type, Enbridge integrates inline inspections data to identify the following interacting threats:

- corrosion + crack;
- deformation + corrosion;
- deformation + crack; and
- deformation + crack + corrosion.

Enbridge has completed a data integration assessment associated with the above on all of its NEB regulated pipelines.

Enbridge excavated 87 features based on its threat integration analysis for Lines 01, 03, 05 and 11. The results demonstrated that primary and secondary features were found to be interacting in the field 52% of the time. This indicates that almost half of the digs completed may have not been required, which supports the conservative approach Enbridge has been taking for identifying and addressing possible anomalies. Enbridge continues to work with inline inspections vendors to improve its detection and characterization of anomalies.

### Program Processes for Coordinating, Controlling and Managing the Operational Activities of Employees and other People Working With or On Behalf of the Company

As noted above, during the audit Enbridge indicated that it has established a number of OMM and program based processes that address the Board's requirements for coordinating, controlling and managing the operational activities of employees and other people working with or on behalf of the company. The Board's review of the referenced documents and associated records provided by Enbridge indicated that, at the integrity management program level, the company has established appropriate practices and processes.

### Summary

The Board found that Enbridge has developed and implemented a significant number of programs, processes and practices to prevent, manage and mitigate most of its hazards.

The Board also found non-compliances related to Enbridge's hazard mitigation programs and controls.

The Board found that, at the governance level, Enbridge references IMS-01, section 4.3 *Risk Management Process* and the Risk Management Process Map. Step #17 - *Identify Risk Mitigation approach and prepare Risk control plan* on this process map is colour coded red, indicating that the processes are either aspirational or are not fully established or implemented and therefore are non-compliant with the OPR. This non-compliance has been previously identified as part of the Board's finding documented in sub-element 2.1 *Hazard Identification, Risk Assessment and Control*, above. The corrective actions developed to address that finding must specifically consider and include any corrective actions associated with this sub-element.

The Board found that Enbridge did not provide information with sufficient clarity for the Board to evaluate Enbridge's controls to address the threat of corrosion fatigue as part of its crack management program. Enbridge will need to provide this information in a manner that facilitates the Board's evaluation.

The Board found that Enbridge's Geohazard Management Program did address most of its geotechnical hazards; however, the program and the associated controls were not fully developed and implemented and therefore presently non-compliant. Additionally, the Board found that Enbridge's GeoHazard Management Program had not fully integrated and addressed all of the requirements for managing the threat of seismic activity.

The Board found that Enbridge's Mechanical Damage Management Program did address most of the identified hazards due to mechanical damage; however, because of its current state of development and implementation, the Board assessed Enbridge's mechanical damage management program as non-compliant.

The Board found that, at the program level, Enbridge has developed and implemented processes and practices for coordinating, controlling and managing the operational activities of employees and other people working with or on behalf of the company; however, the Board also found that Enbridge has not established and implemented management system level processes that meet the OPR requirements relating to these same issues.

Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

### 3.2 Operational Control-Upset or Abnormal Operating Conditions

**Expectations:** The company shall establish and maintain plans and procedures to identify the potential for upset or abnormal operating conditions, accidental releases, incidents and emergency situations. The company shall also define proposed responses to these events and prevent and mitigate the likely consequence and/or impacts of these events. The procedures must be periodically tested and reviewed, and revised where appropriate (for example, after upset or abnormal events). The company shall have an established, implemented and effective process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.

#### References:

OPR section 6.5(1)(c),(d),(e),(f),(t)

#### Assessment:

##### Governance Upset and Abnormal Operating Conditions

Enbridge uses the processes described in sub-elements 2.1 and 3.1 of this audit report to identify hazards and potential hazards to the occupational health and safety of its workers during abnormal operating conditions, accidental releases, incidents and emergency situations. Therefore, the general findings of those sub-elements apply to this sub-element as well. Since any issues applicable to this sub-element must be addressed in the corrective action plan developed for sub-element 2.1, the Board will not assign further Non-Compliances for the governance process in this sub-element.

##### Governance Developing Contingency Plans for Abnormal Events

The Board requires the company to establish and implement an effective process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations. It is important to note that contingency plans are not limited to emergency response. The Board found that Enbridge's governance processes did not include specific processes or policies for developing contingency plans for abnormal events.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

##### Integrity Management Program Upset or Abnormal Operating Conditions

As assuring the control of pipeline and facility hazards is of primary importance to the Board, this audit included an in-depth examination of

Enbridge's Operational Controls. A description of the controls developed and implemented by Enbridge has been included in this sub-element. Unless otherwise noted, based on the information provided by Enbridge, no issues of non-compliance were noted during the Board's audit of the controls.

### Pressure Control and Over-pressure Protection

Enbridge presented information on its *Pipeline Integrity – Protocol, 3.2*, that any pressure above 100% of the allowable working pressure is deemed an overpressure, and that Control Centre Operations contacts Pipeline Integrity if an overpressure exceeds 110% of the maximum allowable operating pressure. Enbridge previously advised the Board that it does not have mechanical overpressure protections on its pipeline as required in CSA Z662-11, Clause 4.18.1.2. The Board therefore issued a Safety Order in May 2013 (SO-E101-004-2013) that required Enbridge to submit, for Board approval, its plan for conducting a transient analysis and assessment on all Enbridge pipelines and facilities. The Safety Order also required Enbridge to provide a timeline and explain the prioritization of its transient analysis mitigation plan. Further, Enbridge was required to provide a status update every six months on the progress of its overpressure control and overpressure protection mitigation. The last progress meeting with Enbridge and NEB staff concluded that Enbridge was proceeding with changes to its operating procedures and PSV settings, installing pressure relief systems and imposing flow restrictions when required.

As the Board has oversight on the issue of overpressure control and overpressure protection through its Safety Order and subsequent follow-up, overpressure control and overpressure protection have been excluded from the scope of the Integrity Management Program audit.

### Summary

Based on interviews, and document and record reviews, the Board found that Enbridge has established controls for managing and mitigating abnormal operating conditions that have been identified in its integrity management program.

The Board also found that Enbridge does not have a management system process for developing contingency plans that meets the requirements of the OPR.

Based on the Board's evaluation of Enbridge's management system and the Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.



**Compliance Status: Non-Compliant**

### 3.3 Management of Change

**Expectations:** The company shall have an established, implemented and effective process for identifying and managing any change that could affect safety, security or protection of the environment, including any new hazard or risk, any change in a design, specification, standard or procedure and any change in the company's organizational structure or the legal requirements applicable to the company.

#### References:

OPR section 6.5(1)(i)  
CSA Z662-11, Clause 3.1.2 (g)

#### Assessment:

##### Governance Management of Change Process

During the audit, Enbridge identified that it had developed a governance management of change process. In reviewing the documents and records and conducting interviews, the Board found that Enbridge's governance process had not been fully established or implemented at the time of the Board's audit. The Board's review found that Enbridge's design of its governance process does not meet the OPR management system process requirements.

During the audit, Enbridge indicated that MOC processes and requirements are embedded in all of its existing written processes, procedures and practices. Enbridge indicated that a single MOC process would not be able to meet its or other companies with significant facilities and processes, requirements. Therefore, Enbridge has multiple processes embedded in multiple locations. Further, Enbridge indicated that its interpretation of the OPR is to "ensure that a MOC process is available for unplanned, unexpected or infrequent changes that are not already embedded in existing activities and processes. There is no requirement in the OPR for these various management of change processes to be formally tied to one another."

The Board has found that Enbridge's interpretation and practices are inconsistent with the Board's interpretation of the OPR process requirements. The Board notes that the OPR requires a company to develop a management system MOC process that identifies and manages any change that could affect safety, security or the protection of the environment, not only those described by Enbridge. Further the Board notes that, while a company may have multiple processes, there still must be consistency in process requirements, development and implementation as well as coordination of the various practices in order to meet the OPR requirements and to ensure formal management. The Board notes that a singular management system process developed to meet the OPR requirements, as prescribed, would address these requirements.

*(Note: During its audit the Board noted that Enbridge’s Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the “program” level follows.)*

#### Integrity Management Program Management of Change Process

At the department level, IMS-09, section 4.2 *Management of Change* referenced Enbridge’s IMS-01 governance process. The Board identified that Enbridge had developed and implemented its PI-82, *Pipeline Integrity Management of Change* procedure. PI-82 outlines the roles and responsibilities, processes and procedures for ensuring that all changes are planned appropriately to eliminate and/or reduce risks and are completed safely. As per the documentation provided for review, PI-82 “*applies to all changes initiated or led by the Pipeline Integrity department including changes to process, design, specifications, standards, procedures, operations and personnel. It applies to all assets where change is managed through Pipeline Integrity; and covers permanent, temporary and emergency changes.*” Further it was demonstrated that PI-82 also addressed changes that are initiated by other Enbridge departments that may affect pipeline integrity, and that the changes are communicated as required by the Liquids Pipelines (LP) MOC process. Enbridge also demonstrated that Pipeline Integrity MOC records are filed and stored formally. The Board’s review of the Liquids Pipelines (LP) MOC process indicated that it has not been incorporated within the existing IMS process.

#### Summary

The Board found that Enbridge demonstrated that it had established and implemented a number of MOC procedures and practices to document and manage change at the program level on a consistent basis. The Board identified that all departments and programs were using Enbridge’s Liquids Pipelines MOC process, including Integrity Management, as its primary corporate MOC process. The Board, however, identified that this process did not meet all of the MOC process requirements and was specifically not intended to be included within its IMS process.

The Board also found that Enbridge did not demonstrate that it had established and implemented a management system level process that meets the requirements of the OPR.

Based on the Board’s evaluation of Enbridge’s management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

### **3.4 Training, Competence and Evaluation**

**Expectations:** The company shall have an established, implemented and effective process for developing competency requirements and training programs that provide employees and other persons working with or on behalf of the company with the training that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

The company shall have an established, implemented and effective process for verifying that employees and other persons working with or on behalf of the company are trained and competent, and for supervising them to ensure that they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment. The company shall have an established, implemented and effective process for making employees and other persons working with or on behalf of the company aware of their responsibilities in relation to the processes and procedures required by the management system or the company's protection programs.

The company shall have an established, implemented and effective process for generating and managing training documents and records.

#### **References:**

OPR section 6.5(1)(j),(k),(l),(p)

CSA Z662-11, Clauses 3.1.2(c), 3.2 and 10.2.1

#### **Assessment:**

##### Governance Competency Processes and Training Program

Through interviews and document and record review, the Board found that Enbridge has established and implemented a documented, comprehensive training program applicable to its employees undertaking integrity management activities. The training program is appropriately supported and managed throughout the organization. Enbridge has developed a management system called the Enbridge Learning Management System (eLMS). eLMS provides the mechanism to register, deliver, track and record learning completions. Enbridge's Human Resources department provides support to all departments for the development of departmental content and eLearning programs and each department manages the content of programs housed in eLMS. The Board verified that Enbridge has implemented the systems to generate, manage and document the various training programs through front line interviews and inspections.

Notwithstanding Enbridge's training program implementation, the Board found that Enbridge had not established and implemented compliant,

documented processes for developing competency requirements that are used to develop training and learning programs and to establish baseline competencies required for employees and others working on behalf of the company to perform assigned tasks in a manner that is safe, ensures the security of the pipeline and protects the environment. Similarly, the Board found that Enbridge has not established and implemented a process for verifying competency as required. Interviews with staff indicated that there were undocumented competency evaluation processes being undertaken at the time of the audit; however, they did not meet the Board's management system process requirements. Record reviews conducted by the Board indicated that Enbridge had at one time implemented a formal Competency Based Training program but that had been officially discontinued a number of years ago. It was identified that staff in some of the regions were still implementing the practices of this program as a method to ensure competency of new staff.

The Board considers competency identification and verification to be a key component in assuring the safety of workers, the public, the environment and facilities. Therefore, this issue was brought to Enbridge's attention as requiring urgent attention. Enbridge has responded by developing an interim process while Enbridge's Workforce Competency and Qualification Process (WCQP), commenced in 2013, is fully rolled out. This was provided to the Board for review prior to end of its close-out discussions. While not yet demonstrated as established or implemented, based on initial interviews with departmental staff, the Board found that the described practices could meet the Board's requirements.

The Board's review of the written governance policy that had been provided by Enbridge indicated that some of the key legally required process requirements were mapped as "red". According to Enbridge's described process mapping convention this would indicate that the process steps are "aspirational" and therefore outside of its legal requirements to be measured by the Board. As noted elsewhere in this report, aspirational or stretch practices are encouraged but they cannot include legally required content within this category.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

#### Integrity Management Program Competency Process and Training Program

At the department level, IMS-09 section 4.3 refers to the *Pipeline Integrity Competency and Qualification Program* as a systematic approach to ensure that training and qualifications align with industry best practice and result in a competent workforce. Documents referenced in this section are *Pipeline Integrity Competency and Qualification Program – PI SharePoint* and the *IMS – 01 Workforce Competency and Qualification Process*, as noted above.

#### Training

Enbridge's *Pipeline Integrity Training and Qualifications Program* outlines Enbridge's processes for developing training and competency

requirements to “ensure that its personnel are qualified to fulfill tasks required to achieve Pipeline Integrity Management system objectives.” This program includes descriptions of the roles and responsibilities required to ensure effective implementation and are supported by several sub-programs to ensure personnel have access to and receive the necessary training.

Training and qualifications of provisional contractors are reviewed by Enbridge People Leaders on a case-by-case basis. Provisional contractors are provided job descriptions and expectations within their contracts. Training and qualifications requirements for non-provisioned contractors, consultants and vendors are outlined in the Supply Chain Management System.

