Enbridge Consent Decree – Civil Action No. 1:16-cv-914
Independent Third Party Verification Report:
Section VII, Paragraphs 132.c and 133.a

September 24, 2018

Prepared by:

O.B. Harris, LLC
Independent Third Party

Prepared for:

The United States
Environmental Protection
Agency

Approved by: O.B. Harris

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O.B. Harris, LLC, the appointed Independent Third Party (ITP) under the Enbridge Consent Decree (CD) (Civil Action No. 1:16-cv-914) has prepared this report as required by the CD. In assessing Enbridge's compliance with the requirements contained in the CD, the ITP has in part relied on data and information supplied by Enbridge. The ITP, though, cannot be responsible for any errors or omissions in this report that are a result of errors or omissions in the data and information provided by Enbridge.

To the extent in this report that the ITP finds that Enbridge is in compliance with, or not in compliance with, the CD requirements addressed by this report, such finding is for the sole purpose of informing the EPA of the ITP's independent conclusions. The ITP does not officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD; the EPA may accept or reject, in whole or in part, the ITP's findings, conclusions, and recommendations. No inference may be drawn from any ITP conclusion regarding the position of the United States as to whether or not Enbridge is in compliance with the CD.

An ITP conclusion that Enbridge complies with the CD does not assure a given level of safety for a given pipeline; conversely, a finding that Enbridge is not compliant with a given provision of the CD does not indicate that the safety of a given pipeline necessarily is lessened.

Executive Summary

The Independent Third Party (ITP) for the Enbridge Consent Decree (CD), O.B. Harris, LLC, was engaged effective January 11, 2017. Paragraph (¶) 125 of the CD provides that the ITP is to conduct a comprehensive verification of Enbridge compliance with Section VII, Injunctive Measures,[1] of the CD. Paragraph 132.c of the CD provides that the Independent Third Party (ITP) shall "review and evaluate Enbridge's compliance with all requirements set forth in … Section VII" of the CD (except Section VII.H, spill response and preparedness); that the ITP's initial review shall be completed within 16 months of the CD Effective Date (May 23, 2017); and that, in conjunction with each review, the ITP "shall prepare a verification report in accordance with" CD ¶ 133. The ITP has prepared this Verification Report (VR) in accordance with the requirements of the CD.

In addition to O.B. Harris, the principal of O.B. Harris, LLC, the ITP is comprised of ten subject matter experts (SMEs) with approximately 400 years of experience in the oil and gas industry, of which about 280 years is in pipeline operations.

The CD contains multiple measures to ensure:

- That the ITP and its SMEs have the requisite education and pipeline experience to perform the verification activities.
- That the ITP, its SMEs, and other personnel performing work relating to the ITP's verification activities, were independent upon commencement of work and remain independent throughout the term of the CD and for three years following termination of the CD.

In the process of evaluating Enbridge's compliance with the requirements of the CD to date, the ITP has participated in nearly 100 separate meetings with Enbridge, either face-to-face or remotely. During the process, the ITP team has spent approximately 2300 person-days performing verification activities to determine whether Enbridge fulfilled the applicable requirements of the CD.

This VR analyzes Enbridge activities and work undertaken to fulfill CD Requirements over the period covered by the initial two Enbridge Semi-Annual Reports (*SAR1* and *SAR2*), May 23, 2017 through May 22, 2018.

The CD contains 83 paragraphs of injunctive measures which the ITP must verify. Many of these paragraphs have sub-paragraphs which contain incremental requirements with which Enbridge must comply. From the 83 CD Paragraphs and their sub-paragraphs, the ITP has compiled 156 CD individual requirements (CD Requirements) against which the ITP evaluated Enbridge compliance.[2]

[1] CD ¶125 provides that the ITP shall not evaluate Enbridge's compliance with requirements in Section VII, Subsection H (Spill Response and Preparedness) of the Injunctive Measures.

[2] The term CD Requirements refers to a grouping of CD paragraphs, sub-paragraphs, or logical groupings of CD paragraphs and sub-paragraphs for the purposes of verifying compliance.

The ITP established the following categories to summarize and report its findings and conclusions for each CD Requirement:

- **Compliant** – The ITP has verified that the Enbridge Covered Work complied with applicable CD requirements during the period of the Covered Work (Covered Period).
- **Discussion Item** – Further discussion and information are required to verify whether the Enbridge Covered Work complies with applicable CD Requirements.
- **Not Compliant** – The ITP concluded that the Enbridge Covered Work did not comply with the applicable CD Requirements.
- **Not Applicable** – The applicable CD Requirement either has not yet come into effect or was not in effect during the period covered by this VR.

Table 1 summarizes the ITP's conclusions regarding Enbridge's compliance with the 156 CD Requirements.[3] For each CD Requirement, the ITP's verification analysis is contained in the ITP Verification of Enbridge Compliance for the Covered Work Period section of this report (on page 31).

Table 1: Summary of the ITP's Conclusions for CD Requirements

	Compliant	Discussion Item	Not Compliant	Not Applicable	Total Verified
Number of CD Requirements	**118**	**10**	**6**	**22**	**156**

Table 2 summarizes the ITP's findings of Not Compliant for 6 separate CD Requirements that are attributable to two topics:

- Priority Notification of certain pipe ovalities
- Management of certain dents <2% OD

Table 2:Summary of ITP's evaluation – Not Compliant

CD Requirement and Description		ITP's Evaluation
33.a, 33.b, & 33.c	Priority Notification	Priority Notifications are not given to Enbridge for certain ovality features, as provided in the CD.
35, 58, & 59.b	Managing Certain Interacting Features	Dents <2% OD interacting with other features are not identified, and thus are not managed, as provided in the CD

[3] To the extent in this report that the ITP finds that Enbridge is in compliance with, or not in compliance with, the CD requirements addressed by this report, such finding is for the sole purpose of informing the EPA of the ITP's independent conclusions. The ITP does not officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD; the EPA may accept or reject, in whole or in part, the ITP's findings, conclusions, and recommendations. No inference may be drawn from any ITP conclusion regarding the position of the United States as to whether or not Enbridge is in compliance with the CD.
An ITP conclusion that Enbridge complies with the CD does not assure a given level of safety for a given pipeline; conversely, a finding that Enbridge is not compliant with a given provision of the CD does not indicate that the safety of a given pipeline necessarily is lessened.

