Canada Energy Regulator | Régie de l'énergie du Canada

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File OF-Surv-OpAud-P384-2019-2020-01
28 May 2020

Mr. Dean Liollio
President and Accountable Officer
Plains Midstream Canada ULC
607 - 8 Avenue SW
Calgary, AB T2P 0A7
Email: [redacted]

Dear Mr. Liollio:

Canada Energy Regulator (CER) Final Audit Report
Plains Midstream Canada ULC (Plains) – Control Room Management

Please find attached a copy of the Final Audit Report for the audit of Plains' Control Room Management conducted during the period from October 2019 to March 2020. The audit was conducted by the Canada Energy Regulator (CER) in accordance with section 103 of the *Canadian Energy Regulator Act* (CER Act).

On 22 April 2020, the CER sent Plains the Draft Audit Report documenting the evaluation of Plains' Control Room Management for review and comment. Plains was also advised that the CER intends to post the Final Audit Report on the CER's website. To that end, Plains was advised that if it had any objections to the release of the audit report, or to specific parts of the report, to provide a list of those objections along with a detailed rationale and specific reference to applicable sections of the *Access to Information Act and Privacy Act*. Plains was advised that the CER redacts the personal information of Plains' employees with the exception of the personal information of Plains' executive staff, which the CER considers publicly known figures of the company.

On 21 May 2020, Plains responded stating that it had no proposed edits to the findings in the report. Plains also advised the CER that it had no redactions to propose. The CER has now finalized its Final Audit Report and appendices, attached to this letter, which it will now post on the CER's website.

Corrective and Preventive Action (CAPA) Plan

Plains is ordered to file, with the Secretary of the Commission, a Corrective and Preventive Action (CAPA) Plan for approval within 30 calendar days of receipt of this Final Audit Report describing the methods, timing and rationale for addressing the Non-Compliant finding identified in the audit report. Plains is directed to use the CER standard CAPA Plan template in the development of its CAPA Plan for approval. The template is attached to this letter as Attachment 2.

…/2

The CER will monitor and assess Plains' corrective and preventive actions until they are fully implemented. Additionally, it is ordered that, where applicable, the approved CAPA Plan requirements will be implemented on a system-wide basis to address similar deficiencies. In addition, the CER will continue to monitor the implementation and effectiveness of Plains' management system and programs through targeted compliance verification activities as a part of its on-going regulatory approaches.

If you require any further information or clarification, please contact Mark Tinney, Lead Auditor, Systems Operations Business Unit at 403-966-1065 or at 1-800-899-1265 toll free.

Yours sincerely,

Original signed by

Mark Tinney
Lead Auditor
Inspection Officer Number 2777

Attachment

c.c. [redacted], Director, Environment, Regulatory, Emergency Management and Security, Email: [redacted]

Suite 210, 517 Tenth Avenue SW
Calgary, Alberta T2R 0A8

Final Audit Report
Audit of Control Room Management

Compliance Verification Activity: CV1920 - 401
File OF-Surv-OpAud-P384-2019-2020-01

Plains Midstream Canada ULC.
607 - 8 Avenue SW
Calgary, AB T2P 0A7

Date: 28 May 2020

Executive Summary

In accordance with section 103 of the *Canadian Energy Regulator Act* (CER Act), the Canada Energy Regulator (CER) conducted a compliance audit of Plains Midstream Canada ULC's (Plains) control room management (the audit) from October 2019 to March 2020.

The objectives of the audit were to verify that Plains had developed and implemented a pipeline control system and leak detection system in accordance with the requirements of the *Canada Energy Regulator Onshore Pipeline Regulations (SOR/99-294)* (OPR) and the *CSA Z662 Oil and Gas Pipeline Systems* standard (CSA Z662), and to verify that control system operation and maintenance processes are effectively integrated within the company's management system.

The scope of the audit included the personnel, processes, and activities used to operate and control the liquid pipeline control system and leak detection system. The scope applied to normal and abnormal operating conditions, including emergency shut down of the pipeline in place at the time of the audit and looking back for up to six months to verify that the company is compliant with relevant sections of the OPR and CSA Z662.

The CER conducted the audit using the audit protocols, attached in Appendix 1 of this report, which are focused on control room management. The CER assessed whether Plains' documentation, processes, and activities complied with legal and other requirements under the CER's authority listed below.

- The *Canadian Energy Regulator Act* (CER Act);
- The *Onshore Pipeline Regulations* (SOR/99-294) (OPR); and,
- Any conditions contained within applicable certificates or orders issued by the CER.

Of the twenty-one (21) regulatory requirements listed in the audit protocol, the CER audit staff had no issues of concern with twenty (20), and found Plains to be non-compliant with one (1). The one non-compliant finding related to the level of detail utilized by the company in establishing the goals incorporated into its management system and technical programs. The findings from the audit are summarized in Table 1 and explained in detail in Appendix 1 of this report.

With respect to the identified non-compliance, based on interviews with Plains' staff and a review of the information provided by the company, the CER is of the view that the non-compliant finding does not result in imminent or immediate safety or environmental protection issues.

Plains is required to develop a Corrective and Preventive Action (CAPA) Plan to address the non-compliant finding and file it with the Secretary of the Commission of the Canada Energy Regulator within 30 days of receipt of the Final Audit Report for approval. The CER will monitor the implementation of the CAPA Plan to confirm that it is completed in a timely manner.

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1.0 Introduction

In accordance with section 103 of the *Canadian Energy Regulator Act* (CER Act), the Canada Energy Regulator (CER) conducted a compliance audit of Plains Midstream Canada ULC's (Plains) control room management (the audit) during the period October 2019 to March 2020.

CER audit staff applied the audit protocol listed in Appendix 1 of this report. Abbreviations and terminology used in the report can be found in Appendix 3.

1.1 Audit Objectives

The objectives of the audit were:

- to verify that Plains had developed and implemented a pipeline control system and leak detection system in accordance with the requirements of the *Onshore Pipeline Regulations* (SOR/99-294) (OPR) and the *CSA Z662 Oil and Gas Pipeline Systems* standard (CSA Z662), and,
- to verify that control system operation and maintenance processes were effectively integrated within the company's management system.

1.2 Audit Scope and Methodology

The scope of the audit included the personnel, processes and activities used to operate and control the liquid pipeline control system and leak detection system. The scope applied to normal and abnormal operating conditions, including emergency shut down of the pipeline in place at the time of the audit and looking back for up to six months, to verify that the company is compliant with relevant sections of the OPR and CSA Z662.

An audit notification letter was sent to Plains on 16 October 2019 advising Plains of the CER's plans to conduct the audit and detailing the audit's objectives and scope. The Lead Auditor provided the audit protocol and initial information request (IR) to Plains on 17 October 2019 and followed up on 22 October 2019 with an opening meeting to discuss the plans and schedule for the audit.

Document review began on 25 November 2019 and on-site interviews were conducted during the period from 24 February to 28 February 2020. The on-site portion of the audit was originally scheduled to occur during the period from 13 January to 17 January 2020 but had to be postponed due to severe weather in the Calgary region at that time. As a result, the CER audit staff conducted interviews, toured the facilities and reviewed additional documents during the period from 24 February to 28 February 2020. CER audit staff visited Plains' Operational Control Centre (OCC) and its Alternate Control Centre (ACC), and also witnessed a shift changeover between an incoming and outgoing Control Room Operator.

To evaluate Plains' compliance, CER audit staff reviewed a sample of Plains' documents and records, visited both control centres and conducted interviews with company personnel.

CER audit staff shared a pre-closeout summary of the results of the audit with Plains' staff on 06 March 2020, which identified one non-compliance. At that time, Plains was given an additional week to provide any documents or records which Plains believed could help resolve the identified gap in information or compliance. Subsequent to the pre-closeout meeting, Plains provided additional information to assist the CER audit staff in making their final assessment of compliance and indicated that regardless of the CER's assessment of the additional information, a final closeout meeting would not be necessary.

2.0 Facility and Process Description

Plains is an indirect subsidiary of Plains All American Pipeline (PAA) and handles the Partnership's Canadian crude oil and liquefied petroleum gas (LPG) operations. The head office for Plains is located in Calgary, Alberta. Plains operates liquid, natural gas and liquid natural gas pipeline systems that extend across Canada and into the United States (US). Canadian pipeline operations are controlled by Plains' Operational Control Centre (OCC) or its Alternate Control Centre (ACC), both located in Alberta. According to Plains' staff, its control and responsibility for the pipeline that crosses the border into the US ends at the flange at the Canada/US Border. The US portion of the pipeline comes under the control and responsibility of the PAA. As such, Plains OCC operates and controls pipelines that come under the jurisdiction of the CER and other provincial regulators but does not come under the jurisdiction of the United States Pipeline and Hazardous Materials Safety Administration (PHMSA). The pipelines that are regulated by the CER are shown in Appendix 2.

Within the OCC, there are eight control consoles, three of which control the CER-regulated pipelines illustrated in Appendix 2. One console is used by the Team Lead (Shift Supervisor) and one is set aside as a spare which can be used to replace any of the other consoles.

Plains maintains an ACC, which mirrors the OCC in both setup and functionality. The ACC is used when maintenance is being carried out on the OCC or in an emergency when the OCC is unavailable for use, such as during an extended power outage. Plains' Supervisory Control and Data Acquisition (SCADA) system is comprised of real-time, historical and pipeline monitoring leak detection and Real-Time Transient Model leak detection that has five different operating environments in the OCC and two operating environments in the ACC. In the OCC there is a:

- Production Environment, which is the actual real-time system being used by each Operational Control Centre Controller (Controller).
- Quality Assurance Environment which is used to conduct quality checks on any patches or configuration changes.
- Test and Development Environment, which is used by the SCADA Group to develop new screens, points and test all patches and configuration changes.
- Training environment, which is used to provide a separate environment for the training simulator.
- Decision Support System used for remote viewers such as Leak Detection Specialists to access SCADA information.

At the ACC, the two environments are the Production Environment and the Decision Support System, which is a mirror of the OCC Decision Support System.

Plains uses a modern, industry recognized protocol to control its communications between the Control Centres and the Field Locations.

Plains is currently in the process of upgrading its SCADA system and expects to be completed by 2021. The upgrade includes moving to a more modern SCADA system; upgrading its leak detection system; rebuilding all control screens to meet the current standards; replacing all servers, storage devices, workstations and monitors; and upgrading the network and communication equipment at both the OCC and the ACC. During the upgrade process, the existing systems and equipment are maintained in place while new systems and equipment are tested and proven to be fully functional before being added within the OCC and ACC.

For its Management System, Plains had an Operational Management System (OMS), which, according to the document, is '*the one source of truth to align multiple regulations and standards and measure performance.'* It is designed to *'provide the framework and approach for setting,*

cascading, executing and measuring performance to operational goals and objectives, in conjunction with continual improvement.'

According to Plains' OMS, its Code of Conduct sets the standards, principles and values that every employee is expected to honour when conducting business for Plains. The Code is the highest level Policy document at Plains. Plains' Operations Policy is an extension of the Code as it applies to Operations; it includes a commitment to use the OMS to manage all obligations. Plains had a process of reviewing and updating its policies, processes and commitments on a recurring basis. When these updates were carried out, Plains had a process of prompting its employees to review the updated document and then signing off to verify that they have done so.

Plains' Vision and Goals set the Operational expectations for all of Plains Operations. The OMS had six core operational requirements which are then broken down into 41 sub-elements with single points of accountabilities to ensure the requirements are appropriately documented, implemented and continuously improved. Each sub-element within the OMS had a program owner and a program sponsor. The sub-element owner was responsible for fulfilling the requirements of the program area and was accountable to the program sponsor. The six main requirements (or elements) were:

1. Leadership and Organization;
2. Risk and Compliance;
3. Asset Lifecycle;
4. Operational Controls;
5. Enabling Processes; and,
6. Performance and Improvement.

The CER's OPR requires companies to have programs for Safety Management; Environmental Protection; Security Management; Damage Prevention; Integrity Management; and Emergency Management. Plains manages this requirement by having each of these programs as a sub-element within the OMS.

During the audit, Plains provided the following sub-elements which were specific to the scope of the audit: Control Room Management (sub-element 4.3); Operations Assurance Program (sub-element 6.2); Personal Health and Safety (sub-element 2.5) and one for Process Safety (sub-element 2.3).

Within sub-element 4.3, Plains Control Room Management Program consists of six sub-sub-elements which include:

1. Alarm Management;
2. Console Operator Management;
3. Fatigue Management;
4. Leak Detection Management;
5. Supervisory Control and Data Acquisition (SCADA) Management; and,
6. Shift Turnover Management.

There are policies and processes in place for each of the six sub-elements of sub-element 4.3. To combat fatigue, Plains had policies, processes and facilities to keep workers as alert as possible. Shifts for the Control Room Operators and Team Leads are 12 hours in duration and are organized such that employees work two to four nights in a row before having time off and then switching to the day shift. The schedule is arranged so that under normal circumstances, no employee works more than four nights in a row.

Plains conducts annual exercises related to testing its procedures for switching its operations between the OCC and the ACC. The exercises are conducted in an organized fashion so that the pipeline control system remains operational and is not shut down. However, in a real scenario, it is

possible that the pipelines would have to be shut down from the OCC and then restarted once the operators take up their positions in the ACC.

Within its OMS, Plains also had an Operations Assurance Program (sub-element 6.2), that committed Plains to the identification of deficiencies through ongoing assurance activities, facilitating corrective actions that continually safeguarded operations, and supported the sharing of lessons learned. The Operations Assurance Program was designed to verify the state of Plains' operations and to support improvement by providing management with regular feedback on the implementation and effectiveness of the OMS, related programs and overall business performance. According to the Operations Assurance Program document, it provided *'a clear line of sight into operational performance through audits, assessments, inspections and observations aligned across operations.'*

The Operations Assurance Individual Activity Process supported the Operations Assurance Process by defining execution requirements for assurance activities. It ensured a consistent approach by which sub-element owners, leads, auditors and employees undertake assurance activities. According to the document, the Assurance Activity Process was designed to ensure that assurance activities were planned, executed and reported to achieve the objectives of the Operations Assurance Program in a consistent manner.

The Operations Assurance Process supported the Operations Assurance Program by providing assurance for the company's operations to evaluate the adequacy and effectiveness of the management system components. It was the guiding document for each sub-element owner to prepare their annual Embedded Assurance Plan, communicate the plan, execute it and then report on results.

The sub-element owner for sub-element 4.3 Control Room Management, provided the CER audit staff with a copy of the most recent Embedded Assurance Plan for the Control Centre which included the OCC and the ACC.

Plains also had a sub-element for Personal Health and Safety (sub-element 2.5) and one for Process Safety (sub-element 2.3). To that end, Plains had established a Process Safety Management Program (PSM Program). According to the PSM Program document, Plains was committed to conducting its operations in a manner that ensured the protection of people, property and the environment. The PSM Program was modeled after the requirements of the United States Occupational Health and Safety Administration (OSHA) *Code of Federal Regulations (CFR), 29 CFR 1910.119* and had been enhanced to ensure conformance and compliance with both Canadian and US jurisdictions.

According to the PSM Program document, it outlined the Process Safety Management requirements within the company and established the basis by which operating locations were to be measured. According to the document, *'the management of process safety is globally recognized as the primary approach to establishing the required level of safe operations required to manage high hazard processes.'* The document stated that Plains is *'committed to ensuring the protection of people, property and the environment while upholding the highest standards of Process Safety.'* According to the PSM Program document, even though the Process Safety Management Program was subordinate to the OMS, it behaved similar to an operating management system itself and had direct and indirect interaction with every OMS sub-element.

3.0 Assessment of Compliance

3.1 General

The OPR requires CER-regulated companies to develop and implement a pipeline control system and a leak detection system as part of the companies' management systems. Carefully designed and well-implemented management systems are a reflection of a company's commitments to continual improvement in safety and environmental protection throughout the full life-cycle of facilities. They also support strong cultures of safety and are fundamental to keeping people safe and protecting the environment. The control systems and leak detection systems must also meet the requirements of CSA Z662 and reflect the level of complexity of the pipeline, the pipeline operation, and the products transported.

For the purposes of this audit, the CER's expectations included, but were not limited to, Plains having established and implemented:

- an effective organizational structure, competency and training requirements, and training programs and processes to identify and communicate roles, responsibilities, and authorities, and to verify the competency of workers;
- control room operation and maintenance manuals designed to ensure that the pipeline is operated safely, efficiently, and in a manner that protects people and the environment;
- a process for the internal reporting, analysis, and investigation of hazards, potential hazards, incidents, and near-misses reported through the control centre, and for taking corrective and preventive measures, including measures to manage imminent threats; and,
- quality assurance measures, including audits and inspections, to ensure that the pipeline control system is being effectively operated and maintained and that personnel are carrying out their duties in accordance with company requirements in a competent manner.

Each company and its management system is required to comply with all applicable requirements of the CER Act, its applicable regulations, standards referenced in the regulations, such as the CSA Z662, and any company-specific Orders and Certificates.