### Effectiveness of Training

Enbridge’s procedure to review the effectiveness of its training programs is described in OMM, Book 1, *General Compliance Reference – Procedure and Training Effectiveness*. Pipeline Integrity reviews its training and qualifications program annually as part of its management system review to ensure that the program is fit-for-purpose and is delivering the desired results. The company reviewed its training and qualifications program in 2013 and documented all of the resulting improvement requirements in the 2014 *Continuous Improvement Plan* and department initiatives. Enbridge demonstrated that it is maintaining a process for reviewing the effectiveness of its training and qualifications program, and ensuring that proposed improvements are being implemented.

### Qualifications and Supervision of Contractors

OMM, Book 2, *Safety – Contractor Safety Management Program* applies to all contractors and contract personnel that perform construction or maintenance work at Enbridge facilities including the pipeline ROW. Contractors must meet the requirements of the contractor safety prequalification process before they begin to work for Enbridge. Once a contract is awarded, Enbridge operations personnel supervise the contractor throughout execution of the work. Interviews with Enbridge regional personnel and field personnel verified that contractors do not complete work for Enbridge without an Enbridge employee or representative in attendance. Enbridge refers to contractor evaluations to ensure that contractors are trained and competent to complete the work awarded to them. Enbridge has also implemented a process to ensure that contractors receive a level of supervision that helps ensure that the work is completed in a manner that is safe, ensures the security of the pipeline and protects the environment. Based on the records reviewed, the Board found that Enbridge’s processes for verifying that contractors are adequately trained and supervised has been established and implemented.

### Competence

The *Training, Competence and Assessment – Field Operations Training Services* document summarizes the current state of Enbridge’s program for assessing employee competence. According to this document, competency assessment is completed through a layered approach that consists of mandatory training, procedures, field level mentorship/supervision, and health and safety programs. An experienced employee within the same discipline mentors new hires. The duration of the mentorship is at the discretion of field leadership and depends on the new hires’ pace of development. Enbridge only permits new hires to perform safety critical tasks independently after the employee’s direct leader has deemed the person competent to do so.

The mentorship program used in the South Prairie Region (Estevan) and in the Central Region (Regina) includes documentation that states that, once mentored staff demonstrate proficiency, the mentor must complete a sign-off document. The Board did not receive records that demonstrated that Enbridge had been consistently completing this formal sign-off. Audit interviews indicated that the sign-off is presently an informal process. Enbridge does, however, have a process for supervising workers to ensure that they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment. Enbridge personnel stated that, by practice, new hires typically work with a mentor for at least one year before being allowed to undertake tasks independently. The new hires are advised verbally that they have been assessed as competent to do the tasks safely and according to prescribed procedures.

#### Awareness of Responsibilities

The Board requires the company to have an established, implemented and effective process for making employees and other persons working with or on behalf of the company aware of their responsibilities in the processes and procedures required by the management system and the company’s protection programs. In a review of programs and procedures Enbridge uses to communicate the responsibilities of employees and other persons working on behalf of the company, Enbridge demonstrated that it met the requirements of OPR Section 6.5(1)(l).

#### Generating and Managing Training Documents and Records

Enbridge’s process for generating and managing training documents and records is largely based on the following:

- Enbridge Learning Management System – to manage department training records;
- Matrix Verification Reports on the Field Operations Learning Management System (TRAC);
- Individual Development Plans – to manage training and records at an individual level; and

- Monthly Training Report for Pipeline Integrity.

In reviewing the records, Enbridge demonstrated that it had an established, implemented and effective process for generating training documents and records.

### Summary

The Board found that Enbridge had established and implemented a formal management program for identifying and managing its training requirements.

The Board also found that Enbridge had started to implement a new process for the identification and verification of worker competency. However, this new process remains non-compliant as it has not been established or implemented and that its governance management system process does not meet the Board's requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**



### 3.5 Communication

**Expectations:** The company shall have an established, implemented and effective process for the internal and external communication of information relating to safety, security and environmental protection. The process should include procedures for communication with the public, company employees, contractors, regulatory agencies and emergency responders.

#### References:

OPR section 6.5(1)(m)

CSA Z662-11 Clauses 3.1.2(d) and 3.2

#### Assessment:

##### Governance Communication Process

The Board found that Enbridge's governance level management system processes are inadequate. Enbridge's IMS-01 is limited to requiring Enbridge's IMS-01 is limited to requiring that each department must develop a communication plan and does not meet the OPR requirements.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

##### Integrity Management Program Communication

At the Program level, the Board assessed Enbridge's communication processes specific to the Pipeline Integrity Management Program. IMS-09 Section 4.4 *Communication, Participation and Engagement* provided an overview of several programs and methods being used by this department in communicating pipeline integrity related information. At the department level, Enbridge did not demonstrate that it has a formal, documented communication plan that supports the effective implementation and operation of the safety and loss management system as per CSA Z662-11 clause 3.1.2(d) and as required by Enbridge's governance management system commitments.

Regardless of the state of Enbridge's management system process, the Board found that Enbridge conducts a significant amount of internal and external communication using a number of corporate and departmental practices. During audit interviews, Enbridge personnel stated that the communication processes by which they received information about safety, security and environmental protection were effective. The Board found that Enbridge's personnel demonstrated a good understanding of integrity management information and were knowledgeable in accessing

information through the various communication methods that supported the staff comments.

Summary

The Board found that Enbridge communicated throughout its organization as a matter of practice.

The Board also found that Enbridge had not established or implemented a communication process that meets the Board's management system process requirements, the requirements outlined in CSA Z662-11 clause 3.1.2(d) and as required by its internal commitments.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

### 3.6 Documentation and Document Control

**Expectations:** The company shall have an established, implemented and effective process for identifying the documents required for the company to meet its obligations to conduct activities in a manner that ensures the safety and security of the public, company employees and the pipeline, and protection of property and the environment. The documents shall include all of the processes and procedures required as part of the company's management system.

The company shall have an established, implemented and effective process for preparing, reviewing, revising and controlling documents, including a process for obtaining approval of the documents by the appropriate authority. The documentation should be reviewed and revised at regular and planned intervals.

Documents shall be revised where changes are required as a result of legal requirements. Documents should be revised immediately where changes may result in significant negative consequences.

#### References:

OPR sections 6.5(1)(i),(n),(o), 6.5(3)

#### Assessment:

##### Governance Process for Identifying the Documents Required to Meet its Obligations

This sub-element includes the requirements to develop a process for identifying the documents required for the company to meet its obligations described in OPR section 6.

In the information provided to the Board, Enbridge indicated that its interpretation of the OPR requirements is that the required documents to meet its obligation are "those documents developed as part of the management system required by the OPR". Enbridge further identified that its management system design is comprehensive and encompasses the all of the company's activities that are designed to meet the obligations. As such it indicated that its IMS – 01 section 1.3 *Integrated Management Structure* identifies the documents required. The Board's review of this section indicated that it did not constitute a list of documents or classes/categories of required documents. It was a high level description of the nineteen management systems that comprise Enbridge's management system and high level descriptions of the content of each.

##### Governance Documentation and Document Control

During the audit, Enbridge was not able to demonstrate that it had established or implemented a governance management system process that meets the Board's Documentation and Document Control process requirements. Enbridge did not provide a documented management system process until after the Board's closeout discussions. This document was dated 22 August 2014; however, until provided by Enbridge, the Board was not presented evidence of its existence either as a document or as referred to by Enbridge staff during interviews. The Board could not therefore verify its establishment or implementation during the audit.

The Board's review of this document indicated that it did not meet the OPR management system process requirements as described elsewhere in this audit report. As well the Board could not determine the applicability of the process to the programs required in OPR section 55 as the process as written only appears to apply to the governance management system processes.

Regardless of the Enbridge's lack of compliant management system processes, the Board found that Enbridge does have some document control processes that it is presently using on a corporate basis. Enbridge governs its document processes through its *Documents Policy*, which is available on the company's intranet and through an online tool called the Governance Documents Library. The Board identified that the *Documents Policy* and its associated practices and tools set Enbridge's minimum standards for documents and document tracking.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

### Integrity Management Program Documentation and Document Control

#### Identification of Documents

As part of its demonstration of compliance with the Board's document control and management requirements, Enbridge provided its *Pipeline Integrity Management System Master Controlled Document List* and its *Facilities Integrity Master Document List*. Review of these lists identified that they constituted lists of documents to be formally managed within the program; however, they did not include management system processes that meet the OPR requirements for identification of documents required to meet its obligations under OPR section 6.

#### Preparing, Reviewing, Revising and Controlling Documents

The Board requires the company to establish and implement a process for preparing, reviewing, revising and controlling documents. The process must include obtaining approval of documents by the appropriate authority. Further, the company must document these processes and procedures. In

reviewing Enbridge's integrity management program document management processes, the Board found that Enbridge has demonstrated that it has developed and implemented processes that meet the OPR requirements at a program level.

#### Managing Change of Documents

The Board requires the company to establish and implement a process for identifying and managing any document changes. In reviewing Enbridge's integrity management program document management processes, the Board found that Enbridge has demonstrated that it has developed and implemented document change practices that meet the OPR requirements at a program level.

#### Summary

The Board found that, at the program level, Enbridge demonstrated that it had developed document control lists and procedures and practices for managing and controlling its integrity management program documents that address many of the OPR requirements.

The Board also found that, at the governance level, Enbridge provided its new IMS-01, section 4.9 *Governance Document Control Process*, dated 22 August 2014; however, Enbridge did not demonstrate that this process met the OPR requirements or had been established and implemented.

The Board also found that Enbridge did not demonstrate that it had a process for identifying the documents required to meet its obligations under OPR section 6.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 4.0 CHECKING AND CORRECTIVE ACTION

### 4.1 Inspection, Measurement and Monitoring

**Expectations:** The company shall have an established, implemented and effective process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the protection programs and for taking corrective and preventive actions if deficiencies are identified. The evaluation shall include compliance with legal requirements.

The company shall have an established, implemented and effective process for evaluating the adequacy and effectiveness of the company's management system, and for monitoring, measuring and documenting the company's performance in meeting its obligations to perform its activities in a manner that ensures the safety and security of the public, company employees and the pipeline, and protection of property and the environment.

The company shall have an established, maintained and effective data management system for monitoring and analyzing the trends in hazards, incidents and near-misses. The company shall have documentation and records resulting from the inspection and monitoring activities for its programs.

The company management system shall ensure coordination between its protection programs, and the company should integrate the results of its inspection and monitoring activities with other data in its hazard identification and analysis, risk assessments, performance measures and annual management reviews, to ensure continual improvement in meeting the company's obligations for safety, security and protection of the environment.

#### References:

OPR sections 6.1(d), 6.5(1)(g),(s),(u), (v), 56

CSA Z662-11, Clauses 3.1, 3.2, 4.18, 10.9.5

#### Assessment:

##### Governance Inspection, Measurement and Monitoring

The Board requires companies to have an established, implemented and effective process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the protection programs and for taking corrective and preventive actions if deficiencies are identified.

Through staff interviews, and document and record review, the Board found that Enbridge has documented its governance management system inspection, measurement and monitoring practices in its IMS-01 manuals. The IMS documents describe Enbridge's process for Health Checks, internal reviews, audits and external audits. The Board completed a full review of the Health Checks, internal reviews, audits and external audits as part of its evaluation of Enbridge's Internal Audits and Quality Assurance Program and has documented them in Sub-element 4.3 *Internal Audits*, below. The Board has identified deficiencies with the processes and practices that directly relate this sub-element as well. The Board, however, will not assign an additional non-compliance based on that finding within the section. Enbridge's CAP must include corrective actions that ensure that the processes will address the linked requirements within this sub-element explicitly.

#### Surveillance and Monitoring Program

The OPR requires companies to develop and implement surveillance and monitoring program. During its audit the Board identified that Enbridge undertakes numerous types and a high number of monitoring and surveillance activities of its regulated facilities. The Board found, however, that the amalgamation of activities do not meet the OPR section 39 program requirements with respect to design and management. The Board has included its program requirements with Section 1.0 *Audit Terminology and Definitions* in the attached audit report.

#### Governance Corrective and Preventative Actions

During the audit, Enbridge indicated that its IMS, section 4.6, *Corrective and Preventive Action Management Process* defines the minimum standards for administering, tracking and managing corrective and preventive actions through their implementation and resolution. This process applies to Enbridge departments and addresses events, hazards and near-misses. This process includes Health Checks, internal reviews, regulatory inspections, investigation and audits. The documentation provided at the time of the audit does not show that Enbridge's *Corrective and Preventative Action Management Process* has been fully implemented. Portions of the process, according to the process map, have only been partially implemented at the IMS level.

The Board notes that the requirement to have a process to take corrective and preventive action is included in many of the sub-elements within the Board's audit protocol and the OPR. The Board therefore requires the corrective action plan developed to address the deficiencies identified for this sub-element to explicitly include all sub-element and OPR requirements, where corrective and preventive actions are referenced.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

#### Integrity Management Program Inspection, Measurement and Monitoring

As assuring the control of pipeline and facility hazards is of primary importance to the Board, this audit included an in-depth examination of Enbridge's inspection, measurement and monitoring processes. A description of the processes and practices developed and implemented by Enbridge has been included in this sub-element. Unless otherwise noted, based on the information provided by Enbridge, no issues of non-compliance were noted during the Board's audit of Enbridge's processes and practices.

