National Energy Board

Office national de l'énergie

File OF-Surv-OpAud-C298-2018-2019 01
27 March 2019

Mr. Tim S. McKay
President
Canadian Natural Resources Limited
2100, 855 - 2 Street SW
Calgary, AB T2P 4J8
Email : [redacted]

Dear Mr. McKay:

National Energy Board (Board or NEB) Final Audit Report
Canadian Natural Resources Limited (CNRL)

The Board has completed its Final Audit Report of CNRL. CNRL was provided with the Draft Audit Report on 14 February 2019, and CNRL responded on 11 March 2019 with comments and requests for changes. The board accepted some of those changes and has updated the final audit report.

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

- the *National Energy Board Act* and its associated regulations, including;
- the *National Energy Board Onshore Pipeline Regulations*;
- any conditions contained within applicable Board certificates or Orders issued by the Board.

CNRL was required to demonstrate the adequacy and effectiveness of the methods it has selected and employed within its management system and integrity program to meet the regulatory requirements listed above. Throughout this audit, the Board has evaluated selected management system processes and requirements as applied to CNRL's integrity program. The Board has enclosed its Final Audit Report and associated Appendices with this letter. The Board will make the Final Audit Report public and it will be posted on the Board's website.

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Within 30 days of the issuance of the Final Audit Report by the Board, CNRL is required to file a Corrective and Preventative Action Plan (CAPA Plan), which describes the methods and timing for addressing the Non-Compliant findings identified through this audit, for approval. Board staff will provide the CAPA Plan template for CNRL to complete.

The Board will also make the CAPA Plan public and will continue to monitor and assess all of CNRL'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 CNRL's management system and programs through targeted compliance verification activities as a part of its regulatory mandate.

If you require any further information or clarification, please contact Niall Berry, Lead Auditor, at 403-471-1921.

Yours truly,

Original signed by L. George for

Sheri Young
Secretary of the Board

Attachment

c.c. [redacted]

National Energy Board

Office national de l'énergie

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Canadian Natural Resources Limited
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Final Audit Report
Integrity Management Program

Compliance Verification Activity: CV1819-420
File OF-Surv-OpAud-C298-2018-2019 01

27 March 2019

Executive Summary

In accordance with section 49(3) of the *National Energy Board Act* (NEB Act), the National Energy Board (NEB or the Board) conducted a compliance audit of Canadian Natural Resources Limited (CNRL) during the period from 21 August 2018 to 4 January 2019.

The Board expects companies to have effective, fully developed and implemented management systems and protection programs and a strong culture of safety, all of which are fundamental to keep people safe and protect the environment. The NEB *Onshore Pipeline Regulations* (OPR) require that companies develop, implement and maintain an Integrity Management Program (IMP) 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. The objective of this audit was to verify that the company established and implemented an IMP in accordance with the OPR.

During the audit, the NEB assessed the adequacy, implementation and effectiveness of selected management system processes and requirements as applied to the IMP. The scope also included a review of selected company activities and operational practices related to the IMP. The audit was conducted using the criteria listed in Appendix I of this report.

Out of a possible twelve findings, the Board made nine Non-Compliant findings. The majority of the Non-Compliant findings relate to process documentation. Appendix I of this report contains a summary table and the details regarding the Board's findings.

The Board concludes that, at the time of the audit, CNRL's integrity management program was written within the Integrity Manual, which describes various aspects of the company's corporate pipeline integrity program. The program does not document process(es) nor does it integrate management systems as required by the OPR. The Board requires companies to have a management system that identifies and controls hazards and risks, and requires that companies continually evaluate and improve effectiveness of its management systems and implement corrective actions to prevent incidents. This approach is intended to enhance performance of the regulated industry as a whole, and which should result in an energy infrastructure that is systematically reliable and safe for people, the environment and property.

The Board expects CNRL to finalize and address the deficiencies in management system processes that the Board identified in this Audit. The Board requires CNRL to develop and submit a Corrective and Preventive Action (CAPA) Plan to address the Board's findings. The CAPA Plan must describe its proposed methods to resolve the deficiencies identified and the timeline in which corrective and preventive actions will be completed. CNRL is required to submit its CAPA Plan for approval within 30 days of this Final Audit Report being issued by the Board.

The Board will assess the implementation of all of CNRL's CAPA Plans 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 CNRL's management system through targeted compliance verification activities as a part of its ongoing regulatory mandate.

The Board will make its Final Audit Report and CNRL's approved CAPA Plan public on the Board's website.

Table of Contents

1.0 Introduction

In accordance with section 49(3) of the *National Energy Board Act* (NEB Act), the National Energy Board (NEB or the Board) conducted a compliance audit of CNRL's Integrity Management Program during the period from 21 August 2018 to 04 January 2019.

1.1 Audit Objective

The objective of this Integrity Management Program audit was to verify that the company has established and implemented an IMP in accordance with the *National Energy Board Onshore Pipeline Regulations* (OPR). The audit assessed the adequacy, implementation, and effectiveness of:

- selected management system processes and requirements as applied to the IMP; and
- selected company activities and operational practices related to the IMP.

1.2 Audit Scope

The audit scope included the requirements of the OPR primarily focusing on, but not limited to, the management system requirements of OPR sections 6.5(1)(a) to (f), (q), (r), (t) and (u), and OPR section 6.6 in the context of their application to the company integrity management program. Other OPR requirements related to integrity programs were also included in the audit scope, including OPR sections 27, 37, 39, 40, 42, 53 and 55, and relevant clauses of CSA Z662-15.

The audit focused on the operation part of the life cycle of the pipeline system. In terms of facilities, pipe and equipment, the scope was limited to pipelines and station piping.

Storage tanks, pressure vessels, and ancillary equipment and piping were excluded from the scope of the audit.

2.0 Company/Management System Overview

Canadian Natural Resources Limited (CNRL)'s pipeline system is comprised of 80,548 line segments with a total accumulated length of 98,652 km. A total of 25 NEB regulated line segments accounts for 0.03% of the total number of segments in CNRL's pipeline system. (See Figure 1) The total accumulated length of the NEB regulated line segment is 190.8 km which accounts for 0.19% of the total length of pipelines within CNRL's pipeline system. Of the 98,652 km of pipelines, 81% transport gas with the remaining 19% transporting liquids.

3.0 Assessment of Compliance of the Audited Processes and Activities

3.1 General

This section of the audit report documents the Board's assessment of compliance of the processes and activities reviewed as part of the audit. To determine compliance, the Board evaluated CNRL's documents and records and conducted interviews with the company personnel on issues relevant to the audit scope and criteria. The Board applied the working definitions which can be found on the Board's website.

There are two possible audit findings for each regulatory requirement assessed by the Board in this audit:

- No issues noted – *no non-compliances were identified during the audit based on the information provided and reviewed within the context of the scope of the audit;*
- Not-compliant - *an evaluated regulatory requirement 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.*

4.0 Integrity Management Program Assessment

The Board expects companies to have effective, fully developed and implemented management systems and protection programs and a strong culture of safety, all of which are fundamental to keep people safe and protect the environment. The OPR s. 40 requires that companies develop, implement and maintain an IMP 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.

The OPR s. 6.1 outlines the Board's management system requirements, which are as follows:

> OPR s. 6.1: 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 determining CNRL's compliance with respect to establishing and implementing an IMP, the Board evaluated documents and records that described the company's establishment and implementation of its management system in the context of its application to the company IMP. This aided the Board in evaluating CNRL's systematic practices as applied to the IMP. The Board's findings therefore are not an evaluation of CNRL's other OPR section 55 programs, nor are they an evaluation of the CNRL's application to other lifecycle activities such as construction or abandonment.

The assessment of the management system processes and other requirements is documented in Appendix I.

The Board notes that it is important to understand that the Board's findings reflect the company's level of progress in developing and applying its management system to the IMP. It does not necessarily reflect the technical management activities being undertaken to ensure the integrity of its pipelines, the protection of the environment, and the safety of people.

Table 1 below provides a summary of the findings and deficiencies identified during the audit.