Section 6.1 of the OPR requires a company regulated by the CER to establish and implement a management system that:

- is systematic, explicit, comprehensive and proactive;
- 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 the OPR section 6;
- applies to all of the company's activities involving the design, construction, operation, or abandonment of a pipeline, and to the programs referred to in the OPR section 55;
- ensures coordination between the programs referred to in the OPR section 55; and,
- 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.

3.2 Assessment of Plains' Regulated Facilities

The CER audit staff's assessment of Plains' compliance with the regulatory requirements are summarized in Table 1 of this report and explained in detail in Appendix 1 attached to this report. The CER identified no issues of concern with twenty (20) of the protocol items and found Plains to be non-compliant with one (1) of the regulatory requirements evaluated as part of this audit.

3.3 List of Audit Findings

The CER could assign one of two possible types of findings to each audit protocol item evaluated:

1. 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; or,*

2. Non-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 and preventative action plan must be developed and implemented.*

Below is a table that provides a generalized description of the CER's audit findings. They correspond to the Appendix 1 Audit Assessment Tables that provide more information regarding the review and substance of each finding.

Table 1: Summary of Findings

Audit Protocol Item	Regulatory Reference	Protocol Topic	Status	Summary of Finding
AP-01	**OPR s. 6.3(1)**	**Policy and Commitment Statements**	Non-compliant	CER audit staff found that Plains' goals were not specifically aligned with the requirements of the OPR s. 6.3(1). They were found to be related to the protection of people and the environment, but were of such a high level as to make it difficult for sub-element owners to set objectives and targets that would guide Plains' towards the achievement of the goals specified in the OPR s. 6.3(1)(b).
AP-02	**OPR s. 6.5(1)(d)**	**Hazard Identification**	No Issues Noted	Plains demonstrated that it was identifying hazards associated with control centre operations.
AP-03	**OPR s. 6.5(1)e**	**Risk Assessment**	No Issues Noted	Plains demonstrated that it assessed the risks associated with the identified hazards.
AP-04	**OPR s. 6.5(1)(f)**	**Controls**	No Issues Noted	Plains demonstrated that it had developed suitable controls to manage the risks with the identified hazards.
AP-05	**OPR s. 6.5(1)(a)**	**Goals, Targets and Objectives**	No Issues Noted	Plains demonstrated that it had goals, objectives and targets for its control centre operations designed to work towards the achievement of the company's goals. Plains was found to

Audit Protocol Item	Regulatory Reference	Protocol Topic	Status	Summary of Finding
				be complying with the requirements of the OPR s. 6.5(1)(a) even though the CER audit staff found that Plains corporate goals did not meet the requirements of the OPR s. 6.3(1)(b) (See the Assessment of AP-01).
AP-06	**OPR s. 6.4**	**Organizational Structure, Roles and Responsibilities**	No Issues Noted	Plains demonstrated that it had an adequate organizational structure to manage the control centre and that it had defined the roles and responsibilities for each position.
AP-07	**OPR s. 6.5(1)(q)**	**Operational Control**	No Issues Noted	Plains demonstrated that it had established and implemented a process for coordinating and controlling the operational activities of the control room.
AP-08	**OPR s. 27**	**Operating & Maintenance Manuals**	No Issues Noted	Plains demonstrated that it had developed, regularly reviews and updates as required, control room operations and maintenance manuals.
AP-09	**OPR s. 37(c)**	**Pipeline Control System and Leak Detection System**	No Issues Noted	Plains demonstrated that it had developed and implemented a pipeline control system that included a leak detection system, although due to the scope of the audit and the protocol used, the audit staff did not assess the control system against all of the requirements of CSA Z662.
AP-10	**OPR s. 37(b)**	**Pipeline Control System Data Recording System**	No Issues Noted	Plains demonstrated that it had developed and implemented a pipeline control system that records historical pipeline operation data, messages and alarms for recall.
AP-11	**OPR s. 6.5(1)r**	**Investigation of Incidents, Near Misses and Non-compliances**	No Issues Noted	Plains demonstrated that, within the scope and objectives of this audit, it had established and implemented a process for the internal reporting of hazards, potential hazards, incidents, and near-misses related to the operation of the pipeline and for taking corrective and preventative actions.
AP-12	**OPR s. 32(1.1)**	**Emergency Procedures Manual**	No Issues Noted	Plains demonstrated that it had developed, regularly reviews and updates as required an emergency procedures manual to respond to control room emergencies.
AP-13	**CSA Z662-15 – Clause E.4.3.2**	**Analysis of Leak Alarms**	No Issues Noted	Plains demonstrated that it analyzed all leak alarms to determine the cause.

Audit Protocol Item	Regulatory Reference	Protocol Topic	Status	Summary of Finding
AP-14	**CSA Z662-15 Clause 10.5.2.1**	**Safe Shut Down of Pipeline in an Emergency**	No Issues Noted	Plains demonstrated that it had established emergency procedures for the safe control or shutdown of the pipeline system in the event of an emergency.
AP-15	**OPR s. 6.5(1)(j)**	**Training, Competence and Evaluation**	No Issues Noted	Plains demonstrated that it had established competency criteria and training programs for control centre staff.
AP-16	**OPR s. 6.5(1)(k)**	**Training, Competence and Evaluation**	No Issues Noted	Plains demonstrated that it had established and implemented a process for verifying that control room personnel are trained and competent and for supervising them to ensure they perform their duties in a manner that is safe, ensured the security of the pipeline and protected the environment.
AP-17	**OPR s. 56 (b)**	**Annual Training Report**	No Issues Noted	Plains demonstrated that it annually compared the actual training received by control centre staff with the planned training and conveyed this information to Senior Management.
AP-18	**OPR s. 55(1)(2)**	**Control Room audits**	No Issues Noted	Plains demonstrated that it had conducted an OPR s. 55 audit of its pipeline control system.
AP-19	**CSA Z662-15 Clause E.8.4**	**Leak Detection System – audits of Special Incidents**	No Issues Noted	Plains demonstrated that it conducted assessments of the leak detection system to evaluate incidents as required by CSA Z662-15, Clause E.8.4.
AP-20	**OPR s. 6.5(1)(x)**	**Annual Management Review**	No Issues Noted	Plains demonstrated that it had a process for conducting an annual management review of its control room operations and for ensuring continual improvement.
AP-21	**OPR s. 37(a)**	**Supervisory Control and Data Acquisition (SCADA) design, maintenance and operational functions**	No Issues Noted	Plains demonstrated that it had developed and implemented a pipeline control system that comprised the facilities and procedures used to control and monitor the operation of the pipeline.

4.0 Conclusion

Within the scope of this audit, the CER audit staff found that Plains was operating its liquid pipeline control and leak detection systems in a manner that protects the safety of its employees and the public and protects the environment. Plains was able to demonstrate that its liquid pipeline control centre's operations were integrated within the company's Operational Management System.

Plains demonstrated that, within the scope of the audit, it had established and implemented:

- an effective organizational structure, competency and training requirements, and training programs and processes to identify and communicate roles, responsibilities, and authorities, and to verify the competency of workers;
- control room operation and maintenance manuals designed to ensure that the pipeline is operated safely, efficiently, and in a manner that protects people and the environment;
- a process for the internal reporting, analysis, and investigation of hazards, potential hazards, incidents, and near-misses reported through the control centre, and for taking corrective and preventive measures, including measures to manage imminent threats; and,
- quality assurance measures, such as inspections and assessments, to ensure that the pipeline control system and leak detection system are being effectively operated and maintained and that personnel are carrying out their duties in accordance with company requirements in a competent manner.

However, the CER audit staff found that Plains' goals were not aligned with those required by the OPR s. 6.3(1)(b). The OPR requires companies to establish documented goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations. CER staff were of the view that the goals that Plains had established were not explicit enough to meet this regulatory requirement.

The CER requires Plains to address the deficiencies identified during this audit through the development of a Corrective and Preventive Action Plan (CAPA Plan) using a template which will be provided by the CER to analyze, address, and manage these deficiencies. The CAPA Plan is to be filed by Plains with the Secretary of the Commission of the Canada Energy Regulator for approval within 30 days of receipt of the Final Audit Report for approval.

The CER will assess the implementation of Plains' CAPA Plan to confirm it is fully implemented in a timely manner.

The CER will make its Final Audit Report public on the CER's website.

Appendix 1.0 - Audit Assessment Tables

AP-01: Policy and Commitment Statements

Regulatory Requirement: **OPR s. 6.3(1)** The company shall establish documented policies and goals for meeting its obligations under section 6, including (b) goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations.
Expected Outcome: The company is able to demonstrate that it has established documented policies and goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations.
Summary of Information Made Available by Plains: To demonstrate compliance with this requirement, Plains supplied Canada Energy Regulator (CER) audit staff with: • Plains Midstream Canada (PMC) Operational Management System • PMC Control Room Management Program, dated 26 July 2019 • PMC Operations Policy • PMC Control Centre Commitment Statement • 2019 Operational Leadership Team (OLT) Scorecard – Performance Dashboard • PMC Approval to Shut Down Letter, dated 24 May 2017
Assessment: Within Plains' Operational Management System (OMS), Plains' Code of Business Conduct described the expected obligations of all employees, directors and officers of the company to follow company policies, procedures and laws that apply to their work. Plains provided the CER audit staff with a copy of the Plains' Control Room Management Program (CRM Program) document dated 26 July 2019. The CRM Program contained the Operations Policy Statement and Commitments, as well as the Control Centre Commitment Statement. Plains' Operations Policy was the written document for the policies and goals and was managed through the corporate document control process. The latest version was dated 30 March 2017 with a review date of 30 March 2021. The Senior Vice President of operations was listed as the document owner and approver. According to the document, the CRM Program was established to address the organization's commitment to ensure control room activities were conducted in a manner that safeguarded the safety and security of Plains' employees, the public, and the environment. The CRM Program described the six pillars to support the program, which were:

- *Alarm Management*
- *Console Operator Management*
- *Fatigue Management*
- *Leak Detection Management*
- *Supervisory Control and Data Acquisition (SCADA) Management*
- *Shift Turnover Management*

According to the document, the objectives of the CRM Program were to:

- *Define and implement site specific processes, procedures and guidance documents for monitoring normal, abnormal and emergency conditions;*
- *Define and implement requirements for alarm management to effectively identify, respond and report on abnormal and emergency operating conditions when they occur;*
- *Define and implement requirements for leak detection systems to effectively identify system imbalances;*
- *Define and implement requirements for fatigue management of control room employees and contractors to mitigate related operational safety and health-related risks; and,*
- *Define and implement requirements for control room management, including information management and SCADA, to meet legal and regulatory requirements and industry standards.*

Within the CRM Program, the Control Centre Commitment Statement stated that Plains was committed to safe, reliable and effective operations. This commitment was reflected in the development and use of policies, processes and procedures that provided guidance to Control Centre personnel and set expectations for how Control Centre personnel and management were to carry out their duties.

Also within the CRM Program document, the Plains Operations Policy, dated 30 Mar 2017 stated that Plains' Mission was to connect its network of people and assets to safely deliver results. The scope applied to Plains Midstream Canada ULC and its affiliates in the United States and Canada, including all employees, contractors and service providers. The CRM Program document stated that all levels of management were responsible and would be held accountable for providing leadership and demonstrating commitments to the policy through their decisions and actions.

The Operations Policy stated that Plains committed to conducting its operations in a manner that protected people and the environment. It states that Plains was committed to:

- *'The safety and security of the public, its employees and contractors;*
- *The protection of the environment; and,*
- *The safety, security and integrity of all Plains assets, including property.'*

The document stated that Plains committed to fostering a safety culture that exemplified safety as a core value, supported its drive to zero incidents and optimized Plains' ability to rapidly and effectively respond to emergency situations. The document stated that Plains encouraged '*… individual responsibility to stop work, without fear of reprisal or disciplinary action, if an unsafe condition is identified.'*

In the Operations Policy document, under the heading of Sustainment and Continuous Improvement, Plains set five main Goals to:

- *'Protect People, the Environment and assets;*
- *Achieve Consistency in Execution;*
- *Maintain Socially Responsible Operations;*
- *Apply Discipline in Planning and Managing Business; and,*
- *Develop Employee and Leader Effectiveness.'*

The Operations Policy document was signed and approved by the Accountable Officer on 01 April 2017.

Plains explained that these goals drove the objectives of the Operational Leadership Team (OLT) score card. Prevention of workplace injury and loss of primary containment were specifically called out as objectives to meet Goal 1 on the OLT scorecard. The OLT scorecard was a regular reporting mechanism for Operations executives to review performance to Goals via key objectives measures and targets.

The Plains' CRM Program included and was aligned to the Plains Operations Policy. To support the Operations Policy the Control Centre Commitment Statement was developed. It underlined Plains' commitment to safe, reliable, and effective operations.

The 2019 OLT Scorecard – Performance Dashboard outlined that Plains had a number of Goals and Objectives and Performance Indicators to:

- *'Prevent Workplace Injuries*
- *Prevent Loss of Primary Containment*
- *Consistent Information Management Practices*
- *Improve Stakeholder Engagement*
- *Manage Operational and Capital Expenditures*
- *Consistent Execution of Operational Activities*
- *Consistent Emergency Preparedness*
- *Ensure Personnel are Trained*
- *Ensure Personnel are Competent*
- *Consistent Leadership Engagement.'*

Plains set targets in all of these areas and then tracked its performance in achieving these targets.

The issue of concern for the CER audit staff is that these goals do not meet the specific requirements of the OPR s. 6.3(1)(b) to have documented goals for the *'prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations.'*

Plains also provided the CER audit staff with a copy of its Authority to Shut Down Letter, in which it is clearly articulated that Control Room Operators have the authority to shut down a pipeline anytime that a leak alarm or warning is being investigated or any SCADA system event that meets any criteria in the abnormal operating conditions and the integrity of the pipeline is in question. The letter, dated 24 May 2017 was directed to Control Centre Staff and was signed by the Control Centre Manager.

Finding: Non-Compliant

The CER audit staff reviewed the goals and policies provided by Plains, but were unable to relate the corporate goals and policies to the explicit requirements of the OPR to have written goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations as required by the OPR s. 6.3(1)(b). They were found to be related to the protection of people and the environment, but were of such a high level as to make it difficult for sub-element owners to set objectives and targets that would guide Plains' towards the achievement of the goals specified in the OPR s. 6.3(1)(b). Plains will have to develop a corrective and preventive action plan and submit it to the CER for approval.

AP-02: Hazard Identification

Regulatory Requirement: **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.
Expected Outcomes: The company is able to demonstrate that it has identified the hazards and potential hazards associated with the pipeline control room and has included them in the inventory. Specific areas for demonstration related to this protocol question include: • the company has a compliant inventory that is established and maintained; • the inventory includes hazards and potential hazards associated within the company scope of operations and activities through the lifecycle of the pipelines; • hazards and potential hazards are identified for the control room; • the inventory has been maintained, it is current, and is up-to-date including changes made to company operations and activities; and, • the inventory is being used as part of the risk evaluation and controls processes.
Summary of Information Made Available by Plains: To demonstrate compliance with this requirement, Plains supplied the Canada Energy Regulator (CER) audit staff with the following documents: • Operational Risk Management Program • Controls Communication Process • Corporate Role Profile – Control Centre Operation (Controller) Level 6 • Formal Hazard Assessment Process • Hazard Analysis Process • Hazard Identification Process • Hazard Identification (HID) Reporting Procedure • Hazard Prevention Program • Hazards and Controls Inventory • Hazard and Controls Inventory Update Process • Health and Safety Management Program • OMC Control Room Management - Information Management • Role Hazard Profiles • Task Hazard Inventory User Guide

Regulatory Requirement:

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:

Plains provided the CER audit staff with its Operational Risk Management (ORM) Process, which included its:

- *'Risk Assessment Process;*
- *Controls Communication Process;*
- *Operations Hazard and Controls Inventory Process;*
- *Risk Register Procedure; and,*
- *ORM Reporting Process*.'

Plains' Risk Assessment Process included its Hazard Identification Process, Hazard Analysis Process and Post Hazard Assessment Response Process.

Plains' Hazard Identification Process provided direction on how the organization identifies potential hazards, which then leads to the process to evaluate and manage the risks. According to the document, a hazard can be a dormant or potential situation that poses a threat to health, property, reputation or environment. There is a link in the document to a list of the Company's terms and definitions on its SharePoint. However, the link did not work on the SharePoint site assigned to CER audit staff.

According to the Plains' Hazard Prevention Program, it is intended to safeguard personal health and safety by ensuring workers (which includes employees and contractors) and visitors are protected from worksite health and safety hazards. According to the document, this is achieved through the adequate and consistent identification, assessment, communication and control of health and safety hazards. It is designed around the principle that finding and preventing hazards before they cause injury or illness is a far more effective approach than reactively addressing problems.

Plains provided the CER audit staff with its Hazard Analysis Process, which followed an industry recognized process. This process involved calculating the inherent risk by determining the likelihood and consequence of each hazard, evaluating existing controls to determine the residual risk and if the residual risk was considered too high, then new or additional controls were contemplated.

Plains directed the CER to Hazard and Controls Inventory Process, dated 8 March 2018 (next review date scheduled to be 8 March 2021), which was managed through the corporate document control process. The Manager of Operations was the document owner and approver.