Table 3 summarizes Discussion Items as to which further discussion and information are required to verify 10 CD Requirements:

Table 3: Summary of ITP's evaluation - Discussion Items

CD Requirement and Description		ITP's Evaluation
23	Line 10 Replacement Evaluation	Further discussion and information are required to verify compliance with scope of the evaluations as required by the CD.
33.d	Adding Priority Notification Features Requiring Excavation (FRE) to the Dig List	ITP cannot determine whether certain ovality features >5%, for which there was no evaluation as a Priority Notification, should have been added to the Dig List.
34.c	Resolution of Identified Data Quality Concerns	Incorrect pipe data used in the Initial ILI Report was entered in OneSource for the ENO-EMA Corrosion Tool Run.
37	Deadlines for Adding FRE	Calculation dates indicated on the ILI Assessment Sheets do not match the dates reported by Enbridge in *SAR2*.
46.d	Allowance for Alternate Prescription Restriction if Prescribed Pressure Restriction Would Significantly Impact Operation	*SAR2* Table 23-1 contains a statement that it is not possible to compare the level of safety covered by an alternate pressure restriction to the level of safety achieved through compliance with CD ¶59.b.
53	Interaction of Dents with Axial Slotting or Grooving, Selective Seam Corrosion, and Seam Weld Anomaly A/B Features	Dents <2% are not reported as dents; therefore, any interactions with these features cannot be determined as provided in the CD.
68.a	Reduce the Risk of Vessel Anchor Damage to the Dual Pipelines	Further discussion and information are required regarding measures Enbridge is evaluating to reduce the risk of a vessel anchor strike.
69.c	Biota Investigation Work Plan (BIWP) Implementation	Further discussion and information are required regarding the finding that the biota is not providing an environment that allows sulfate-reducing bacteria to colonize.
78.a	OneSource ILI updates	Further discussion and information are required to determine how inconsistencies between CD ¶34.a and CD ¶78.a timing requirements are being managed.
102	Rupture Detection System (RDS) Implementation	Further discussion and information are required to verify that the RDS detects an abnormal increase in flow rate.

For the period covered by this VR, the ITP verified Enbridge compliance with 118 applicable CD Requirements (i.e., Enbridge is Compliant). The ITP also notes that 22 CD Requirements did not come into effect or otherwise were Not Applicable during the period.

Introduction

Verification Report

The Independent Third Party (ITP) for the Enbridge Consent Decree (CD), O.B. Harris, LLC, was engaged effective January 11, 2017. Paragraph (¶) 125 of the CD stipulates that the ITP is to conduct a comprehensive verification of Enbridge's compliance with Section VII (Injunctive Measures) of the CD. CD ¶132.c and ¶133.a require that the ITP:

- Complete an initial review of Enbridge's compliance with the CD.
- Prepare and submit a written report of its evaluation to the Environmental Protection Agency (EPA) within 16 months after the Effective Date of the CD.

The ITP has prepared this Verification Report (VR) in accordance with the following requirements:

- CD ¶132.c, *Task 3 – Review of Implementation of Compliance Measures*
  - The ITP shall review and evaluate Enbridge's compliance with all requirements of the CD, except Section VII, Subsection H, Spill Response and Preparedness.
  - The ITP shall complete its initial review within 16 months of the CD Effective Date.
  - In conjunction with each review, the ITP shall prepare a VR in accordance with CD ¶133.
- CD ¶133.a, *Verification Report*
  - The ITP shall prepare a written report "…that sets forth findings, conclusions, and recommendations, if any…" regarding each CD requirement in Section VII of the CD, excluding Section VII, Subsection H, Spill Response and Preparedness.
  - In preparing the VR, the ITP shall:
    - Consider the Enbridge Semi-Annual Reports (SARs) and may consider additional information collected from information requests or visits to Enbridge facilities.
    - List all information considered by the ITP.
    - List all persons interviewed by the ITP
    - Summarize relevant oral communications between the ITP and Enbridge
  - The ITP shall submit the VR concurrently to EPA and Enbridge.

On September 24, 2018, the ITP hereby submits this VR of its initial review of Enbridge's compliance with the CD (i.e. within 16 months after the CD Effective Date).[4]

[4] Sixteen months from the Effective Date is September 23, 2018, a Sunday. CD ¶10.m provides that when a due date falls on a Sunday, the ending of the period of time shall run until the following business day. Therefore, the VR due date is September 24, 2018.

Enbridge's Semi-Annual Reports and the ITP's Evaluations

Section IX of the CD, Reporting Requirements, requires that Enbridge prepare and submit to the EPA, on a semi-annual basis, a report documenting Enbridge's compliance with the CD. Enbridge submitted its first Semi-Annual Report (*SAR1*) on January 18, 2018, covering CD related activities that Enbridge undertook between May 23, 2017, and November 22, 2017. Enbridge's second Semi-Annual Report (*SAR2*) was submitted on July 18, 2018, covering activity between November 23, 2017 and May 22, 2018.

CD ¶132.b requires that the ITP review and evaluate each Enbridge submittal to the EPA and provide a report to the EPA, if requested. In conducting the review and evaluation of Enbridge's two SARs, the ITP used twelve criteria to determine whether the information provided in each of the two SARs met the requirements of the CD. These twelve criteria were taken from requirements in CD ¶132.b, ¶134.e, ¶144, and ¶145.

- *ITP Report on the First Semi-Annual Report* (*ISR1*) – Upon request from the EPA, the ITP published its review and evaluation of *SAR1* on May 31, 2018. This report described the process used by the ITP to determine whether the information Enbridge provided in the *SAR1* satisfied the twelve criteria for each of the CD Paragraphs[5]. In this process, Enbridge responded to the ITP's requests for additional information and the ITP's preliminary findings. The *ISR1* included a detailed description of the ITP's assessment for each CD Paragraph.

- *Enbridge Semi-Annual Report November 23, 2017 to May 22, 2018 (SAR2)* – For its review and evaluation of *SAR2*, the ITP determined whether the information in *SAR2* satisfied the twelve criteria (used in *SAR1*) for each of the CD Paragraphs. Where *SAR2* did not meet one or more of the twelve criteria, the ITP identified the relevant CD Paragraphs as exceptions. The ITP briefed Enbridge and the EPA on those exceptions on August 10, 2018, and Enbridge subsequently provided a response on August 17. The ITP has established a record of its review and evaluation of *SAR2* and will furnish a report to the EPA when requested.

CD ¶133.a directs that the ITP consider the SARs as part of preparing this VR. For this VR, the ITP considered Enbridge's *SAR1* and *SAR2*, including Enbridge responses to ITP information requests, as the starting basis for the assessment of Enbridge compliance with the CD.

[5] Section VII, Injunctive Measures, excluding Subsection H (Spill Response and Preparedness) which is outside the scope of the ITP's responsibilities.

ITP Overview

ITP Organization

O.B. Harris, the principal of O.B. Harris, LLC, selected and contracted with subject matter experts (SMEs) with expertise in the various technical and operational subjects of the CD. In addition to O.B. Harris, the ITP team is comprised of 10 SMEs, a technical writer, and an ILI administrator. O.B. Harris and the 10 SMEs have approximately 400 years of experience in the oil and gas industry, of which about 280 years are in pipeline operations. The duties and qualifications of O. B. Harris and his ITP team are included in Appendix A: The ITP Leadership and SMEs – Responsibilities and Experience on page 128 of this VR.

O.B. Harris organized the ITP beginning in late 2016 and held a kick-off meeting with the team in February 2017. Enbridge conducted an orientation for the ITP in Edmonton in early March, and the ITP completed the CD-required (¶132.a) planning meeting with the EPA on April 12, 2017 in Chicago.