Table 1: Findings Summary

Audit Protocol Number	OPR Clause	Summary of the Requirement	Finding	Summary of Deficiencies to be addressed
AP-01	s. 6.5(1)(a)	Process for setting objectives and targets	Non-compliant	**CNRL does not have an explicit process documenting the steps of a process for setting its objectives and targets.**
AP-02	s. 6.5(1)(b)	Performance measures	No issues noted	
AP-03	s. 6.5(1)(c)	Process for identifying and analyzing hazards	Non-compliant	**CNRL does not have an explicit process documenting the steps of a process for identifying and analyzing hazards. Also, CNRL does not have a process that is part of both the management system and the integrity program.**
AP-04	s. 6.5(1)(d)	Inventory of Hazards	Non-compliant	**CNRL does not have an inventory of identified hazards and potential hazards.** **Further, if the list of foreseeable failure modes presented in the Failure Modes and Effects Analysis (FMEA) register is considered by CNRL to be its hazard inventory, there is no formal documented process to regularly review and maintain this list.**
AP-05	s. 6.5(1)(e)	Process for evaluating and managing risks	No issues noted	
AP-06	s. 6.5(1)(f)	Process for developing and implementing controls	Non-compliant	**CNRL does not have an explicit process for developing its controls, or additional controls when required, to prevent, manage and mitigate identified hazards and risks. In**

				addition, the company did not demonstrate that is has developed a process for communicating controls to anyone who is exposed to the risks.
AP-07	s. 6.5(1)(q)	Process for coordinating and controlling operational activities	Non-compliant	**CNRL has several procedures and uses several modes of communication to provide safety awareness and hazard awareness to its workers (most of which falls under the umbrella of the Safety Management System) however, the company did not provide evidence to demonstrate that it has established and implemented an explicit documented process for coordinating and controlling the operational activities of workers to ensure that each person is aware of the activities of others and has the information that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.** **Auditors note that there does not appear to be an overarching documented process in place which addresses the requirements of OPR s. 6.5 1)(q).**
AP-08	s. 6.5(1)(r)	Process for internal reporting of hazards, incidents and near-misses	Non-compliant	**Although CNRL provided several documents illustrating that the company does have guidelines and expectation statements on reporting, and it does appear to internally report many incidents and hazards, it did not demonstrate that the company has an explicit documented 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.
AP-09	s. 6.5(1)(t)	Process for developing contingency plans	No issues noted	**CNRL has an established process for developing contingency plans as it relates to the Integrity Management Program.**
AP-10	s. 6.5(1)(u)	Process for inspecting and monitoring	Non-compliant	**CNRL provided several documents, procedures, programs, and performance indicators as evidence to demonstrate that it meets the requirements of OPR s. 6.5(1)(u). Although these documents do describe the different activities the company is doing to inspect and monitor its activities and facilities, they are not a documented series of actions that take place in an established order, directed toward a specific result, and they do not articulate the roles, responsibilities and authorities involved in each of the actions. The actions in themselves do not constitute a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the integrity program and for taking corrective and preventive actions if deficiencies are identified.** **CNRL did not demonstrate that it has an explicit documented process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the pipeline integrity program.** **CNRL also did not demonstrate that it has an explicit documented process**

				for taking corrective and preventive actions if deficiencies are identified
AP-11	s. 6.6(1)	Annual Report	Non-compliant	**OPR s. 6.6 requires that the company's annual report (CNRL's Stewardship Report) be signed by the Accountable Officer.** **In reviewing the CNRL 2017 Annual Stewardship Report, auditors noted that it had not been signed by the Accountable Officer.** **This report also does not meet the management system review requirements nor the requirements to describe achievement of its goals, objectives and targets OPR s. 6.6.** **The company is non-compliant with the requirements of OPR s. 6.6.**
AP-12	s. 55(1)	Program audits	Non-compliant	**CNRL internal audits do not include a verification of compliance with the OPR. As such, the company is non-compliant with the requirements of OPR s. 55(1).**

5.0 Conclusion

The Board found that CNRL demonstrated it is committed to the establishment and implementation of its management system. CNRL's integrity program is written within their Pipeline Integrity Manual. The Manual describes various aspects of the corporate pipeline integrity program. The Integrity Management Program does not document process or integrate management systems. Review of the management system indicated that, once fully established, implemented and modified by any Corrective and Preventative Action Plan (CAPA) associated with this audit, it should meet the OPR requirements.

The Board expects CNRL to finalize its process documents and address the deficiencies in management system processes identified in this Audit. While no enforcement actions are immediately required to address these non-compliant findings, the Board requires CNRL to develop and submit a Corrective and Preventative Action Plan (CAPA) to address the Board's findings. The CAPA must describe its proposed methods to resolve the deficiencies identified and the timeline in which corrective and preventive actions will be completed. CNRL is required to submit its CAPA for approval within 30 days of the final Audit Report being issued by the Board.

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

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

Appendix I: Audit Assessment Tables

Background

The Board expects companies to have effective, fully developed and implemented management systems and protection programs and a strong culture of safety, all of which are fundamental to keep people safe and protect the environment. To that end, the OPR provides specific requirements for the processes and other items that need to be part of these systems and programs.

The audit protocol (AP01-AP12) is comprised of specific legal requirements against which the company's Integrity Management Program was assessed for compliance. During the audit, compliance to these legal requirements was examined to confirm that the requirements were met and that the relevant characteristics set out in sections 6.1, 6.5(2) and (3) of the OPR were also addressed.

OPR s. 6.1: 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.

OPR s. 6.5(2) In this section, a reference to a process includes any procedures that are necessary to implement the process.

(3) The company shall document the processes and procedures required by this section.

AP-01 Setting of Objectives and Specific Targets

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(a)** establish and implement a process for setting the objectives and specific targets that are required to achieve the goals established under subsection 6.3(1) and for ensuring their annual review.	
	Assessment
Accountabilities	CNRL's commitment to asset integrity is demonstrated within the Corporate Statement on Asset Integrity Management. This document is posted in each CNRL Boardroom and provides a list of principles that CNRL Leadership has committed to through signatory endorsement. Included within these principles is to "Comply with all relevant legislation and regulatory requirements relating to asset integrity" and "Ensure there is a program in place to monitor, audit, and review our performance and see continuous improvement by having clear objectives and targets." Further, the document states that "Canadian Natural's Management is committed to achieving continual improvement in asset integrity performance through annual objectives and targets". Accountabilities and responsibilities in regard to the Integrity Program are included within CNRL's Pipeline Integrity Manual – dated 4/4/2018. Although the manual describes several integrity specific accountabilities and responsibilities for each of the President, the Chief Operation Officer of E&P, the Chief Operating Officer for Oilsands, and the Vice President (VP) of Safety, Risk Management and Innovation, no accountabilities or responsibilities explicitly include setting objectives and specific targets, or for setting organizational goals to which the integrity objectives and targets should be working toward. The Pipeline Integrity Manual, states that "the Asset Integrity Manager, along with Integrity Leads, set Asset Integrity goals and objectives annually, which drive the key activities throughout the year. These goals and objectives are published at the start of each year, and are aligned with Key Performance Indicators, to monitor the progress against the plan. The Asset Integrity goals and objectives are aligned with Corporate goals and objectives." CNRL clarified during the audit interviews that it is actually the Asset Integrity Director that sets the goals and objectives annually. Although responsibilities and accountabilities at a high level are documented as explained above, since CNRL did not demonstrate that it has a documented process for setting objectives and targets (see "Process" section below), roles and responsibilities in setting these objectives and targets are not clearly defined for all persons involved in this process. This would include: the process owner, the approver of the objectives and targets, and those persons involved at the program level and at the management system level in the annual setting and reviewing of objectives and targets. In the response to the information request, CNRL stated that "objectives and targets and key performance indicators are vetted and approved by the VP West Field Operations, VP East Field Operations, and the Sr. VP Safety, Risk Management, Innovation. Once set, the key performance indicators are shared and discussed with the executive team and then distributed to the Integrity and Operations Teams monthly." CNRL did not provide reference to any documentation supporting this statement.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(a)** establish and implement a process for setting the objectives and specific targets that are required to achieve the goals established under subsection 6.3(1) and for ensuring their annual review.	
	Assessment
Process	CNRL did not provide the documented Asset Integrity Goals referred to in the *Pipeline Integrity Manual*, described as being set annually and which drive key activities throughout the year. CNRL did however, point to CNRL's Nine Principles considered to be the corporate goals, to which the Asset Integrity Program aligns its activities with. The Nine Principles do not specifically include explicit commitments for the prevention of ruptures, liquid and gas releases, fatalities and injuries, and for the response to incidents and emergency situations. However, CNRL principles state that safety is a core value that applies to all activities supporting the ultimate goal, "No Harm to People. No Safety Incidents", and that the overarching goal is that which the Integrity Management Program aligns its activities with. CNRL did not provide documentation to demonstrate that it has goals which articulate "the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations", as required per OPR s. 6.3(1)(b). CNRL did not provide documentation to demonstrate is has a process for setting objectives and targets. The company did however provide detail on its Key Performance Indicators (KPIs) and associated KPI activities and how they are used to track progress in achieving established integrity objectives and targets or target ranges. The *2018 KPI Strategy Summary* states that KPI Roadmaps "align Asset Integrity Goals with Canadian Natural's Goals". As CNRL did not provide documented Asset Integrity Goals, the KPI strategy to align these goals with corporate goals is unclear. CNRL provided documentation to demonstrate that KPIs are tracked and communicated to Managers and VPs in the monthly KPI report, quarterly to the Board of Directors within the *Quarterly Stewardship Report*, and annually within the *Annual Stewardship Report*. KPIs are reviewed annually. CNRL advised that the company has a group that stewards the Stewardship Reports and develops KPIs as outlined in the document titled *Stewardship KPI Methodology*. Although requested by the auditors through the daily brief to clarify the KPI process, this document was not provided. CNRL provided evidence demonstrating that the company performs numerous integrity management related activities and has developed measures of leading and lagging key performance indicators. However, the company did not provide documentation to demonstrate that it has a process for setting objectives and targets, and did not demonstrate that it has established goals of which the objectives and targets are to achieve.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(a)** establish and implement a process for setting the objectives and specific targets that are required to achieve the goals established under subsection 6.3(1) and for ensuring their annual review.	
	Assessment
Integration and Application	**In absence of a documented process for setting objectives and targets (see "Process" section above), CNRL did not demonstrate that the process for setting objectives and targets is integrated with or linked to the following OPR management system requirements that directly receive input from, or provide input to, this process:** • **OPR s. 6.3(1) - Goals** • **OPR s. 6.5(1)(b) - Performance Measures** • **OPR s. 6.6(1)(a) - Annual Report**
FINDING: Based on the scope of the audit and the documents and interviews conducted, CNRL did not demonstrate that it has a documented process for setting objectives and targets (as applied to the integrity management program) required to achieve its goals, as required per OPR s. 6.5(1)(a). Roles and responsibilities for this process are not clearly defined. Steps of the process are not documented, and the process does not have explicit linkages to other interrelated management system requirements. The company has not demonstrated that its process for setting objectives and targets, as applied to the integrity program, is compliant to the OPR s. 6.5(1)(a).	