Note: the OPR does not require a process for this audit protocol item.

Regulatory Requirement:

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.

The Plains Hazard and Controls Inventory Process outlined how its ORM Group was to maintain an inventory of identified and potential hazards and their associated controls. The inventory is to be updated annually in the third or fourth quarter of the year, upon completion of the annual risk register review.

Plains provided the CER audit staff with its corporate hazard inventory that resided on the corporate SharePoint site and was available to all employees. The inventory was used by all departments and employees for company hazard operability studies and field-level hazard assessments. The inventory headings include Hazard Category, Hazard Definition, Example Consequences, and Controls. As a subset the company also had a task based hazard inventory which describe the task based hazards and controls for all workers at Plains and were maintained in the Task Hazard Inventory.

The inventory and the subset task inventory were comprehensive and included hazards and potential hazards associated with the company scope of operations and activities through the lifecycle of the pipelines. Formal Hazard Assessments are conducted at 5 year intervals. Workers use the Task Hazard Inventory to inform their Job Hazard Assessments or Field Level Hazard Assessments. Incident investigators use the Task Hazard Inventory. At least annually (typically quarterly), via the Asset Management Team meetings, the Hazard and Control Inventory is reviewed by District Leadership for additions and accuracy.

Specific to the control room, hazards identified included all expected office type hazards, slips trips and falls, ergonomics and additionally hazards associated specifically with shift work (i.e., fatigue, alarm overload).

Through the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had an established and maintained inventory of the identified hazards and potential hazards.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-03: Risk Assessment

Regulatory Requirement: **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 conditions.
Expected Outcome: The company is able to demonstrate that it has evaluated and are managing the risks of the identified hazards associated with running an effective control room, including the risks related to normal and abnormal conditions. Specific areas for demonstration related to this protocol question include: • the company has a compliant process for evaluating and managing risks that is established and implemented; • the method(s) for risk evaluation and managing the risks are based on referenced regulatory standards and are appropriate for the nature, scope, scale, and complexity of the company's operations, activities, and s.55 programs; • risk is evaluated for all hazards and potential hazards and includes normal and abnormal conditions; • risk levels are monitored on a periodic basis as-needed, and re-evaluated for changing circumstances; • risk is managed using defined method(s) appropriate to the s.55 programs; and, • risk acceptance criteria is determined for all hazards and potential hazards.
Summary of Information Made Available by Plains: To demonstrate compliance with this requirement, Plains provided the Canada Energy Regulator (CER) audit staff with: • Controls Communication Process • Management of Change Process • Management of Change Training • Creating an Operation Change Notice • Developing Controls Process • Operational Control Centre – Alarm Rationalization – SSOI (13.0236) • Operational Risk Management Matrix • Operational Risk Management Process • Risk Assessment Process • Risk Register Procedure • Risk Register Form • Operational Control Centre Risk Register • Safety System Bypass Procedure using Maximo

Assessment:

Plains provided the CER audit staff with Plains' Operational Risk Management (ORM) Process and associated Risk Assessment Process as the written document and standard approach, guideline for Plains to use when evaluating risks. The documents were managed through the corporate document control process. The latest version was dated 21 September 2018 and the next review is scheduled for 21 September 2021. The Manager of Operations was the document owner and approver. The ORM Process includes:

- *'Risk Assessment Process;*
- *Controls Communication Process;*
- *Operations Hazard and Controls Inventory Process;*
- *Risk Register Procedure; and,*
- *ORM Reporting Process*.'

The overall ORM Process guides Plains' employees and contractors in how a risk is assessed, from hazard identification to risk analysis, and the controls to mitigate the hazards. The processes are applicable to Control Centre and all Plains' employees and contractors who manage hazards, potential hazards, incidents, and near-misses.

Plains used a corporate-wide risk matrix with a multiplier using severity and probability to assign priority and mitigation to identified hazards. Risk acceptance is assigned based on the risk matrix and decisions are moved up the corporate structure based on the severity and probability.

The risk register was the primary tool in how a risk is managed and evaluated. The risk register procedure described how the risk register is to be used. The Risk Register Template was the template used by all company departments. The procedure and template were applicable to Control Centre and all Plains' employees and contractors who manage hazards, potential hazards, incidents, and near-misses.

The Control Center used the process in developing annual Hazard and Control Inventory and Risk Register updates. An example of process integration within the Operations Control Centre was the Alarm Rationalization Procedure developed to address the specific risks around alarm management. The procedure leads to effective Controller response to alarms and continuous improvement to support proactive Controller response.

The risk registry was revalidated during risk management update sessions performed annually as described in the ORM Process.

In summary, through the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented a process for evaluating and managing the risks associated with the identified hazards, including the risks related to normal and abnormal conditions.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-04: Controls

Regulatory Requirement:

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.

Expected Outcome: The company is able to demonstrate that it has developed and implemented controls for the identified hazards associated with the pipeline control room and that it has communicated the risk controls to anyone exposed to the risks. Specific areas for demonstration related to this protocol question include:

- the company has a compliant process for developing and implementing risk controls;
- the method(s) for developing risk controls are appropriate for the nature, scope, scale, and complexity of the company's operations and activities and s.55 programs;
- risk controls are developed and implemented;
- risk controls are adequate to prevent, manage and mitigate the identified hazards and risks;
- risk controls are monitored on a periodic basis and as-needed and re-evaluated for changing circumstances; and,
- risk controls are communicated to those exposed to the risks.

Summary of Information Made Available by Plains:

Plains supplied Canada Energy Regulator (CER) audit staff with documentation used for its control development process including:

- Controls Communication Process
- Developing Controls Process
- Management of Change Process
- Risk Register
- Operational Management System Manual
- Operations Procedure Decision Flowchart
- Operations Procedure Decision Process
- Plains Midstream Canada Control Room Management Change Management Process
- Process Hazard Analysis
- SE 4.3 Embedded Assurance Workbook
- Writing Operations Procedures

Assessment:

Plains directed the CER audit staff to its Developing Controls Process document on Plains' corporate SharePoint site as part of its demonstration of compliance. The document was managed through a corporate document control process. The latest version was dated 20 February 2018 and has a review date of 20 February 2021. The Director of Operations was the document owner and approver. The document described the process steps for the development of controls from the Operational Risk Management (ORM) Process.

The Controls Communication Process document provided direction on how developed controls are to be communicated to anyone that is exposed to a risk. New controls or changes to controls were communicated through the prestart actions of the Management of Change process. Decisions on why, what, who and where controls need to be proceduralized were located within the Operations Procedure Decision Process and the Operations Procedure Decision Flowchart. Controls were prioritized by a hierarchy of effectiveness in the following order: Elimination, Substitution, Engineered, Administrative and Personal Protective Equipment.

Procedures were categorized as Standard Procedure (SP), Site Specific Operating Procedure (SSOP), Site Specific Maintenance Instruction (SSMI), and Site Specific Operating Instruction (SSOI).

The Control Center was subject to processes as defined by Sub-Element 4.2 of the Operational Management System. The majority of Control Centre procedures were SSOP which require annual review to ensure current risk and operational information are included. The Operations Control Centre (OCC) used the Operations Procedure Decision Process and Operations Procedure Decision Flowchart to classify type of governance document used.

Risk Registers and Process Hazard Analysis were used to evaluate risks including the associated controls and determine residual risk, and if any further control was required. Sub-Element Embedded Assurance Plans outlined a variety of assurance activities as they related to specific controls. The OMS 4.3 Embedded Assurance Plan included guidance on conducting Job Observations and an Annual Effectiveness Review of the Control Room Management Plan.

In summary, through the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented 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.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-05: Goals, Targets and Objectives

Regulatory Requirement: **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 section 6.3(1) and for ensuring their annual review.
Expected Outcome: The Company is able to demonstrate that it has established and implemented a process for setting the objectives and specific targets and key performance indicators to achieve the company's goals for the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations applicable to the company's control room operations. Specific areas for demonstration related to this protocol question include: • the company has a compliant process that is established and implemented; • the company has set objectives and targets and key performance indicators; • all objectives are relevant to the company's management system when considering the scope of the process and their application to s.55 programs; • an annual review of the objectives and targets is performed by the company; and, • the annual reviews are being completed and have determined if the objectives were achieved.
Summary of Information Made Available by Plains: Plains provided the Canada Energy Regulator (CER) audit staff with the following documents: • Plains Midstream Canada Control Room Management Program • Operational Control Centre - Terms of Reference and Commitment Statement • 2019 Operations Strategic Plan V 1.0 • 2019 Asset Management Team (AMT) Dashboard – As at October 2019 • 2019 Annual Operations Strategic Plan v 1.0 • 2019 District Plan and Review – Operational Control Centre District • 2019 Sub-element AMR – 4.3 Control Room Management • 2019 Sub-element Plan – 4.3 Control Room Management Record • 2020 Sub-Element AMR - 4.3 Control Room Management • Monthly Compliance Summary • AMT Monthly Scorecard • Annual Management Review Process • Annual Planning Process

- Compliance Summary August 2019
- Operational Leadership Team Actions and Decisions Log

Assessment:

Plains provided the CER audit staff with the Plains Midstream Canada - Control Room Management Program (CRM Program). The CRM Program provided the Company's Operations Policy and Goals. The purpose of the CRM Program was to address the organization's commitment to ensure control room activities were conducted in a manner that safeguards the safety and security of its employees, the public and the environment. The document described how Plains' Leadership intended to meet the Control Centre's Commitment, which was to provide*: 'safe, reliable and effective operations,'* through the development and use of policies, processes and procedures that provided guidance to Control Centre personnel and that set expectations for how Control Centre personnel and management were to carry out their duties.

The CRM Program document provides the Operations Policy and its five goals which were to:

- *'Goal 1: Protect People, the Environment and the Company's Assets*
- *Goal 2: Achieve Consistency in Execution*
- *Goal 3: Maintain Socially Responsible Operations*
- *Goal 4: Apply Discipline in Planning and Managing our Business*
- *Goal 5: Develop Employee and Leader Effectiveness'*

Plains also provided its Operational Leadership Team (OLT) Scorecard – Performance Dashboard which sets goals, objectives and targets for Plains to work towards in an effort to achieve the company's policies and goals. They were:

- *'The Prevention of Workplace Injuries*
- *The Prevention of Loss of Primary Containment*
- *Consistent Execution of Operation Activities*
- *Consistent Emergency Preparedness*
- *Personnel Training and Competence.'*

Plains provided the CER audit staff with its Annual Planning Process and its Annual Management Review Process documented on their corporate SharePoint site. The documents were managed through the corporate document control process.

The Annual Planning Process was dated 20 November 2019 with a scheduled review date set for 20 November 2022. The Manager of Operations was the document owner and approver. The Annual Management Review Process was dated 26 February 2019 with a review date scheduled for 26 February 2022. The process steps related to setting the objectives and specific targets that are required to

achieve the goals were contained in the Annual Planning Process.

District Plans were developed with defined Operations' Objectives; Annual Management Review confirmed the performance to those objectives (met or not met).

District and Sub-Element objectives were reviewed monthly by the leadership team at Asset Management Team meetings. District compliance summary of local performance indicators was completed monthly.

Management System: Operations Goals, Objectives and Targets (GOTs) were documented in the Operations Vision and Strategic plan. The Strategic Plan was approved by the Senior Vice-President of Operations as evidenced by the decision log. The operations GOTs were copied into the Sub-Element and District Plans. The update of Sub-Element and District Plans included the GOTs. Directors communicated operation and district objectives at their District Manager Meeting. The vision and strategic plan were communicated to everyone in Operations and those who have a role in Operational Management System by email.

Performance to Plan, including Sub-Element objectives was reviewed during the Annual Sub-Element review, as defined by the Annual Review Process. Objectives not met were evaluated and carried over into the following year's sub-element plan.

Through a review of the documents and records made available by Plains for review, it was evident to the CER audit staff that Plains does have a process in place to ensure the goals objectives and targets of the OMS sub-element owners are aligned with Plains' Corporate Goals. However, as noted in the assessment of AP 01 (above), the corporate policies and goals do not meet the specific requirements of the OPR s. 6.3(1)(b) to have written goals for *the prevention of ruptures, liquid and gas releases, fatalities and injuries and for the response to incidents and emergency situations*.

Nevertheless, Plains was able to demonstrate that even though its corporate policies and goals do not meet the specific requirements of the OPR s. 6.3(1)(b), the company's program areas, including the control room were setting goals, objectives and targets to meet the corporate policies and goals. Therefore, it can be concluded that Plains was complying with the requirements of the OPR s. 6.5(1)(a).

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-06: Organizational Structure, Roles and Responsibilities

Regulatory Requirement:

OPR s. 6.4 The company must have a documented organizational structure that enables it to (a) meet the requirements of the management system and meet its obligations under section 6; (b) determine and communicate the roles, responsibilities and authority of the officers and employees at all levels of the company; and (c) demonstrate, based on an annual documented evaluation of need, that the human resources allocated to establishing, implementing and maintaining the management system are sufficient to meet the requirements of the management system and to meet the company's obligations under section 6.

Expected Outcome: The company is able to demonstrate that:

- it has a documented organizational structure for its control room, operations staff, SCADA support staff and other support staff;
- it has determined and communicated the roles, responsibilities and authorities for control room management and operation to all control room staff and those who interact with them; and,
- it conducts an annual documented evaluation of need of the human resources required to operate and maintain its pipeline control system and leak detection system.

Summary of Information Made Available by Plains:

Plains supplied the Canada Energy Regulator (CER) audit staff with the following documents:

- 2019 District Plan and Review – Operational Control Centre District
- 2019 Sub-Element Annual Management Review – 4.3 Control Room Management
- Control Room Workload Study 2017
- Control Room Workload Study 2018
- Corporate Role Profile – Control Centre Operator
- Operational Control Centre – Controller Progression Process
- Organizational Structure (Operational Control Centre)
- Organizational Structure (Supervisory Control and Data Acquisition)
- PMC Control Room Management Roles and Responsibilities
- PMC Required Reading Procedure

Assessment:

Plains provided the CER audit staff with screen captures of Plains' Organizational Charts and a PowerPoint presentation. The organizational charts can be viewed by all employees on a continually updated database called Workday. The submitted PowerPoints were pulled from Workday and show the organizational structure for the Operations Control Centre (OCC) and Supervisory Control and Data Acquisition (SCADA) organization from the President down to the worker level.

Control Room Roles and Responsibilities are outlined in the Plains' Control Room Management (CRM) Manual. The document was dated 31 October 2019 and is scheduled for its next review by 30 June 2020. It is owned and approved by the Director Operations Asset Management. Profiles have been developed for all Controller positions.

The Control Room Management Plan is a required reading (including CRM - Roles and Responsibilities) by all OCC staff. The OCC uses its SharePoint to communicate required reading to all OCC staff. OCC staff are required to complete the required reading and then click a button on their console to indicate that they have done so. The CER audit staff were able to verify through interviews with OCC personnel that this practice is being followed.

The process used to evaluate needs is the Plains Midstream Canada Control Room Management Workload Analysis Method in a document dated 31 October 2019 and scheduled for review by 30 June 2020. It is owned and approved by the Director of Operations Asset Management. The document describes roles and responsibilities primarily based on the United States Pipeline and Hazardous Materials Safety Administration (PHMSA) requirements, *Code of Federal Regulations (CFR) Title 49 Part 195.44*.

All Sub-Element Owners and Districts are required to review resource planning as part of the Annual Management Review Process. To support the review of resource planning, the Control Room performs Workload Studies on an annual basis. Plains demonstrated that it was conducting this annual review through the submission of corresponding records to the CER audit staff.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit. Plains demonstrated that it had a documented organizational structure that enables it to (a) meet the requirements of the management system and meet its obligations under section 6; (b) determine and communicate the roles, responsibilities and authority of the officers and employees at all levels of the company; and (c) demonstrate, based on an annual documented evaluation of need, that the human resources allocated to establishing, implementing and maintaining the management system are sufficient to meet the requirements of the management system and to meet the company's obligations under section 6.

AP-07: Operational Control

Regulatory Requirement:

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.

Expected Outcome: The company is able to demonstrate that it has established and implemented a process for coordinating and controlling the operational activities of control room staff 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. It is expected that:

- the company has a compliant process that is established and implemented to supervise and ensure the operations of the control room are correct;
- the methods for coordinating and controlling operational activities are defined;
- employees and other people working with or on behalf of the company are aware of the activities of others;
- employee's operational activities are planned, coordinated, controlled, and managed; and,
- people working for or on behalf of the company,
  - are pre-qualified for their assigned duties to ensure safety, the security of the pipeline and to protect the environment;
  - are assigned work plans that have been reviewed by the company and are assessed for the interoperation with the work to be performed by other people working on behalf of the company; and,
  - have adequate oversight performed by company representatives for their assigned tasks to ensure safety, security of the pipeline and the protection of the environment.