Over the period of January 2017 through July 2018, the ITP has spent approximately 2300 person-days performing the following activities:

- Reviewing and evaluating various data, records, information, and reports Enbridge has made available to the ITP
- Attending meetings, both in person and by teleconference, with the EPA and Enbridge
- Preparing Task 2 reports in accordance with CD ¶132.a, when requested by the EPA, and providing those reports to the EPA and Enbridge
- Undertaking field and on-site observations of various Enbridge activities covered by the CD
- Interviewing Enbridge staff on various CD covered activities

ITP Independence

The CD contains multiple measures to ensure:

- That the ITP and its SMEs have the requisite education and pipeline experience to perform the verification activities.
- That the ITP, its SMEs, and other personnel performing work relating to the ITP's verification activities:
  - Were independent upon commencement of work.
  - Remain independent throughout the term of the CD.

The members of the ITP meet these requirements of the CD as summarized below:

- The ITP and its subcontractors have demonstrated experience in pipeline integrity and operations and have the appropriate education to provide the services required of the ITP pursuant to the CD (CD ¶127.a).

- The ITP and its subcontractors have not conducted research, development, design, construction, financial, engineering, legal, consulting, or any other advisory services for Enbridge since three years prior to January 11, 2017 (CD ¶127.b).
- Neither the ITP, nor its subcontractors, have been involved in the development of Enbridge's control room, leak detection, or pipeline integrity procedures that are the subject of the CD (CD ¶127.c).
- Neither the ITP, nor its subcontractors, will provide commercial, business, or voluntary services to Enbridge, excluding services provided in the capacity of the ITP, for the life of the CD and for a period of at least three years following termination of the CD (CD ¶127.d).
- The ITP and its subcontractors acknowledge that Enbridge will not provide future employment to the ITP or its subcontractors, or their personnel who perform services on behalf of the ITP, for a period of at least three years following termination of the CD (CD ¶127.e).
- Neither the ITP nor its subcontractors has identified any conflict of interest relating to their review and verification of Enbridge's compliance with the CD (CD ¶134.k).

Upon retention to perform the verification activities in January 2017, the ITP certified to the United States its independence, along with the independence of its subcontractors, in accordance with the foregoing measures. The ITP also recertifies annually to the United States that it and its subcontractors remain independent (CD ¶134.l).

ITP Methods and Processes

The ITP has developed and implemented the following methods and processes to discharge the duties and responsibilities provided by CD ¶125, ¶132, and ¶133:

- **Understanding CD Requirements:** In the ITP's February 2017 kick-off meeting, the ITP SMEs presented an overview of their portions of the CD to develop an understanding of the requirements. This SME discussion included a summary of each requirement of the CD and due dates where applicable. Following this meeting, the ITP SMEs prepared further descriptions of the requirements of the CD along with the ITP plans for compliance evaluation. These descriptions and plans were presented to the EPA and Enbridge in the April 2017 Task 1 planning meeting.
- **ITP Information Requests:** During the March 2017 orientation meeting, the ITP, EPA, and Enbridge discussed a process by which Enbridge would fulfill information requests from the ITP. This information request process was named the Grocery List (GL). It was organized so that the ITP transmitted information requests, and Enbridge posted responses for the ITP's use. The first ITP GL requests were submitted in late April 2017. Through July 23, 2018, 187 requests have been submitted, and Enbridge has responded with approximately 1,200 documents. Enbridge has worked with the ITP to:
  - Streamline the process for providing documents and other information.
  - Catalog meeting materials.
  - Record action items.

Enbridge also has responded to ITP information requests outside the Grocery List through activities such as meeting action items and other compliance assessment inquiries.

- **Access to Enbridge Data Repositories for ILI:** The requirements of the CD for In-Line Inspection (ILI) are applicable to all ILI runs initiated over the life of the CD on the Lakehead System. To facilitate ITP access to this data, Enbridge has provided the ITP's ILI SMEs secure access to certain databases containing ILI-related data.

- **CD ¶132.a Task 1 – Initial Project Planning Meeting with EPA Region 5 in Chicago:** The CD requires that this meeting be held within 60 Days of the CD Effective Date for the ITP to provide an overview and detailed project plan on how it intends to perform its CD obligations. The meeting was held on April 12, 2017, in the EPA Region 5 office in Chicago. The ITP's SMEs participated, along with representatives of EPA, Department of Justice (DOJ) and Enbridge.

- **CD ¶132.b Task 2 – Review of Plans, Reports, and Other Deliverables**: The CD requires that the ITP review and evaluate CD-required Enbridge submittals to the EPA and, upon request from the EPA, provide a written report within 45 Days. The ITP developed a process that has been used for preparation of Task 2 reports. The process is designed for the ITP to request additional information and share preliminary findings which provides an opportunity for Enbridge to address ITP concerns, correct factual matters, provide additional information, and the like.

  Through August 2018, the ITP has prepared:

  - Twelve reports that were requested by the EPA and subsequently submitted to the EPA and Enbridge.

  - One review and evaluation, as required by CD¶ 132.b, as to which a report was not requested by the EPA.

  - Four reports that are in process.

- **CD ¶132.c Task 3 – Review of Implementation of Compliance Measures**: The CD requires that the ITP review and evaluate Enbridge's compliance with all CD Section VII requirements (except CD Section VII, Subsection H, Spill Response and Preparedness). The ITP initiated this, its initial review of Enbridge's compliance, commencing on the CD Effective Date (May 23, 2017), at which time Enbridge activities to meet requirements of the CD were ongoing. This VR summarizes the results of the ITP's verification of those Enbridge activities.

- **Peer Review:** The ITP employs a peer review process throughout its compliance-related review and evaluation, and verification, activities. The Task 2 review, evaluation, and report process involves an SME who leads the evaluation with at least two SMEs with relevant expertise as peer reviewers. In Task 3 compliance verification, one or more peer reviewers evaluate the analysis and conclusions of the lead SME. This peer review process ensures that the ITP employs and applies a broad range of relevant technical expertise to all of its compliance evaluations and that the results and reports of evaluations reflect that level of expertise.

- **Field and Onsite Observations:** Where the ITP determined that observation of field or control center operations was necessary to evaluate compliance, the ITP has traveled to those locations. Through August 2018, the ITP has conducted observations of nine activities:
  - Installation of valves
  - Commissioning of valves
  - Various control center operations
  - Hydrostatic pressure tests of the Line 5 Dual Pipelines across the Straits of Mackinac
  - Biota investigations and coating repairs of the Line 5 Dual Pipelines across the Straits of Mackinac
  - A fluid withdrawal test to evaluate the Leak Detection System and control center response
  - Installation of screw anchors on the Line 5 Dual Pipelines across the Straits of Mackinac
  - Demonstration of integrity management processes and procedures
  - Evaluation and mitigation of Corrosion features and Crack features on Line 6A
- **ILI Milestone Compliance Verification Process:** The CD contains approximately 145 separate requirements for planning, completing, analyzing and following-up on ILIs. These requirements are repeated for each of the estimated 140 ILI Tool Runs to be undertaken over the life of the CD. This results in an estimated 20,000 points of verification for the ITP over the period of the CD. To help manage the verification process, records, and reporting, the ITP has grouped these CD ILI requirements into 10 ILI Milestones. Each ILI Milestone is a discrete step in the logical progression of a typical ILI cycle that begins with running the tool and ends with establishing the appropriate period until the next Tool Run. Figure 1 (on page 14) illustrates and describes the 10 ILI Milestones in the ILI review cycle. A listing of CD Paragraphs within each ILI Milestone is provided in Appendix B: ILI Milestones and CD Requirements (on page 131). Appendix C: Milestone Status Summary (on page 132) shows the status of each ILI milestone activity that was completed by Enbridge during the periods covered by *SAR1* and *SAR2*.