AP-02 Performance Measures

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(b)** develop performance measures for assessing the company's success in achieving its goals, objectives and targets.	
	Assessment
Accountabilities	CNRL has established a set of leading and lagging key performance activities and associated key performance indicators (KPIs) to measure the performance of the Integrity Management Program. Leading KPIs include: (1) completed 5-why reports; (2) completed pipeline integrity training; (3) completed leak detection verifications; (4) completed mitigation and control reviews; and (5) completed risk acceptance. Pipeline leaks are the lagging KPIs. The company did not provide information on roles and responsibilities in regard to who actually developed, or is responsible for developing performance measures (KPIs). CNRL stated in its response to the information request that the Sr. VP Safety Risk Management Innovation & Technology and the VPs for Field Operations (East &West) review and approve performance measures and provide quarterly updates to the Senior Executive and the Board of Directors – HSE Committee. CNRL did not provide reference to any documentation supporting this statement. This responsibility is not documented within the *Pipeline Integrity Manual*, but was added in the response to the information request for clarification purposes. In the response to the information request, CNRL stated that "objectives and targets and key performance indicators are vetted and approved by the VP West Field Operations, VP East Field Operations, and the Sr. VP Safety, Risk Management, Innovation. Once set, the key performance indicators are shared and discussed with the executive team and then distributed to the Integrity and Operations Teams monthly." CNRL did not provide reference to any documentation supporting this statement. Information provided during the interviews related to the roles and responsibilities for this process was inconsistent with documentation provided.
Performance Measures	As discussed previously, CNRL has established a set of leading and lagging key performance activities and associated KPIs to measure the performance of the integrity management program. The "*2018 KPI Targets Stewardship - Final*", lists Asset Integrity KPIs for North America E&P as: (1) High and Moderate-High Pipeline Mitigation Reviews (Corporate Risk); (2) Pipeline Leaks/1,000 kms; (3) High and Moderate-High Pipeline Leaks (Corporate Risk); and (4) Process Safety Management (PSM) Incidents.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(b)** develop performance measures for assessing the company's success in achieving its goals, objectives and targets.	
	Assessment
	As described in the *Pipeline Integrity Manual*, KPIs have been identified which track the progress of pipeline integrity key performance activities. The KPIs are tracked and communicated to Managers and VPs in the monthly KPI report, quarterly to the Board of Directors within the *Quarterly Stewardship Report*, and annually within the *Annual Stewardship Report*. Target ranges are included with the KPIs to provide flexibility in achieving and overachieving results. Benchmarks are also identified and tracked to monitor progress of activities which are important to the Pipeline Integrity Management program. KPIs are reviewed annually. CNRL did not provide evidence of how performance measures were, or are, developed to allow the company to assess its success in achieving its goals, objectives and targets. Although it remains unclear what the goals of the Pipeline Integrity are, the KPIs appear to be aligned with established objectives (Areas of Focus).
Supporting Procedures	N/A
Integration and Application	N/A
FINDING: Based on the scope of the audit and the documents and interviews conducted, CNRL demonstrated that it has developed performance measures for assessing the company's integrity management program's success in achieving its goals, objectives and targets as required per OPR s. 6.5(1)(b). Based on the scope of the audit, and the documents and interviews conducted, the Board has not identified any non-compliances to the OPR s. 6.5(1)(b).	

AP-03 Hazard Identification and Analysis

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(c)** establish and implement a process for identifying and analyzing all hazards and potential hazards.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018.* The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to this manual. CNRL stated in its response to the information request that the Corporate Integrity Advisory takes ownership of the Failure Modes and Effects Analysis to sufficiently identify, understand and analyze foreseeable threats and hazards. CNRL did not provide reference to any documentation supporting this statement. This responsibility is not documented within the *Pipeline Integrity Manual* however; auditors were advised that this statement was added in the response to the information request for clarification purposes. *SMS Element 1 – Introduction and Leadership Commitment* states that Supervisors are responsible to "identify hazards through inspections and remove them if possible" and "ensure workers know and are prepared to deal with potential hazards of their work and any specific hazards on the worksite". This statement applies to the Safety Management System; however, auditors were advised that the Integrity Management Program falls under the umbrella of the SMS; therefore, by inference, Supervisors are also be responsible for identification and management of asset integrity-related hazards and potential hazards. CNRL did not provide documentation explicitly outlining roles, responsibilities and accountabilities in regard to identifying and analyzing hazards and potential hazards, specific to the Integrity Management Program. Information provided during the interviews related to the roles and responsibilities for this process was inconsistent with documentation provided.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(c)** establish and implement a process for identifying and analyzing all hazards and potential hazards.	
	Assessment
Process	CNRL's *Pipeline Integrity Manual 4/4/2018* describes Pipeline Hazard Identification and Controls. This section includes several integrity management approaches to identifying, assessing and managing hazards that may impact pipelines. Hazards covered in this section include: Internal corrosion, External corrosion, Non-metallic pipeline materials, Geohazards, Manufacturing or Construction Defects, Legacy Construction Practices, Environmentally Induced Cracking, Third Party Damage, Seismic Activity, Lightning, and Wildfires. The *Pipeline Integrity Manual* defines Hazard as, "A condition or event that might cause a failure or damage incident or anything that has the potential to cause harm to people, property or the environment." CNRL explained that identification and analysis of integrity hazards is conducted and documented using the *Canadian Natural Pipeline Risk Assessment Model*. This model evaluates four foreseeable likelihood related drivers (threats/hazards): internal corrosion, external corrosion, degradation of non-metallic materials and Geohazards. The threat with the highest likelihood value is used for the pipeline risk score. CNRL provided its *Failure Modes Effects & Analysis - Register of CNRL Pipeline Types*, to describe its foreseeable hazards which are reported and evaluated. Documented in the *Pipeline Risk Management Guideline*, the company completes a Failure Modes and Effects Analysis for each of the foreseeable pipeline threats (hazards) based on the pipeline type, fluids/gases transported and pipeline routing. Each pipeline type is evaluated for the foreseeable hazards that could cause pipeline failure. Based on the threats, a failure mode analysis is completed to evaluate the failure type (rupture or leak) expected. Pipelines identified as being susceptible to rupture failure modes such as non-metallic pipelines and pipelines exposed to Geohazards, may be evaluated on an individual basis using appropriate Engineering/Third Party support depending on consequence of failure. CNRL's *Pipeline Risk Management Guideline* describes the Bow-Tie Risk Assessment process as its means to evaluate foreseeable threats and explains that an annual risk assessment using the *Pipeline Risk Assessment Tool* will be completed on each operating pipeline annually. During audit interviews, CNRL explained that in addition to the annual risk assessment of each pipeline (evaluated against the established foreseeable threats/hazards), the company also relies on other methods and activities to identify integrity hazards, such as: formal and informal facilities inspections, right-of-way patrols, geohazard surveys, and Operations observations. As explained in the audit interviews and documented in the *Pipeline Integrity Manual*, the company follows recognized and generally accepted good engineering practices for identification and control of pipeline-related hazards, and company representatives sit on various industry groups and standard organization task forces, and attend workshops and conferences to remain current with best-in-class methodology for pipeline hazard management.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(c)** establish and implement a process for identifying and analyzing all hazards and potential hazards.	
	Assessment
	CNRL described and provided documentation to demonstrate that it utilizes several activities and resources as part of its risk management program, for assessing and managing foreseeable threats (hazards); however, the company has not provided evidence to demonstrate that it has a documented explicit process for identifying and analyzing all hazards and potential hazards applicable to the integrity of the pipeline system. To ensure the identification and analysis of integrity hazards is conducted by competent persons, CNRL advised that the hazard analysis process (Failure Modes and Effects Analysis) is reviewed and updated by the Corporate Integrity Advisory Group which includes Senior Integrity Engineers and Specialists. The individuals are responsible for the risk assessment tools and to ensure that emerging threats or hazards or any change in likelihood or consequence are incorporated in the risk assessment tools. CNRL did not provide reference to any documentation supporting this statement and advised auditors that the Corporate Integrity Advisory Group responsibility for maintaining the data in the Risk Assessment tool, includes updating to reflect current practices and roles.
Supporting Procedures	N/A
Integration and Application	CNRL explained that it operates all aspects of its business, including identifying and analyzing all integrity hazards and potential hazards, under the encompassing umbrella of the Safety Management Program. *SMS Element 6 - Incident Reporting and Investigation* states that the roles of initiating and stewarding incident investigations may be passed to another CNRL Safety Department Authority (including Asset Integrity), if they are deemed to be the responsible authority, and investigation notifications may include Asset Integrity, as applicable. During audit interviews, CNRL explained that its internal reporting of hazards, potential hazards, incidents and near-misses are reported as described in the in *SMS Element 6,* and tracking is through the *Incident Report Form* and stored within the *Incident (Report) Database*. The Corrective Action process provides a formalized path to identify and track an unacceptable condition to resolution. If an unacceptable condition exists, it is recorded as a Corrective Action Record and is routed through the Integrity Lead for review. Once reviewed, the Integrity Lead is responsible to log the Corrective Action Record and notify the Operations Foreman, Superintendent, and Integrity Manager of the unacceptable condition. CNRL clarified that the Foreman has ownership of corrective actions applicable to incidents that occur in their geographical areas.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(c)** establish and implement a process for identifying and analyzing all hazards and potential hazards.	
	Assessment
	During interviews, CNRL explained that not all hazards are reported into the Incident Database. Coating failure is not recorded into the Incident Database; however, near-miss reporting (also considered to be a hazardous situation), such as digging too close to the pipeline, or Aerial Surveillance reports may be recorded into the Incident Database, depending on circumstances. All Corrective Action Records are recorded and reviewed with stakeholders monthly by the Integrity Engineer / Specialist to resolution. Any active or recent Corrective Action Records are reviewed as part of the annual Field Level Integrity Assessments for the respective operating areas. **Although CNRL described several procedures for reporting of hazards, incidents and near-misses, and for developing and managing corrective actions, the company did not provide evidence to demonstrate that the internal reporting process required by the OPR s. 6.5(1) includes explicit linkages connecting outputs of hazard reporting through any CNRL program, as an input into the hazard identification and analysis process.**
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that its process for identifying and analyzing hazards, as applied to the integrity program, is compliant to the OPR s. 6.5(1)(c). The process documentation provided is not sufficiently explicit nor does it provide clear links to procedures, processes, or documents describing how CNRL identifies integrity hazards and potential hazards. The company has not demonstrated that its process for identifying and analyzing hazards, as applied to the integrity program, is compliant to the OPR s. 6.5(1)(c).	