Summary of Information Made Available by Plains:

Plains supplied the Canada Energy Regulator (CER) audit staff with access to:

- Authorization to Work Program
- Operational Control Centre - Field to Control Centre Communications Procedure 13.0154
- Operational Control Centre - Field to Control Centre Communications Procedure 13.0154
- Operational Control Centre - Controller Daily Event Logs
- Operational Control Centre - Field to Control Centre Communications Procedure 13.0154
- Operational Control Centre - Controller Daily Event Logs
- Field Activity Notification Forms

- Morning Contact Log Sheet
- Operational Control Centre - Field to Control Centre Communications Procedure 13.0154
- Job Observation Example OB-20190710-001 - Shift Change JOC
- Job Observation Example OB-20190717-009 - Covered Task JOC
- Job Observation Example OB-20191031-10 - Covered Task JOC
- Job Observation Example OB-20191205-030 - Shift Change JOC
- Job Observation Example OB-20191214-002 - Golden Hour JOC
- Job Observation Example OB-20191218-014 - Covered Task JOC
- Narrative - Operations Assurance
- Operations Assurance Program
- Operations Assurance Individual Activity Process
- Operations Assurance Process
- OMS Sub-Element 4.3 Control Room Management - Embedded Assurance Plan

Assessment:

Plains provided the CER audit staff with its Operations Assurance Program which is managed through the corporate document control process and accessed through the corporate SharePoint site. The Senior Vice-President Operations is the document owner and approver. The latest version is dated 22 March 2018 and its next scheduled review date is 22 March 2021.

Plains also included the Operations Assurance Process (OAP) documented on the corporate SharePoint site, which is also managed through the corporate document control process. The latest version of the OAP is dated 07 March 2017 and its next scheduled review date is 01 November 2021. The Director, Operations Asset Management is the document owner and approver.

The Operations Assurance Program and Operations Assurance Process documents describe how the company controls the work with respect to permitting, communication and control of work so that the OCC staff know who is conducting work on the pipelines, where they are, and the activities executed. The Operations Assurance Program provides oversight on the effectiveness of implementation of the management system to provide safety and security of people, assets, the environment and the performance of Plains operations.

The scope of the Operations Assurance Process applies to Functional Groups, Support Groups, and Field Districts reporting to the Senior Vice-President Operations. This includes processes and activities that are managed by Plains' groups that directly support Plains' operations. It also includes the assurance components of related programs and the coordination between them.

Included in the Operations Assurance Program scope is the execution of work. This is done through a Work-level Assurance Process covering activities carried out by Functional Groups and operating areas wherever the work is performed (e.g., asset areas, field offices, facility locations, construction locations, and/or Functional Groups in Calgary).

The company provided records of completed job observations, field activity notifications, and operations assurance individual activity processes as evidence of implementation of the Operations Assurance Program. These records verified that:

- *'Site-specific risks and hazards are identified, controlled and communicated to impacted stakeholders;*
- *Work practices are being executed as designed, including in regulatory compliance with all applicable laws and regulations; and,*
- *Safety and security of employees, contractors, the public and Plains assets, and protection of property and the environment, is being achieved.'*

Plains also provided CER audit staff with its Field to Control Centre Communications Procedure which is accessible on the corporate SharePoint site. The document is managed through a corporate document control process. The latest version is dated 07 October 2017 with a review date of 25 September 2021. The Specialist, Control Centre is the document owner and approver. This procedure documents the steps necessary to ensure the Control Centre is aware of field operations activities, recording of the notification and how to report if notifications are not received in a controlled and safe manner, while ensuring the safety and security of the public, employees, contractors, PMC assets and the environment.

Through the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented 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.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-08: Operating and Maintenance Manuals

Regulatory Requirement:

OPR s. 27: A company shall develop, regularly review and update as required, operation and maintenance manuals that provide information and procedures to promote safety, environmental protection and efficiency in the operation of the pipeline and shall submit them to the Regulator when required to do so.

Expected Outcome: The company is able to demonstrate that it has developed, regularly reviews and updates as required, control room operations and maintenance manuals that provide information and procedures to promote safety, environmental protection and efficiency in the operation of the pipeline, including but not limited to guidance on issues such as:

- shift handover communications;
- fatigue management;
- alarm management; and,
- handling of over-pressurization and leak alarms.

Summary of Information Made Available by Plains:

Plains provided the Canada Energy Regulator (CER) audit staff with its:

- Leak Detection Program
- Plains Midstream Canada Control Room Management Program
- Plains Midstream Canada Control Room Management Alarm Management
- Plains Midstream Canada Control Room Management Change Management
- Plains Midstream Canada Control Room Management Compliance
- Plains Midstream Canada Control Room Management Fatigue Risk Management
- Plains Midstream Canada Control Room Management Information Management
- Plains Midstream Canada Control Room Management Introduction
- Plains Midstream Canada Control Room Management Operating Experience
- Plains Midstream Canada Control Room Management Roles and Responsibilities
- Plains Midstream Canada Control Room Management Supervisory Control and Data Acquisition
- Plains Midstream Canada Control Room Management Shift Turnover
- Plains Midstream Canada Control Room Management Training
- Plains Midstream Canada Control Room Management Workload Analysis Method

Assessment:

The Leak Detection Strategy provides the scope and guidelines for the Plains Midstream Canada (PMC) Leak Detection Program. The document provides guidelines for the analysis, evaluation and configuration of leak detection systems on Plains' pipelines.

The Plains Midstream Canada Control Room Management Program (CRM Program) document provides the Operations Policy and its five goals which are to:

- Goal 1: Protect People, the Environment and the Company's Assets
- Goal 2: Achieve Consistency in Execution
- Goal 3: Maintain Socially Responsible Operations
- Goal 4: Apply Discipline in Planning and Managing our Business
- Goal 5: Develop Employee and Leader Effectiveness

According to the document, the purpose of the CRM Program is to address the organization's commitment to ensure control room activities are conducted in a manner that safeguards the safety and security of its employees, the public and the environment. The document describes how PMC leadership will meet the Control Centre's Commitment, which is to provide*: 'safe, reliable and effective operations,'* through the development and use of policies, processes and procedures that provide guidance to Control Centre personnel and that set expectations for how Control Centre personnel and management shall carry out their duties.

Within the CRM Program, it discusses:

- Roles and Responsibilities;
- Regulatory Compliance;
- Training;
- Information Management;
- Alarm Management;
- Change Management;
- Fatigue Risk Management;
- Shift Turnover;
- Workload Analysis; as well as,
- Other aspects of Control Room Management.

As indicated throughout Appendix 1 of this audit report, in each of the Audit Protocol Items from AP-01 to AP-21, a variety of documents are discussed, covering all aspects of control room operations and management and each one of those manuals indicates who is

responsible and who is accountable for the manual. Also, each of those documents shows the date it was created and when it is next due for review and has a revision history that shows when the document was modified, by whom and why.

Plains also provided the CER audit staff with a view of its document control process which lists the documents and records under the control and responsibility of the Operational Control Centre, lists who is the document owner and the document sponsor, the frequency of document review and when each document is next due for review and update.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had developed, regularly reviews and updates as required, control room operations and maintenance manuals.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-09: Pipeline Control System and Leak Detection System

Regulatory Requirement:

OPR s. 37 A company shall develop and implement a pipeline control system that **(c)** includes a leak detection system that, for oil pipelines, meets the requirements of CSA Z662-15 and reflects the level of complexity of the pipeline, the pipeline operation and the products transported.

Expected Outcome: The company is able to demonstrate that it has developed and implemented a pipeline control system that includes a leak detection system that, for oil pipelines, meets the requirements of CSA Z662-15.

Summary of Information Made Available by Plains:

Information provided by Plains to the Canada Energy Regulator (CER) audit staff included:

- Leak Detection Program Manual
- Managing and Monitoring Regulatory Legislative Amendments and Updates
- Operational Control Centre Leak Detection Manual – Theory of Operation
- Tour of the Operational Control Center and the Alternate Control Center
- Leak Detection System Calibration Records - Location 06-17-34-03-W5 dated 2019-04-16, Location 19-9-32-4-W5 dated 2019-08-06, Location 01-26-33-05-W5 dated 2019-04-04, and Milk & River Prover Reports dated February 2020
- Alarm Management Meeting (Monthly Minutes) - 2019-10-17
- Leak Detection Meeting (Monthly Minutes) - 2019-09-29
- PAA Plains Midstream Canada Leak Detection Meeting (Monthly Minutes) – 2019-11-13
- Leak Detection Committee Meeting (Quarterly Minutes) – 2019-12-09
- Simulator Training and Evaluation (Simulator Test) – 2020-01-04
- Leak Test PLM (Fluid withdrawal test) - 2019-01-28
- Leak Test SimSuite (Fluid withdrawal test) – 2019-07-02

Assessment:

Plains provided the CER audit staff with a tour of the Operational Control Center (OCC) and the Alternate Control Center (ACC), which included an overview of the Leak Detection System (LDS). The CER audit staff conducted interviews with the Control Center personnel and Supervisory Control and Data Acquisition (SCADA) support staff.

The Leak Detection Program Manual describes the guidelines for the analysis, evaluation and configuration of the leak detection system. The document's scope included the demarcation of the LDS, associated regulatory requirements and applicable standards used by the Company. Two methods are currently used to monitor for leaks and provide early notification of loss of containment (LOC). These are

'Non-Continuous,' which includes aerial surveillance, walkthrough, volume or line balance calculations; and 'Continuous,' which are compensated volume balance, Real-Time Transient Model (RTTM) and pressure monitoring. Leak Detection System performance metrics and roles and responsibilities of employees are explained in the respective sections of the Leak Detection Manual. The Company staff stated in the interviews that the LDS meets the requirements of CSA-Z662-19, including Annex E. The Standards section of the Leak Detection Program states the Company *will conform to:*

- *CSA-Z662-19 – Oil and Gas Pipeline systems*
- *API 1130 Computational Pipeline Monitoring for Liquids*

Alignment to CSA Z662-15 applicable requirements were discussed with the Company and the supporting documents, records, and observations are listed and described below:

- The Operational Control Centre - Leak Detection Manual – Theory of Operation describes how the company manages the periodic line balance calculations. This was discussed with the Leak Detection Specialist during interviews. The Calculation Windows section described the Company's methods. The Company stated that '*Plains Midstream Canada Leak Detection systems, exceeds the 'CSA Z-662, Annex E' recommendations in related to all classification types and segments. SimSuite performs calculations every second and PLM performs calculations every minute. The interval for data retrieval has been improved significantly with the implementation of the MQTT protocol communication between the SCADA system and field devices; the average interval for data retrieval is less than 1 minute.* This section also provides a table that aligns to CSA Z662 Annex E Table E.1. It lists the interval for data retrieval as less than one minute, which exceeds CSA recommendations. The leak detection systems line balance alarms are active on all sampling periods and response is required by the Control Center Operator if an alarm is annunciated. For SimSuite, short periods are 5 and 15 minutes, long periods are ½ and 1 hour, and extended periods are 2, 8 and 24 hours. PLM short periods are 5, 15 and 30 minutes, long periods are 1, 8 and 24 hours and extended periods are 3, 7 and 30 days.

- Performance of the Leak Detection System is evaluated on a daily, monthly and annual basis, with specific targets described in the Performance Targets, Metrics and KPIs section of the Leak Detection Program. According to the LDS Manual, a Short-Term Periodic Review is to be completed monthly. The program states that the review includes, but is not limited to:

    - *Review of alarms, threshold trends, imbalance trends and causes over a defined time period*
    - *Analysis of imbalances, threshold, line pack and meter over/short (flow balance) during pipeline start-ups and shutdowns, pump starts/stops, movement changes, valve close/open, column separation condition, process variable changes, etc.*
    - *Analysis of measurement trends (pressures for the segment of pipeline that issued the alarm, meters/flow rates, temperatures, densitometers, process variable, etc.).'*

    Records that supported the Short-Term Periodic Review of the leak detection systems included minutes form the PAA PMC Monthly Leak Detection Meeting dated 2019-11-13, and Leak Detection Committee Meeting (Quarterly) dated 2019-12-09. In addition, the minutes from the Monthly Alarm Management Meeting, dated 2019-10, was an example of an Alarm

Management Meeting that included a review of LDS alarms. On a five-year cycle, which aligns to SCADA refresh periods, a thorough review of the requirements is performed. Criteria for this review is documented in the Leak Detection Selection Criteria section of the Leak Detection Program document.

In the Leak Test section of the Leak Detection Program document, the Company states that '*Leak Testing is performed every year. The testing may or may not be announced*.' Interviews with the Control Centre personnel and SCADA Support staff confirmed the testing procedure. The Control Center staff explained that announcing leak testing to the CCO is preferred and reduces operational risk.

The Company also has a pipeline simulator for training purposes. When a Control Center Operator is tested on the simulator on leak analysis and response, the LDS system is also being evaluated. Records confirming leak tests included examples of a simulated pipeline fluid withdrawal on the PLM system, and a fluid withdrawal on the SimSuite LDS. The vendor, Aveva, performs an annual on-site review of the systems. The Company supplied the Aveva LDS Plains Midstream Report 20190325 record that discussed the scope of work which included validation, tuning and upgrades.

- The section titled 'Minimum Level of Instrumentation' of the Leak Detection Program Manual describes the mandatory meters, pressure transmitters and temperature transmitters required for the LDS. A reference is made to CSA Z662-19 E.5.3.1 *'Critical leak detection system instruments shall be placed at locations where they will not be isolated during normal pipeline operations.'* This equipment is considered a safety related point. The Company utilizes the Computational Maintenance Management System (CMMS), which outlines the requirements for calibration and maintenance of the LDS equipment. Records from the CMMS were provided as evidence of leak detection equipment calibrations. These records confirmed calibrations of pressure and temperature transmitters, and one record was an example of a meter proving report, which is the means by which meters are calibrated.

- Plains' pipelines regulated by the CER have two independent leak detection systems that utilize the SCADA system. SimSuite, a Real-Time Transient Model, is considered the primary LDS, and Pipeline Monitoring is a compensated volume balance system which is considered complementary. Both are commonly used in the in the pipeline industry and supplied by Aveva. The two systems analyze data using different algorithms to detect leaks. When a leak detection is triggered from either, a high priority alarm is annunciated in the SCADA alarm screen and the CCO responds. Since both systems are acceptable methods for leak detection; if one fails, the other system will provide the leak detection monitoring. Should both systems fail then the pipeline is shutdown by the CCO. This was confirmed during interviews with Plains Midstream Canada staff and documented in the response procedures. In the section titled 'Roles and Responsibilities' of the Leak Detection Program Manual, it is stated that '*Only qualified Controllers shall control the company pipelines.'* Leak detection training is provided for Control Center Operators. The Training Section of the Leak Detection Program Manual identifies the curriculum and includes hydraulics, alarming, data presentation (displays), instrument failure, line pack changes, slack condition (column separation) and leak signature. The OCC-Abnormal Operating Conditions Investigation Procedure describes '*the roles and responsibilities for PMC employees during*

a pipeline metering or imbalance investigation.' This identifies the potential Abnormal Operation Conditions (AOC) that the CCO may experience, the list of triggers that require pipeline shutdown, and detailed procedural steps to investigate an AOC.

- Plains has signage posted with the PMC emergency telephone number on right-of-ways and facilities. Employees or third parties may notify the Control Center through the emergency phone line. This is recorded in the Plains Initial Notification System (PINS) and immediately addressed by the Control Center Operators. Control Center and SCADA staff support the CCO during this time. Designated first responder groups, which includes Field Operations, are notified and respond to the event. Appendix 1: Abnormal Operating Conditions Investigation Procedure showed a swim lane flow chart diagram that described the investigation procedure.

For a detailed description of the pipeline SCADA system, please refer to the assessment section of AP-21: Supervisory Control and Data Acquisition Design, Maintenance and Operational Functions.

Plains Midstream Canada demonstrated that it has a developed and implemented a control system and leak detection system that has data and alarming integrated with the SCADA system. The pipeline systems are monitored 24 hours a day, 7 days a week for leaks by trained Control Center Operators.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had developed and implemented a pipeline control system that includes a leak detection system, although due to the scope of the audit and the protocol used, the Audit staff did not assess the control system against all of the requirements of CSA Z662.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-10: Pipeline Control System Data Recording System

Regulatory Requirement: **OPR s. 37:** A company shall develop and implement a pipeline control system that **(b)** records historical pipeline operation data, messages and alarms for recall.
Expected Outcome: The company is able to demonstrate that it has developed and implemented a pipeline control system that records historical pipeline operation data, messages and alarms for recall.
Summary of Information Made Available by Plains: To demonstrate compliance with this requirement, Plains provided the Canada Energy Regulator (CER) audit staff with: • Tour of the Operational Control Center and Alternate Control Center • Leak Detection Program • Shift Change Observation 2020-02-27 • Leak Detection Assessment – SSPL -Cantuar 2017-03-26 • Leak Detection Assessment– CRKD-Crooked Lake Lateral 2018-01-29 • Shift Turnover - C1 - 2020-01-06 Night to Day • Shift Turnover - C2 - 2020-01-03 Day to Night • Shift Turnover - C3 - 2020-01-02 Day to Night • Golden Hour Checklist – C1- 2020-01-01 • Golden Hour Checklist – C2- 2020-01-03 • Golden Hour Checklist – C2- 2020-01-02
Assessment: Plains provided the CER audit staff with a tour of the Operational Control Center (OCC) and Alternate Control Center (ACC). Both facilities had redundant Supervisory Control and Data Acquisition (SCADA) systems, which include leak detection applications. The retention of SCADA data was discussed with Control Center personnel and SCADA Support staff and observed by the CER audit staff while on site at the OCC. The company stated that the SCADA system can retain real time data for a period of six months; historical retrieval for the Decision Support System (DSS) is seven years, which utilizes Storage Area Network (SAN) systems. The SCADA system has the capability to retain data points, events, alarms, and configurations. Trending and summary screens are available, which allows the Control Center Operator (CCO) to readily filter and view information. The SCADA data is continuously replicated and ensures current and valid information is available at the OCC and ACC, and on the primary and secondary servers. A Decision Support System (DSS) is a read-only SCADA interface that allows support groups, such as field

operations or engineering, to view data that is delayed by 15 minutes. The SCADA system also retains commissioning point-to-point records within its database. CCO sign in and all associated commands are logged in the SCADA system. Leak Detection Assessment – SSPL -Cantuar 2017-03-26 and Leak Detection Assessment– CRKD-Crooked Lake Lateral 2018-01-29 records provided examples of screen captures of historical alarms and analog trends that used for reporting and investigative purposes.