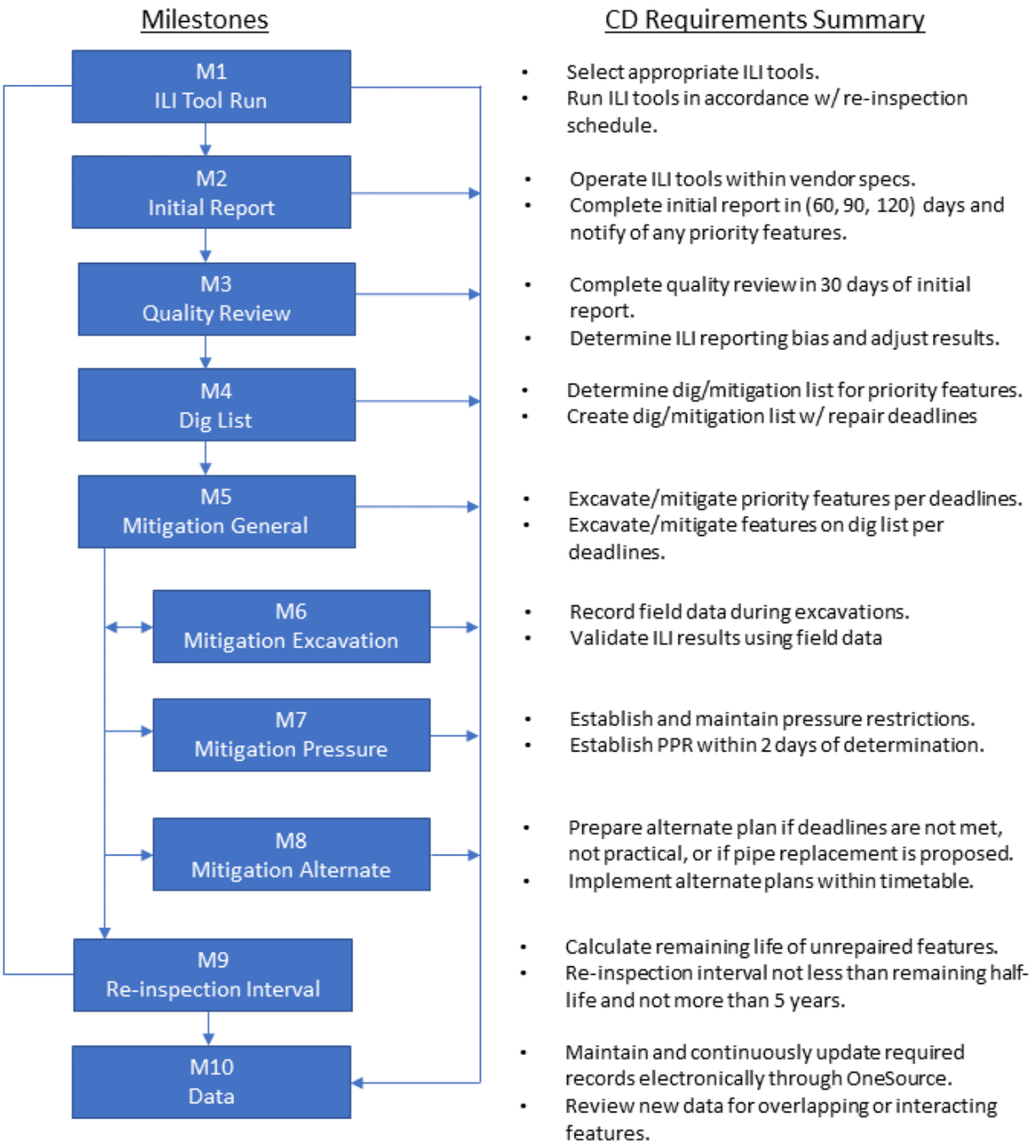

Figure 1: ILI Milestone process

ITP's Body of Knowledge

The ITP Team's foundation of education, knowledge, and experience has enabled the ITP to build their Body of Knowledge through the collective exchange of information and materials with Enbridge. That Body of Knowledge was derived from the following:

- The approximately 400 years of experience and expertise of the ten subject matter experts comprising the ITP.
- Consensus standards and recommended practices from groups including the American Petroleum Institute (API), Association of Oil Pipelines, American Society of Mechanical Engineers (ASME), Canadian Standards Association, ASTM International (formerly known as the American Society for Testing and Materials) (ASTM), and NACE International (formerly known as the National Association of Corrosion Engineers) (NACE).
- Publicly available third-party information, including reports Enbridge submitted to the State of Michigan, the State of Minnesota, the Pipeline and Hazardous Materials Safety Administration (PHMSA), and the Canadian National Energy Board.
- Relevant regulations, such as 49 CFR 195, *Transportation of Hazardous Liquids by Pipeline*.
- Relevant factual data and information provided previously to the ITP by Enbridge.
- Factual data and information included within various reports and analyses provided to the ITP by Enbridge, including Enbridge's two Semi-Annual Reports (SARs).
- The ITP's various reports relating to specific compliance actions that Enbridge has undertaken and reported upon.
- The ITP's field and on-site interviews and observations with Enbridge personnel.

Scope and Content of the VR

Enbridge Covered Work

This VR analyzes Enbridge's activities and work undertaken to fulfill requirements of the CD over the period covered by the first two Enbridge SARs (May 23, 2017 to May 22, 2018). Throughout the VR, this activity is referred to as "Enbridge Covered Work" which was conducted over the "Covered Work Period." Beyond May 22, 2018, Enbridge work is ongoing and, as a result, that work may impact, and/or demonstrate compliance with a particular requirement of the CD. In such cases, Enbridge comments in *SAR2* or other references describe the nature and timing of that work.

Verification Activity

The ITP completed the various activities described previously to assess the compliance status of Enbridge Covered Work. This assessment began upon the appointment of the ITP and continues as of the writing of this report. To facilitate the evaluation of the Enbridge Covered Work, the following guidance was established.