AP-04 Hazard Inventory

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5.1(d)** establish and maintain an inventory of the identified hazards and potential hazards.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018*. The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the *Pipeline Integrity Manual*. CNRL stated in its response to the information request that the Corporate Integrity Advisory takes ownership of the Failure Modes and Effects Analysis to sufficiently identify, understand and analyze foreseeable threats and hazards. CNRL did not provide reference to any documentation supporting this statement. This responsibility is not documented within the *Pipeline Integrity Manual*; however; auditors were advised that this statement was added in the response to the information request for clarification purposes. Information provided during the interviews related to the roles and responsibilities for this process was inconsistent with the documentation provided. During audit interviews, CNRL advised that as part of ownership of the Failure Modes and Effects Analysis process, it is the Corporate Integrity Advisory team that is responsible for maintaining the data including identified hazards (described as foreseeable failure modes in the Failure Modes and Effects Analysis process).
Hazard Inventory	The *Pipeline Integrity Manual* defines Hazard as, "A condition or event that might cause a failure or damage incident or anything that has the potential to cause harm to people, property or the environment." Throughout the documentation provided by company, the terms hazard, threat, and drivers are used interchangeably. Further, there is no definition of Potential Hazard in this document; however, the definition for Qualitative Risk Analysis includes reference to "transforming potential hazard into an accident". OPR s. 6.5(1c) requires that a company have a process for identifying and analyzing all hazards and potential hazards, and (d) expects the company to maintain an inventory of these hazards and potential hazards. CNRL directed auditors to the *Failure Modes and Effects Analysis spreadsheet* which lists foreseeable failure modes (hazards) by pipeline type. These include Internal Metal Loss. External Metal Loss, Natural Forces, Third Party Damage, Construction Defects, External SCC, and Operational Excursion. This list different than the list of hazards provided in CNRL's *Pipeline Integrity Manual*

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5.1(d)** establish and maintain an inventory of the identified hazards and potential hazards.	
	Assessment
	4/4/2018. Hazards covered in this section include: Internal corrosion, External corrosion, Non-metallic pipeline materials, Geohazards, Manufacturing or Construction Defects, Legacy Construction Practices, Environmentally Induced Cracking, Third Party Damage, Seismic Activity, Lightning, and Wildfires. **CNRL explained that the list of foreseeable failure modes presented in the *FMEA (Failure Modes and Effects Analysis) register* would be considered a working list and would be the closest thing the company has in regard to an inventory of hazards and potential hazards. Auditors were also advised during interviews that, although this list does get reviewed and updated periodically by the Corporate Integrity Advisory (typically when new pipelines are added to the inventory), there is no formal documented process to regularly review and maintain this list.**
Supporting Procedures	N/A
Integration and Application	N/A
FINDING: Based on the scope of the audit and based on the documents and interviews conducted, CNRL did not provide evidence to demonstrate that it has established an inventory of identified hazards and potential hazards as required per OPR s. 6.5(1)(d). **Further, if the list of foreseeable failure modes presented in the FMEA register is considered by CNRL to be its hazard inventory, there is no formal documented process to regularly review and maintain this list as required per OPR s. 6.5(1)(d).**	

AP-05 Evaluating and Managing Risks

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(e)** establish and implement a process for evaluating and managing the risks associated with the identified hazards, including the risks related to normal and abnormal operating conditions.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018*. The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the Pipeline Integrity Manual. CNRL stated in its response to the information request that the Corporate Integrity Advisory takes ownership of the Failure Modes and Effects Analysis to sufficiently identify, understand and analyze foreseeable threats and hazards, and works with Calgary and field-based integrity program stakeholders to find workable solutions that are consistent, efficient and effective at identifying and managing risk. CNRL did not provide reference to any documentation supporting this statement. This responsibility is not documented within the *Pipeline Integrity Manual;* however, auditors were advised that this statement was provided in the response to the information request for clarification purposes. CNRL's *Pipeline Risk Assessment Guideline* provides that the Integrity Manager is accountable, and the Integrity Representative is responsible for: risk assessments prior to new construction, importing and exporting PipeManager data, data truthing, reviewing the unmitigated risk assessments, and evaluating mitigations and controls. A part of the Pipeline Risk Assessment Process, the Engineer/Specialist is responsible for evaluating residual (mitigated) risk. Information provided during the interviews related to the roles and responsibilities was inconsistent with the documentation provided.
Process	CNRL defines risk as a function of both the likelihood and the consequence of a specific undesired event occurring. That is, risk is the likelihood that a specific undesired event will occur within a specified period leading to a consequence. CNRL describes its Pipeline Risk Management process as the identification, evaluation and prioritization of risk followed by application of resources to control and mitigate the risk associated with loss of containment. The three-stage process used at CNRL is described in the *Pipeline Risk Management Users Handbook*. This process includes Risk Assessment, Validation of Mitigation/Controls, and Risk Acceptance. CNRL developed a *Corporate Risk Matrix* and a *Corporate Risk Matrix guideline* which are used to classify risk. Each pipeline at CNRL is assessed using a *Pipeline Risk Assessment tool* which considers pipeline attributes, products within the pipeline, risk controls applied, and hazards identified. Each pipeline is assessed and is categorized

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(e)** establish and implement a process for evaluating and managing the risks associated with the identified hazards, including the risks related to normal and abnormal operating conditions.	
	Assessment
	with a risk score based on the criteria established in the *Corporate Risk Matrix*. Data and associated Risk Scores are validated periodically throughout the year to maintain a consistent level of consistency and quality control. CNRL explained that this is completed by the Corporate Integrity Advisory; however, this activity is ad hoc and not formally documented. A risk assessment is completed on every operating pipeline on an annual basis using the *Pipeline Risk Assessment Tool*. Pipelines evaluated to be Moderate-High and High Unmitigated risk are evaluated for the effectiveness of mitigation and controls (mitigation). Pipelines with a Residual Risk of Moderate-High or High will be evaluated for continued operation using the *Risk Acceptance Process* Data in the *Risk Assessment Tool* is updated annually for operating pipelines by Field Integrity personnel. New pipelines to be constructed by CNRL are assessed using a version of the pipeline risk calculator based on anticipated operating conditions. This ensures that adequate internal corrosion mitigation activities are arranged prior to the operation of the new pipelines. Pipelines gained through acquisition are also evaluated using the *Risk Assessment Tool*. In addition to the above factors, CNRL relies on operational experience and industry-accepted guidance to assess the type and severity of corrosion anticipated in a given pipeline or pipeline system. In general, the risk assessment attributes combined with a historical review of the pipeline operation including historical inspection and monitoring results assists in the assessment of expected corrosivity of a given system. Where system attributes are not compatible with the risk assessment algorithm, the company assesses the internal corrosion hazard using alternative methodologies suitable for the specific application. Operational data is gathered and reviewed annually during meetings with stakeholders including Integrity, Operations and Production personnel. This data is updated as required for each segment within the PipeManager database. Data and associated risk scores are validated periodically throughout the year to maintain a consistent level of consistency and quality control. CNRL explained that this is completed by the Corporate Integrity Advisory; however, this activity is ad hoc and not formally documented. To validate risk assessment scores, pipeline inline inspections are completed (typically only on calculated high and moderate-high unmitigated risks pipelines) to compare pipeline risk assessment predictions with inline inspection results. The risk assessments and the *Risk Assessment Tool* may be adjusted based on the results. CNRL completed in excess of 700 inline inspections in 2017 and over 400 are planned to be completed in 2018. For pipelines exceeding the corporately endorsed threshold risk level, each likelihood and consequence driver is evaluated to determine if mitigation or controls can be used to reduce the (unmitigated) risk. The validation step in the risk management process is where each mitigation or control is assessed for its effectiveness to ensure accuracy in assessing the actual residual risk level. For example, mitigation measures such as pigging, chemical treatment, and batch treatment will only be considered effective once they have been verified to be effective.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(e)** establish and implement a process for evaluating and managing the risks associated with the identified hazards, including the risks related to normal and abnormal operating conditions.	
	Assessment
	For steel pipelines, the likelihood validation is typically completed by running inline inspection tools, or performing excavations and non-destructive examination inspections to confirm pipeline condition. For non-metallic pipelines the validation process may include: pipeline cut-outs and rupture testing, verification of pipeline over-design (reducing effects of cyclic loading), or selective excavation and verification of pipeline support systems. Consequence reduction mitigation strategies and controls are typically focused on the effectiveness of leak detection systems, flood monitoring and shutdown strategies for hydro-technical threats, and are based on plume dispersion modeling for sour gas systems. CNRL's risk assessment process is detailed in CNRL's *Pipeline Risk Management Users Handbook*. The handbook provides a step-by-step guide of how to manage pipeline risk and how to run a pipeline risk assessment using CNRL's *Pipeline Risk Assessment Tool*. The processes are supported by, and references: the PipeManager Database, the *Corporate Risk Guideline*, CNRL's *Pipeline Risk Assessment Tool* and CNRL's *Pipeline Risk Management Guideline.*
Supporting Procedures	N/A
Integration and Application	N/A
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company demonstrated that its process for evaluating and managing the risks associated with the identified hazards, as applied to the integrity program, is compliant to the OPR s. 6.5(1)(e).	