### Evaluating Adequacy and Effectiveness

As part of its demonstration of compliance Enbridge directed the Board to its IMS-09, section 5.2, *Performance Measurement Management*. This section stated, "*Pipeline Integrity performance measures are evaluated with respect to their effectiveness within the Management System and associated integrity management processes and programs. Performance measures are also evaluated against existing and proposed regulatory requirements.*" In its review of Enbridge's documentation and records, the Board found that it had established metrics for evaluating the adequacy and effectiveness of its protection programs, as per the statements. These were listed in IMS-09, Appendix 7.1 and included:

- Number of leaks or Ruptures – on the mainline or at facilities;
- Inline inspection program – planned runs versus completed runs;
- Remediation program – km of pipe replaced, % of digs completed within deadlines; and
- Inspection of high-risk facilities – planned inspections versus completed inspections.

### Surveillance and Condition Monitoring

The Board identified that Enbridge has implemented surveillance and condition monitoring activities to detect the presence of threats, monitor threat progression and reduce or eliminate the threats or hazards at their source. Enbridge uses various techniques to monitor its system, verify pipeline and facility integrity and confirm that the company's prevention mechanisms are effective. Many of these have been discussed and assessed in Section 3.1: *Operational Control – Normal Operations*.

Techniques that Enbridge uses to monitor its system and to confirm that its prevention mechanisms are effective include:

- pipeline ROW surveys;
- corrosion control surveys (cathodic protection);
- external corrosion monitoring;
- internal corrosion monitoring and chemical injection program;
- inline inspections management process;



- hydro-test management process;
- geotechnical surveys and water crossing surveys; and
- mechanical damage management programs.

Enbridge also has developed several programs to support Facilities Integrity Management. These include:

- facility (on-property) piping program;
- laterals (off-property) piping program;
- flange integrity program;
- pressure vessel integrity program;
- replacement and monitoring of sump tanks;
- above-ground storage tank integrity program; and
- ancillary small diameter piping program.

#### ROW Aerial Inspections

Enbridge stated that it relies almost exclusively on its aerial inspections for surveillance and monitoring of its pipeline ROWs. Enbridge patrols its pipeline system on a regular basis using fixed wing aircraft and helicopters. With the exception of ROW aerial inspections of Enbridge’s gathering system in Saskatchewan, all pilots completing the ROW aerial inspections are Enbridge employees. Enbridge’s South Prairie Region contracts its ROW inspections to a company in Saskatchewan that patrols the gathering system on behalf of Enbridge. CSA Z662-11, Clause 10.6.1.1 uses the term “periodically” and the OPR-99, section 39 remains silent on the patrol frequency. The Board found that Enbridge’s ROW patrol frequencies are in compliance with the intent of the standard and regulation for pipeline patrol frequency.

The Board reviewed Enbridge’s procedures and reports for aerial ROW patrols. The Board found that Enbridge’s procedures include the requirement for observing conditions and activities set out in CSA Z662-11, Clause 10.6.1.1; however, the company’s monthly patrol reports do not include verifying that each required condition and activity was surveyed or assessed during the flights. As such, Enbridge did not demonstrate that its aerial surveillance programs fully comply with the requirements of CSA Z662-11, Clause 10.6.1.1 and the OPR.

#### Monitoring of Corrosion and Chemical Injection Program

In its audit the Board identified that Enbridge samples its products periodically to ensure they meet the specifications for products transported in its

pipeline system. The company completes a chemical analysis on the samples to determine sulphur content, water content, product density and the presence of contaminants. Enbridge has installed corrosion monitoring coupons in 40 of its incoming pipelines at terminals and remote terminals through its pipeline system to monitor the effectiveness of the chemical programs put into place to manage internal corrosion. Enbridge analyzes coupons twice a year for average metal loss that may be attributed to corrosion, pitting, and/or erosion. The company also analyzes product samples to determine the adequacy of its chemical injection program by measuring the residual inhibitor.

### Cathodic Protection Monitoring

Enbridge monitors its cathodic protection programs through annual corrosion control surveys, which are primarily completed by contracted companies. Enbridge uses information from the annual cathodic protection reports for each region to compile its Pipeline Integrity cathodic protection line summary. The line summary assists Pipeline Integrity threat managers in establishing re-assessment intervals for inline inspections.

*Note: Enbridge's regulated facilities include, by necessity a significant number of "non-pipeline" facilities that require individualized integrity management and monitoring practices and activities based on technical requirements. As part of its audit, the Board reviewed these requirements separately during its integrity management program in order to ensure that an appropriate audit was conducted. The Board included it assessment within this sub-element as it best aligned with the required outcomes. The Board, however, expects that, in the developing any management system process corrective actions arising from this audit, these facilities will be explicitly considered, where appropriate.*

### Facilities Integrity Program Overview

The Enbridge Facilities Integrity department was formed in 2005 to address releases from tankage, equipment and piping in Enbridge's stations and terminals. In 2011, the Pipeline Integrity department integrated the Facilities Integrity group within its organization. The purpose of this change was to ensure that all pipelines and facilities assets have access to all of Enbridge's integrity subject matter experts, and to allow for an integrated approach between the pipeline and facility integrity management systems. Enbridge developed its Facilities Integrity management system to be in alignment with its Pipeline Integrity management system.

IMS-01, *Governing Policies and Processes*, Section 1.2, The Foundations of Integrated Management, outlines the 16 process sets required to achieve safety management and operational reliability. Number 12 is the process for System and Facilities Integrity. In this process, Enbridge describes its structured approach for assessing the integrity of its pipeline and facility assets through monitoring, inspection and evaluation programs.

While IMS-09 is the overarching document for Pipeline Integrity and Facility Integrity, Enbridge uses a tiered approach for its Facilities Integrity Program processes and procedures. Documents such as the *Facilities Integrity Management Program Framework* and the *Facilities Integrity Roles*,

*Responsibilities and Authorities Guideline* fall under the umbrella of IMS-09. These guidance documents are supported by Tier 2 processes and procedures, which are labelled with an FI number. Enbridge's FI documents provide details on the purpose, scope, responsibilities and procedures. Tier 3 procedures are taken from the OMM and provide detailed procedures for operations personnel to follow when conducting site-specific tasks. As discussed previously in this section, Enbridge has developed several programs to support Facilities Integrity Management.

### Enbridge's Functional Structure and the Facilities Integrity Management Program

The Enbridge Facilities Integrity Management Program is implemented within the facilities of Enbridge Liquids Pipelines Inc. This includes Enbridge Pipelines (Westspur) Inc., Enbridge Bakken Pipeline Company Inc., Enbridge Southern Lights GP Inc., Enbridge Pipelines (Norman Wells) Inc., as well as Enbridge's gathering systems in Enbridge Pipelines Saskatchewan Inc. and Enbridge Pipelines North Dakota (USA).

### Station Piping Program

Enbridge has developed and implemented a Facilities Integrity Management Program for its above-ground and underground station piping. Enbridge's station piping program addresses corrosion in above-ground and below-ground facility piping. According to Enbridge's Facility Integrity 2014 *Path to Zero Incidents* document, station piping accounted for approximately 7% of the releases in Enbridge facilities over the past 11 years. Enbridge's station piping program currently focuses on internal corrosion issues in piping sections of idle piping, dead-leg piping, low flow and/or intermittent flow, and low points in the piping segments. The company's station piping program also addresses the other potential threats of external corrosion that have been identified including corrosion under insulation, cracking, mechanical damage and erosion.

Enbridge implements its station piping program through its processes for identifying hazards and threats, and prioritizing facilities by risk ranking. The station piping program manager and regional Engineering and Operations staff identify the hazards and threats, and rank the risk to facilities. The company develops an annual scope of work for its priority facilities based on hazards, threats and risks identified and incorporates learnings and continuous improvement opportunities into the station piping program for subsequent cycles of risk prioritization.

### Lateral Integrity Program

Enbridge developed its initial station lateral program in response to a requirement from the US Department of Transportation for a baseline assessment of all line pipe affecting a high consequence area. The lateral integrity program was later expanded to Enbridge's Canadian operations due to the potential impact on population and environment if a release were to occur. The program covers pipelines not included in Enbridge's main

pipeline segments, such as station-to-station transfer lines. These pipeline segments are typically not piggable, except by using tethered inline inspection tools. Enbridge performs a risk prioritization based on the likelihood and consequence of failure. Enbridge's Facility Integrity group has inspected 10 laterals in Canada to date: 4 in the Western Region, 3 in the Central Region and 3 in the Eastern Region. The company has a 15 year plan to continue baseline inspections on all identified laterals. Re-inspection intervals are determined based on a condition assessment of the asset and a determination of remaining life based on its deterioration rate. Enbridge's lateral integrity program is intended to prevent leaks and ruptures within the company's facilities.

#### Small Diameter Piping Program

Enbridge has developed and implemented a Facilities Integrity Management Program for small diameter piping located within its facilities. Enbridge's small diameter piping program was implemented to reduce the frequency of leaks in its facilities by replacing installations prone to failure due to vibration of small diameter connections. Enbridge presented that 11% of the company's facilities releases in 2014 were due to small diameter piping. Enbridge annually develops a scope of work for this program that is given to Operations for implementation. Enbridge's small diameter piping integrity program is intended to prevent leaks and ruptures within its facilities.

#### Flange Integrity Program

The company implemented its flange integrity program for its buried flanges because it identified this as an area in which preventive inspection and maintenance could reduce the number of releases. Facilities releases for flanges accounted for 11% of the company's facilities releases. The initial flange integrity program focused on threats related to improper assembly, gasket damage or degradation, and flange bolt loosening. Enbridge has since identified areas of improvement for its flange assembly and torquing procedures that improve the reliability of flanged connections. Enbridge's flange integrity program is intended to prevent leaks and ruptures within its facilities.

#### Above-Ground Storage Tank Integrity Program

This program applies to the company's breakout tanks, above-ground tanks, storage tanks, atmospheric tanks, welded steel tanks for oil storage, and oil tanks. Enbridge's processes and procedures for inspection cycles, maintenance intervals and long-range planning to address above-ground storage tank integrity are in accordance with API 653, *Standard for Tank Inspection, Repair, Alteration and Reconstruction*. API 653 is the industry standard for above-ground storage tanks. Enbridge also has developed and implemented procedures to support inspection and maintenance activities. Enbridge employs API 653 certified inspectors to plan, coordinate and provide technical supervision of the company's above-ground storage tank

inspections. This was confirmed during site inspections in support of the Integrity Management program audit. Enbridge's above-ground storage tank integrity program is intended to prevent leaks and ruptures within its facilities.

#### Underground Tank Replacement and Monitoring

Enbridge has developed and implemented a program for replacing and monitoring underground sump tanks. Sump tanks are used within Enbridge's facilities for purposes, such as temporary storage of runoff products that contain flammable and/or combustible liquids. Enbridge developed its underground tank replacement and monitoring program in the 1990's in response to a voluntary guideline issued by the Canadian Council for the Ministers of the Environment. This voluntary guideline was entitled *Environmental Code of Practice for Aboveground and Underground Tank Systems Containing Petroleum and Allied Petroleum Products*. The guideline recommended that all underground single-walled steel tanks be replaced with double-walled tanks that include a leak detection system. Enbridge has addressed the recommendations by focusing on the replacement of underground tanks that do not have secondary containment and by monitoring the integrity of all other tanks, including repairs and replacements as necessary. Enbridge's underground tank replacement and monitoring integrity program is intended to prevent leaks and ruptures within its facilities.

#### Pressure Vessel Integrity Program

Enbridge has developed and implemented a Facilities Integrity Management Program for inspecting, repairing and replacing its pressure equipment. Enbridge's pressure equipment integrity program complies with API 510, *Pressure Vessel Inspection Code* and CSA B51, *Inspection and Repair of Certified Pressure Vessels*. Enbridge employs contract personnel certified as API 510 Authorized Inspectors to plan, coordinate and provide technical supervision for the pressure equipment integrity program. The pressure vessel integrity program manages 379 pressure vessels within its Canadian operations. Enbridge's program also includes assessing the integrity of all pressure equipment owned and operated by Enbridge Liquids Pipelines. This includes fired equipment such as boilers and heaters. Enbridge's pressure vessel integrity program is intended to prevent leaks and ruptures within its facilities.

#### Facilities Integrity Management Program Technical Requirements

In addition to the requirements in CSA Z662-11, Clause 3.2, Enbridge refers to two additional industry standards relevant to the station piping

program. API, RP 570, *Piping Inspection Code: In-Service Inspection, Rating, Repair and Alteration of Piping Systems* and API 2611, *Terminal Piping Inspection – Inspection of In-Service Terminal Piping Systems* provide guidance on risk-based inspection procedures, inspection methodologies, frequency and extent of inspections and data evaluation, analysis and recording. Enbridge has conducted gap analyses of its station piping program as compared to the requirements of API 570 and API 2611. The company determined that the station piping program meets or exceeds most of the requirements of the standards. Enbridge identifies some areas that require minor improvements and the company made recommendations for changes to its practices. In March 2014, Enbridge completed a *Hazard and Risk Register* for its Facilities Integrity department. A total of 40 risk scenarios were assessed. Enbridge has developed an action plan with planned completion dates to address the root cause for each identified risk.

### Geotechnical Monitoring

CSA Z662 clause 10.6.1.1(f), (g) and (h) present requirements for pipeline monitoring of geotechnical issues. Enbridge stated that it developing and implementing its geohazard mitigation design.

The audit identified that Enbridge’s geohazard management program falls within the Pipeline Integrity department. The Board was provided evidence that Enbridge’s program was managing approximately 500 slopes and 700 watercourse crossings that affect NEB regulated pipelines. The Pipeline Integrity department’s long-range plan specified the pipelines that should receive “smart pig” runs and the frequency of the runs. With “smart pig” runs, Enbridge used an Inertial Monitoring Unit to monitor slope movement in real time. In 2013, the Pipeline Integrity department conducted a geohazard baseline study to identify significant slopes and water crossings. Approximately 520 slopes and 677 water crossings were identified that affect NEB regulated pipelines. Additionally, review of Enbridge’s OMM, Book 3, 03-02-01 identified that its procedure for ROW patrols included requirements for monitoring geotechnical threats.