Control Centre Operators have access to the corporate network and SharePoint site where they can readily access information specific to the user profile. Examples of information included event logging tools, operational and emergency procedures, and training documentation.

A CCO shift change was observed by the Audit staff on 27 February 2020. The PMC CRM Shift Turnover Procedure is used to ensure accurate and consistent information is exchanged between the incoming and outgoing CCO. A standardized template has been developed for this purpose. Observations of the shift change online record, temporary Management of Change, and SCADA information, including LDS, were made. Control Center logs cannot be modified or deleted once the CCO has signed out of the logging application. Logs are available online and the sign-off is completed on a paper copy. Signed copies are scanned and physically retained. The Company is actively working toward implementing an electronic sign-off method. Three samples of shift change records were submitted as records of routine utilization of this procedure.

A Golden Hour Checklist is completed by a CCO when they start a shift. To maintain consistency and thoroughness, this on-line form template has specific items a CCO must review. CCO shift preparedness includes the review of operations, SCADA, system, documentation and leak detection. Examples of these records were submitted to the Audit staff.

Plains uses an application called 'TiPS' to extract alarm data that is analyzed against Key Performance Indicators (KPI) within the alarm management process. Leak detection alarms are included. The Leak Detection Program Record Control section lists the documents that are used to maintain the control of documents for leak detection. These include the Records Management Standard, Document Management Standard, Information Management Policy and the Information Management Program.

The CER audit staff asked Plains to provide a list of incidents which had occurred within the previous six months where the company had Operation Beyond Design Limit (OBDL) incidents or leaks. The company explained that there had not been any such incidents in the previous six months.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had developed and implemented a pipeline control system that records historical pipeline operation data, messages and alarms for recall.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-11: Investigation of Incidents, Near Misses and Non-Compliances

Regulatory Requirement: **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 preventative actions, including the steps to manage imminent hazards;
Expected Outcome: The company can demonstrate that it has established and implemented a process for the internal reporting of hazards, potential hazards, incidents and near-misses related to the operation of the pipeline and for taking corrective and preventative actions, including the steps to manage imminent hazards. It is expected that: • the company has a compliant process that is established and implemented; • the company has defined its methods for internal reporting of hazards, potential hazards, incidents and near-misses; • hazards and potential hazards are being reported as required by the company's process; • incidents and near-misses are being reported as required by the company's process; • the company has defined how it will manage imminent hazards; • the company is performing incident and near-miss investigations; and, • the company's investigation methodologies are consistent and appropriate for the scope and scale of the actual and potential consequences of the incidents or near misses to be investigated.
Summary of Information Made Available by Plains: Information provided by Plains to the Canada Energy Regulator (CER) audit staff to demonstrate compliance with this regulatory requirement included: • Plains' Operations Policy • Plains' Operational Management System • Plains' Control Room Management Program • Plains' Incident Reporting and Investigation Program • Abnormal Operating Conditions Investigation Checklist • Authority to Shut Down Letter • Corrective Action Management Program • Monitoring and Reporting Corrective Actions • Corrective Actions Closure Procedure • Evaluation of Corrective Actions Process • Hazard Identification Reporting • Hazard Prevention Program

- Hazard Identification Template
- Incident Documentation 13.0011
- Operational Control Centre – Plains Incident Notification System Procedure
- Safety Incident Management Procedure
- Stop Work Authority

Assessment:

Plains' Operational Management System (OMS) includes Plains Operations Policy. In the policy, dated 01 April 2017, Plains commits to: '*fostering a safety culture that exemplifies safety as a core value, supports our drive to zero incidents, and optimizes our ability to rapidly and effectively respond to emergency situations. We encourage individual responsibility to stop work, without fear of reprisal or disciplinary action, if an unsafe act or condition is identified.* ***We commit to an environment of trust and reporting of incidents, close calls (near misses), and good catches (hazards and potential hazards).*** *We commit to a continuous learning culture where we share lessons and learn from each other. We commit to ongoing assurance activities that identify and correct deficiencies that safeguard our people, the environment, and our assets.'*

The OMS, Sub-element 5.5 (Incident Management) states that: '*Plains leaders define and implement requirements for incident management, including reporting, investigation, and corrective actions, with a focus on root cause analysis and prevention of recurrence.'* In the OMS, Plains' Leaders are tasked to:

- '*Define and implement the Incident Reporting and Investigation Program, including requirements for identifying and reporting incidents and near misses, thresholds for internal and external notifications and reporting, and alignment with the Operational Risk Management Program;*
- *Define and implement requirements for investigating incidents, performing root cause analysis, applying corrective and preventive action management, and identifying operational shared learning; and,*
- *Define and implement requirements and supporting data management systems for capturing, managing, tracking, analyzing and reporting incident information, including incident and near miss reports, investigations, trends, causal factors, corrective and preventive actions, and operational shared learning.'*

Section 5.5 of Plains' Control Room Management Program (CRM Program) dated 26 July 2019, dealing with Incident Management states that *'Plains leaders define and implement requirements for incident management, including reporting, investigation, and corrective actions, with a focus on root cause analysis and prevention of recurrence.'* The expectation is that the CRM Program shall:

1. *'Define requirements for investigating incidents and performing root cause analysis.*
2. *Utilize systems for managing, tracking, analyzing and reporting incident information.'*

The expectation is that the Sub-Element will be aligned with the following documentation:

- Operational Control Centre – Plains Incident Notification System Procedure
- Restart Approvals
- Incident Documentation Procedure
- CRM Section 12: Information Management
- FCRM Section 12: Information Management

To meet the requirements of the OMS Sub-Element 5.5 and the CRM Program, Plains has established and implemented an Incident Reporting and Investigation Program under the umbrella of the company's Health and Safety Functional Group. The CRM Program document, which was initially established on 18 August 2015 and was last updated 14 December 2017, describes the processes to meet all of the requirements for Plains' Leaders are described above.

Plains provided the CER audit staff with a copy of its Corrective Actions Management Program, dated 16 January 2018. The document is actually a Corrective and Preventive Actions (CAPA) Management Program, which was established in support of Plains' OMS Sub-Element 6.4 which addresses corrective and preventive actions (CAPAs). It requires Plains' leaders to define and implement requirements to proactively identify, implement and manage CAPAs. The process is applied based on a prioritized approach in consideration of significance, criticality, sensitivity, risk, and/or impact of non-conformances to the safety of workers, the public, the company, shareholders and the environment as well as operational impact. The program is designed to:

- Develop effective CAPAs;
- Prioritize them;
- Implement them; and,
- Assess their effectiveness.

According to the information provided by Plains, and observed by the CER audit staff, all incidents are reported to the OCC which then follows Plains' Incident Notification System (PINS) Procedure. The Controller is to add a new incident on the Plains' incident notification website whenever notification of an incident is received. In the event that the online system is not available, the Controller is to use the Manual PINS Form.

Plains also provided its PMC Monitoring and Reporting Corrective Actions Procedure, dated 23 March 2017. The procedure is part of the Corrective Actions Management Program and its purpose is to monitor and report on trends of performance and non-conformance related to corrective actions. According to the company's document, *'It is part of the continuous improvement cycle, with metrics, issues and performance reporting to provide a means of determining the effectiveness of corrective actions and provide insight into areas for improvement.'* Plains provided the CER audit staff with evidence that the procedure is being followed.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented a process for the internal reporting of hazards, potential hazards, incidents and near-misses and for taking corrective and preventative actions.
Finding: No Issues Noted Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-12: Emergency Procedures Manual

Regulatory Requirement: **OPR s. 32(1.1):** The company shall develop an emergency procedures manual, review it regularly and update it as required.
Expected Outcome: The company is able to demonstrate that it has developed, regularly reviews and updates as required an emergency procedures manual to respond to control room specific emergencies (e.g. bomb threat).
Summary of Information Made Available by Plains: Information provided by Plains to the Canada Energy Regulator (CER) audit staff to demonstrate compliance to this regulatory requirement included: • Interviews with Control Center staff • PMC CORE Emergency Response Plan 2019 • Operational Control Centre – Plains Incident Notification Procedure • Operational Control Centre – Abnormal Operating Conditions Investigation Procedures • Operational Control Centre – Wildfire Management and Mitigation Procedure • Control Center Evacuation Procedure • Emergency Response Plan Update Process • PMC Control Room Management Training • PMC Control Room Management Operation Experience • Alternate Control Centre Evacuation Attendance • Console 3 Cantuar LRN-2017-03-026 • Simulator Training and Evaluation (Simulator Test) – 2020-01-04 • Wizard Lake 2019 Post ERP Exercise Report Final (including Attendance List) • Prairie-CEPA TTX Exercise Report • Operational Control Centre Evacuation Docs EVAC 2019-10-28 • PMC Required Reading Procedure • Governance Document Management Process – Policies and Governance
Assessment: Plains had developed corporate and control center emergency procedures. The company's Corporate Emergency Response Plan (ERP) 2019 and control center specific procedures were submitted to the CER audit staff as evidence. The ERP, which aligns to the Incident Command System, described the Control Center role in the initial emergency notification. This manual is available on the corporate network and hard copies are located in the Operational Control Centre (OCC) and the Alternate Control Centre (ACC). They

are regularly updated by the Control Center administrative staff, as described in the ERP Update Process. This is a guide for the annual maintenance, revision and distribution of the Plains Midstream Canada ('Plains' or 'PMC') Regulated ERPs. Section 4 of this document describes the specific scenarios that the Control Center may experience or their involvement in a coordinated response with support groups. Examples include fire/explosion, gas release, vapor cloud, pipeline release, third party identification of a potential pipeline release/leak, spill or leak, transportation of dangerous goods, natural disasters or severe weather, next of kin notification, and security incidents. The company stated that all Control Center Operators (CCOs) receive basic Incident Command System (ICS 100) training to ensure understanding of the corporate emergency response procedure. The OCC – Plains Incident Notification System (PINS) Procedure was submitted to the CER audit staff described the steps taken by the CCO when an initial emergency call is routed to the Control Center. The PINS require the CCO to complete a templated form that logs the event details. The CCO reviews the PINS information and if required, addresses the issue. If additional assistance is needed, this information is passed to the first responders or designated groups.

Control Center specific emergency procedures include several documents that address Control Center evacuation, and operational procedures that assist the CCO during an abnormal operating condition. The OCC – Abnormal Operating Conditions Investigation Procedure dated 4 April 2018, OCC Wildfire Management and Mitigation Procedure dated 21 February 2020, and Control Center Evacuation Procedure dated 4 October 2018 demonstrated functional emergency procedures were readily available to the Control Center employees. The OCC – Abnormal Operating Conditions Investigation Procedure is the primary response document for the control center and identifies six abnormal operating conditions. These include increase or decrease in flow rate, increase or decrease of pressure, complete loss of communications, unintended shutdown, activation or failure to activate a safety device and unintended valve closure. Procedural steps to investigate are listed and supported by an investigation procedure flowchart in Appendix 1 – Abnormal Operating Conditions Investigation Flowchart. These documents are available and can be accessed on the corporate intranet and the SCADA system, and are also copied to the corporate computer hard drives. Appendix 1 – Document Hierarchy and Document Type Definitions and Authority Levels of the Governance Document Management Process – Policies and Governance described the review period for emergency response plans (ERP) and standard procedure (SP) is three years and site-specific operating procedures (SSOP) are one year.

Control Centre staff indicated stated critical procedures are reviewed by the Control Center Operator on an annual frequency. Control Center staff are involved in field emergency exercises and formally trained as described in the PMC CRM Training document. The General section 4.2.2 described three requirements that the Control Center Operator needs to clearly understand:

1. *Controller's authority and responsibility to make decisions and take actions during normal operations;*
2. *Controller's role when an AOC is detected, even if the Controller is not the first to detect the condition, including the Controller's responsibility to take specific actions and to communicate with others; and,*
3. *Controller's role during an emergency, even if the Controller is not the first to detect the emergency, including the Controller's responsibility to take specific actions and to communicate with others.*

Interviews were conducted with three Controllers who discussed their familiarity with the emergency procedures, how to access them and their responsibilities. It was clear to the CER audit staff, based on the responses to interview questions provided by Plains' Controllers that they were familiar with the CCO's emergency procedures and their responsibilities and knew where to find and access them, both electronically and in hard copy, in an emergency situation.

Controllers are required to attend team meetings where operational information and learnings are shared by various support groups. Lessons learned from reportable and non-reportable pipeline incidents, abnormal operations and near misses are listed as a requirement of section 4.4.7 of the Required Reading Procedure. The PMC CRM Operation Experience document lists what is included in the lessons learned in section 2.3, and who is responsible and how it is communicated in section 5. Records supporting training, participation in exercises and lessons learned include the Simulator Training and Evaluation (Simulator Test) – 2020-01-04, ACC Evacuation Attendance, Console 3 Cantuar LRN-2017-03-026, Wizard Lake 2019 Post ERP Exercise Report Final, Prairie-CEPA TTX Exercise Report, and OCC Evacuation Docs EVAC 2019-10-28.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had developed, regularly reviews and updates as required emergency procedures to be used by Control Centre staff to respond to control room emergencies.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-13: Analysis of Leak Alarms

Regulatory Requirement: **CSA Z662-15 - E.4.3.2:** Analysis of leak alarms shall determine the cause of the alarm. The leak alarm shall not be discounted and declared invalid without such analysis; all alarms shall be assumed to have a cause. Methods to determine the cause of the leak alarm shall be developed. The leak detection system analysis procedure shall state a maximum analysis period. If the cause of the leak alarm has not been declared within the period, the pipeline shall be brought to a safe state until the leak alarm cause has been determined.
Expected Outcome: The company is able to demonstrate that it analyzes all leak alarms to determine the cause and has developed methods to determine the cause.
Summary of Information Made Available by Plains: Information provided by Plains to the Canada Energy Regulator (CER) audit staff to demonstrate compliance to this regulatory requirement included: • Interviews with Control Center personnel and support staff for the Supervisory Control and Data Acquisition System • Observations of Alarm Management Data and Records • Leak Detection Program • Operational Control Centre – Leak Detection Manual – Theory of Operations • Operational Control Centre – Abnormal Operating Conditions Investigation Procedure • Operational Control Centre – Shut in Pipeline or Segment Procedure • Operational Control Centre – Steady Operations Procedure • Alarm Management Meeting (Monthly Minutes) - 2019-10-17 • Leak Detection Meeting (Monthly Minutes) - 2019-09-29 • PAA PMC Leak Detection Meeting (Monthly Minutes) – 2019-11-13 • Leak Detection Committee Meeting (Quarterly Minutes) – 2019-12-09 • 2019 District Plan and Review – Operational Control Centre District • Incident Notification
Assessment: Plains provided an overview of the leak detection systems and discussed the analysis of leaks with the CER audit staff. Plains has two leak detection systems that actively monitor the pipelines under the regulatory authority of the Canada Energy Regulator. One is a Real Time Transient Model (RTTM), which is considered the primary Leak Detection System (LDS) and Pipeline Monitoring (PLM) is a compensated volume balance system, which is the complementary. The two systems use different algorithms to detect leaks. If a leak is detected, it is annunciated within the Control Centre console alarm screen as a high priority alarm. If one LDS fails, the other will continue

to provide the leak detection monitoring. If both systems fail, then the pipeline is shutdown by the Control Centre Operator (CCO) in accordance with the OCC – Abnormal Operating Conditions Investigation Procedure.

The primary procedure used for the analysis of leaks by the CCO is the Abnormal Operating Conditions Investigation Procedure. The CER audit staff conducted interviews with Control Center Operators who described their responsibilities with respect to leak analysis and the triggers that shutdown the pipeline.