AP-06 Developing and Implementing Controls

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(f)** establish and implement a process for developing and implementing controls to prevent, manage and mitigate the identified hazards and the risks and for communicating those controls to anyone who is exposed to the risks.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018*. The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the *Pipeline Integrity Manual*. CNRL stated in its response to the information request that the Corporate Integrity Advisory "works with Calgary and field-based integrity program stakeholders to find workable solutions that are consistent, efficient and effective at identifying and managing risk and, provides guidance to all levels of management and the field-based integrity team related to threat mitigation and controls". Further, the response stated that Field Integrity Techs/Field Integrity Specialists "troubleshoot corrosion/integrity issues and recommends mitigation strategies" and "work with Operations and the Geohazard service provider as required to coordinate field assessments and implement monitoring and mitigation activities as required." CNRL stated that Corporate Integrity Advisory Team develops appropriate controls for managing foreseeable threats. Any emerging regulations/issues are evaluated by this team and mitigations and controls are adjusted accordingly. The Geohazard service provider provides guidance to CNRL's Geohazard mitigation program, including providing technical solutions to help mitigate the likelihood of failure related to Geohazards. CNRL did not provide reference to any documentation supporting these roles or responsibilities. Auditors were advised that responsibilities specific to each area of the audit protocol were added to reflect who does what at CNRL and was added in the response to the information request for clarification purposes. CNRL's *Pipeline Risk Assessment Guideline* states that the Integrity Manager is accountable, and the Integrity Representative is responsible, for evaluating mitigations and controls. A part of the *Pipeline Risk Assessment Process*, the Engineer/Specialist is responsible for evaluating residual (mitigated) risk. Information provided during the interviews related to roles and responsibilities was inconsistent with the documentation provided.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(f)** establish and implement a process for developing and implementing controls to prevent, manage and mitigate the identified hazards and the risks and for communicating those controls to anyone who is exposed to the risks.	
	Assessment
Process	CNRL provided a table listing various mitigation strategies and control options available to mitigate integrity related risks within the company. The table provides descriptions of 13 Mitigations and Controls focusing on reducing Consequence, and 18 Mitigations and Controls focusing on reducing the Likelihood of an event occurring, each color coded according to the threat category they may apply to. The threat categories on this table include; corrosion, geohazard, non-metallic, and an all-encompassing "all threat types". CNRL explained that this table is provided as a drop-down menu within the *Pipeline Risk Management Tool*. The *Pipeline Risk Management Users Handbook* provides a link to the *Pipeline Risk Mitigation and Controls Table: Pipeline Risk Mitigation & Controls*. The extent of guidance provided to users on identifying controls is to "Review the pipeline mitigations and controls and apply the following likelihood reductions if appropriate". Potential effectiveness of each of the various mitigation and controls option is calculated within the *Pipeline Risk Management Tool* and compares the before and after as: Consequence compared to Mitigated Consequence, and Likelihood compared to Mitigated Likelihood. This is documented in the *Pipeline Risk Management Users Handbook.* CNRL explained that credit for risk reduction is only accepted once the effectiveness of Mitigations and Controls has been verified through ILI's, radiography, ultrasonic testing, investigative digs or other applicable verification activities. The final risk assessment results are communicated in the form of residual risk which is deemed to be the existing risk level of the pipeline, taking into account verified mitigations, controls, and safeguards that have been implemented. If the residual risk is assessed as Moderate-High or High, the Risk Owner (VP Operations for High Residual Risk, and Operations Manager for Moderate-High residual risks) must be notified if the pipeline remains in operation, and must accept the risk; or reject the residual risk and decide whether to shut-in the pipeline or apply additional mitigation measures or controls. This is also documented in *the Pipeline Risk Management Users Handbook.*

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(f)** establish and implement a process for developing and implementing controls to prevent, manage and mitigate the identified hazards and the risks and for communicating those controls to anyone who is exposed to the risks.	
	Assessment
	Outlined in the *Asset Integrity Procedure 11-06,* once unmitigated and residual risk results have been calculated based on verified mitigations/controls, a CNRL *Risk Acceptance Sign-Off Form* must be completed for Management review. CNRL explained that Operations Manager signed off is required in order to proceed with applying controls. Although CNRL has a list of available mitigation measures and controls it has determined to be most effective in reducing pipeline integrity risks at CNRL, the company did not demonstrate that it has a process for developing those controls or additional controls when needed. CNRL explained that communication of controls is relies on a wide distribution of signed off *Risk Acceptance forms*, and regular discussions and meetings within teams including Production Engineers, Managers, Superintendants and Foremen. CNRL stated in the information request response that the company maintains a strong Asset Integrity presence within the field offices, with approximately 70% of Asset Integrity staff living and working in the same centers as Field Operations personnel. A core component of field based Asset Integrity roles are to ensure daily interaction and high engagement with Field Operations' personnel to ensure risk management activities (including but not limited to inspections, mitigation, and monitoring programs) are understood and implemented by Operations. CNRL did not however, demonstrate that it has established and implemented a process for communicating controls to anyone who is exposed to the risks.
Supporting Procedures	No documentation and implementation issues were identified in the supporting procedures provided.
Integration and Application	N/A
Additional Information Reviewed	N/A

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(f)** establish and implement a process for developing and implementing controls to prevent, manage and mitigate the identified hazards and the risks and for communicating those controls to anyone who is exposed to the risks.	
	Assessment
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that it has a process for developing its controls, or additional controls when required, to prevent, manage and mitigate identified hazards and risks. In addition, the company did not demonstrate that is has developed a process for communicating controls to anyone who is exposed to the risks. Both of these are required per OPR s. 6.5(1)(f). The company has not demonstrated that its process for developing and implementing controls, as applied to the integrity program, is compliant to the OPR s. 6.5(1)(f).	

AP-07 Coordinating and Controlling the Operational Activities

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(q)** establish and implement a process for coordinating and controlling the operational activities of employees and other people working with or on behalf of the company so that each person is aware of the activities of others and has the information that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

	Assessment
Accountabilities	CNRL stated in its response to the information request that the Integrity Engineer / Specialists and Field Integrity Tech / Field Integrity Specialists perform Workplace Safety Observations while on site to ensure work is performed safely, and Field Operators communicate with Field Integrity Tech/Specialists as required on integrity related issues, and provide Hazard Assessments, as needed, to foster safe work practices. The Cathodic Protection Service Provider participates in Hazard Assessments and Workplace Safety Observations to foster safe work practices. CNRL did not provide reference to any documentation supporting these roles or responsibilities. Auditors were advised that responsibilities specific to each area of the audit protocol were added to reflect who does what at CNRL, and was added in the response to the information request for clarification purposes. As stated in CNRL's document *SMS Element 1 Introduction and Leadership Commitment*, Supervisors are responsible to: provide adequate supervision at every worksite, ensure workers know what is expected of them through orientation, ensure workers know what, and are prepared to deal with, potential hazards of their work and any specific hazards on the worksite, coordinate activities of contractors when there are two or more employers present at the worksite to ensure activities don't interfere or cause hazards for others, and consult and cooperate with the Joint Work Site Health and Safety Committee or Health and Safety Representative." Information provided during the interviews related to roles and responsibilities for this audit element was inconsistent with the documentation provided.
Process	CNRL uses several modes of communication to provide safety awareness and hazard awareness to its workers. As described in *CNRL's SMS Element 1 Introduction and Leadership Commitment*, as part of orientation, all workers on a CNRL worksite must receive appropriate information as provided by the quadfold handout *Safety Orientation*, or by Computer Based Training. CNRL also expects workers to take the *General Safety Orientation for the Industry* administered by Enform. The document states that a Hazard Assessment must be conducted before any work commences on a CNRL worksite, and (potential) hazards must be identified, assessed and controlled. Workers and Service Providers are expected to participate in conducting Hazard Assessments, and must understand the Hazard Assessment and the Controls they are expected to use. CNRL states that