### Evaluating Program Effectiveness

As discussed in section 3.1, Operations Control – Normal Operations of this audit report, Enbridge’s Leak Reduction Team reviews all integrity type failures as they relate to each monitoring program. This helps ensure that the monitoring programs at Enbridge are effective and that appropriate mitigations are being used to manage the company’s pipeline system. Enbridge evaluates the effectiveness of its leak prevention programs through metrics such as the number of leaks and ruptures, and contacts (or near-contacts) on pipeline facilities.

### Summary

The Board found that, at the program level, Enbridge had met the OPR requirements with respect to developing a process for inspecting and monitoring of its activities and facilities. The Board found that Enbridge was undertaking numerous inspections and monitoring activities in support of its Integrity Management program.

The Board also found that Enbridge had implemented its surveillance and condition monitoring activities through various programs that detect threats, monitor threat progression, and reduce or eliminate the threats or hazards at their source. Enbridge used various techniques to monitor its system, verify pipeline and facility integrity, and confirm that its prevention mechanisms are effective.

The Board found that, while Enbridge was undertaking many of the activities that would normally be undertaken as part of a surveillance and monitoring program, it had not developed or implemented them in a manner that meets the Board's program requirements.

The Board found that, while Enbridge's procedures and training programs for aerial ROW patrols include the requirement for observing the conditions and activities set out in CSA Z662-11, the company's patrol reports did not include requirements to develop records that demonstrate verification that each required condition and activity was surveyed or assessed during the ROW patrols. As such, Enbridge did not demonstrate that its aerial surveillance programs comply with the requirements of OPR and CSA Z662-11.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 4.2 Investigating and Reporting Incidents and Near-misses

**Expectations:** The company shall have an established, implemented and effective process for reporting on hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions. This should include conducting investigations where required or where hazards, potential hazards, incidents and near-misses have or could have resulted in the safety and security of the public, company employees and the pipeline, and protection of property and the environment, being significantly compromised.

The company shall have an established, maintained and effective data management system for monitoring and analyzing the trends in hazards, incidents and near-misses.

The company should integrate the results of its reporting on hazards, potential hazards, incidents and near-misses with other data in hazard identification and analysis, risk assessments, performance measures and annual management reviews, to ensure continual improvement in meeting the company's obligations for safety, security and protection of the environment.

### References:

OPR sections 6.5(1)(r),(s),(u),(w),(x), 52

CSA Z662-11, Clauses 3.1.2(g) and 3.1.2(h)(i), 3.2, 10.3.6, 10.4.4 and 10.5

### Assessment:

#### Governance Investigating and Reporting Incidents and Near-misses

The Board notes that there is not a specific OPR management system or other process development requirement for investigating incidents or near-misses. The Board, however, considers processes for conducting investigations to be implicit with any process developed to satisfy OPR 6.5 (1) (r) and therefore companies must demonstrate how they develop adequate and effective corrective and preventive actions associated with incidents and near-misses.

Enbridge provided its IMS-01 4.10 Event Investigation Processes, and its IMS-01 4.6 Corrective and Preventive Action Management (CAPA) Process in support of it meeting the requirements of OPR 6.5(1)(r). The Board found that Enbridge's Event investigation Processes were designed in aid of understanding the causes of events from the perspective of root and contributory causes to prevent recurrence within the Enbridge entities to which it is applied. The processes included Event Investigation Principles, Event Impact Criteria and Low and Medium and High Impact Event Investigation Processes. The IMS-01 4.10 processes were documented in detail. Review of the associated process maps indicated that the processes



included specific links to the IMS-01, 4.6 CAPA process for assurance of consistent corrective and preventive action development and implementation. Review of the IMS- 01, 4.6 CAPA Process is documented below.

The Board noted that the process maps provided to the Board indicated that the processes had not been fully established and implemented at the time of the Board's audit. Regardless of the full implementation of the processes, the Board was able to see evidence of implementation of key investigation process activities within Enbridge's program level activities in its audit activities.

#### Governance Corrective and Preventative Actions

During the audit, Enbridge indicated that its IMS, section 4.6, *Corrective and Preventive Action Management Process* defines the minimum standards for administering, tracking and managing corrective and preventive actions through their implementation and resolution. This process applies to Enbridge departments and addresses events, hazards and near-misses. This process includes Health Checks, internal reviews, regulatory inspections, investigation and audits. The documentation provided at the time of the audit does not show that Enbridge's *Corrective and Preventative Action Management Process* has been fully implemented. Portions of the process, according to the process map, have only been partially implemented at the IMS level.

The Board notes that the requirement to have a process to take corrective and preventive action is included in many of the sub-elements within the Board's audit protocol and the OPR. The Board therefore requires the corrective action plan developed to address the deficiencies identified for this sub-element to explicitly include all sub-element and OPR requirements, where corrective and preventive actions are referenced.

*Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

#### Integrity Management Program Incident Reporting

The Board requires the company to have an established, implemented and effective process for the internal reporting of hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions, including steps for managing imminent hazards.

Enbridge's Risk Management department is responsible at the governance level for the process of internal reporting of hazards and potential hazards. The Risk Management department compiles information and generates risk reports including an annual Liquids Pipelines *Risk Report*, a *Corporate Risk Assessment* and a quarterly *Operational Risk Management Report*. Further, Pipeline Integrity and Facilities Integrity each compile and maintain a list of identified risks and hazards in *Hazard and Risk Registers*. The *Hazard and Risk Registers* include planned actions, status of planned actions,

action owners and planned and actual completion dates. Controls to; prevent, manage and mitigate the identified hazards and risks are also listed and assessed in each of the *Hazard and Risk Registers*.

At the program level, IMS-09, section 4.5.7, *Pipeline Incident Management* outlines processes and supporting procedures for the internal reporting of hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions, including steps to manage imminent hazards. Hazards, potential hazards and threats identified through ROW inspections (aerial and land-based) are communicated immediately to Enbridge Operations personnel. All hazards and threats found during ROW inspections are summarized in daily reports that are provided to Enbridge Operations. Employees can access these daily reports on the company's database. Enbridge is a member of Alberta One-Call and Saskatchewan First-Call. All hazards, potential hazards and threats, including the potential for third-party strikes, are reported directly to key Enbridge personnel for immediate action and mitigation. Once identified, integrity related hazards or potential hazards are reported and communicated through various means, depending on the hazards or potential hazards. All leaks are reported and communicated through Enbridge's online Leak Reporting System, which is accessible by all employees and automatically sends reports to key personnel identified in the system.

Enbridge's Leak Reduction Team monitors and analyzes causes of systemic leaks, and makes recommendations for system-wide initiatives for reducing leaks on the Liquid Pipelines system. To capture a wide range of experience and knowledge, this team is comprised of personnel from several functional areas with roles in leak reduction.

Enbridge has developed an *Event Learning Process* for documenting and managing corrective and preventive actions to enhance the company's Pipeline Integrity Management Program. Hazards, incidents and near-misses are included as events within this process. The *Event Learning Process* provides procedures and the mechanism for documenting and investigating events, developing and completing corrective action plans, and documenting learnings. Records and resources for the *Event Learning Process* are available to Enbridge employees through the Pipeline Integrity SharePoint site.

Enbridge integrates the results of its reporting of hazards, potential hazards, incidents and near-misses with other data in hazard identification and analysis, risk assessments, performance measures and annual management reviews, to ensure continual improvement. Enbridge's integrates Enbridge's list of identified risks and the status of these risks into an annual Liquids Pipelines *Risk Report*, a *Corporate Risk Assessment* and a quarterly *Operational Risk Management Report*. These reports and records are supported by the data in the Pipeline Integrity and Facilities Integrity *Hazard and Risk Registers*. Enbridge communicates these reports directly with staff and by providing them for review on its intranet. Progress in managing or mitigating operational hazards and risks are communicated to senior management through the *Operational Risk Management Plan*.

## Summary

The Board found that Enbridge has developed and implemented its *Event Learning Process* for documenting and investigating events that include hazards, incidents and near-misses. This process also included requirements for developing and completing corrective action plans, and documenting learnings.

The Board also found that, at the governance level, Enbridge's IMS-01, section 4.10 Event Investigation Processes, dated 11-December 2013 had been documented and included in its Governing Policies and Processes Management System manual and that key activities were being implemented within its programs. These processes were, however, identified as "In Progress" and therefore not established and implemented.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

### 4.3 Internal Audits

**Expectations:** The company shall have an established, implemented and effective quality assurance program for its management system and for each protection program, including a process for conducting regular inspections and audits and for taking corrective and preventive actions if deficiencies are identified. The audit process should identify and manage the training and competency requirements for staff carrying out the audits.

The company should integrate the results of its audits with other data in hazard identification and analysis, risk assessment, performance measures and annual management review, to ensure continual improvement in meeting the company's obligations for safety, security and protection of the environment.

OPR section 6.5(1)(w),(x)

#### **Assessment:**

##### Governance Quality Assurance Program

During the Board's audit, Enbridge indicated that quality assurance is implicit within a management system, especially within the "Check-Act" elements of the standard "Plan-Do-Check-Act" structure to which it follows. Therefore, Enbridge's indicated that it met the Board's requirements to establish and implement a documented Quality Assurance Program by having a documented, appropriately designed management system that incorporates quality assurance activities.

In reviewing Enbridge's "Check-Act" elements, the Board noted that they do contain a number of activities that would normally be considered quality assurance activities. Examples of these activities are inspections, audits, data trending, monitoring performance measures, etc. Within the limitations of the results of the Board's audit associated with the elements, the Board was able to view records of the activities being implemented as required.

The Board has found, however, that Enbridge's interpretation of Quality Assurance Program is incorrect. The Board has found that Enbridge has not met its expectations with respect to "programs". The Board has provided clear guidance as part of the guidance notes that accompany the OPR that a program is not simply a description of activities. Programs are: "a documented set of processes and procedures designed to regularly accomplish a result. A program outlines how plans, processes and procedures are linked, and how each one contributes toward the result. Program planning and evaluation are conducted regularly to check that the program is achieving intended results". The Board's definition is included in Section 1.0 *Audit Terminology and Definitions* of the attached audit report.

## Governance Internal Audits

Enbridge indicated that its management system includes processes that meet the Board's auditing process requirements. Enbridge indicated that it accounts for the OPR requirements using a combination of its Health Check and Internal Review processes. While not standard in its approach to conducting audits, the Board reviewed Enbridge's practice to determine whether it met the OPR requirements. Additionally, Enbridge indicated that the Board should consider the audits completed as part of its Internal Auditing program activities as part of its demonstration of undertaking the required audits.

The Board found through its review of documentation and records associated with the two referenced processes that they did not individually or together constitute a compliant auditing process. The Board found that both processes were specifically designed not to be exhaustive in their reviews of practice, processes or legal requirements. Further, the Internal Review process had not been fully established or implemented at the time of the audit. Enbridge was in the process of confirming the design of the process by conducting a review of one of its internal processes.

As noted, Enbridge provided a description of its Internal Auditing process and activities as well as selected records of completed audits as a demonstration of completing audits. Review of the Internal Audit process indicated that it was a process designed to be implemented based on corporate risk priorities as directed by Enbridge's senior governance and not a repeatable compliance review process applicable directly to the Board's requirements. Additionally, the audit records did not demonstrate it had conducted audits compliant with OPR sections 53 or 55.

Additionally, Enbridge indicated that it had conducted a number of internal and 3<sup>rd</sup> party assessments of its management system against its OPR requirements. Review of the associated records provided by Enbridge indicated that they were evaluations of the alignment of Enbridge's management systems with the OPR management system and program requirements and did not evaluate the adequacy and effectiveness or compliance of the company practices.

Based on the Board's review of Enbridge's audit processes, audit activities completed to date and other linked processes such as those related to legal requirements, Enbridge was unable to demonstrate that it had completed audits consistent with section 53 of OPR. Further, the Board finds Enbridge's integrated management system process for conducting audits does not meet the Board's requirements from the perspective of present design and of Enbridge's interpretation of audits.

As noted above, Enbridge's Health Check and Internal Review processes have specific design issues that, when evaluated together, do not meet the Board's audit expectations with respect to comprehensiveness of the required audits. Additionally, the Board finds that Enbridge's interpretation that the OPR audit requirements can be met using a combination of processes conducted over a number years is incorrect. The Board notes that there is a common understanding that an audit is a discrete verification activity that allows for an assessment of conformance/compliance to be made at a given

time. The Board notes that the comprehensive audits it requires necessitates evaluation of systems and programs that require evaluation of linked processes and evaluations of the adequacy and implementation of the system, programs and processes. This requires specific coordination of the reviews in terms of time, processes, programs and regions. Enbridge's present practices, based on its interpretation of the regulations, do not allow for the required assessments to be made. The Board understands that audits often contain a number of different activities; however, each activity is coordinated within the auditing process and scheduled within the individual plan for the audit.

#### Auditor Training

This sub-element indicates that a company audit process should identify and manage the training and competency requirements for staff carrying out the audits. Enbridge did not demonstrate that its training and competency activities account for staff implementing its audit related processes. The Corrective Action Plan associated with the Board's Non-Compliant finding related to Training and Competency and Evaluation as described in sub-element 3.4 above will need to explicitly address this issue.