- Verification activity undertaken prior to the CD Effective Date but after the appointment of the ITP (January 11, 2017 to May 22, 2017):
  - Review of the *Line 5 Hydrostatic Pressure Test Plan* for the Line 5 Dual Pipelines
  - Submission of various requests for information using the Grocery List process
  - Review of the *Biota Investigation Work Plan*
  - Attendance at an orientation meeting with the EPA and Enbridge, held in Edmonton, Canada
  - Attendance at the Task 1 meeting with the EPA and Enbridge, held in Chicago, IL
- The ITP continued verification of Enbridge Covered Work after the end of the Covered Work Period.
  - For ILI Covered Work completed before May 23, 2018, the ITP established July 23, 2017 as the cut-off date for receipt and consideration of Enbridge reports. On occasion, the ITP has considered ILI information received after this date.
  - For certain other Enbridge Covered Work, the ITP has continued verification activity through late August.

The time period described in the above guidance is referred to in this VR as the "ITP Verification Period." Verification activities are expected to be ongoing continuously until the CD is terminated.

Reporting Segments

CD Section VII (Injunctive Measures) Subsections A-G and I consist of 83 CD Paragraphs of requirements. In addition, a number of these 83 CD Paragraphs contain sub-paragraphs detailing specific requirements Enbridge must undertake. For example, CD ¶46 contains 13 sub-paragraphs (e.g., CD ¶46.a-m), and in two cases these sub-paragraphs of CD ¶46 contain an additional level of requirements [e.g., CD ¶46.c(1)-(3) and CD ¶46.g(1)-(2)].

The ITP has developed a list of 156 requirements of the CD (CD Requirements) against which the ITP evaluated Enbridge's compliance. For the purposes of this report, the ITP grouped related CD Requirements into 33 Reporting Segments (RS).

Table 4 provides a list of the 33 Reporting Segments and a title describing the contents of each of the Reporting Segments. Appendix D: Reporting Segments and CD Requirements (page 134) includes the Reporting Segment designation for each of the 156 CD Requirements by CD Paragraph and sub-paragraph.

Table 4: Reporting Segments organization

Sub-section of CD Section VII	ITP Reporting Segment
VII	
A	RS 1. Enjoined from Operating Original US Line 6B
B	RS 2. Replacement and Deactivation of US Line 3
	RS 3. Line 3 MOP Management Pending Replacement
	RS 4. Line 3 Operation Pending Replacement
	RS 5. Line 10 Replacement Evaluation
C	RS 6. Hydrostatic Pressure Testing Requirements
B, D, E	RS 7. ILI Milestone 1: ILI Tool Run
D	RS 8. ILI Milestone 2: Initial Report
	RS 9. ILI Milestone 3: Quality Review
	RS 10. ILI Milestone 4: Dig List
	RS 11. ILI Milestone 5: Mitigation General
	RS 12. ILI Milestone 6: Mitigation Excavation
	RS 13: ILI Milestone 7: Mitigation Pressure
	RS 14. ILI Milestone 8: Mitigation Alternate
	RS 15. ILI Milestone 9: Re-Inspection Interval
D, F	RS 16. ILI Milestone 10: Data
E	RS 17. Dual Pipelines – Span Management
	RS 18. Dual Pipelines – Biota Investigation
	RS 19. Dual Pipelines – Axially-Aligned Cracks, Pipeline Movement
	RS 20. Dual Pipelines – Acoustic Leak Detection
	RS 21. Data Integration – General
F	RS 22. Assessment of Alternative Leak Detection Technologies

Sub-section of CD Section VII	ITP Reporting Segment
G	RS 23. Straits of Mackinac-ALD Report
	RS 24. Leak Detection for New Pipelines
	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
	RS 26. Transient-State Sensitivity Analysis
	RS 27. 24-hour Alarm
	RS 28. New Equipment at Remotely-Controlled Valves
	RS 29. Operate and Test New Rupture Detection System
	RS 30. Alarm System and Response Procedures
	RS 31. Leak Detection Alarm Compliance Certification
	RS 32. Shutdown Procedures in Response to Other Events
	RS 33 New Remotely-Controlled Valves

VR Analysis Requirements and Format

CD ¶133.a, *Verification Report,* requires the following:

- The ITP shall prepare a written report "that sets forth findings, conclusions, and recommendations, if any," regarding each requirement of the CD in Section VII of the CD, excluding Section VII, Subsection H, Spill Response and Preparedness.
- The ITP's VR is organized to address the five requirements of CD ¶133.a which are described in Table 5:

Table 5: The five provisions of CD ¶133.a

CD Provisions	VR
The ITP shall consider Enbridge's SARs	Enbridge's *SAR1* was submitted on January 18, 2018, and *SAR2* was submitted on July 18, 2018.
The ITP may consider additional information collected from information requests or visits to Enbridge facilities.	The ITP's Body of Knowledge represents the ITP's basis for evaluation of Enbridge compliance with the CD.
The ITP shall list all information considered by the ITP.	Each Reporting Segment's compliance analysis is followed by a table that identifies the information that was considered for each Reporting Segment.
The ITP shall list all persons interviewed by the ITP.	Appendix E: List of Enbridge Personnel with ITP Interaction (page 141) provides the job titles, number of persons, and departments for Enbridge persons who have interfaced with the ITP throughout the ITP Verification Period.
The ITP shall summarize relevant oral communications between the ITP and Enbridge.	Appendix F: Summary of Meetings between the ITP, EPA, and Enbridge (page 143) provides a listing of the various meetings during the ITP Verification Period between Enbridge, the EPA, and the ITP.

This VR describes the ITP's verification of Enbridge's compliance with applicable requirements of the CD. The requirements of the CD which are the subject of the ITP's verification activities are referred to hereafter as the "CD Requirements." Table 6 illustrates the structure and content used within each of the 33 Reporting Segments to document the ITP's verification activity for each individual Reporting Segment.

Table 6: Reporting Segment compliance analysis

Summary of CD Requirements	A summary of the applicable CD Requirements
Verification Activity	The activities (e.g., review, evaluation, assessment) in which the ITP engaged to verify compliance with the CD
Findings	Statements of fact drawn from the ITP's Body of Knowledge and verification activities
Conclusions	Based upon the ITP's findings, the ITP's conclusion regarding the status of Enbridge's compliance
Recommendations to EPA (if any)	One or more courses of action recommended to the EPA by the ITP for Enbridge to achieve compliance The CD does not obligate the ITP to provide recommendations
Schedule for Recommendations	A suggested schedule for completing any recommended actions for achieving compliance

Each Reporting Segment analysis section is followed by a list of reference materials for that Reporting Segment.

Evaluation Categories

The ITP established the following categories to summarize and report its conclusions for each CD Requirement.

- **Compliant** – The ITP has verified that the Enbridge Covered Work complied with applicable CD Requirements during the period of the Covered Work (Covered Period).
- **Discussion Item** – Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with applicable CD Requirements.
- **Not Compliant** – The ITP concluded that the Enbridge Covered Work did not comply with the applicable CD Requirements.
- **Not Applicable** – The applicable CD Requirement either has not yet come into effect or was not in effect during the period covered by this VR.