	hazard assessments are intended to involve all workers who will be participating in the work to ensure adequate communication of the hazards and what the controls for each are, identify the scope of the work to be completed, identify (potential) hazards of the work or task, and ensure appropriate control measures are taken to eliminate or mitigate all identified hazards. At CNRL, Conventional / Thermal Operations use a Hazard Assessment; whereas Oil Sands Operations use a Safe Work Permit system and/or a Hazard Assessment. Hazard Assessments and Safe Work Permits must be conducted and documented by a CNRL representative, employee, or contract operator who is responsible to supervise the work being done. For proven service providers who perform routine and repetitive work at similar work sites, CNRL allows the issuance of an *Extended Hazard Assessment*; however, the CNRL worker issuing the extended Hazard Assessment must clearly identify all potential hazards and control measures to the service provider, identify the need for the Hazard Assessment to be in the possession of the service provider at the work site, and verify that the service provider has their own Hazard Assessment and Job Procedures at the worksite for the tasks to be done . Service providers and contractors who provide a specialized service must provide a Hazard Assessment specific to the task to be performed as specified in the CNRL *Hazard Assessment*. Service Providers working for CNRL must provide a Hazard Assessment and / or job specific step by step procedures (Job Safety Assessments) for specialized services being provided and have them readily available at the job site. Worksite Safety Observations as described in CNRL's *Guide to Safety and Compliance*, is an additional tool the company uses to help identify opportunities for improvement of Safety, through observation of people, equipment, processes and procedures while engaged in activities at CNRL's worksites. In addition to training, Hazard Assessments, Worksite Safety Observations, Job Safety Assessments, and Safe Work Permits, CNRL provided that it relies on daily reports, daily communication and regularly held project meetings to coordinate and control operational activities of its workers. **CNRL has several procedures and uses several modes of communication to provide safety awareness and hazard awareness to its workers (most of which falls under the umbrella of the Safety Management System). However, the company did not provide evidence to demonstrate that it has established and implemented an explicit documented process for coordinating and controlling the operational activities of workers to ensure that each person is aware of the activities of others and has the information that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.** **Auditors note that there does not appear to be an overarching documented process in place which addresses the requirements of OPR s. 6.5(1)(q).**

Supporting Procedures	
Integration and Application	
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that it has a process for coordinating and controlling the operational activities of employees and other people working with or on behalf of the company, as applied to the integrity program, and as required per OPR s. 6.5(1)(q).	

AP-08 Internal Reporting of Hazards, Incidents and Near-Misses

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(r)** establish and implement a 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.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018*. The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the *Pipeline Integrity Manual*. Specific to internal reporting, the *Pipeline Integrity Manual* states that the Foremen in Field Operations are responsible to: (1) provide immediate notification to the Safety Coordinator and the Environmental Coordinator in the event of a pipeline loss of containment; (2) provide immediate notification to the relevant regulatory jurisdiction, based upon CNRL incident reporting requirements; and (3) integrates learnings from pipeline failures and inspections into operational practices. Field Integrity Tech / Field Integrity Specialists are responsible to: (1) ensure incident reports on pipeline failures are updated; (2) champion failure investigations, including interfacing with the Failure Analysis service provider; and (3) follow-up on failure report recommendations to ensure learnings help reduce re-occurrence of failures. The Field Operators are to communicate immediately with the Foreman in the event of a pipeline loss of containment. *SMS Element 1 Introduction and Leadership Commitment* states that "Workers are responsible to Report potential hazards, incidents and injuries to supervisors as soon as practical". This statement was echoed by CNRL personnel during audit interviews. *SMS Element 6 Incident Reporting and Investigation* includes an Incident Process Workflow diagram, including responsibility swim lanes, outlining the process from occurrence of incident through to incident closeout. **CNRL provided several documents which include some level of description or reference to internal reporting of hazards, incidents and near-misses. However, CNRL did not demonstrate that it has an explicit documented process, which should clearly articulate roles, responsibilities, and accountabilities**.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(r)** establish and implement a 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.	
	Assessment
	OPR s.6.3(1)(a) requires that a company have an established 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. CNRL referred to, and provided, its *Canadian Natural Code of Integrity 2015* to address the requirements of OPR s. 6.3(1)(a). Under *Reporting Violations of the Code* the document states that "Staff making in good faith, a report of a possible violation of the Code or who report any questionable accounting, internal accounting controls or auditing matters or assists in an investigation of these types of violations will not be discharged, demoted, suspended, threatened, harassed or in any other manner discriminated against in the terms and conditions of employment, or otherwise." **This statement does not address reporting of hazards, potential hazards, or incidents and near-misses, nor does it clearly articulate the conditions under which a person who makes a report will be granted immunity from disciplinary action. CNRL did not provide additional evidence to demonstrate it meets the requirements of OPR s.6.3(1)(a).**
Process	*SMS Element 6 Incident Reporting and Investigation* details CNRL's Incident Reporting / Investigation Process, and includes: examples of incidents to be reported, who needs to receive incident reports, when an investigation is required, responsibility for corrective action, and escalation requirements with respect to Management participation based on severity level of incident based on the CNRL Risk Matrix. *SMS Element 6* also includes an Incident Process Workflow diagram, including responsibility swim lanes, outlining the process from occurrence of incident through to incident closeout. *SMS Element 6* states that "All Injuries, Equipment Damage, Spills, and Near-misses must be reported as soon as possible after the incident is controlled and the site is secured"; however, it does not clearly articulate how to report, i.e., verbally, written submission, or online. Examples of incidents to be reported include: near-misses, spills or emissions, pipeline leaks, and sabotage or vandalism. *SMS Element 6* does not specifically address internal reporting of hazards or potential hazards. *SMS Element 6* states that "all incidents are (to be) reported using the Incident Report. However, there is no link or reference to the Incident Report to be used for reporting. *SMS Element 6* only includes a template for an Investigation Report.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(r)** establish and implement a 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.	
	Assessment
	There is a *Preliminary Incident & Investigation Guide for Safety & Compliance Coordinators* included in this document. In regard to internal reporting, its guidance is to report the incident to applicable CNRL departments including, but not limited to, Asset Integrity for process equipment and pipeline incidents. CNRL provided an example of a completed *Incident Report Form (Report no. Q0203)* for auditor review. No reference was provided as to where this Incident Report Form resides, how it is accessed, who completes this form, who receives it, who reviews it, or who addresses it. CNRL stated during audit interviews that the *Incident Report Form* is used when reporting hazards and significant near-misses. CNRL clarified that near miss reporting on ground disturbance such as digging close to the pipeline, and Aerial Surveillance reports may not use the *Incident Report Form*; however, they are filed within the Incident Database. Pipeline Integrity hazards such as coating failure would not be captured in the Incident Database; however, discovery of, or contact with, asbestos would be captured in the Incident Database. CNRL explained during audit interviews that the Foremen have ownership of corrective actions and preventive actions related to incidents (or hazards) which occur within their respective geographical areas. CNRL indicated that the *Pipeline Risk Management Handbook* provides a procedural guide to analyze hazards, for directing resources to reduce risks, identify controls and mitigation strategies to manage the risks (and imminent hazards). CNRL issues a variety of communication strategies to share learnings from incidents. Examples provided or discussed include a monthly *Asset Integrity Bulletin*, a monthly *Safety Bulletin*, regularly held safety meetings, a *Pipeline Failure Lookback 2017 presentation*, and (at a higher level of detail), *quarterly Stewardship reports* and *annual Stewardship Reports*. CNRL *SMS Element 3 Employee Training* states that "All workers on Canadian Natural sites must understand (10) Incident Reports", however as noted under section 3.2 - Mandatory Courses for Field Positions, there is no mandatory training regarding, or specific to, reporting of hazards, potential hazards, incidents and near-misses, or for taking corrective and preventive actions. Hazard Identification and Accident / Incident Investigation are provided under optional courses.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(r)** establish and implement a 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.	
	Assessment
	Although CNRL provided several documents illustrating that the company does have guidelines and expectation statements on reporting, and it does appear to internally report many incidents and hazards, it did not demonstrate that the CNRL has an explicit documented 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.
Supporting Procedures	N/A
Integration and Application	N/A
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that it has a 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, as applied to the integrity program, and as required per OPR s. 6.5(1)(r).	