#### Governance Corrective and Preventive Actions Process

The Board's audit process requirements include establishment and implementation of a process for taking corrective and preventive actions to address any deficiencies identified by the audits. As part of its review of the documentation and records provided by Enbridge, the Board reviewed the establishment and implementation Enbridge's corrective and preventive action process. The Board found that Enbridge had developed a Corrective and Preventive Action (CAPA) Management Process and included it within its IMS governance documentation (IMS-01, section 4.6 *Corrective and Preventive Action Management Process*). Review of this governance process indicated that it did not meet the Board's process design requirements as outlined in Section 1.0 *Audit Terminology and Definitions* section of the attached audit report. For example there are no definitions of corrective or preventive actions or appropriate linkages to or from other management system processes. Additionally, the process map indicated that none of the required steps were fully implemented.

The Board notes that the requirement to have a process to take corrective and preventive action is included in many of the sub-elements within the Board's audit protocol and the OPR. The Board therefore requires the corrective action plan developed to address the deficiencies identified for this sub-element to explicitly include all sub-element and OPR requirements, where corrective and preventive actions are referenced.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

#### Integrity Management Program Quality Assurance Program and Internal Audits.

As noted above, Enbridge was unable to demonstrate that it has an established, implemented and effective quality assurance program for its management system and Integrity Management Program; however, the company did provide several examples of completed audit activities and did provide an overview of several integrity related inspection programs which are being completed on a regular basis.

At the integrity management program level, Enbridge uses various techniques to monitor its system, verify pipeline integrity and facility integrity and confirm that its prevention mechanisms are effective. Enbridge's inspection, surveillance and monitoring activities are implemented to evaluate the adequacy and effectiveness of its protection programs as outlined in IMS-09, *Pipeline Integrity Management System* and section 5.2, *Verification and Review – Performance Measurement Management*. Enbridge also evaluates its performance measures against existing and proposed regulatory requirements.

During the audit, Enbridge provided records relating to a number of its Integrity Management program audit activities that it had completed in the past.

Enbridge provided the following examples of audits completed or planned:

- Internal Audit department reviews (Contractor Safety Management, Western Region Audit, Eastern Region Audit) – Review of these records indicated that the activities focused largely on field operations and included corrective actions, status and timelines.
- Regional/functional reviews – Review of these records indicated that the activities did not focus on Enbridge's management system and were not completed on a regular basis.
- Health Checks for departments and projects – Review of these records indicated that the activities indicated that they were completed as per Enbridge's requirements, but as described previously did not meet the Board's requirements.
- 2011 Integrity Management Program Pre-audit and Audit Summary – Review of these records indicated that this activity was based on the USA Pipeline and Hazardous Materials Safety Administration's *Standard Inspection Report of a Liquid or Gas Pipeline Carrier*" and applicable Canadian Federal audit protocols. The review assessed compliance with USA and Canadian regulatory requirements. However, the report provided to the Board did not include corrective action plans, timelines or follow-up to findings. For this reason, the Board found that the activity did not constitute an adequate and effective audit of Enbridge's Integrity Management Program.

During the review of Enbridge's Integrity Management program, the company indicated that the reviews completed by this and other functional or program areas should be considered together to demonstrate that it has conducted audits of its program areas as required by OPR Section 53. Based on its review of the documentation and records provided by Enbridge, the Board has found that Enbridge has not met its section 53 audit requirements for this program.

## Summary

The Board found that Enbridge demonstrated that it is conducting many of the activities that normally are contained within a quality assurance program on a regular basis.

The Board also found deficiencies with Enbridge's Quality Assurance Program both from the perspective of definition and design.

Enbridge provided several examples of completed audit related activities; however, the Board found deficiencies with respect to the design of the management system audit processes and activities. The Board also found that Enbridge was not able to demonstrate that it has undertaken audits consistent with the OPR requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**



#### 4.4 Records Management

**Expectations:** The company shall have an established, implemented and effective process for generating, retaining, and maintaining records that document the implementation of the management system and its protection programs, and for providing access to those who require them in the course of their duties.

#### References:

OPR section 6.5(1)(p)

#### Assessment:

##### Governance Records Management

During the Board's audit, Enbridge provided the Board with a copy of its draft governance Records Management Process. The Board's review indicated that process incorporated its existing practices along with new requirements within it. The Board could not determine the adequacy of the process as some of the referenced Tier 2 and 3 documents were not provided with Enbridge's submission. As well, the Board did not find that the process was established or implemented as it was considered by Enbridge to be in draft format and staff interviewed did not refer to it as a required process during interviews. The Board found that Enbridge has not established or implemented a management system process that meets the OPR requirements. This lack of a compliant management system process, however, is not indicative of a lack of formal records management within Enbridge.

The Board found that, at the time of the audit, Enbridge managed its records according to its *Records Management Policy*. Based on this policy Enbridge had developed its *Records Retention Schedule* and *Records Development and Sustainment Standard* that further guided its records practices. In reviewing these documents, the Board found that Enbridge has established practices for generating, retaining and maintaining its corporate records.

The Board's review of Enbridge's corporate records management practices identified that the company's Records Management department is responsible for developing and maintaining the company's records management requirements and recommended processes and that its individual department managers are responsible for maintaining and implementing processes and practices at the department level. Department managers develop, maintain and implement departmental records procedures that are aligned with the company's records management requirements. During its audit the Board found that the established requirements and practices were being implemented on a consistent basis and that the existing

requirements were incorporated into the draft Records Management Process.

*(Note: During its audit the Board noted that Enbridge's Management and Protection Programs are directed by its Governance Management System Processes; therefore, a full review of the Governance Processes and their application at the "program" level follows.)*

### Integrity Management Program Records Management

At the program level, Enbridge demonstrated that it has established and implemented processes for generating, retaining and maintaining records related to the implementation of its Integrity Management Program.

The Pipeline Integrity department is responsible for ensuring that integrity management records are generated and retained in accordance with the company's records management policies and procedures. These policies and procedures are provided by the Enbridge *Records Retention Schedule* and the *Information Management Records Retention Guideline*. The *Records Retention Schedule* identifies 40 categories of information and evidence that define business functions, activities, transactions and processes, and must therefore be handled according to the creation and retention requirements.

The Pipeline Integrity *Data Matrix* identifies data groups related to pipeline asset information, inline inspections, non-destructive examinations, dig information, pipeline operating conditions and facility asset information. These data groups are subdivided into data elements. Pipeline Integrity data management systems are identified for each element. These data management systems include OneSource, eDig, PipeTrax2, Pressure Restriction Tracking, Maximo, PI Google Earth, ILI Run History and Line Summary.

During the audit interviews and site inspections, the Board observed evidence of the data management system Enbridge has implemented to manage its Integrity Management program records. The records obtained from the data management system adhere to Enbridge's Records Classification System and *Retention Schedule*. No issues were identified during the audit.

### Summary

The Board found that Enbridge had developed a draft governance Records Management Process as part of its management system.

The Board also found that Enbridge had implemented a consistent records management practice for application across its organization that resulted in appropriate records management practice being implemented at the program and corporate levels.

The Board also found that, due to the draft nature of the process and the lack of Tier 2 and 3 documentation provided during the audit, Enbridge did

not demonstrate that it has established and implemented a management system process that meets the OPR requirements.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

## 5.0 MANAGEMENT REVIEW

### 5.1 Management Review

**Expectations:** The company shall have an established, implemented and effective process for conducting an annual management review of the management system and each protection program and for ensuring continual improvement in meeting the company's obligations to perform its activities in a manner that ensures the safety and security of the public, company employees and the pipeline, and protection of property and the environment. The management review should include a review of any decisions, actions and commitments which relate to the improvement of the management system and protection programs, and the company's overall performance.

The company shall complete an annual report for the previous calendar year, signed by the accountable officer, that describes the performance of the company's management system in meeting its obligations for safety, security and protection of the environment and the company's achievement of its goals, objectives and targets during that year, as measured by the performance measures developed under the management system and any actions taken during that year to correct deficiencies identified by the quality assurance program. The company shall submit to the Board a statement, signed by the accountable officer, no later than April 30 of each year, indicating that it has completed its annual report.

#### References:

OPR sections 6.5(1)(w), (x), 6.6

CSA Z662-11, Clauses 3.1.2 (h)(iii) and 3.2

#### Assessment:

*(The sub-element is attributed to companies' senior management and Accountable Officer; therefore, the Board does not break up its review into governance and program levels.)*

#### Annual Management Reviews

IMS-01, section 4.3 outlines the *Management System Review Process* for ensuring that each management system, including IMS-09, is reviewed annually to confirm that the desired results are being achieved. As detailed in IMS-09, section 6.0, *Management System Review*, Pipeline Integrity completes an annual management system review of IMS-09 using its PI-84, *Pipeline Integrity Management System Review* procedure. Enbridge completes this review to evaluate the overall performance of its Integrity Management program. The review also enables the company to identify

and address areas of improvement that may be required to meet specific priorities of the Pipeline Integrity department, and the priorities and obligations of the company. The Board reviewed the 2012 *Management Review Report* and the 2013 *Pipeline Integrity Management System Review Report*. Both reports demonstrated that Enbridge assesses its Pipeline Integrity Management program activities, results and completed improvements. The reports also included a list of planned improvements. Enbridge indicated that an additional process, PC-1801, *Accountable Officer Report Development Process*, is also used to evaluate the management system. The output of the PC-1801 process is the *Annual Report*.

Upon reviewing of Enbridge's processes and records supporting implementation of an annual management review, the Board noted the following:

- IMS-01, *Management System Review Process* is not fully established; as defined by Enbridge standards, all process steps were considered aspirational;
- PC-1801, *Accountable Officer Report Development Process* is not referenced or inferred in IMS-01 or IMS-09, and thus is not integrated into Enbridge's management system;
- PC-1801, *Accountable Officer Report Development Process* is not established as per the Board's working definition (approval date on the document is 21 October 2014); and
- While certain tasks are being reviewed by practice or by exception, the IMS-09 annual review process does not include a review of the implementation of the Integrity Management program at the operations level.

Based on the Board's evaluation of Enbridge's Management System and Integrity Management Program against the requirements, the Board has determined that Enbridge has not established and implemented a process for conducting an annual review of its management system and protection program. Enbridge will have to develop corrective actions to address the described deficiencies.

#### Adequacy and Effectiveness of the Management System

While the Board has listed this requirement under sub-element 4.1 of the Protocol, Enbridge indicated during the audit that its IMS-01, *Management System Review Process* is also used to evaluate the adequacy and effectiveness of the company's management system. When reviewing the content of this governance process, Enbridge indicated that each process within the management system is reviewed to ensure effectiveness. Enbridge's IMS-09, *Management System Review Process* overviews this requirement. Enbridge has developed an additional process, PC-1701, *Management System Evaluation Process*. The PC-1701 process includes an evaluation of the adequacy and effectiveness of the overall management system.

Records provided to demonstrate implementation of these processes include:

- 2012 and 2013 Pipeline Integrity Management System Review Reports;

- 2013 Internal Management System Alignment Assessment; and
- 3<sup>rd</sup> Party Assessment (Dynamic Risk) completed in 2013.

Upon review of the various processes and records supporting the implementation of a process for evaluating the adequacy and effectiveness of the company's management system, the Board noted the following:

- IMS-01, *Management System Review Process* is not fully established; as defined by Enbridge standards, all process steps were considered aspirational;
- IMS-01, *Management Review Process* does not include an evaluation of the adequacy of the management system;
- PC-1701, *Management System Evaluation Process* is not referenced or inferred in IMS-01 or IMS-09, and thus is not integrated into Enbridge's management system;
- *Internal Management System Alignment Assessment* describes assessing adequacy, effectiveness and implementation of processes, but it is based on the OPR requirements and not an evaluation of Enbridge's management system as designed;
- 3<sup>rd</sup> Party Assessment (Dynamic Risk) is strictly an alignment/compliance assessment to the OPR 6.1-6.6 requirements and does not attest to the adequacy or effectiveness of Enbridge's management system (IMS 01 et al); and
- Records from the IMS-09, *Management Review Process* could not confirm that the management system has been fully reviewed for adequacy.

Based on the Board's evaluation of Enbridge's management system and Integrity Management program against the requirements, the Board has determined that Enbridge has not established and implemented a process for evaluating the adequacy and effectiveness of the management system. Enbridge will have to develop corrective actions to address the described deficiencies.

### Annual Report

Enbridge develops an *Annual Accountable Officer Report* that describes the performance of the company's management system in meeting its obligations for safety, security and protection of the environment. The report also describes the company's performance in achieving its goals, objectives and targets during that year. The company's performance is evaluated against the performance measures developed under the management system and any actions taken that year to correct deficiencies identified by the quality assurance program. The PC-1801, *Accountable Officer Report Development Process* describes the required process for developing the *Annual Accountable Officer Report*. According to this process, the *Annual Accountable Officer Report* must "detail the performance of Enbridge LP management system and will cover areas of

*leadership, performance measures, internal review, management review and corrective actions taken.*” The report must also include details about achievement of goals, objectives and targets during that year as assessed through performance measures.

According to the PC-1801, *Accountable Officer Report Development Process*, Enbridge must complete its *Annual Accountable Officer Report*, have it signed by the accountable officer, and submit it to the Board no later than April 30 of each year. The Board confirmed that the *Annual Accountable Officer Report* for the 2013 performance year was signed by the accountable officer and submitted to the Board by 30 April 30 2014.