Stated in the OCC – Abnormal Operating Conditions Investigation Procedure, Leak Trigger Section (page 4) *'If at any point the Control Center Controller experiences two or more leak triggers, the pipeline shall be shut down immediately.'* These include:

1. *Leak detection alarm or system imbalance*
2. *Sudden decrease in upstream discharge pressure*
3. *Sudden change in upstream control valve throttling*
4. *Sudden decrease in downstream suction pressure*
5. *Sudden change in downstream control valve throttling*
6. *Sudden decrease in pressure at delivery location*
7. *Sudden increase in upstream flow*
8. *Sudden decrease in downstream flow*
9. *Significant communication loss adversely affecting the calculation of the leak detection system*
10. *Leak detection calculation have been affected by anomalous conditions, causing it to be ineffective*
11. *Any combination of events / circumstances that cause the Controller concern that a leak is occurring or may have occurred*

Detailed steps are listed and require the CCO to analyze information, log findings, and notify support personnel. Analysis includes review of Supervisory Control and Data Acquisition (SCADA) data, and the leak detections systems. Team Leads and the Leak Detection Specialist are available to support 24x7 and 365 days. If an event occurs, the CCO uses an Incident Investigation Checklist, shown in Appendix 3. Appendix 2 of this procedure, dictates the maximum analysis period for leak investigation based on pipeline flow rates. The company identified 30 minutes as the maximum investigation time for flow rates >= 250 m3/hour, 45 minutes for flow rates between 150 m3/hour and 250 m3/hour, and 60 minutes for flow rates at 150 m3/hour or less. For a pipeline that is shut-in, the OCC – Shut in Pipeline or Segment Procedure is used. The procedure adjusts the pressure and flow rates to minimal levels. Once the initial settings, upper and lower pressure alarms (initial setting at +-300 kPa) and high flow rate (initial setting at 2 m3/hour), are modified, the CCO will actively monitor the pipeline segment. The OCC – Steady Operations Procedure, utilizes a similar approach to proactively identify anomalies on a pipeline that is operating at steady state conditions. Note these alarms are considered supplemental (Hi and Lo alarms); the design pressures and flow rates (the Hi-Hi and Lo-Lo alarms, which are considered safety related) are not modified.

During interviews, Plains' stated the Leak Detection Group reviews console daily event logs and leak detection alarms and performs a cause analysis. The output is the daily leak detection analysis that described the type of alarm, frequency and analysis. This event logs were observed by the Audit staff during interviews and were found to be thorough and complete.

Stated in the Leak Detection Program, the LDS alarms are reviewed on a monthly basis as part of the alarm management process. This includes the top 10 leak detection alarms. Other concerns or nuisance alarms detected by the Control Center Operator or Team Lead are reviewed ad-hoc or daily. This Short-term Periodic Review section states '*This review includes, but not limited to:*

- *Review of alarms, threshold trends, imbalance trends and causes over some defined time period.*
- *Analysis of imbalances, threshold, line pack and meter over/short (flow balance) during pipeline startups and shutdowns, pump starts/stops, movement changes, valve close/open, column separation condition, process variable changes, etc.*
- *Analysis of measurement trends (pressures for the segment of pipeline that issued the alarm, meters/flow rates, temperatures, densitometers, process variable, etc.).'*

The result of the review can trigger training, procedure modifications, management of change and/or a work order. Incidents are documented as per the Incident Documentation Procedure.

The CER audit staff were shown samples of 2019 alarm management meetings that included PLM and SimSuite top 10 alarms, and the follow up actions for the SimSuite monthly top 10, dated 2020-01-16. TiPs is an alarm management application used by the Company. TiPs analyzes SCADA data and provides regular reports on problematic alarms, including leak alarms. An Alarm Management Coordinator reviews monthly and develops plans to address the problems. Other examples of the monthly review meetings included records Alarm Management Meeting dated 2019-10-17, Leak Detection Meeting dated 2019-09-29, and PAA PMC Leak Detection Meeting dated 2019-11-13. Leak Detection Committee Meeting dated 2019-12-09 was provided as a sample of regular quarterly steering committee meetings. This meeting is chaired by the Leak Detection Specialist and attendees include various company stakeholders, including engineering, integrity and field operations. The 2019 District Plan and Review – OCC District record provided an example of a district annual review that included the Leak Detection Program.

In the Leak Detection Program, the Leak Detection Alarm Management section states in paragraph 2 '*Leak Alarms shall not be discounted and declared invalid without proper analysis; every alarm shall be assumed to have a cause. For each alarm, sufficient information should be captured so it is possible to determine what adjustments may be made to improve the leak detection alarms and response.'* This statement is supported by the information provided by the Company and through interviews with the Audit staff.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated to the CER audit staff that it had technology and procedures to analyze all leak alarms to determine the root cause. Based on the evidence provided it appeared that Company did not discount and declare invalid such alarms without analysis. The Company used leak detection analysis, guided by documentation to determine the cause of leak alarms.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-14: Safe Shutdown of Pipeline in an Emergency

Regulatory Requirement:

CSA Z662-15 Clause 10.5.2.1 Operating companies shall establish emergency procedures that include:

(a) procedures for the safe control or shutdown of the pipeline system, or parts thereof, in the event of a pipeline emergency; and,

(b) safety procedures for personnel at emergency sites.

Expected Outcome: The company is able to demonstrate that it has established emergency procedures for the safe control or shutdown of the pipeline system in the event of an emergency; and safety procedures for personnel at emergency sites.

Summary of Information Made Available by Plains:

Information provided by Plains Midstream Canada to the Audit staff to demonstrate compliance to this regulatory requirement included:

- Authority to Shut Down Letter
- Control Centre Commitment Statement
- OCC – Abnormal Operating Conditions Investigation Procedure
- OCC – Milk River Terminal – Heavy Crude to Cenex Shutdown Procedure
- Training Program for OCC Controllers
- OCC - Controller Qualification Renewal
- PMC - CRM Training
- PMC Required Reading Procedure
- Simulator Training and Evaluation (Simulator Test) – 2020-01-04
- OCC - Man Down Response Procedure
- OCC - Field to Control Center Communications Procedure
- OCC – Wildfire Management and Mitigation Procedure
- PMC - Work Alone Procedure

Assessment:

As evidence that the Control Centre Operators have the authority to shut down the pipeline, Plains supplied the CER audit staff with documents and records. This is stated in the Abnormal Operating Conditions Investigation Procedure, dated 4 April 2018. In addition, an Authority to Shutdown letter to the CCOS from the Company's management and executive team, dated 24 May 2017 reinforces this policy. It states the individual Control Controller has the '*authority to shut down a pipeline, anytime that a leak alarm or warning is being investigated or any SCADA system event that meets any criteria in the abnormal operating conditions and the integrity of the affected pipeline is in question*.' In addition, the CER audit staff conducted interviews with Control Center staff who verified that they had been

instructed that they have not only the authority to shut down a pipeline, but an obligation to shut down it down if they have indications of potential leaks.

The primary procedure used to determine whether to shutdown the pipeline is the OCC - Abnormal Operating Conditions Investigation Procedure. The Abnormal Operating Conditions (AOC) section lists six conditions *may indicate failure of a component or deviation from normal operations. An AOC may indicate a condition exceeding design limits or result in a hazard to persons, property, or the environment.* These are increase or decrease in flow rate, increase or decrease of pressure, complete loss of communications, unintended shutdown, activation or failure to activate a safety device and unintended valve closure. The Leak Trigger Section states '*If at any point the Control Center Controller experiences two or more leak triggers, the pipeline shall be shut down immediately.''*

Detailed steps are listed and require the controller to analyze information, log findings and notify support personnel as required. Analysis includes review of SCADA data, and the leak detections systems. Team Leads and the Leak Detection Specialist are available 24 hours a day, 365 days a year to support the analysis. An Incident Investigation Checklist is Appendix 3.

The Work Authority section states *'The Control Center Controller has the authority to shut down a pipeline(s) at any time if:*

- *A leak alarm or warning is being investigated*
- *A SCADA system event meets the criteria in the Abnormal Operating Conditions*
- *The integrity of the affected pipeline is in question.'*

During tours of the Operational Control Center (OCC) and the Alternate Control Center (ACC), the Audit staff observed signs that stated the message *'When in doubt shutdown.*' This reinforced the message from management to safely shutdown the pipeline when analysis cannot clearly detect a problem.

The OCC – Milk River Terminal – Heavy Crude to Cenex Shutdown Procedure was provided as an example of a site-specific shutdown procedure used by the Control Center. Training Program for OCC Controllers describes the timelines, methods, responsibilities and curriculum for the Control Center. Section 6, Training Details, identifies the requirements that included specific topics that support the task to shut down the pipeline. Incident Command System (ICS) 100, leak detection, hazard recognition and control, normal and emergency shutdown scenarios, and procedure review were examples. The PMC CRM Training document states in section 2, Scope, that the Company will reference United States regulations, Code of Federal Regulations (CFR) Title 49 Part 195 Section 446 sub-section (h) Training as a best practice. The Operator Qualification, section 6.7.2 specifically addresses the operator qualification program include the shutdown of a pipeline. Training records were observed during interviews and an example of a completed CCO Simulator Training and Evaluation (Simulator Test) dated 2020-02-04 was provided. In this record, Item 2 - Specific Duties/Tasks section, confirmed that the shutdown of a pipeline was evaluated for this CCO. Additional information regarding training can be found in Training, Competence and Evaluation (Audit Protocols 15 and 16).

There are five qualified CCOs per operational console. During interviews, Plains stated that Control Center Operators are qualified to operate on one specific console. Based on the shift schedule, a minimum of four CCOs are required to operate the pipeline 24 hours a

day, 365 days per year. One CCO acts as a spare, who covers for absences or vacation. Team Leads are available and support the CCO, but due to the manner in which Team Leads are selected, are not trained and qualified to shut down all pipelines.

Safety procedures for personnel at emergency sites submitted to the Audit staff included:

- OCC Field to Control Center Communications Procedure – Normal and emergency operations communication protocol between the Control Center and Field Operations.
- OCC Man Down Response Procedure – Notification to the Control Center and response steps for a man down incident at Company facilities.
- PMC Work Alone Procedure – Notification to the Control Center and response steps when contact is lost with an employee who is working at a facility.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established emergency procedures for the safe control or shutdown of the pipeline system in the event of an emergency; and safety procedures for personnel at emergency sites.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-15: Training, Competence and Evaluation

Regulatory Requirement:

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)(j) establish and implement a process for developing competency requirements and training programs that provide employees and other persons working with or on behalf of the company with the training that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

OPR s. 46(1) A company shall develop and implement a training program for any employee of the company who is directly involved in the operation of the pipeline.

OPR s. 46(2) The training program shall instruct the employee on

(a) The safety regulations and procedures applicable to the day-to-day operation of the pipeline;

(a.1) The security processes, procedures and measures applicable to the day-to-day operation of the pipeline;

(b) responsible environmental practices and procedures in the day-to-day operation of the pipeline;

(c) the procedures for the proper operation of the equipment that the employee could reasonably be expected to use; and,

(d) the emergency procedures set out in the manual developed under section 32 and the procedures for the operation of all emergency equipment that the employee could reasonably be expected to use.

OPR s. 46(3) The company shall use reasonable efforts to ensure that any employee who attends a training program has a working knowledge of the subject-matter of the program at the end of the program.

Non-Mandatory Requirement - CSA Z662-15 - E.9.1: Pipeline controllers shall receive appropriate initial training and retraining. The operating company shall develop a policy for pipeline controller training, testing and retraining. Testing shall be performed to determine pipeline controller competency before the pipeline controller operates the pipeline. The operating company shall establish competency criteria for pipeline controllers. The leak detection system developers, support staff, and pipeline controllers shall be competent in understanding the leak detection methodology, critical equipment and processes, the software application, and the influence of each on the performance of the leak detection system.

Expected Outcome: The company can demonstrate that it has established competency criteria and training programs for pipeline controllers. It is expected that:

- the company has a compliant process for developing competency requirements and training programs;
- the company has defined what competency requirements are required;
- training programs are traceable and trackable to the defined competency requirements and effective at achieving the desired competencies;
- employees and those working on behalf of the company are competent to carry out their assigned work; and,
- persons working with or on behalf of the company are provided with adequate training applicable to s. 55 programs and the management system.

Summary of Information Made Available by Plains:

The information provided by Plains to the CER audit staff to demonstrate compliance to this regulatory requirement included:

- Plains Midstream Canada Control Room Management Roles and Responsibilities
- Competency and Training Management Program
- Plains Midstream Canada Control Room Management Training
- Functional Competency Matrix Development Process
- Functional Competencies – Olds Control Centre Controller
- Operational Control Centre – Hiring and Qualifying a New Controller
- Operational Control Centre – Leak Detection Program for Controllers

Assessment:

Plains advised the CER audit staff that it developed and implemented the Control Room Management Program (CRM Program) to specify the requirements needed to meet all Operational Management System (OMS) obligations, including specified industry standards and regulatory requirements. The CRM Program defines the roles and responsibilities of Console Supervisors, Team Leads and Controllers in the Operational Control Centre (OCC) during normal, abnormal and emergency conditions. It also establishes a method to transfer responsibility from one Controller to another at regular shift change, and at other times when one Controller assumes responsibility for another.

Plains provided the CER audit staff with a copy of its Competency and Training Management Program (CATM Program) manual dated 23 March 2017 for review. According to the VP Human Resources Commitment Statement in the CATM Program document, the role of the program is to ensure all employees governed by the OMS are clear on the functional competency requirements of their role, and receive the training they need to be safe, reliable and efficient. It governs the processes and procedures which identify functional

competencies, identify required training, ensures functional competency assessments are completed and ensures records are managed accurately. The CATM Program document commits to:

- Define functional competency requirements and qualifications for roles governed by the OMS and assign them to employees and leaders in the Learning Management System (LMS);
- Evaluate functional competency requirements and qualifications of candidates during the recruitment and selection process;
- Define training requirements, configure and assign them in the LMS, assess employee knowledge upon completion of training, and record all completions and knowledge test scores in the LMS;
- Assess that employees are competent to perform their duties, as defined by the functional competency requirements of their role and record functional competency assessments in the LMS;
- Define and implement requirements for the administrative management of functional competency models, training assignments and training completions in the LMS; and,
- Define employee, contractor and visitor orientation requirements, including site-specific orientations.

Plains provided CER audit staff with its Functional Competency Matrix Development Process, dated 8 March 2017, which is used to identify the functional competencies required in each role. The objective of the process is to ensure that leaders and supervisors and employees have competencies approved and documented. Once identified, they are used to develop functional competency assessments in the LMS.

Plains also provided the Functional Competencies Matrix for its six levels of Controllers from Level 6 (lowest level) to Level 1 (highest level) for tasks associated with:

- The operation and control of Supervisory Control and Data Acquisition (SCADA) Systems;
- Operation and Monitoring of Pipeline Systems;
- Shift Information Exchange;
- Control Room Management;
- Leak Detection Systems;
- OCC Leadership;
- Alternate Control Centre Evacuation Exercises;
- Training/Mentorship; and,
- To Develop Control Centre Standard Operating Procedures.

Plains also provided the Functional Competencies for the Team Leads.

Plains provided the CER audit staff with the company's Control Room Management Training document, first issued on 01 December 2014. The purpose of the document is to specify the requirements needed to meet all OMS obligations, including specified

industry standards and regulatory requirements. It incorporates the Memorandum of Understanding between the CER and the United States Pipeline and Hazardous Materials Safety Administration (PHMSA) established in 2005 to enhance cooperation and coordination for the purpose of improving pipeline safety in both Canada and the US.

Plains provides its OCC personnel with training on general safety, security and environmental protection as part of its introductory training during the first month that new employees join the organization. Plains also has a requirement for all employees to become operationally qualified. Any employee that does not complete the training within the prescribed time period, is removed from operating the control consoles. Plains also has a system to require OCC personnel to requalify every three years.

Plains provided the CER audit staff with its OCC Leak Detection Training Program for Controllers, dated 30 August 2017. The program is designed to provide each controller with a working knowledge of their pipeline systems and prepare them:

- To carry out their roles and responsibilities as a Pipeline Console Controller;
- To recognize and respond to normal and abnormal operating conditions: and,
- The impact to the leak detection system.

It also includes required training for Team Leads. The training is a combination of scheduled on-the-job training, classroom training and computer-based training.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented a process for developing competency requirements and training programs that provide employees and other persons working with or on behalf of the company with the training that will enable them to perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-16: Training, Competence and Evaluation

Regulatory Requirement:

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)(k) establish and implement a process for verifying that employees and other persons working with or on behalf of the company are trained and competent and for supervising them to ensure that they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

OPR s. 46(2) The training program shall instruct the employee on:

(a) The safety regulations and procedures applicable to the day-to-day operation of the pipeline;

(a.1) The security processes, procedures and measures applicable to the day-to-day operation of the pipeline;

(b) responsible environmental practices and procedures in the day-to-day operation of the pipeline;

(c) the procedures for the proper operation of the equipment that the employee could reasonably be expected to use; and,

(d) the emergency procedures set out in the manual developed under section 32 and the procedures for the operation of all emergency equipment that the employee could reasonably be expected to use.