AP-09 Developing Contingency Plans

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(t)** establish and implement a process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018*. The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the *Pipeline Integrity Manual*. CNRL stated in its response to the information request that the Sr. VP, Safety, Risk Management, Innovation & Technology " Provides adequate resources to manage and implement the safety, emergency response and integrity programs described in the Pipeline Integrity Manual". As such, contingency planning responsibilities largely reside within the Emergency Management Team (specifically the Lead of ERP), with direction and support from the Asset Integrity team. Responsibilities and accountabilities for developing contingency plans is not explicitly documented; however, discussions during the audit interviews supported with swim lane flow diagrams and evidence of implementation, demonstrated that CNRL has developed (and has the ability to continue to develop) site specific emergency response plans in response to identified hazards and higher level risks identified by loss management teams including the Asset Integrity Management team. CNRL did not provide specific reference to documentation supporting these roles or responsibilities; however, auditors were advised that responsibilities specific to each area of the audit protocol were added to reflect who does what at CNRL and was added in the response to the information request for clarification purposes.
Process	CNRL explained that the company focuses on proactive risk management, from risk identification and mitigation, to response across its operations in Canada and offshore UK and Africa, and that it is the integrated management systems that help the company evaluate and prevent the risk of incidents, such as spills or leaks from occurring. To mitigate impacts, incidents that may occur are managed in accordance with the company's emergency management and spill preparedness programs.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(t)** establish and implement a process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.	
	Assessment
	CNRL relies on its Emergency Management program to prepare the company for a safe and coordinated response to potential accidents and incidents. This program includes an Incident Command System, detailed emergency response procedures, and the resources and training needed for reliable and effective emergency response. Another key component of this program is CNRL's site specific *Emergency Response Plans (ERPs)* which are developed to ensure immediate initial response and efficient management of the situation until it has been resolved or until other resources can be mobilized to the site. As presented during audit interview, site specific ERPs are developed to address specific risks identified at specific locations. Processes used in the identification of risks and development of contingency plans include: the Risk Assessment - Risk Management Process, the Engineering Assessment Process, and Transportation of Injured Worker Plans. CNRL's Emergency Management team provided an explanation supported by documentation demonstrating its process including a process flow (diagram) detailing the contingency planning process from the "Hazard Identification and Response Process", to the identification of hazards, through to the development of various specific responses. The process is initiated by an email request to the Emergency Management team to develop a new site specific ERP or to complement or revise an existing plan. (All existing plans meet or exceed the requirements of provincial regulations.) The Emergency Management team works with the Asset Integrity team to ensure all risks and hazards are understood and addressed in the development of each site specific ERP. Calculations to which each plan is developed include multi pipeline-connections and the potential effects of a concerted or domino release. The contingency plans (site specific ERPs) are subsequently developed based on the worst case possible scenario. Although site specific ERPs are considered and managed as controlled documents, each is accessible to each of the Operations areas and select information is shared and communicated with persons on an as-needed basis. The Emergency Management team advised that its communication plan follows the CNRL Corporate Communication Plan. The Public Information Package is an example of a public communication tool. CNRL stated that it reviews each of its 143 site specific ERPs annually, nine of which address NEB regulated pipelines. The company's strategic plan references the ICS that the company follows. Roles and responsibilities are described in the ICS documents. The company through interviews directed the audit team to the *O&M manual* sections 8.2 and 8.3 and pages 301 and 302 for procedures and process to deal with abnormal conditions associated with integrity.

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(t)** establish and implement a process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.	
	Assessment
	CNRL employees of the Emergency Management team interviewed could describe what to do and could point to the various procedures and documents that would lead to developing and accessing contingency plans.
Supporting Procedures	N/A
Integration and Application	N/A
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company demonstrated that its process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations, as applied to the integrity program, is compliant with the requirements of OPR s. 6.5(1)(t).	

AP-10 Inspect and Monitor

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(u)** establish and implement a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the programs referred to in section 55 and for taking corrective and preventive actions if deficiencies are identified.	
	Assessment
Accountabilities	Assignment of responsibility is documented within the *Pipeline Integrity Manual 4/4/2018.* The document states that the Chief Operating Officer, Exploration and Production: assigns responsibility to the Senior Vice President, Safety Risk Management and Innovation to provide adequate resources to the Director, Asset Integrity (Thermal-Conventional) in order to ensure effective program implementation AND assigns responsibility to the Senior Vice President, Canadian Conventional Field Operations to work with the Director, Asset Integrity to ensure that the program is implemented according to the *Pipeline Integrity Manual.* CNRL stated in its response to the information request that the Director of Asset Integrity interacts directly with the Asset Integrity team with respect to pipeline integrity performance, emerging issues or regulations and recommends appropriate performance measures. This position also provides monthly KPI updates and Quarterly Stewardship updates to the Sr. VP, Safety, Risk Management, Innovation & Technology, VP, Field Operations (East & West), Operations Managers, Asset Integrity and Operations, and is responsible for adjusting integrity related key performance indicators when needed.
Process	As discussed in AP-02, CNRL has established a set of leading and lagging key performance activities and associated key performance indicators (KPIs) to measure the performance of the integrity management program. As described in the *Pipeline Integrity Manual*, KPIs have been identified which track the progress of pipeline integrity key performance activities. The KPIs are tracked and communicated to Managers and VPs in the monthly KPI report, quarterly to the Board of Directors within the *Quarterly Stewardship Report*, and annually within the *Annual Stewardship Report*. Targets ranges are included with the KPIs to provide flexibility in achieving and overachieving results and KPIs are reviewed annually. Mitigations such as pigging, chemical treatment, and chemical batch treatment are only considered effective if they have been verified to be effective. The validation step in the risk management process assesses each mitigation or control for its effectiveness, thereby more accurately assessing the residual risk level of each pipeline. The *Integrity Program Corrective Action Process* is briefly described in the *Pipeline Integrity Manual* and references a Corrective Action Process within the Pipeline Integrity Program folder. CNRL states that "The Integrity Program Audit processes provide many levels of oversight and opportunities for program improvement; however, if an unacceptable condition persists, the Corrective Action process provides a formalized path to identify and track the unacceptable condition to resolution".

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(u)** establish and implement a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the programs referred to in section 55 and for taking corrective and preventive actions if deficiencies are identified.	
	Assessment
	The Corrective Action process description in the *Pipeline Integrity Manual* does not clearly specify or articulate the Process to manage corrective actions from initiation to completion. Further, the process does not clearly outline the roles, responsibilities and authorities involved in the actions within the corrective action "process". **Neither the Corrective Action process nor details of the Corrective Action process were provided for auditor review. Further, CNRL did not provide any other evidence to demonstrate that it has a process for taking corrective actions and preventive actions for identified deficiencies. Therefore, CNRL did not demonstrate that it has a process for taking corrective and preventive actions as required per OPR s. 6.5(1)(u).** CNRL advised that it completes a variety of audits to evaluate the effectiveness of the Pipeline Integrity Management program. These include: (1) Field Level Pipeline Integrity Audits; (2) High Risk Pipeline Integrity Audits; (3) CNRL Internal Audits; (4) Third Party Audits; and (5) Audits by Regulators. Results of audit findings are shared with Management and findings are used to create an action list which is tracked to completion. **CNRL provided several documents, procedures, programs, and performance indicators as evidence to demonstrate that it meets the requirements of OPR s. 6.5(1)(u). Although these documents do describe the different activities the company is doing to inspect and monitor its activities and facilities, they are not a documented series of actions that take place in an established order, directed toward a specific result, and they do not articulate the roles, responsibilities and authorities involved in each of the actions. Therefore, the actions in themselves do not constitute a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the integrity program and for taking corrective and preventive actions if deficiencies are identified.** **CNRL did not demonstrate that it has an explicit documented process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the pipeline integrity program.** **CNRL also did not demonstrate that it has an explicit documented process for taking corrective and preventive actions if deficiencies are identified.**
Supporting Procedures	N/A

OPR s. 6.5(1) A company shall, as part of its management system and the programs referred to in section 55, **OPR s. 6.5(1)(u)** establish and implement a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the programs referred to in section 55 and for taking corrective and preventive actions if deficiencies are identified.	
	Assessment
Integration and Application	CNRL advised that it completes a variety of audits to evaluate the effectiveness of the Pipeline Integrity Management program. These include: (1) Field Level Pipeline Integrity Audits; (2) High Risk Pipeline Integrity Audits; (3) CNRL Internal Audits; (4) Third Party Audits; and (5) Audits by Regulators. Results of audit findings are shared with Management, and findings are used to create an action list which is tracked to completion. .
Additional Information Reviewed	CNRL performs pipeline surveillance and patrolling relative to assessed risk, CSA Class location and regulatory requirements. Surveillance may be conducted either in from the air or on land. CNRL stated in the response to the information request, that "evidence of 3rd party activity on or along the right-of-way is communicated to, and followed up by, Operations to ensure that any and all activity has the appropriate administrative controls in place". How third-party activity on, or along, the right-of-way is communicated and followed up, is not described within any of the documents provided as evidence to validate the statement provided by CNRL. Documentation reviewed in this regard includes the *CNRL Pipeline Right-of-Way Inspection and Maintenance* procedure and the *Visual Patrol Report for Echo Pipeline* by Airborne Energy Solutions. CNRL has established right-of-way (ROW) inspection frequencies based on regulatory requirements and based on risk. The province of Alberta prescribes right-of-way (ROW) inspection intervals which CNRL has set as the corporate standard. For remaining pipelines, the inspection frequency may be assigned by the Operator on a risk basis, using the Corporate Risk Matrix to recommend inspection frequencies. Inspection frequencies range from bi-weekly to annually, and up to once every five years depending on product and class location. Pipelines which cross water or unstable ground are to be annually inspected. All remaining pipelines may be inspected at a maximum risk-based frequency up to 5 years, based upon unmitigated risk using the CNRL *Corporate Risk Matrix*. All frequencies are be considered a maximum inspection interval and Operations may choose to reduce this time period to take advantage of opportunistic work or normalize the frequency of inspection of all pipelines in a given area.
FINDING: Based on the scope of the audit and the documents and interviews conducted, the company did not demonstrate that it has a process for inspecting and monitoring the company's activities and facilities to evaluate the adequacy and effectiveness of the pipeline integrity program and for taking corrective and preventive actions if deficiencies are identified are per OPR s. 6.5(1)(u).	