Upon review of the *Annual Report*, the Board noted that the report does reference some internal and external reviews conducted on the management system. The *Annual Report* also includes a section that describes the actions taken that year to address deficiencies. However, Enbridge’s *Annual Report* does not specify the deficiencies and actions items, and does not focus on the development and status of the management system. While it is important to communicate this information to the accountable officer, it is not fully representative of Board’s quality assurance program requirement (see sub-element 4.3). Thus, it is unclear whether the accountable officer is aware of the actions taken that year to address deficiencies identified by the quality assurance program. The Board also noted that the deficiencies identified in sub-elements 1.2 and 2.3 will need to be addressed in future annual reports.

#### Management Responsibility

Further to the review of these processes and activities, the Board notes that Enbridge has not conducted audits consistent with its OPR obligations. The Board views the responsibility for undertaking these audits as resting with the company’s senior management (as represented by its Accountable Officer) as the annual report developed as per OPR specifically requires review and reporting on aspects of the Quality Assurance Program (specifically including audits) and the performance of the management system in meeting its obligations under OPR section 6. Additionally, the Board has made Non-Compliant findings related Sub-elements *1.2 Policy and Commitment Statements and 2.3 Goals, Objectives and Targets* that relate to the development of explicit policies and goals required by the OPR. While the Board’s Non-Compliant findings are mitigated by the nature of the deficiencies (implicit inclusion vs. explicit requirements), it is the responsibility of company management to ensure the development and implementation of compliant policies and goals that guide the companies management system and programs.

#### Summary

The Board found that Enbridge had developed processes for and undertaken activities relating to its Management Review responsibilities.

The Board also found that Enbridge’s processes did not meet all of the requirements outlined in the OPR. Additionally, the Board has found that Enbridge has not conducted audits consistent with the requirements of OPR section 53.

Based on the Board’s evaluation of Enbridge’s management system and Integrity Management program against the requirements, the Board has determined that Enbridge is Non-Compliant with this sub-element. Enbridge will have to develop corrective actions to address the described deficiencies.

**Compliance Status: Non-Compliant**

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<sup>i</sup>The “References” in this table contain specific examples of the legal requirements applicable to each element but are not exhaustive and do not represent a complete list of all applicable legal requirements audited to, which are found within the NEB Act and its associated regulations, as well as other applicable legislation, technical and other standards including the *Canada Labour Code* and CSA Z662, and any conditions contained within applicable certificates or orders enforced by the Board.



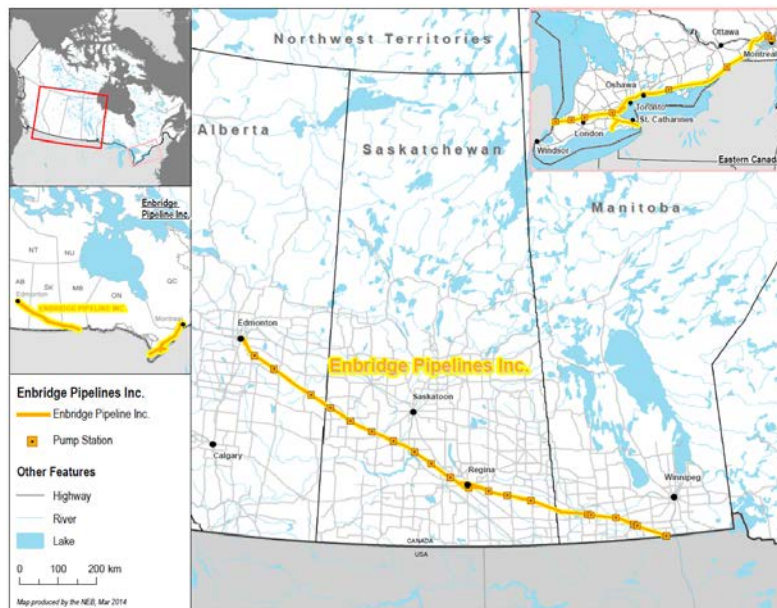
**APPENDIX II**  
**ENBRIDGE PIPELINES INC.**  
**MAPS AND SYSTEM DESCRIPTIONS**

Enbridge Pipelines Inc. and its subsidiaries included in the scope of this audit included specifically:

- Enbridge Pipelines Inc.;
- Enbridge Bakken Pipeline Company Inc. on behalf of Enbridge Bakken Pipeline Limited Partnership;
- Enbridge Southern Lights GP Inc. on behalf of Enbridge Southern Lights LP;
- Enbridge Pipelines (NW) Inc.; and
- Enbridge Pipelines (Westspur) Inc.

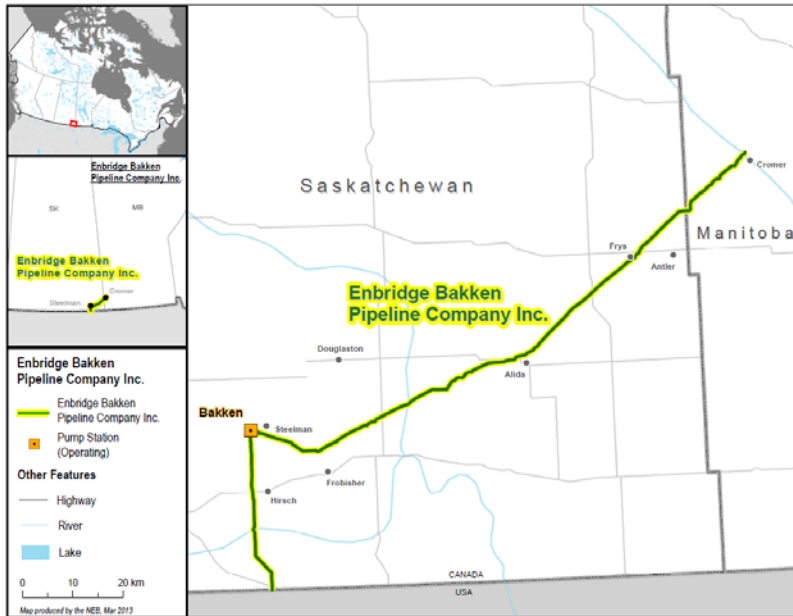
These subsidiaries hold the certificates for Enbridge’s NEB-regulated facilities.

**Figure 1: Enbridge Pipelines Inc.**



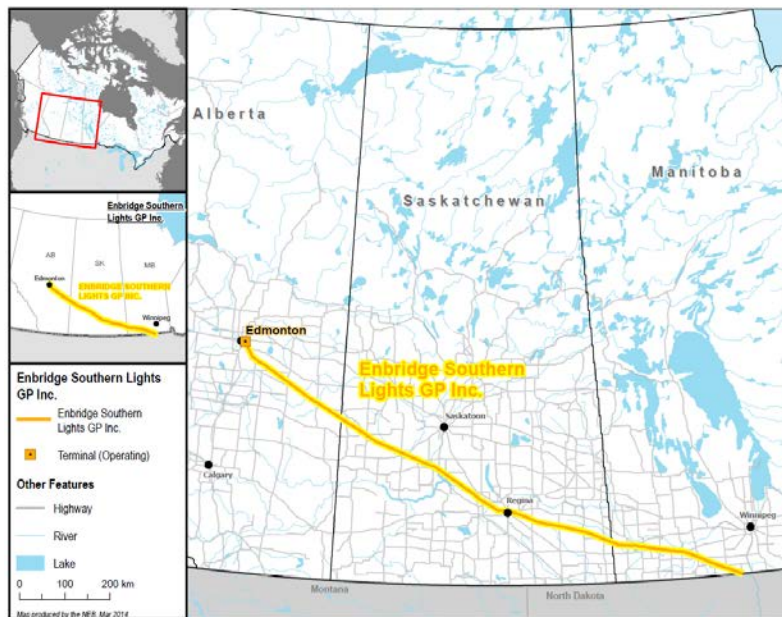
The Enbridge pipeline system, shown in Figure 1, is 7,747.04 km of oil pipelines that extend from Edmonton, Alberta, to Montréal, Québec, connecting with other oil pipelines in the United States at the Manitoba/North Dakota and Michigan/Sarnia Ontario borders.

**Figure 2: Enbridge Bakken Pipeline Company Inc.**



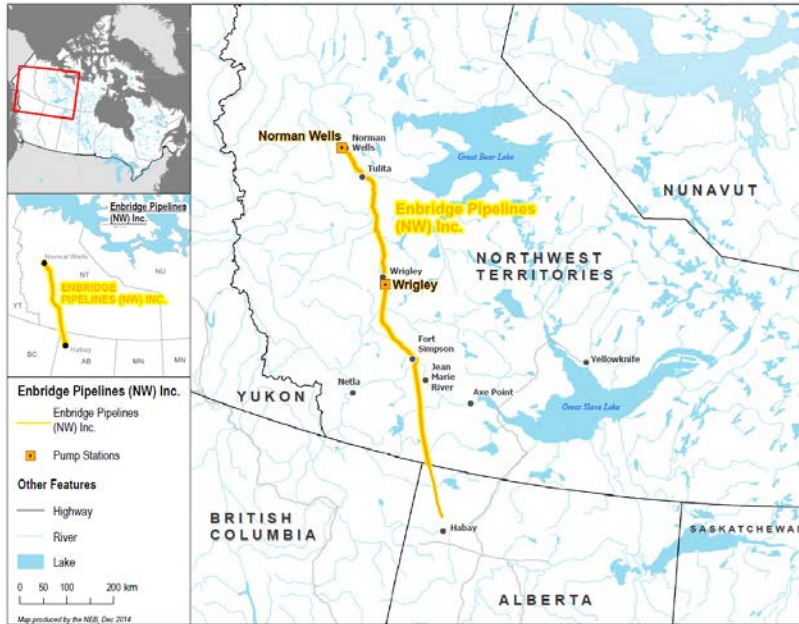
The Enbridge Bakken pipeline, shown in Figure 2, is a 157.28 km pipeline that transports oil from Cromer, Manitoba to the Saskatchewan/North Dakota border. The Enbridge Bakken pipeline continues into the United States.

**Figure 3: Enbridge Southern Lights GP. Inc**



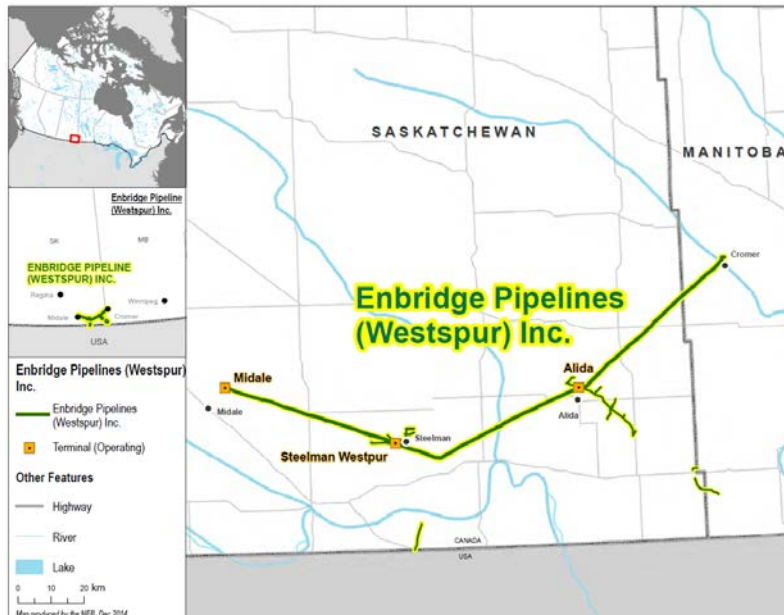
The Enbridge Southern Lights pipeline, shown in Figure 3, is a 1529.75 km pipeline that transports oil from Edmonton Alberta to the Manitoba/North Dakota border. The Enbridge Southern Lights pipeline continues into the United States.

**Figure 4: Enbridge Pipelines (NW) Inc.**



The Enbridge (NW) pipeline, shown in Figure 4, is a 854.65 km pipeline that transports oil from Norman Wells, Northwest Territories into Northern Alberta.

**Figure 5: Enbridge Pipelines (Westspur) Inc.**



The Enbridge Westspur pipeline, shown in Figure 5, is a 483.33 km pipeline that transports oil and gas from Midale Saskatchewan to Cromer Manitoba.