OPR s. 46 (3) The company shall use reasonable efforts to ensure that any employee who attends a training program has a working knowledge of the subject-matter of the program at the end of the program.

Expected Outcome: The company is able to demonstrate that it has established and implemented a process for verifying that control room personnel are trained and competent and for supervising them to ensure they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment. It is expected that:

- the company has a compliant process for verifying employees and other persons are trained and competent;
- records are maintained demonstrating employees and other persons working on behalf of the company are trained and competent as applicable to the Integrity Management Program and specifically, the control room;
- the company has a compliant process for supervising employees and other persons working on behalf of the company; and,
- supervision of employees and other persons is adequate to ensure they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

Summary of Information Made Available by Plains:

To demonstrate compliance to this requirement, Plains supplied the Canada Energy Regulator (CER) audit staff with the following documents:

- Plains Midstream Canada - Control Room Management Roles and Responsibilities
- Plains Competency and Training Management Program

- Functional Competencies – Operations Technician DRAFT
- Plains Midstream Canada – Control Room Management Training
- Plains Functional Competency Assessment Procedure
- Operational Control Centre – Controller Progression Process
- Training Program for Operational Control Centre Controllers
- Operational Control Centre – Controller Qualification Renewal
- Operational Control Centre – Controller Requalification after extended Absence
- Operational Control Centre – Job Observation Checklist
- Operational Control Centre – Leak Detection Training Program for Controllers
- Operational Control Centre – Control Centre Competency Plan

Assessment:

Plains Control Room Management Program (CRM Program) document, first issued on 01 December 2014, and last updated 31 October 2019 defines the roles and responsibilities of Console Supervisors, Team Leads and Controllers in the Operational Control Centre (OCC) during normal, abnormal and emergency conditions. It also establishes a method to transfer responsibility from one Controller to another at regular shift change and at other times when one Controller assumes responsibilities for another.

Plains also provided the CER audit staff with its Competency and Training Management Program (CATM Program) document, dated 23 March 2017. According to the document, the CATM Program is a programs under the OMS, established to address Plains' commitment to *'safely deliver exceptional results'* by identifying competency requirements for individual roles, provide training to develop competency and to assess functional competence on an ongoing basis. It provides a methodology to ensure employees are competent in their roles.

Plains also provided the Functional Competencies Matrix for its six levels of Controllers from Level 6 (lowest level) to Level 1 (highest level) for tasks associated with:

- The operation and control of the Supervisory Control and Data Acquisition (SCADA) Systems
- Operation and Monitoring of Pipeline Systems;
- Shift Information Exchange;
- Control Room Management;
- Leak Detection Systems;
- Operational Control Centre Leadership;
- Alternate Control Centre Evacuation Exercises;
- Training/Mentorship; and,
- To Develop Control Centre Standard Operating Procedures

Plains also provided the Functional Competencies for the Team Leads.

Plains provided the CER audit staff with its Control Centre Competency Plan, dated 16 October 2017. The plan applies to all Control Centre Controllers, Team Leads and Management. It incorporates regulatory requirements, industry guidelines and best practices for managing competency within the OCC and the ACC to ensure safe and efficient Control Centre operation and support effective service delivery.

The CRM Training document outlines the process for the training of OCC personnel on their roles and responsibilities. It is the procedure used by PMC to train Controllers, Team Leads and Supervisors.

The Training Program for OCC Controllers document, dated 30 August 2017 is designed to provide each Controller with a working knowledge of their pipeline systems and prepare them to carry out their roles and responsibilities as a Pipeline Console Controller, to recognize and respond to normal and abnormal operating conditions and communicate in emergency conditions. The training program also includes required training for Team Leads. It consists of a combination of on-the-job, classroom, simulator and computer-based training. New Controllers are expected to complete the training within 9 months in order to achieve the Console Qualification.

The Functional Competency Assessment Procedure dated 08 March 2017 provides guidance and support to the control center assessors on the steps required to complete an employee assessment. It provides the necessary guidance for PMC Team Leaders, Supervisors and Employees to understand and complete the functional competency assessment requirements for PMC operational roles.

Plains provided the CER audit staff with the OCC Controller Progression Process, dated 8 January 2019 which provides the progression testing guidelines for Controller progression at PMC. It defines the steps that a Control Centre Operator must follow in order to progress from level 6 (lowest level) to level 1 (highest level).

Plains provided the CER audit staff with the OCC – Controller Qualification Renewal document, dated 16 October 2017. The procedure documents the steps required to renew Controller Qualification according to the Control Room Management Plan Section 9 – Controller Training Program which states that all Controllers shall re-qualify every three years, using the methods outlined in the Operator Qualification Program.

Plains also has a procedure to requalify Controllers after an extended absence, titled OCC - Controller Requalification After Extended Absence, dated 16 October 2017. The procedure stipulates the steps to re-qualify a Controller who has been absent for 90 days or longer. Controllers in this situation are required to re-train by completing the Operator Qualification process.

The OCC Leak Detection Training Program for Controllers document dated 30 August 2017 describes the on-the-job training, classroom training and computer-based training used to train Pipeline Controllers and Team Leads. This provides them with a working knowledge of their pipeline system leak detection system to prepare them to recognize and respond to normal and abnormal operating conditions and

the impact to the leak detection systems.

Plains provided the CER audit staff with a copy of its Job Observation Checklist – Golden Hour Check, which an assessor would use to assess a Controller in the completion of his or her duties at a particular console. The purpose of the checklist is to assess functional competencies when performing any Controller tasks which then has to be signed by both the assessor and the employee. It is used by a trained and qualified observer to:

- *'Assess functional competencies of employees when performing covered tasks;*
- *Identify, assess and manage competency-related risks;*
- *Evaluate the behavioral aspect of work;*
- *Identify and prioritize competency improvement opportunities; and,*
- *Create a safe working environment and ensure safe operations.'*

As mentioned in AP-15, Plains advised the CER audit staff that it has a process for identifying competency and training requirements and for delivering training. Plains also advised audit staff that it has a process for verifying that control room personnel are trained and competent. The company provided the CER with its Functional Competency Assessment Procedure, dated 08 March 2017. The procedure provides the necessary guidance required for Plains Midstream Canada leaders/supervisors and employees to understand and complete the functional competency assessment requirements for Plains Midstream Canada operational roles. In alignment with the CATM Program, the Functional Competency Assessment Procedure includes scheduling, conducting and recording of functional competency assessments. The assessments are completed as a result of one of the following triggers:

- *'An employee is half way through the duration of their probation period;*
- *Prior to progression of an employee to the next compensation level;*
- *An incident requires an updated functional competency assessment; or,*
- *At the request of a leader/supervisor.'*

Plains has a Training Specialist who educates employees on the CATM Program and the assessment procedure and provides support to assessors in the successful completion of the assessments. The Training Specialist also supervises the training completed on Plains' simulator which is used to qualify and requalify Controllers.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented a process for verifying that employees and other persons working with or on behalf of the company are trained and competent and for supervising them to ensure that they perform their duties in a manner that is safe, ensures the security of the pipeline and protects the environment.

Finding: No Issues Noted Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-17: Annual Training Program Report

Regulatory Requirement:

OPR s. 56 A company shall, in addition to complying with the record retention requirements set out in the CSA standards referred to in section 4, retain

(b) An annual report on the training program developed under section 46 that compares the actual training received by employees to the planned training.

Expected Outcome: The company is able to demonstrate that it prepares an annual report that compares the actual training received by employees and other staff working on behalf of the company in the control room to the planned training.

Summary of Information Made Available by Plains:

To demonstrate compliance with this requirement, Plains provided the CER audit staff with a copy of its 2018 Annual Operations Report.

Assessment:

It was noted by the CER audit staff that Plains ensures personnel are aware of its Code of Conduct, Operations Policy, Commitment Statement, and goals, objectives and targets through its Operational Management System (OMS) and its sub-element documents. Additionally, according to the OMS, personnel receive training on programs, processes and procedures that affect operations performance or the effectiveness of the OMS. The document states that on an annual basis, training is assigned to employees and contractors based on business and regulatory requirements. The completion of required training is monitored and reported on a quarterly basis to the management and leadership team. According to the document, in 2018, Plains met its training target of 95% with a completion rate of 97% for required training. The Director for Plains Control Centre Operations provides monthly, quarterly and annual reports to senior management on the status of training completed or outstanding. As such, senior management has an ongoing picture of the status of training in the Control Centre including any outstanding critical training which might impact the operation of the OCC. Plains demonstrated that the information gets rolled up to senior management and the Accountable Officer as part of the annual management review process.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it annually compared the actual training received by Control Centre staff with the planned training and conveyed this information to Senior Management.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-18: Control Room Audits

Regulatory Requirement:

OPR s. 55(1) A company shall conduct audits with a maximum interval of three years of the following programs: (b) the integrity management program referred to in section 40, including the pipeline control system referred to in section 37;

OPR s. 55(2) The documents prepared following the audit shall include (a) any deficiencies noted; and (b) any corrective action taken or planned to be taken.

Expected Outcome: The company is able to demonstrate that it conducts audits of the pipeline control system and leak detection system with a maximum interval of three years. The audit reports note any deficiencies and any corrective actions taken or planned to be taken.

Summary of Information Made Available by Plains:

To demonstrate compliance with this requirement, Plains provided the Canada Energy Regulator (CER) audit staff with:

- Operational Management System Audit Report – Control Room Management 2019 Final, dated 24 July 2019
- Plains IMP Audit – Final Truncated CRM Portion 2016
- Operational Management System Audit Protocol – Control Room Management (CER Filter)
- Audit and Assessment Corrective Action Plan – Final with Gap and Action

Assessment:

Plains provided the CER audit staff with a July 2019 Audit Report for an audit of its Control Room Management. The company also provided the protocol used for the audit and the Corrective Action Plan resulting from the observations and recommendations for improvement. According to the protocol, the regulatory requirements assessed for compliance during the audit were the applicable sections of the OPR and CSA Z662-15 that the CER would expect of an OPR s. 55 audit. The company also assessed the control room management for conformance to the company's own internal procedures.

In view of the information provided and through document reviews and interviews, Plains demonstrated that it conducted an OPR s. 55 audit of its pipeline control system.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-19: Leak Detection System – Audits of Special Incidents

Regulatory Requirement:

CSA Z662-15 clause E.8.4: audits shall also include and evaluate, where applicable, details of the following categories of incidents, the action taken, and the results achieved:

a) Pipeline leaks that were not detected by the leak detection system or that were not acted upon by personnel responsible for interpreting and responding to the leak detection system;

b) Occasions when the leak detection system was inoperative because of equipment or system failures exceeding 1 hour in duration;

c) Alarms caused by maintenance;

d) Alarms that have an indeterminate cause; and,

e) Invalid alarms of the same cause that occur frequently.

Note: Although Annex E of CSA Z662-15 is non-mandatory, Clause 4.20.2 states that r*egardless of the method of leak detection used, operating companies should comply as* ***thoroughly as practical*** *with Annex E regarding record retention, maintenance, auditing, testing and training.*

Expected Outcome: The company is able to demonstrate that it conducts audits of the leak detection system which evaluates incidents where:

- the leak detection system did not detect the leak;
- the personnel responsible for interpreting and responding to the leak detection system did not act upon leak alarms;
- the leak detection system was inoperative because of equipment or system failures exceeding 1 hours in duration;
- alarms were caused by maintenance;
- alarms have an indeterminate cause; and,
- alarms of the same cause occur frequently.

Summary of Information Made Available by Plains:

To demonstrate compliance to this regulatory requirement, Plains provided the Canada Energy Regulator (CER) audit staff with:

- Leak Detection Assessment Example – CRKD – Crooked Lake Lateral 2018-01-29
- Leak Detection Assessment – SSPL Cantuar – 2017-03-26
- Leak Test Example 2019-01-28
- Leak Test Example 2019-07-02 SimSuite 052_EMP6N_RICHSN_S Leak Test
- Operational Management System Audit Report – Control Room Management 2019 Final, dated 24 July 2019

- Plains IMP Audit – Final Truncated CRM Portion 2016
- Operational Management System Audit Protocol – Control Room Management (CER Filter)
- Audit and Assessment Corrective Action Plan – Final with Gap and Action

Assessment:

As explained in AP13: Analysis of Leak Alarms, Plains was able to demonstrate to the CER audit staff that it analyzes all leak alarms to determine root cause; it does this through daily and monthly alarm reviews. Plains also provided the CER audit staff with the audit protocol, audit report and corrective action plan from a July 2019 Audit Report for an audit of its Control Room Management. As part of the audit, Plains was able to demonstrate that an analysis of CSA Z662 Clause E.8.4 was conducted to verify that the company meets the requirements of the standard.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it conducts daily and monthly annual reviews of alarms and the results of investigations and that it conducts a review of its processes for compliance to the CSA Z662 clause E.8.4 as part of its audits of control room systems.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-20: Annual Management Review

Regulatory Requirement:

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)(x): establish and implement a process for conducting an annual management review of the management system and each program referred to in section 55 and for ensuring continual improvement in meeting the company's obligations under section 6.

Expected Outcome: The company is able to demonstrate that it has a process for conducting an annual management review of its control room operations and for ensuring continual improvement in meeting the company's operations under section 6. It is expected that:

- the company has a compliant process that is established and implemented;
- the company's methods for conducting the management review are defined;
- the company has defined methods for reviewing the management system and each s. 55 program;
- the company has maintained records to demonstrate the achievement of OPR s. 6 obligations is continually improved; and,
- the company has identified, developed, and implemented corrective actions as part of its continual improvement.

Summary of Information Made Available by Plains:

To demonstrate compliance to this regulatory requirement, Plains provided the Canada Energy Regulator (CER) audit staff with:

- Plains' Operational Management System
- Plains' Control Room Management Program
- Operational Management System Assessment Process
- Annual Management Review Process
- 2018 District Annual Management Review Operational Control Centre District Record
- 2018 SE 2.4 Asset Integrity Annual Management Review
- 2018 Sub-Element Annual Management Review 4.3 Control Room Management Record
- 2019 District Plan and Review
- 2019 Sub-Element 2.6 Environmental Management Annual Management Review
- 2019 Sub-Element 2.7 Damage Prevention Annual Management Review
- 2019 Sub-Element 5.3 Emergency Management Annual Management Review
- 2019 Sub-Element Annual Management Review Form Template
- 2019 Sub-Element 6.3 Management Review
- 2019 Sub-Element 2.5 Health and Safety Annual Management Review

Assessment:

Plains' Operational Management System (OMS), Sub-Element 6.3 – Management Review states that '*Plains leaders define and implement management reviews that foster regular assessment and reporting of business performance, and evaluating the continuing stability, adequacy, and effectiveness of the OMS and related programs.'*

The OMS calls for Plains' Leaders to:

6.3.1 Define and implement a management review process and procedures to review performance to plan, define frequency of reviews and specify areas that require management review.

6.3.2 Define and implement a procedure for developing an operations annual report that documents the outcomes of annual management review, including the achievement of goals and objectives as defined in strategic planning, determination of the suitability, adequacy and effectiveness of the OMS and actions taken to correct any deficiencies.

The Plains' Control Room Management Program (CRM Program) document, dated 26 July 2019, section 6.3 – Management Review, mirrors the OMS Sub-Element 6.3 by repeating that *'Plains leaders define and implement management reviews that foster regular assessment and reporting of business performance, and evaluating the continuing suitability, adequacy, and effectiveness of the OMS and related Programs.'* The expectation is that the CRM Program will leverage the OMS Sub-Element by conducting audits, annual management reviews, assessments, observations and quality reviews.

Plains provided its Annual Management Review (AMR) Process, which was first issued in July 2015 and last reviewed on 26 February 2019. According to the process, the objectives of the AMR Process are to ensure continual improvement of the OMS in order to enable sustainment and continuous improvement of Plains' operational performance; and to ensure the required topics are reviewed at the appropriate levels during the annual management reviews. Each OMS Sub-Element Owner and each District are required to conduct their AMR Process using a Template provided by the OMS Manager. To that end, Plains provided its 2019 Sub-Element Annual Management Review Form Template, dated 5 September 2019, which OMS Sub-Element Owners use when conducting their annual review.

Plains also provided the CER audit staff with the 2018 Asset Integrity AMR, as well as the 2019 AMRs for Health and Safety, Environmental Management, Damage Prevention and Emergency Management. In these documents the Sub-Element Owner and Sponsor review and sign off on the results of the Program Area (or OMS Sub-Element) in achieving targets and objectives established the previous year. They also acknowledge:

- Work completed;
- Work to be carried forward;
- A discussion of any emerging risks;
- Updates to the legal list;
- Any trends noted from audits, assessments and other assurance activities;
- The status of document review; and,
- The establishment of targets and objectives for the following year.

All of the AMRs are compiled and reviewed by senior management, which then leads to the preparation and distribution of Plains Annual Report, which is then announced to the CER as having been completed by 30 April of each year in accordance with the requirements of the OPR s. 6.6. Record reviews conducted by CER audit staff indicated that the AMR Process is being conducted by Plains' Sub-Element Owners in a consistent manner and that the results are being conveyed to senior management for the Corporate Annual Management Review.