AP-11 Annual Report

OPR s. 6.6(1) A company shall complete an annual report for the previous calendar year, signed by the accountable officer, that describes (a) the performance of the company's management system in meeting its obligations under section 6 and the company's achievement of its goals, objectives and targets during that year, as measured by the performance measures developed under paragraphs 6.5(1)(b) and (v); and (b) the actions taken during that year to correct any deficiencies identified by the quality assurance program established under paragraph 6.5(1)(w).	
	Assessment
Annual Report	CNRL provided a letter to the Board identifying CNRL's President as the Accountable Officer. The company clarified that the company's annual report is titled the *Annual Stewardship Report*. In reviewing the *2017 Annual Stewardship Report*, auditors noted that it had not been signed by the Accountable Officer. Auditors were advised that a meeting was held to present the report to CNRL Management Committee where attendance is recorded. The record of this meeting indicated that the Accountable Officer was in attendance and was made aware of the information presented in the *Annual Stewardship Report*. OPR section 6.6 requires specifically that the company's annual report be signed by the Accountable Officer. Signatory endorsement by the Accountable Officer provides a documented assurance that the Accountable Officer is aware of the performance of the company's management system in meeting its obligations under OPR section 6, and the company's achievement of its goals, objectives and targets during that year, and the actions taken during that year to correct any deficiencies identified. **Based on the lack of signatory approval on the Annual Report, the company does not meet the requirements of OPR s. 6.6.** The performance of CNRL's Integrity Management System is presented in the *Annual Stewardship Report* through Key Performance Indicators which include leading and lagging indicators of performance. These include number of pipeline leaks/1000 km, completion of high and moderate-high pipeline mitigation reviews, and number of inline inspections completed. Each of these has a set target range and the actual Key Performance Indicators achieved throughout the year, relative to the target range. The *Annual Stewardship Report* did not include an assessment or measurement of Key Performance Indicators in relation to achieving integrity and/or company goals. A description of actions and initiatives planned or taken by the Integrity Management Program to correct deficiencies identified by CNRL's internal audit program and the Continuous Improvement Team was, however, included within the *2017 Annual Stewardship Report.* **CNRL's *Annual Stewardship Report* does describe the performance of the company's integrity program through KPIs however, the report does not include a measure of how the management system(s) achieve program and/or company goals. This report also does not meet the management system review requirements nor the requirements to describe achievement of its goals, objectives and targets OPR 6.6.**

OPR s. 6.6(1) A company shall complete an annual report for the previous calendar year, signed by the accountable officer, that describes (a) the performance of the company's management system in meeting its obligations under section 6 and the company's achievement of its goals, objectives and targets during that year, as measured by the performance measures developed under paragraphs 6.5(1)(b) and (v); and (b) the actions taken during that year to correct any deficiencies identified by the quality assurance program established under paragraph 6.5(1)(w).	
	Assessment
	In reviewing the CNRL 2017 Annual Stewardship Report, auditors noted that it had not been signed by the Accountable Officer.
FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that its annual report met the requirements of OPR s. 6.6 (1).	

AP-12 Integrity Program Audits

OPR s. 55(1) A company shall conduct audits, with a maximum interval of three years, of the following programs
- **(a)** the emergency management program referred to in section 32;
- **(b)** the integrity management program referred to in section 40, including the pipeline control system referred to in section 37;
- **(c)** the safety management program referred to in section 47;
- **(d)** the security management program referred to in section 47.1;
- **(e)** the environmental protection program referred to in section 48; and
- **(f)** the damage prevention program referred to in section 47.2.

(2) The documents prepared following the audit shall include
- **(a)** any deficiencies noted; and
- **(b)** any corrective action taken or planned to be taken.

	Assessment
Integrity Program Audits	CNRL indicated in its response to the information request that the Pipeline Integrity Management Program was audited by the Internal Audit Group in 2015. Based on a review of audit findings provided in *Table 1 – Summary of Continuous Improvement Approach to Address Internal Audit Findings*, the audit completed in 2015 did not assess CNRL's integrity program to ensure compliance to the OPR requirements, but rather, it assessed compliance to its own procedures and management system. The 2015 audit did not audit the company's procedures or its management system against the OPR. CNRL's *Pipeline Integrity Audit Procedure Rev 1.1*, outlines the requirement to complete two types of audits: Field Level Pipeline Integrity Audits and High Risk Pipeline Integrity Audits. The procedure does include assessing the integrity program to ensure compliance with OPR requirements. **The company did not complete an integrity program audit as required per OPR s. 53 and OPR s. 55, in the last 3 years**.

FINDING: Based on the scope of the audit, and the documents and interviews conducted, the company did not demonstrate that it met the audit requirements of OPR sections 53 and 55(1).

Appendix II - Abbreviations

AP: Audit Protocol – (AP01-AP12)

CAPA: Corrective and Preventative Action Plan

CLC: *Canada Labour Code, Part II*

CNRL: Canadian Natural Resources Limited

CSA Z662-15: CSA Standard Z662 entitled *Oil and Gas Pipeline Systems*, 2015

EHS: Environment, Health and Safety

ERP: Emergency Response Plan

IMP: Integrity Management Program

FMEA: Failure Modes and Effects Analysis

KPIs: Key Performance Indicators

NEB: National Energy Board or Board

OPR: National Energy Board *Onshore Pipeline Regulations*

SMS: Safety Management System

Appendix III: Documents and Records Reviewed

1 Attachment #1 - Corporate Statement on Asset Integrity Management

2 Attachment #2 - CNRL Pipeline Integrity Manual

3 Attachment #3 - 2018 KPI Strategy - Summary

4 Attachment #4 - Sep 2018 Asset Integrity Key Performance Indicators (1)

5 Attachment #5 - Q1 2018 Stewardship Report

6 Attachment #6 - 2018 KPI Targets Stewardship Final

7 Attachment #7 - Rolling Action Item List

8 Attachment #8 - 2017 Asset Integrity KPI Roadmap - PIPELINES

9 Attachment #9 - 2017 Annual Stewardship Report (1)

10 Attachment #10 - Corporate Risk Matrix Guideline

11 Attachment #11 - Pipeline Risk Management Users Handbook

12 Attachment #12 - Pipeline Risk Management Guideline

13 Attachment #13 - Failure Modes and Effects Register

14 Attachment #14 - Management of Inactive Pipelines

15 Attachment #15 - Pipeline Records Requirements for Acquisitions

16 Attachment #16 - GeoHazard Inspection and Threat Mitigation Guideline

17 Attachment #17 - Engineering Assessment Handbook

18 Attachment #18 - Pipeline Risk Management Process

19 Attachment #19 - Running Pipeline Risk Assessment from PipeManager

20 Attachment #20 - Evaluating Residual Risk

21 Attachment #21 - Risk Acceptance Process

22 Attachment #22 - Risk Management - Mitigation & Controls Criteria

23 Attachment #23 - Pipeline Integrity Verification Requirements

24 Attachment #24 - Field Integrity Development Plan

25 Attachment #25 - Pipeline Integrity Training for Operators

26 Attachment #26 - Operator Expectations

27 Attachment #27 - SMS Element 1 Introduction and Leadership Commitment

28 Attachment #28 - SMS Element 3 Employee Training

29 Attachment #29 - SMS Element 6 Incident Reporting and Investigation

30 Attachment #30 - SMS Element 7 Incident Analysis

31 Attachment #31 - Release Management and Reporting

32 Attachment #32 - 2017 Failure Lookback Results

33 Attachment #33 - Incident Report Q0203

34 Attachment #34 - Pipeline Right-of-Way Inspection and Maintenance Procedure

35 Attachment #35 - Hiring and Competency of Pipeline Inspector

36 Attachment #36 - Project Kick-Off Safety and Compliance Checklist

37 Attachment #37 - Pipeline Integrity Internal Audit Final Review Report

38 Attachment #38 - Leak Detection Selection and Controls Guide

39 Attachment #39 - Guide to Safety and Compliance

40 Attachment #40 - Change of Service Example

41 Attachment #41 - Transportation of Injured Worker Plan

42 Attachment #42 - Field Level Pipeline Audit PAW

43 Attachment #43 - All Threats Assessment - ECHO Pipeline

44 Attachment #44 - Pipeline Integrity Audit Procedure

45 Attachment #45 - 2015 Corporate Audit Management Response TABLE 1

46 Attachment #46 - Failure Reduction Plan - Example

47 Attachment #47 - Safety News Example

48 CNRL Audit Protocol Information Request - Integrity Program – Oct 23

49 HazardID_RiskAssessment-Management_Procedures_2018

50 Hazard Assessment Guideline (Directive) 2018 CNQ-OVR-FM-LM-000007_4

51 1102_canadian-natural_code-of-integrity-2015

Appendix IV: Company Representatives Interviewed

1 [redacted] – Director. Asset Integrity

2 [redacted] Senior Vice President – Safety, Risk Management & Innovation

3 [redacted]– Advisor, Corporate Asset Integrity

4 [redacted] – Lead, Corporate Integrity Advisory

5 [redacted] – Vice President, West Field Operations

6 [redacted] - Lead, Asset Integrity Analysts

7 [redacted] – Director, Safety

8 [redacted] – Manager, Pipelines

9 [redacted] – Lead, Environmental Operations

10 [redacted] – Manager, Integrity East

11 [redacted] – Manager, Central Field Operations

12 [redacted] – Lead, Safety (Development Operations)

13 [redacted] – Emergency Management Lead - North American Conventional/Thermal Operations

14 [redacted] – Engineer, Emergency Response