**APPENDIX III**  
**ENBRIDGE PIPELINES INC.**  
**COMPANY REPRESENTATIVES INTERVIEWED – INTEGRITY MANAGEMENT PROGRAM**

<b>Company Representative Interviewed</b>	<b>Job Title</b>
██████████	Land Information Management Senior Advisor
██████████	Director Leadership & LS
██████████	Senior Analyst QMS
██████████████████	Director HR Business Support
██████████	Engineering Specialist
██████████	Safety Coordinator
██████████	Senior Corrosion Technician
██████████	S.M.T
██████████	Senior Corrosion Technician
██████████	Senior Manager Aviation
██████████████████	Senior Director RCIM
██████████	EIT Pipeline Compliance
██████████	Senior Manager Facilities Integrity
██████████	Electrical Maintenance
██████████████████	PLM Welder
██████████	Supervisor PLM Services
██████████	Safety Coordinator
██████████	Microprocessor Coordinator

[REDACTED]	Information Management Program Analyst
[REDACTED]	Supervisor Reliability Solutions
[REDACTED]	PLM
[REDACTED]	Operations Coordinator Cromer Area
[REDACTED]	Senior Manager Compliance
[REDACTED]	Senior Electrical Technician
[REDACTED]	Manager Learning Solutions
[REDACTED]	Senior Baron Pilot Aviation
[REDACTED]	Manager Pipeline Compliance
Dale Burgess	Vice President Canadian Operations
[REDACTED]	Manager RINI
[REDACTED]	Senior Engineering Services
[REDACTED]	Compliance Security Coordinator
[REDACTED]	Director
[REDACTED]	Manager RS&D
[REDACTED]	Electrical/Corrosion
[REDACTED]	Acting Area Supervisor
[REDACTED]	Senior Engineer
[REDACTED]	Supervisor PLM Services
[REDACTED]	Senior Manager Program logistics
[REDACTED]	Public Awareness Advisor
[REDACTED]	Supervisor Compliance RCIM
[REDACTED]	Senior Manager Integrity Planning

██████████	Engineer Integrity
██████████	Senior Mechanical Technician
██████████	Manager Media Relations
██████████	Manager RS&D
██████████	Sr. Electrical Technician
██████████	Internal Audit Manger
██████████	Sr. Electrical Technician
██████████	S.M.T
██████████	Manager
██████████	Senior Mechanic
██████████	CP Technician
██████████	S.M.T
██████████	Sr. Mechanical Technician
██████████	Leader OMM Management
██████████	Pipeline Engineer
██████████	SME Corrosion
██████████	Director, Eastern Region
██████████	Coordinator Maintenance Services - Sarnia
██████████	Supervisor Operation Training
██████████	SME Corrosion
██████████	Manager Edmonton
██████████	Coordinator Maintenance Services - Westover

██████████	Maintenance Technician #1
██████████	PLM
██████████	Director EPSI
██████████	Training and Qualifications Program Lead
██████████	Kerrobot PLM
██████████	Damage Prevention Advisor
██████████	Leader Internal Coms (LP)
██████████	Senior Manager Risk Management
██████████	Senior Manager O&M Service
██████████	Compliance Coordinator
██████████	Supervisor P/L Services
██████████	Senior Integrity Engineer
██████████	Manager Reg. Services
██████████	Manager RSS
██████████	Maintenance Coordinator
██████████	Supervisor Corrosion Control
██████████	Senior Manager Risk Manager
██████████	Training Coordinator
██████████	PLM Supervisor
██████████	Engineer
██████████	SME Corrosion
██████████	Director Integrity Systems
██████████	Community Relation Specialist

[REDACTED]	Ethics and Compliance Officer
[REDACTED]	Engineer Dep. Prog.
[REDACTED]	Manager Integrated Management Governance
[REDACTED]	Director Central Region
[REDACTED]	Area Operations Manager
[REDACTED]	Manager Facilities Integrity Programs
[REDACTED]	Kerrobot PLM
[REDACTED]	Advisor LP H&S
[REDACTED]	Senior Manager Integrity Services Pipeline Integrity
[REDACTED]	Sr. Mechanical Technician
[REDACTED]	Manager Area Operations
[REDACTED]	Manager Integrity Services
[REDACTED]	PLM Coordinator
[REDACTED]	PLM QMS Manager
[REDACTED]	Damage Inspector
[REDACTED]	Senior Mech. Technologist
[REDACTED]	Engineer
[REDACTED]	PC Analyst
[REDACTED]	Manager Information Management
[REDACTED]	Area Supervisor
[REDACTED]	PLM Services - Westover
[REDACTED]	Senior Engineer QMS
[REDACTED]	Senior Manager Strategic Planning



[REDACTED]	PLM
[REDACTED]	Supervisor CCO Engineering
[REDACTED]	Manager Communications Enterprise
[REDACTED]	Senior Manager Compliance
[REDACTED]	Senior Electrical Technician
[REDACTED]	Emergency Response Coordinator
[REDACTED]	PLM Services - Westover
[REDACTED]	Supervisor Damage Prevention
[REDACTED]	Director Environment
[REDACTED]	Tank Engineer
[REDACTED]	Manager Corrosion
[REDACTED]	Project Coordinator
[REDACTED]	EIT Integrity
[REDACTED]	Senior Compliance Specialist
[REDACTED]	Senior Integrity Engineer
[REDACTED]	Manager
[REDACTED]	Senior Manager Integrated Management
[REDACTED]	Engineer
[REDACTED]	Sarnia Operations
[REDACTED]	Team Lead Crossings
[REDACTED]	Senior Manager Regional Services
[REDACTED]	Team Lead Engineering Services
[REDACTED]	Safety Coordinator

[REDACTED]	SME Corrosion
[REDACTED]	Supervisor Project Services
[REDACTED]	SML Corrosion Programs
[REDACTED]	Senior Manager Integrity Reliability
Walter Kresic	Vice President Pipeline Integrity
[REDACTED]	Supervisor Tech Services
[REDACTED]	Hardisty Maintenance Coordinator
[REDACTED]	Manager Land Services
[REDACTED]	Pipeline Integrity
[REDACTED]	Kerrobert PLM
[REDACTED]	Manager Crack Group
[REDACTED]	PLM

**APPENDIX IV**  
**ENBRIDGE PIPELINES INC.**  
**DOCUMENTS REVIEWED\* – INTEGRITY MANAGEMENT PROGRAM**

NAME
02 IN 5.0 D PI-84 Management System Review Procedure V01
02 IN 5.0 R 2012 Management Review Integrity Management System V01
02 Major Outage Coordination Upstream Downstream Lines
02 Major Outage Coordination Upstream Lines (April 09, 2014) NEB-regulated1
02 NEB tanks 2014 and OOS inspections planned Rev1
02 PIMS (IMS-09) Framework V01
02 Response 2014 Station Piping Scope of Work- NEB-Regulated Assets
02 Response Eastern Canada Dig Schedule - Line 9
02 Response Eastern Canada Dig Schedule - Lines 8 and 11
02 response NEB Regulated Pressure Vessels - Shipped Product Only
02 response Pig Runs-ILI -Maintenance Pigging Activities - May to August 2014
02 response Station Piping Asset List - High IC Susceptible - NEB-Regulated Assets
02 response Western and Central Canada Dig Schedule
03242014 - Integrated Management System - NEB Auditor Presentation (PDF)
03262014 - Integrated Management System - NEB Auditor Presentation (Dist)
1. Enbridge Liquids Pipelines Pipeline Integrity NDE Scope of work Canada and US, Version 2.0 - Jan 31 2014 – Final
1. Mainline Integrity NDE Vendor Approved List
10. Line 9 GW 57390 MP 2220.1414 ML-CD_Redacted
11 0 FI Facility Piping LRP
11 1 FI AST LRP
11 2 FI UST (sumps) LRP
11 4 FI Pressure Vessel LRP
11 5 FI Laterals LRP
11 6 FI SDP LRP
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Acuren May 6
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Acuren Personnel List_Redacted
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Additional Info and Definitions
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Dig Site Photos
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Enbridge Cobourg Yard Personnel_Redacted

\* Document titles are shown as presented in the electronic portal from Enbridge Pipelines Inc.

11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 May 2014_Redacted
11. L-9_MP_1977.6624-_GW_28190_Integrity_Field_Report_May_2-3__2014 Scope GW 28190
12. Canada Master Bible
12. Fwd_Personnel Certification SGS_Redacted
13. Acuren Enbridge Meeting Minutes 2014-05-15
14. PI-27__NDE_Field_Report_QA_and_Validation
15. NDE QA Manual v.0.95
16. FAQ Nov.1st 2012 Final
17. Enbridge NDE On-Call FAQ Welding Grinding
2. Enbridge Liquids Pipelines Pipeline Integrity NDE Scope of work Canada and US, Version 2.0 - Jan 31 2014 - Final
2. Outlier Checklist - Corrosion L9 MP 2253.1299 GW 9890- v1.0 - 01-16-2013
2014 Audit IR Response Status Check_040414
2014 Eastern Helicopter Planning Schedule
2014 NEB Audit - All Asset Registry - Eastern Region
2014 NEB Audit - All Asset Registry - EPSI Region
2014 NEB Audit - All Asset Registry - Northern Region
2014 NEB Audit - All Asset Registry - Western Region
2014 NEB Audit - Asset Registry - Central Region
2014 NEB Audit - Central Region Org Chart
2014 NEB Audit - Central Region PSV's
2014 NEB Audit - Central Region Stations and Terminals
2014 NEB Audit - Eastern Region Org Chart
2014 NEB Audit - Focus Area - Communication V2
2014 NEB Audit - Focus Area - Integrity Management Program Overview (Mar 26-2014)
2014 NEB Audit - Focus Area - PlanningV2
2014 NEB Audit - Focus Area - Quality Management (Mar 27-2014)
2014 NEB Audit - Integrity Focus Area - Corrosion Control
2014 NEB Audit - Integrity Planning - Prevent Monitor Mitigate
2014 NEB Audit - Life Cycle Asset Management DE March 24
2014 NEB Audit - LP Risk Management Functions
2014 NEB Audit - PI Overview
2014 NEB Audit - PI Program Execution
2014 NEB Audit - Pipe Asset Registry - Central Region
2014 NEB Audit - Pipe Asset Registry - Eastern Region
2014 NEB Audit - Pipe Asset Registry - EPSI Region
2014 NEB Audit - Pipe Asset Registry - Northern Region
2014 NEB Audit - Pipe Asset Registry - Western Region
2014 NEB Audit -Eastern Region PSV's
2014 NEB Audit -Eastern Region Stations and Terminals
2014 NEB Audit -EPSI PSV's
2014 NEB Audit -EPSI Region Org Chart
2014 NEB Audit -EPSI Stations and Terminals

2014 NEB Audit -Field Operations Services Org Chart
2014 NEB Audit Information Exchange Agenda - Emergency and Security Management
2014 NEB Audit Information Exchange Agenda - Environment Management
2014 NEB Audit Information Exchange Agenda - Integrity Management Program
2014 NEB Audit Information Exchange Agenda - Integrity Management Program (March 26-27)
2014 NEB Audit Information Exchange Agenda - Public Awareness and Crossings
2014 NEB Audit Information Exchange Agenda - Safety Management System V2
2014 NEB Audit -Northern Region Org Chart
2014 NEB Audit -Northern Region PSV's
2014 NEB Audit -Northern Region Stations and Terminals
2014 NEB Audit -Northern Region Sump Tanks
2014 NEB Audit -Western Region Org Chart
2014 NEB Audit -Western Region PSV's
2014 NEB Audit -Western Region Stations and Terminals
2014 NEB Audit -Western Region Sump Tanks
2014 SCOPE OF WORK-FLANGE-STATION PIPING-LATERAL-PROGRAMS
2014 Tank Inspection Plan for Central Region
2014-02-14_Integrity Management Program Presentation
3. Outlier Checklist - Cracking - L4 MP 290.3794 GW 31160
3. PLI Field Personnel Matrix 2013_Redacted
4. L1 MP 734.6808 GW 157220 Crack 2014
4. List of Acuren Technicians - 2014-06-23_Redacted
4.4 GV D Email Management Policy V01
4.4 GV D Records Discovery Policy V01
4.4 GV D Records Management Policy V01
4.4 GV D Records Retention Schedule V01
4.4 GV D Retention Schedule Development Sustainment Standard V01
4.4_GV_Documents and Records Summary
4.4_GV_Response to NEB IR No 1
5. 2014 Enbridge Pipeline Integrity Tutorial Agenda
5. Line 9 GW 57390 MP 2220.1414 ML-CD_Redacted
6. Eastern Canada Tutorial Attendance Sheet May 11 2014_Redacted
6. PI-04_Pressure_Restrictions
7. FAQ Jan 16 2013 Final
7. Western Canada NDE Tutorial Acuren Attendance May 09 2014_Redacted
8. MP 772.1457 NDEConstruction Quality Inspection Form Rev 1 July-02
9 3 Drop-In Replacements Program
9 4 Cathodic Protection Program Document
9 5 Depth of Cover Geohazards Program
9. Field Call Form
Annual Tank Inspections Completed in 2013 - Cromer Terminal
Annual Tank Inspections Completed in 2013 - Gretna Terminal

Att GV 2 - Inventory of Hazards and Potential Hazards
Att GV 3 - Identifying and Communicating Legal Requirements
Att GV 4 - Field Operations Training Update
Att GV 5 - Interim Training Verification Solution (Electrical Role)
Att GV 6 - Process for Developing Competency and Training Program
Att IN 1 - IMS-09 Compliance Register (Master) - NEB Audit Print-out
Att IN 10 - PIMS Documents With Effective Date
Att IN 2 - 2014 NDE Tutorial Training Invitation
Att IN 3 - 2014 NDE Tutorial Session Agenda
Att IN 4 - 2014 NDE Tutorial Session - Sample Presentation
Att IN 5 - 2014 NDE Tutorial Session - Vendor Attendance Sheet_Redacted
Att IN 6 - 2013 NDE Tutorial Session Agenda
Att IN 7 - 2013 NDE Tutorial Session - Sample Presentation 2_Redacted
Att IN 8 - L-95_MP 1749 6725 GW 9720 Integrity_Field_Report_Acuren_Aug 9_2014
Att IN 9 - L-95_MP 1799 0167 GW 79180 Integrity_Field_Report_-SGS Aug 6_2014
Attachment 1 - BH-01 trap at 15-35-3-13 W2M
Attachment 2 - 15-35-3-13 W2 Post Construction-2
Attachment 3 - 15-35-3-13 W2 Post Construction-5
Attachment 4 - 2013 Steelman Terminal Guided Wave Inspection Report
Attachment 5 - 2013 Pig sender kicker line at Steelman 9-13-4-6W2
Attachment 6 - MP 14 40 Alida Relief Line Upgrade
Canadian Pinpoint and FSM-IT monitors
Cathodic Protection – Tanks_V9
CCG - Chapter 1 Basic Corrosion Theory
CCG - Chapter 4 Cathodic Protection
CCG - Chapter 5 Designing Cathodic Protection Systems
Central Region Depth of Cover Spreadsheet
Central Region PSV Maintenance Report r1
Centrifuge
Document 1
Document 2
Consultant Response for Using 1000mV Criteria in GTA
Consultant's annual CP survey report - Executive Summary
Copy of Historical Corrosion Rates and Remaining Life
Copy of INTEGRITY IRs - Facilities Integrity - Sept 15 2014
CSA Z662_Defect Assessment in Class Location
Document
Dig Selection Criteria - rev Aug 12 2014
DMAT Monitoring Report - Line 9 Station Bypass at North Westover Station - 2009
DOC Central Region 2010 (Records)_Redacted
DOC Central Region 2010 (Spreadsheet)_Redacted
DOC Western Region 2010 (Spreadsheet and Records)_Redacted