Compliance Considerations

To the extent in this report that the ITP finds that Enbridge is in compliance with, or not in compliance with, the CD requirements addressed by this report, such finding is for the sole purpose of informing the EPA of the ITP's independent conclusions. The ITP does not officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD; the EPA may accept or reject, in whole or in part, the ITP's findings, conclusions, and recommendations. No inference may be drawn from any ITP conclusion regarding the position of the United States as to whether or not Enbridge is in compliance with the CD.

An ITP conclusion that Enbridge complies with the CD does not assure a given level of safety for a given pipeline; conversely, a finding that Enbridge is not compliant with a given provision of the CD does not indicate that the safety of a given pipeline necessarily is lessened.

Evaluation Summary

The compliance evaluation category for the 156 CD Requirements addressed in the VR is shown in Table 7. For those requirements categorized as Discussion Item, Not Compliant, or Not Applicable, Table 7 also includes a comment and a reference to the VR page containing the ITP's discussion and analysis of Enbridge's compliance.

Table 7: Evaluation category for each CD ¶

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant**	**DI=Discussion Item**	**NC=Not Compliant** / **NA=Not Applicable**
RS 1. Enjoined from Operating Original US Line 6B			
21	Enjoined from Operating Original US Line 6B	C	
RS 2. Replacement and Deactivation of Original US Line 3			
22a	Replacement of Original Line 3 in US	C	
22.b	Line 3 Deactivation	NA	Original US Line 3 remains in operation, and, as a result, these requirements were not in effect during the Covered Work Period. Refer to page 33 for more details.
22.e	Prohibition Regarding Use of Line 3 Following Replacement	NA	
RS 3. Line 3 MOP Management Pending Replacement			
22.c	Original US Line 3 MOP	C	
RS 4. Line 3 Operation Pending Replacement			
22.d(3)	Line 3 Cleaning and Biocide Treatment	C	
RS 5. Line 10 Replacement Evaluation			
23	Line 10 Replacement Evaluation	DI	Further discussion and information are required to verify compliance with the scope of the evaluations as required by the CD. Refer to page 41 for more details.
RS 6. Hydrostatic Pressure Testing Requirements			
24	Hydrostatic Pressure Testing Plan and Schedule	C	
25	Procedures for Hydrostatic Pressure Testing	C	
26	Line Failure During Hydrostatic Pressure Testing	NA	The two pipelines were successfully hydrotested during the Covered Work Period. Refer to page 44 for more details.
RS 7. ILI Milestone 1: ILI Tool Run			
22.d(1)	Annual ILI in Line 3 for Crack, Corrosion, and Geometric Features	C	
27	Timely Identification and Evaluation of all Features	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
28.a-b	Periodic ILI Requirements until CD Termination	C	Compliant after consideration of the *Stipulation & Agreement*. Refer to page 47 for more details.
28.c	Incomplete or Invalid ILI	C	
29	12-month ILI Schedule	C	Compliant after consideration of the *Stipulation & Agreement*. Refer to page 47 for more details.
30	ILI Schedule Modification	C	
53.a	ILI Tool Adequate for Assessing Axial Features	C	
70.a	Corrosion and Circumferential Crack ILI Timing (Dual Pipelines)	C	
70.b	Geometric Feature ILI Timing (Dual Pipelines)	C	
RS 8. ILI Milestone 2: Initial Report			
31	ILI Compliance with Tool Specifications	C	
32.a-c	Initial ILI Reports Within: • Cracks 120 Days. • Corrosion 90 Days • Geometric 60 Days	C	
33.a	Require Vendors to Provide Priority Notification	NC	Enbridge does not require ILI vendors to provide Priority Notification for certain ovality features >5% OD. Refer to page 51 for more details.
33.b	Priority Feature Definition	NC	Enbridge's Priority Notification Criteria for ovality features does not match CD Appendix A. Refer to page 51 for more details.
33.c	Review and Evaluate Priority Features within Two Days of Notification	NC	Enbridge does not receive, and therefore does not review, Priority Notifications for certain ovality features >5%. Refer to page 51 for more details.
RS 9. ILI Milestone 3: Quality Review			
34.a	Preliminary Review of Initial ILI Report	C	
34.b	Evaluation of Features Requiring Excavation	C	
34.c	Resolution of Identified Data Quality Concerns	DI	Incorrect pipe data used in the Initial ILI Report was entered in OneSource for the ENO-EMA Corrosion Tool Run. Refer to page 54 for more details.
34.d	ILI Data Quality Evaluation Timelines	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
34.e	Discrepancies Between Two Successive ILI Runs	C	
34.f-g	Investigative Digs	NA	No investigative digs were undertaken during the Covered Work Period.
RS 10. ILI Milestone 4: Dig List			
22.d(2)	Mitigate Features from Line 3 ILI Runs	C	
33.d	Adding Priority Notification FRE to the Dig List	DI	ITP cannot determine whether the ovality features >5%, for which there was no evaluation as a Priority Notification, should have been added to the Dig List. Refer to page 59 for more details.
35	Evaluation of Each Feature in Initial ILI Report for Features Requiring Excavation	NC	Dents <2% interacting with other features are not identified in the Initial ILI Report and, therefore, are not evaluated as provided in the CD. Refer to page 59 for more details.
36	Feature Requiring Excavation Definition	C	
37	Deadlines for Adding Features Requiring Excavation	DI	Calculation dates indicated on the ILI Assessment Sheets do not match the dates reported by Enbridge in *SAR2*. Refer to page 59 for more details.
38.a	Excavation and Repair Deadlines	C	
38.b	Establish Pressure Reduction if Required	C	
40	NDE Data Comparison to ILI Data	C	
42	Calculate Predicted Burst Pressure for Crack and Corrosion Features	C	
43	Predicted Burst Pressure Definition (CD Appendix B)	C	
44.a-b	Initial Predicted Burst Pressure Calculation and Initial Remaining Life Calculations for Crack and Corrosion Features	C	
47	Dig Selection Criteria and Pressure Restriction Requirements for Crack Features	C	
48	Crack and Interacting Feature Mitigation Timelines	C	
49.a-b	Dig Timeline Extensions	C	
50	Corrosion and Interacting Feature Mitigation Timelines	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
51	Corrosion Feature Mitigation Timelines	C	
53	Dig Selection Criteria, Pressure Restrictions, and Mitigation Deadlines for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features • Interacting Features	DI	Dents <2% are not reported as dents; therefore, any interactions with these features cannot be determined as provided in the CD. Refer to page 59 for more details.
55	Dig Selection Criteria for Dents and Other Geometric Features	C	
56	Dents and Other Geometric Feature Mitigation Timelines	C	
58	Dig Selection Criteria for Interacting Features	NC	Dents <2% are not reported as dents; therefore, any interactions with other types of features are not excavated as provided in the CD. Refer to page 59 for more details.
RS 11. ILI Milestone 5: Mitigation General			
34.g	Repair or Mitigate Any Feature Found During Investigative Digs	NA	No investigative digs were required during the Covered Work Period. Refer to page 64 for more details.
39	Mitigate Features on Dig List. Obtain Field Measurements and Record Data During Excavation	C	
46	Excavate, Repair, or Mitigate Features on Dig List	C	
46.a	Complete Mitigations within Time Frames Dependent on Severity	C	
53.c	Mitigation of Crack Features when Located in an HCA	C	
53.d	Mitigation of Axial and Interacting Features if Located Outside of an HCA	C	
RS 12. ILI Milestone 6: Mitigation Excavation			
39.a-b	Field Measurements of Excavated Features	C	
40	ILI Validation and Trending	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
RS 13: ILI Milestone 7: Mitigation Pressure			
46.b	Establish and Maintain Interim Pressure Restrictions	C	
49.c-d	Pressure Restriction Limitations Depending on Feature Type	C	