In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had established and implemented a process for conducting an annual management review of its control room operations and for ensuring continual improvement in meeting the company's operations under section 6 of the OPR.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

AP-21: Pipeline Control System and Leak Detection System

Regulatory Requirement:

OPR s. 37 A company shall develop and implement a pipeline control system that (a) comprises the facilities and procedures used to control and monitor the operation of the pipeline;

Expected Outcome: The company is able to demonstrate that it has developed and implemented a pipeline control system that includes a leak detection system that, for oil pipelines, meets the requirements of CSA Z662-15.

Summary of Information Made Available by Plains:

Information provided by Plains to the Canada Energy Regulator (CER) audit staff to demonstrate compliance to this requirement included:

- Tours of the Operational and Alternate Control Centers
- Interview with Control Center staff and support staff for the Supervisory Control and Data Acquisition System
- Observation of the Supervisory Control and Data Acquisition System
- Plains Midstream Canada Control Room Management Supervisory Control and Data Acquisition System
- Plains Midstream Canada Supervisory Control and Data Acquisition System Display Guide
- Plains Midstream Canada Supervisory Control and Data Acquisition System Procedures Manual
- Operational Control Centre – Supervisory Control and Data Acquisition Display – Creation, Modification or Removal – SSOI
- Plains Midstream Canada Supervisory Control and Data Acquisition System – High Level Description
- Plains Midstream Canada Control Room Management - Alarm Management
- Plains Midstream Canada - Alarm Philosophy
- Operational Control Centre – Alarm Rationalization
- Operational Control Centre – SimSuite Bypass Valve Status Procedure
- Operational Control Centre – SimSuite Inhibit Instrumentation Procedure
- Operational Control Centre – Pressure Alarm Startup and Shutdown Management Procedure
- Operational Control Centre - Steady State Operation Procedure
- Operational Control Centre – Shut in Pipeline or Segment Procedure
- Control Centre Evacuation Procedure
- Operational Control Centre - Evacuation Docs - EVAC 2019-10-28
- Operational Control Centre – Supervisory Control and Data Acquisition System Mode Switch Procedure
- Operational Control Centre – Project Integration Process
- Interaction Model – Projects
- Operational Control Centre - Point to Point Verification Procedure
- Operational Control Centre - Point Verification Procedure

- Screenshot of Standard Operating Procedures in Supervisory Control and Data Acquisition Remote Viewer
- Snippet of Supervisory Control and Data Acquisition Videos
- Aveva Leak Detection System Plains Midstream Pipeline Report 2019325

Assessment:

Plains' uses an industry-recognized Supervisory Control and Data Acquisition System (SCADA) system commonly used in the North American pipeline industry. Integrated with the system is a Real-time Transient Model and Pipeline Leak Monitoring system. Real-time data and information are provided to the Control Center Operator (CCO) who monitors the pipeline systems 24 hours a day, 365 days a year. The SCADA system is separated into five subsystems that include:

- Production
- Quality Assurance
- Test and Development
- Training
- Decision Support System

Production: this is the real time system used by the Control Center.

Quality Assurance: this is used to complete final quality checks on patches and configuration changes before they go into production.

Test and Development: used by the SCADA group to develop new screens, points and test all patches and configurations.

Training: used to provide separate environment for the training simulator.

Decision Support System (DSS): used for remote viewers to access SCADA historical information. The DSS can retrieve seven years of pipeline controls and monitoring data.

Plains uses an industry-recognized communication protocol involving redundant communication paths to link the Operational Control Center (OCC) and the Alternate Control Center (ACC) with the field locations.

A SCADA refresh project is currently underway. The project scope includes upgrading Plains' current SCADA system with a more modern system and rebuilding all control screens to meet current standards. SCADA hardware will be upgraded including servers, storage systems, workstations and monitors, and network and communication equipment. The changes will be applied to the OCC and ACC and is expected to be completed by the first quarter of 2021.

Tours of the Control Centers were provided and included the training simulator room at the OCC. The CER audit staff observed the control room layout, consoles arrangements, ergonomics and CCO interactions. The console configuration is standardized with eight

SCADA and two corporate displays. Corporate computers connect to the Company's intranet and allow the Control Center Operator

(CCO) to access documents, shift schedule, and log applications. The ACC configuration has six SCADA and two corporate displays. In order to mirror the OCC, the SCADA refresh project will add two SCADA displays to each console station in the ACC.

The Audit staff interviewed the SCADA Support staff and viewed training videos. The SCADA System Topology. MQTT Infrastructure and Point to Point Testing videos supported the Company's discussion and audit responses. Videos are used for CCO training and available on the company's SharePoint site. A screen capture of the available videos was submitted to the CER audit staff as a reference.

The PMC SCADA Procedures Manual, PMC SCADA Display Guide, SCADA Display – Creation Modification or Removal SSOI, and PMC CRM SCADA were provided. These describe the SCADA design, maintenance and operation requirements. The PMC CRM SCADA document outlines how the company aligns to industry regulations and standards. It states, '*the program considers (but is not limited to) PHMSA Control Room Management regulations, American Petroleum Institute recommended best practices, and Canadian Standards Association standards.'* Responsibilities, requirements and references in the document align to United States Code of Federal Regulation (CFR) Title 49 Part 195 Section 446 sub-section (c) Provide Adequate Information. Stated in section 2, Scope, '*The Company, employees and controllers shall reference this section of the PHMSA Control Room Management (CRM) Rules as best practice':* Specific parts of API RP 1165 – Recommended Practice for Pipeline SCADA Displays are incorporated into this regulation by reference.

The primary processes and procedures used by the Control Center to manage alarms and set points are PMC CRM Alarm Management, PMC Alarm Philosophy, OCC – Alarm Rationalization, OCC – SimSuite Bypass Valve Status Procedure, and OCC – SimSuite Inhibit Instrumentation Procedure. The PMC CRM Alarm Management document states in section 2.3 that *'The Company, its employees and contractors shall reference this section of the PHMSA Control Room Management (CRM) Rule as a best practice. CFR § 195.446(e) Alarm management.'* These documents describe the alarm design, configuration, maintenance, management of change (MOC), performance metrics and annual review. In section 1.2 of the PMC Alarm Philosophy document, the company states that it is aligned to the requirements included in ANSI/ISA 18.2 Alarm Management Lifecycle. The scope of the OCC-Alarm Rationalization Procedure includes existing points, new facilities, trouble alarms or any configuration changes to existing alarm points. This ensures alarms that are moved into the production (operational) SCADA system have been rationalized and meet applicable alarm standards. Stakeholders in this document include Supervisors, Alarm Management Coordinator, SCADA Specialist, Field Technician, Controller and Engineering. Plains uses an application called 'TiPs' to analyze SCADA data and provides regular reports on problematic alarms, including leak alarms. An Alarm Management Coordinator reviews the data monthly and develops plans to address the problems. Through interviews, the Control Center staff stated that SCADA changes follow the company management of change (MOC) process if they are longer than 90 days or permanent. Changes that are temporary follow a temporary MOC process. The PMC CRM Change Management section 2.3 describes the references to *CFR Title 49 Part 195 § 195.446(f) Change management Alarm* as a best practice.

SCADA backup systems were discussed with Control Center and SCADA Support staff. The SCADA system has primary and secondary production servers at the OCC and ACC. These servers are continuously replicated to ensure current data is available, if a transfer is required. This is referred to as a hot standby system, where operational transfer can be made to any of three available servers within a short time frame. Plains uses an industry-recognized communication protocol involving redundant communication paths using satellite

and cellular. SCADA support staff discussed the improvement in reliability and speed of the communications between the SCADA system and field devices once this new, modern, redundant communication protocol was implemented.

The OCC has an uninterruptable power supply (UPS) and a generator that will allow continuous operations when commercial power is lost. The ACC has a UPS that can operate for 10 hours under load. If the ACC is required to operate longer, a portable generator may be connected to an available transfer switch. Procedures for switching the SCADA system to a backup server and transferring operations to the ACC were reviewed. These included the Control Center Evacuation Procedure and OCC – SCADA Mode Switch Procedure. The OCC Evacuation Docs -EVAC 2019-10-28 (Alternate Control Centre Exercise Oct 28th-30th, 2.01) provided a record of the testing process, event logs and learnings. Interviews with staff identified the transfer of operations to the ACC was completed, at a minimum of two times per year. Not all CCOs have an opportunity to work at the ACC annually; however, they all experience a SCADA mode transfer.

The OCC-Project Integration Process document describes the requirements needed to ensure the Control Center has accurate displays, points and procedures before a facility is formally accepted by the Control Center. According to the document, the process scope is for '*any project, large or small, that affects the OCC'.* Control Center staff stated in the interviews that a new facility cannot be controlled or monitored by the Control Center until an alarm rationalization and point-to-point (P2P) checks have been completed. Outlined in the OCC - Point to Point Verification is the planning, testing and verification of points from the field devices to the SCADA system. The OCC – Point Verification procedure steps the CCO through the SCADA verification tool. This tool is a pop-up SCADA display that has predefined fields that a CCO completes. An extensive list of fields covers the specific details of the verification. All P2P records follow this template and are accessible from the SCADA system. This was observed by the Audit staff.

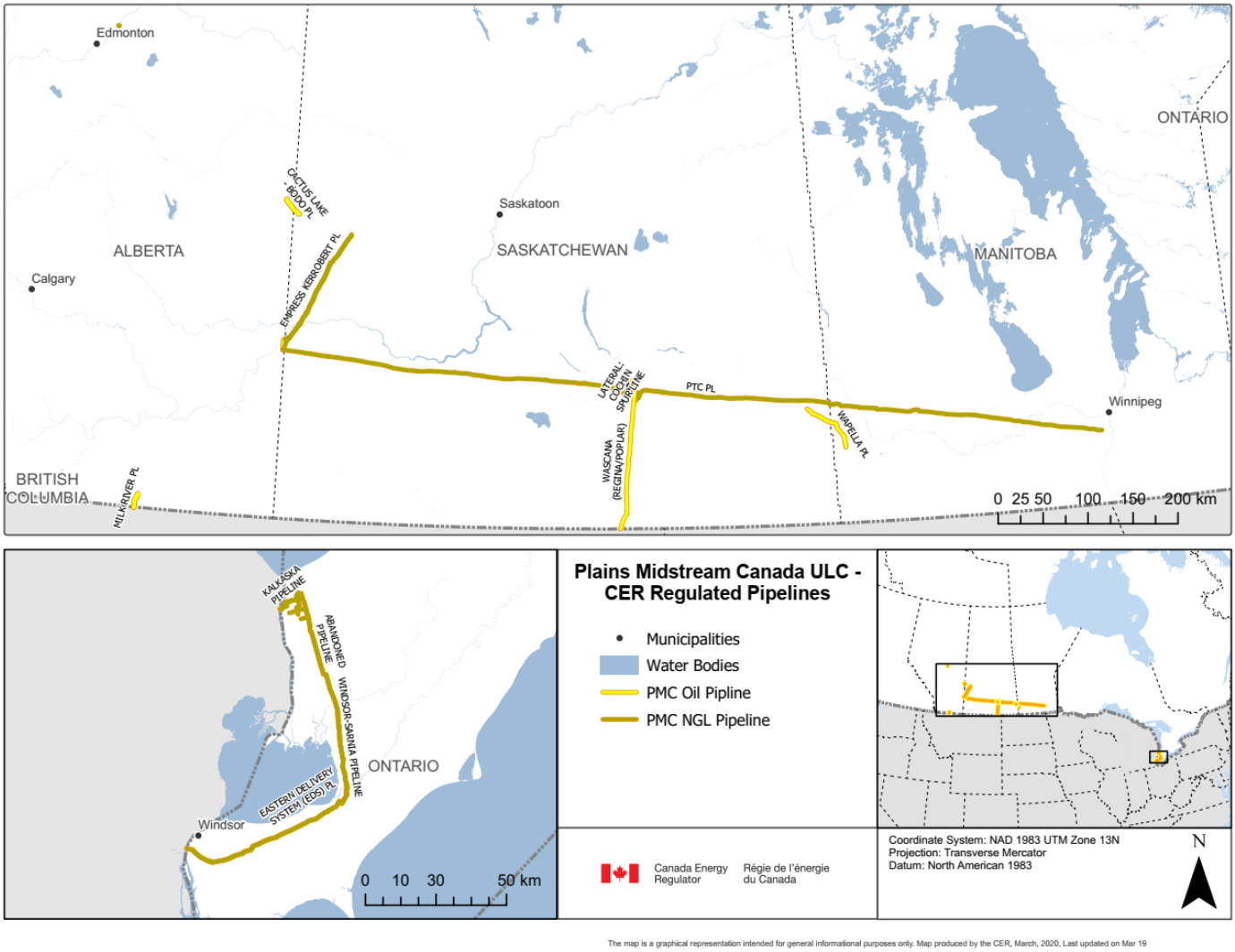
In summary, based on the documents and records made available for review and the responses provided during interviews with management and employees, Plains demonstrated that it had a developed, implemented, operates and maintains a pipeline control system, which is a SCADA system. However, given the scope of the audit and the protocol used, the Audit staff did not verify that the company's pipeline control system and leak detection system fully meet the requirements of CSA Z662.

Finding: No Issues Noted

Based on the information made available by Plains and reviewed by the CER audit staff within the scope of this audit, no non-compliances relating to this protocol item were identified during the audit.

Appendix 2.0 - Maps and System Descriptions

Plains' CER-Regulated pipelines are shown in the following maps:



Appendix 3.1 - Abbreviations

The following abbreviations were used in this report:

ACC:	Alternate Control Centre
AMR:	Annual Management Review
AMT:	Asset Management Team
AO:	Accountable officer
AOP:	Abnormal Operating Procedure
AP:	Audit Protocol
API:	American Petroleum Institute
CAPA:	Corrective and Preventative Actions
CATM:	Competency and Training Management
CCO:	Control Centre Operator
CER:	Canada Energy Regulator
CER Act:	*Canadian Energy Regulator Act*
CFR:	Code of Federal Regulations
CMMS:	Computational Maintenance Management System
CRM:	Control Room Management
CSA:	Canadian Standards Association
EHS:	Environment, Health and Safety
EOP:	Emergency Operating Procedure
ERP:	Emergency Response Plan
IR:	CER audit Information Request
LDA:	Leak Detection Analyst
LDS:	Leak Detection System
LOC:	Loss of Containment
LMS:	Learning Management System
MBS:	Material Balance System
MOC:	Management of change
MQTT:	Message Queuing Telemetry Transport
MR:	Management Review
MS:	Management System
OBDL:	Operation beyond Design Limit
OCC:	Operational Control Centre
OLT:	Operational Leadership Team
OMS:	Operational Management System

Appendix 3.1 - Abbreviations Continued

OPR:	*Onshore Pipeline Regulations*
ORM:	Operational Risk Management
PHMSA:	United States Pipeline and Hazardous Materials Safety Administration
PINS:	Plains' Initial Notification System
PLM:	Pipeline Monitoring
PMC:	Plains Midstream Canada
RTS:	Rupture Detection System
RTTM:	Real-time Transient Model
SCADA:	Supervisory Control and Data Acquisition
SP:	Standard Procedure
SSMI:	Site Specific Maintenance Instruction
SSOI:	Site Specific Operating Instruction
SSOP:	Site Specific Operating Procedure

Appendix 3.2 - Glossary of Terminology and Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Manual: A document that contains a set of instructions on methods which are employed to accomplish a result. These instructions will be detailed and comprehensive. The document will be organized for ease of use.

Non-Compliant: The audited company has not demonstrated that it has established, developed, maintained and/or implemented programs, processes and procedures that meet the legal requirements relating to the protocol item referenced. A Corrective and Preventive Corrective Action (CAPA) plan must be developed for approval and implemented.

Plan: A detailed, documented formulation for action to achieve an end.

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

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

Process: A documented series of actions taking place in an established order, with identified roles and responsibilities, and directed towards a result. A process includes the roles, responsibilities and authorities for the actions. A process may contain a set of procedures, if required.

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

OPR section 6.5(1) describes the CER's required management system processes. In evaluating a company's management system processes, the CER considers whether each process or requirement: has been established, implemented, developed or maintained as described within each section; whether the process is documented; and whether the process is designed to address the requirements of the process, for example a process for identifying and analyzing all hazards and potential hazards. Processes must contain explicit required actions including roles, responsibilities

and authorities for staff establishing, managing and implementing the processes. The CER considers this to constitute a common 5 w's and h approach (who, what, where, when, why and how). The CER recognizes that the OPR processes have multiple requirements; companies may therefore establish and implement multiple processes, as long as they are designed to meet the legal requirements and integrate any processes linkages contemplated by the OPR section. Processes must incorporate or contain linkage to procedures, where required to meet the process requirements.

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

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

Program: A documented set of processes and procedures designed to regularly accomplish a result. A program outlines how plans, processes and procedures are linked, and how each one contributes toward the result. Program planning and evaluation are conducted regularly to check that the program is achieving intended results.

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

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

Appendix 4.0 – List of Company Staff Interviewed and Documents Reviewed

The lists of company staff interviewed and documents reviewed are maintained on file at the offices of the Canada Energy Regulator.