Eastern Region Depth of Cover Spreadsheet
Eastern Region PSV Maintenance Report r1
Employee Type by Region
ENBRIDGE (WOODLAND) HDD EVAL_EA (3)
Enbridge Annual Tank Inspection CHECKLIST
Enbridge Assets by NEB Entity
Enbridge Final Responses to close-out discussion
Enbridge Mainline Patrols_ Western, Central and Northern
EPSI Region PSV Maintenance Report r1
EPWI Gathering Lines Info and Lateral Listing
Evaluation of Coating Pipe Condition
Excerpt showing 2014 LRT Initiatives (from Leak Reduction Team Agenda March 27 2014)
Facilities Integrity 2014 Path to Zero R2
FI Presentation for NEB 2014 March
Field Inspection Template
Gathering Line Risk Assessment Model Guidance Document Revision 1 Aug 2014
GEN 20.5 2014 Top Canadian Mainline Risk Segments (writeup) updated
GV 1 2 Documents and Records Summary
GV 1.2 D IMS 01 Governing Policies and Processes
GV 1.2 Response to NEB IR No 1
GV 2 3 Response to NEB IR No 1
GV 2.1 D IMS-01 Governing Policies and Processes V1.0
GV 2.1 D LP Mainline Risk Modeling Presentation - 3-28-2014
GV 2.1 Documents and Records Summary
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IN_3.6_D_PI-15 Pipeline Integrity Management System (PIMS) Document Review Form_V01
IN_3.6_D_PI-15 Pipeline Integrity Management System (PIMS) Document Review_V02
IN_3.6_D_PI-74 Document Management Procedure_V01
IN_3.6_D_PIMS (IMS-09) Framework_V02
IN_3.6_D_PIMS Master Controlled Documents List_V00
IN_3.6_R_IMS MOC 13-06 revise PI-15 bi annual review and docs_V01
IN_3.6_R_IMS MOC 13-54 revise PI-04 with review form and docs_V01
IN_3.6_R_IMS MOC 13-57 PI-30 revision with review form and docs_V01
IN_4.1_D_PI-83 Health Check Procedure_V00
IN_4.1_D_PI-85 Regulatory Compliance Procedure_V01
IN_4.1_D_PI-88 Performance Measures Procedure_V01
IN_4.1_D_PIMS (IMS-09) Framework_V02
IN_4.1_R_OneSource Data Management System_V01
IN_4.2_D_PIMS (IMS-09) Framework_V02
IN_4.2_Documents and Records Summary
IN_4.2_Response to NEB IR No 1
IN_4.3_D_PI-83 Health Check Procedure_V00
IN_4.3_D_PIMS (IMS-09) Framework_V02
IN_4.3_Documents and Records Summary
IN_4.3_R_1 IMS Update communique
IN_4.3_R_2 Coming changes communique
IN_4.3_R_2013 Dig Program Effectiveness Health Check Plan_V01
IN_4.3_R_3 IMS Index screen shot
IN_4.3_R_4 GDL screen shot
IN_4.3_R_ELP Event - Dig Program Effectiveness Health (Quality) Check_V01
IN_4.3_Response to NEB IR No 1
IN_4.4_D_PI Information Management Records Retention Guideline_V00
IN_4.4_D_PI-08 ILI Report Collection, Processing and Storage_V04
IN_4.4_D_PI-09 NDE Field Report Collection, Processing and Storage_V03
IN_4.4_D_PIMS (IMS-09) Framework_V02
IN_4.4_D_Pipeline Integrity DMS User Guide_V01
IN_4.4_Documents and Records Summary

IN_4.4_R_PipeTrax System - PI-08_V01
IN_4.4_R_Procedures Library_V01
IN_4.4_Response to NEB IR No 1
IN_5.0_D_PIMS (IMS-09) Framework_V02
IN_5.0_Documents and Records Summary
IN_5.0_Response to NEB IR No 1
IN_5.1_D_2013 Management Review Integrity Management System V1 0
IN_5.1_R_2013 Management System Review Meeting Invitation
IN_5.1_R_2013 Management System Review Project Plan
IN_5.1_R_2013 PIMS - Management System Review Meeting Presentation
IN_5.1_R_Continuous Improvement Plan V2
IN_D_3.2_B1_02-02-01_Incident_Reporting_CAN_CRITICAL_V11
IN_D_3.2_B1_02-02-03_Incident_Investigation_V11
IN_D_3.2_B1_02-02-04_Investigating_P_and_C_Failure_V11
IN_D_3.2_FI-12 Fitness-for-Service Overpressure March2014_V01
IN_D_3.2_Leak Reduction Team - Framework Document_V01
IN_D_General Tariff Violations
IN_D_Guidelines for Inspection, Repair and Reporting for Station Piping (Feb 2014)
IN_D_Station Piping Program Inspection Process Flowchart (Aug 2013)
IN_R_3.1_FI-11 Appendix API 570 Gap Analysis (06-21-2013)_V01
IN_R_3.1_FI-11 Appendix API RP 2611 Gap Analysis (06-21-2013)_V01
IN_R_Bethune PDF Excerpt
IN_R_Depth of Cover Records – Eastern Region
IN_R_Enbridge New Stream
IN_R_Highest Risk Piping (Bethune)
IN_R_Highest Risk Piping (Regina)
IN-2.1_D_FI Mgmt Program Aboveground Tank_V3.8
IN-DP 3 1 Documents and Records Summary
IN-DP 3 1 Response to NEB IR No 1
IN-DP_3.1_D_Advanced_Line_Locator_Field_Manual_-_Enbridge_FINAL_DRAFT_v3_TL_2-22-12
IN-DP_3.1_D_Canadian- One Call Procedures 2013_V01
IN-DP_3.1_D_Damage Prevention Assessment Procedure_V01
IN-DP_3.1_D_Data Mining Guidelines 2014_V01
IN-DP_3.1_D_DP Assessment Excavation Sites 2013
IN-DP_3.1_D_DP Assessment One Call Response 2013
IN-DP_3.1_D_DP Assessment TALL Competency 2013
IN-DP_3.1_D_Enbridge Baron B58 Operations Manual - Original Final
IN-DP_3.1_D_Excavation_Site_Assessment_2014
IN-DP_3.1_D_LTU Unauthorized Crossing Process and Filing (23.07.12)_V01
IN-DP_3.1_D_OMM B3_03-01-01_Overview of ROW Maintenance_V01
IN-DP_3.1_D_OMM B3_03-02-01_Right-Of-Way Monitoring_V01
IN-DP_3.1_D_OMM B3_03-02-02_Right-of-Way Signs-Markers_V01

IN-DP_3.1_D_OMM B3_03-02-06_Depth of Cover Monitoring_V01
IN-DP_3.1_D_OMM B3_04-02-02_Damage Prevention_V01
IN-DP_3.1_D_One-Call_Response_Assessment_2014
IN-DP_3.1_D_Pipeline Depth Monitoring Program LP (July 2013)_V01
IN-DP_3.1_D_Safety Zone Excavation Request Form (April 2014)_V01
IN-DP_3.1_D_TALL Evaluation Form 2013-05-31_V01
IN-DP_3.1_D_TALL Training Classroom Presentation
IN-DP_3.1_D_TALL Training Course_Syllabi_for_█_(12 11)
IN-DP_3.1_D_TALL Training in-person Curriculum
IN-DP_3.1_D_TALL_█_2011_(12 11)
IN-DP_3.1_D_Tracking Storage Process_V01
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IN-DP_3.1_R_10-2-1 Brochure(2012)_V01
IN-DP_3.1_R_DP Assessment One Call Response Tracking (2013)_V01
IN-DP_3.1_R_DP Assessment TALL Response Tracking (2013)_V01
IN-DP_3.1_R_Example Log Sheets Aerial Patrol May 2014
IN-DP_3.1_R_Final NEB Pipeline Protection measures 2012 signed by Mgt_V01
IN-DP_3.1_R_IMS Damage Prevention Function Model_V01
IN-DP_3.1_R_Line Locate Brochure (2013)_V01
IN-DP_3.1_R_Meeting 1 Minutes- October 11, 2012_V01
IN-DP_3.1_R_TALL Participants list_V01
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IN-Ops_3.1_Documents and Records Summary
IN-Ops_3.1_Response to NEB IR No 1
IN-PI 3.3 Documents and Records Summary
IN-PI 3.3 Response to NEB IR No 1
IN-PI 3.6 Documents and Records Summary
IN-PI 3.6 Response to NEB IR No 1
IN-PI_2_1_Documents and Records Summary
IN-PI_2.1_Document and Record Map
IN-PI_2.1_Response to NEB IR No 1
IN-PI_3.1_Document and Record Map
IN-PI_3.1_Documents and Records Summary
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IN-PI_3.2_Documents and Records Summary
IN-PI_3.2_Document and Record Map
IN-PI_3.2_Response to NEB IR No 1
IN-PI_4.1 Documents and Records Summary
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INTEGRITY IR - Facilities Integrity - September 15 2014
Integrity Management Program - Organization Inter-Relations
Internal Corrosion Monitoring INTEGRITY IR- _27 Facilities Integrity - July 9 2014

IN-WB 3 1 Documents and Records Summary
IN-W-B_2.1 Response to NEB IR No 1
IN-W-B_3.1 Response to NEB IR No 1
Document 1
Document 2
Letter to NEB Auditors re Treatment of Documentation - Mar 25 2014
Likelihood of Failure for Small Diameter Piping - 2014
Line 3 PCV Bypass at Cromer Terminal - 2013
Line 3 PCV Bypass at Cromer Terminal 2009
Line 9 Station Bypass at North Westover Station - 2006
Line Repairs Program Document
Line Replacement Program Document
Line Summary Maps - 2013
LRT Meeting Minutes March 2014
LRT Update - 2013 in Review - COps 2013 December 19
Major Outage Coordination Upstream Downstream Lines
Major Outage Coordination Downstream Lines(April 09 2014) NEB-regulated1
Major Outage Coordination Upstream Lines (April 09, 2014) NEB-regulated1
Mar 26-2014 Agenda and Safety Moment
Mar 27-2014 Agenda and Safety Moment
May Audit Schedule - Draft - IMP NEB Audit v3
Mentee List- Central
Mentee List-Eastern Region
Mentee List-Enbridge Sask
Monitor Locations
Monthly Tank Inspection Cromer TK 104
MP-CPCS-PROC-INHDD-006
NEB Audit Governance Level May Schedule
NEB Geohazard Slope Instrumentation and IMU Run Summary 1
NEB Geohazard Slope Instrumentation and IMU Run Summary 2
NEB Org chart CR all v2
NEB Org chart EPSI all v2
NEB Org chart.ER.all
NEB Org chart.NR.all
NEB Org chart.WR.all
NEB Regulated Pressure Vessels - Shipped Product Only
NEB Regulated Pump Stations and Terminals
NEB tanks 2014 and OOS inspections planned Rev1
OMM Awareness 101 Presentation_2014 Customized for GS Rollout
Open System Template - Line 10 12in Line Proving Tool June 2014 Receiving
Other
PI_NDE Scope of Work_US _ CAN V1.2

PI-01 In-Line Inspection Report Quality Assurance_V03
Program Data Review - Top 10 probabilities of pipeline failure Determination
PROTOCOL 3.1 - NEB Audit - Integrity - Geohazards May 14 GV MS (3)
Redacted 2013 Crude Characteristics
Redacted 2013 ILI Schedule - ICP Metrics
Redacted May 15 SW
Registry_Inventory
Reliability Measurement - NEB v3
Response to Information Request re Rationale for ILI Intervals
response_2014 Station Piping Scope of Work- NEB-Regulated Assets
response_Eastern Canada Dig Schedule - Line 9
response_Eastern Canada Dig Schedule - Lines 8 and 11
response_Enbridge NEB tanks 2014 OOS inspections planned Rev1
response_NEB Regulated Pressure Vessels - Shipped Product Only
response_Pig Runs-ILI -Maintenance Pigging Activities - May to August 2014
response_Station Piping Asset List - High IC Susceptible - NEB-Regulated Assets
response_Western and Central Canada Dig Schedule
Risk Register - Facilities Integrity v1 1 - Audit Copy
Risk Register - Pipeline Integrity v2
RP_System Capacity_Rev1
SCOPE OF WORK - ABOVE GROUND STORAGE TANK - 2014 Summary-Final
SCOPE OF WORK - PRESSURE EQUIPMENT- 2014 Summary-Final
SCOPE OF WORK - SMALL DIAMETER PIPING - 2014 Summary-Final
SCOPE OF WORK - SUMP - 2014 Summary-Final
SDP Likelihood of Failure Inspection Guide - DRAFT
SPR Map for NEB - Aug 2014
TRAC Syllabi V01
Vehicle Screening Tool - Hoop Stress Calculator V1-26-11 (line 9 30000lbs)
Vehicle Screening Tool - Hoop Stress Calculator V1-26-11(line3 30000lbs)
Western Region PSV Maintenance Report r1
Westspur Gathering System Internal Corrosion Program Details