52.a-b	Corrosion Feature Pressure Restrictions	C	
54	Pressure Restrictions for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features	C	
57. a-b	Dents and Other Geometric Feature Pressure Restrictions	C	
59.a	Pressure Restrictions Crack and Corrosion Interactions	C	
59.b	Pressure Restrictions for Dent Interactions	NC	Pressure restrictions are not implemented for Dents <2% interacting with other features as provided in the CD. Refer to page 68 for more details.
RS 14. ILI Milestone 8: Mitigation Alternate			
46.c	Allowance for Alternate Plan (AP): • Excavation timetables not practicable due to extraordinary scope or complexity • If pipe replacement is proposed	NA	No APs were submitted during the Covered Work Period. Refer to page 70 for more details.
46.d	Allowance for Alternate Pressure Restriction (APR) if Prescribed Pressure Restriction Would Significantly Impact Operations	DI	*SAR2* Table 23-1 contains a statement that it is not possible to compare the level of safety covered by an alternate pressure restriction to the level of safety through compliance with CD ¶59.b. Refer to page 70 for more details.
46.e	Limit 40 APs/APRs During Life of CD	C	
46.f	Alternate Plan Not Allowed for Rupture Threat	C	
46.g	Conditions for AP/APR: • Engineering Assessment • Demonstrate equal or greater level of safety • Written EPA notification	C	
46.h	Interim Pressure Restrictions for AP	C	
46.i	Compliance with Laws and Regulations	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
46.j	Implementation of AP/APR in Accordance with Plan's Timetable	C	
46.k	Documentation of AP/APR	C	
46.l	Summary of AP/APR in Semi Annual Report	C	
46.m	EPA Disapproval of an AP	NA	No APs were submitted, and no alternate interim pressure restrictions were disapproved, during the Covered Work Period. Refer to page 70 for more details.
49.c	Maintenance of Pressure Restrictions for Excavations Not Completed within 180 Days	NA	No excavations extended beyond 180 Days. Refer to page 70 for more details.
49.e	Report Mitigation Not Completed in 180 Days in Semi-Annual Report	NA	No mitigations extended beyond 180 Days. Refer to page 70 for more details.
RS 15. ILI Milestone 9: Re-Inspection Interval			
60	Determine Remaining Life of Corrosion and Crack Features	C	
61	Features Not Requiring Remaining Life Calculations	C	
62	Representative Values for Remaining Life Calculations	C	
63	Models for Crack Feature Remaining Life Calculations	C	
64	Corrosion Growth Rate Calculations	C	
65	Re-Inspection Interval Not Greater than 1/2 Remaining Life	C	Compliant after consideration of the *Stipulation & Agreement*. Refer to page 73 for more details.
66	Re-Inspection Interval Not Greater than 5 Years	C	Compliant after consideration of the *Stipulation & Agreement*. Refer to page 73 for more details.
RS 16. ILI Milestone 10: Data			
41	ILI Electronic Records	C	
45	Retention of Electronic Records	C	
75	Integrity Management Personnel Access to Feature Integration Database	C	
76	Successive ILI Data Sets	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
78.a	OneSource ILI Updates	DI	Further discussion and information are required to determine how inconsistencies between CD ¶34.a and CD ¶78.a timing requirements are being managed. Refer to page 75 for more details.
78.b	OneSource Interacting Features	C	
RS 17. Dual Pipelines – Span Management			
68.a	Integrity Protection from Currents, Ice, Vessel Anchors, and Spans	DI	Further discussion and information are required regarding measures Enbridge is evaluating to reduce the risk of a vessel anchor strike. Refer to page 78 for more details.
68.b	Screw Anchor Support	C	
68.c	Periodic Visual Inspection	C	
68.d	Underwater Inspection Repairs	C	
68.e	Screw Anchor Report	NA	The CD Requirements did not come into effect during the Covered Work Period. Refer to page 78 for more details.
68.f	Periodic Visual Inspection of Dual Pipelines	NA	The CD Requirements did not come into effect during the Covered Work Period. Refer to page 78 for more details.
18. Dual Pipelines – Biota Investigation			
69.a	Biota Investigation	C	
69.b	Biota Investigation Work Plan (BIWP)	C	
69.c	BIWP Implementation	DI	Further discussion and information are required regarding the finding that the biota is not providing an environment that allows sulfate-reducing bacteria to colonize. Refer to page 82 for more details.
19. Dual Pipelines – Axially-Aligned Cracks, Pipeline Movement			
71	Investigation and Repair of Axially Aligned Cracks	C	
72	Pipeline Movement Investigation	NA	Surveys of the Dual Pipelines have not detected any appreciable movement of the pipelines. Refer to page 86 for more details.
20. Dual Pipelines – Acoustic Leak Detection			
73	Quarterly Inspections Using Acoustic Leak Detection Tool	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
RS 21. Data Integration – General			
74	Feature Integration Database	C	
77	Update of OneSource Database	NA	Deadline falls after the Covered Work Period. Refer to page 91 for more details.
RS 22. Assessment of Alternative Leak Detection Technologies			
79	Prepare and Submit a Report of Alternative Leak Detection Technologies	C	
80	Report to Include a Description of All Tests and Summarize Findings	C	
RS 23. Straits of Mackinac ALD Report			
81	Create and Submit an ALD Report for the Dual Pipelines Crossing the Straits of Mackinac	C	
82	Evaluate ALD Effectiveness, Practicality, and Net Present Costs	C	
83	Compare ALD Relative Performance and Evaluate Risks and Benefits	C	
RS 24. Leak Detection for New Pipelines			
84	New Lakehead Pipelines and Replacement Segments – Applicability	NA	Enbridge did not replace a Lakehead Pipeline or install a Replacement Segment during the Covered Work Period. Refer to page 99 for more details.
85	Installation of Flowmeters	NA	
86	Installation of Flowmeters on Lines That Utilize In-Line Batch Interface Tools	NA	
87	Installation of Other Instrumentation	NA	
88	Establishment of MBS Segments	NA	
89	Leak Detection Sensitivity Requirements	NA	
90	Demonstration of Compliance with Leak Detection Sensitivity Design and Construction Requirements	NA	
91	Establishment and Optimization of Alarm Thresholds	NA	
RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline			
92	Operation of MBS Leak Detection System	C	
93	Temporary Suspension of MBS Leak Detection Capabilities	C	
94	Overlapping MBS Segments	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant** / **DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
95	Alternative Leak Detection Requirements	C	
96	Reporting MBS Outages	C	
97	Reporting Requirements	C	
98	Tolling Requirements	C	
RS 26. Transient-State Sensitivity Analysis			
101	Transient-State Sensitivity Analysis	C	
RS 27. 24-hour Alarm			
103	24-hour Alarm	C	
RS 28. New Equipment at Remote Controlled Valves			
99	Installation of New Equipment at Remotely-Controlled Valves	C	
100	Conditions When the Requirements in CD ¶99 Shall Not Apply	NA	No emergency excavations were undertaken during the Covered Work Period. Refer to page 109 for more details.
RS 29. Operated and Test New Rupture Detection System			
102	Rupture Detection System Alarm	DI	Further discussion and information are required to verify that the RDS detects an abnormal increase in flow rate. Refer to page 111 for more details.
RS 30. Alarm System and Response Procedures			
104	Leak Detection Requirements for Control Room: Applicability	C	
105	Alarm Response Team (ART)	C	
106	Remote Notification of Alarm Response Team	C	
107	Audible and Visual Alarms	C	
108	Alarm Clearance Procedures	C	
108.a	Alarm Clearance Requirements	C	
108.b	Alarm Clearing Restrictions	C	
108.c	Confirmation of Leak Detection System Functioning	C	
108.d	Independent Alarm Investigation	C	
108.e	ART Procedures for Column Separation	C	
108.f	Electronic Records of Alarm Response	C	
109	Unscheduled Shutdown in Response to an Alarm	C	
109.a	Ten-minute Rule	C	
109.b	Column Separation - Running Pipelines	C	
109.c	Column Separation - Pipeline Shutdown	C	

CD¶	CD¶ Title	VR Evaluation	VR Comment
Key:	**C=Compliant**	**DI=Discussion Item**	**NC=Not Compliant**	**NA=Not Applicable**
109.d	Confirmed Leak Rule	C	
109.e	Shutdown and Restart Record	C	
RS 31. Leak Detection Alarm Compliance Certification			
110.a	Weekly List of Alarms	C	
110.b	Record of Alarms	C	
110.c	Alarm Submittal to the EPA	C	
110.d	Certification of Reporting Period	C	
RS 32. Shutdown Procedures in Response to Other Events			
111	Unscheduled Shutdown Procedures in Response to Other Events	C	
112	Reporting of Events from CD ¶111	C	
RS 33. New Remotely-Controlled Valves			
121-122	Installation of 14 Remotely-Controlled Valves	C	
123	Enbridge Computer Modeling for Valve Locations	C	
124	Valve Design and Closure	C	

ITP Verification of Enbridge Compliance for the Covered Work Period

This section presents the ITP's compliance verification analysis for each Reporting Segment (RS).

RS 1. Enjoined from Operating Original US Line 6B

CD ¶	¶ Title	Assessment
21	Enjoined from Operating Original US Line 6B	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶21: • Permanently enjoins Enbridge or anyone else from operating Original US Line 6B for the purposes of transporting any of the following: – Oil – Gas – Diluent – Any hazardous substance • Provides Enbridge the ability to remove pumps or other equipment from the line and reuse such equipment.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed 18 facility plans documenting that Original Line 6B was isolated from all pump stations and terminals by disconnecting and removing sections of piping prior to the Effective Date of the CD. • Reviewed a schematic drawing supporting Enbridge's statements that, following cleaning of Original US Line 6B: – The pipeline was segmented at numerous locations along its length. – Sections of the mainline pipe were removed to render the pipeline inoperable. • Reviewed the statement in Enbridge's *SAR1* that Original US Line 6B had been capped to prevent water ingress. • Reviewed Enbridge's response to the ITP's Additional Information Request related to Enbridge's *SAR1* statement that, "Original Line 6B could not physically be operated by Enbridge or any other entity during the period provided in the Decree, in full compliance with Paragraph 206."
Findings	The review of Enbridge's documents indicates: • In its current state, the Original US Line 6B is unable to transport any of the precluded materials. • Original US Line 6B has been rendered inoperable in compliance with the applicable CD Requirement.
Conclusions	CD ¶21 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Line 6B & Deactivated Loops Griffith, Stockbridge and Bay City Areas Mainline Schematic Diagram.* July 22, 2016. • Facility as-builts (16): – A1 Griffith: 01212, 20135 – A1 Howell: 10693 – A1 Laporte: 6490 – A1 Mendon: 20114 – A1 Niles: 20065 – A1 Ortonville: 16095 – A1 St Clair: 03199 – A1 Stockbridge: 07354, 10716, 15065, 15066, 15067, 16416, 21532, 25245, • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	None
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 2. Replacement and Deactivation of Original US Line 3

CD ¶	¶ Title	Assessment
22.a	Replacement of Original Line 3 in US	**Compliant**
22.b	Line 3 Deactivation	**Not Applicable**
22.e	Prohibition Regarding Use of Line 3 Following Replacement	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	• CD ¶22.a requires Enbridge to: – Replace the Original US Line 3, provided that Enbridge receives all necessary approvals. – Seek all approvals necessary to replace Original US Line 3 as expeditiously as practicable. – Replace Original US Line 3 as expeditiously as practicable once Enbridge receives all necessary approvals. • CD ¶22.b requires that, within 90 Days after Original US Line 3 is taken out of service, Enbridge purge the line of remaining oil and within one year complete a final clean-out and decommissioning of the line. • CD ¶22.e requires that, after Original US Line 3 is taken out of service, Enbridge is permanently enjoined from operating the pipeline or allowing anyone else to operate the pipeline.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed various publicly available sources of information regarding Enbridge's Original US Line 3 permitting process. • Reviewed the statements in Enbridge's *SAR1* that Enbridge has been "vigorously pursuing all avenues to complete the replacement of Line 3 as quickly as possible." Based upon Enbridge's statements, the ITP requested additional detail on the permitting status and a construction schedule. Enbridge responded: – "There is no requirement in the consent decree to provide procurement, design, and construction requirements for Line 3 other than items related to permitting and leak detection." – "Enbridge believes that the semi-annual report is not a forward-looking document and is therefore not the appropriate document to report on a future looking milestone schedule for Line 3." • In the ITP's *ISR1*, the ITP disagreed with Enbridge's interpretation of the CD. In *SAR2*, Enbridge responded with additional information: – An update on the status of primary permitting activity, which is the Minnesota Public Utilities Commission (MPUC) grant of a Certificate of Need and a Route Permit, and a table of the status of 31 necessary permits. Applications for seventeen of those permits are to be filed after receipt of MPUC approvals. – A narrative discussion of permitting activity and construction planning, including a construction milestone schedule of major project elements.

Verification Activity	During this ITP Verification Period, the ITP noted: • Original US Line 3 remains in operation, and the replacement project is pending. • The construction of segment 18, which consists of a 14-mile section of Original US Line 3 in Wisconsin, did not trigger the requirements in CD ¶22.b since the CD defines Original US Line 3 as the entire approximately 292 miles of Original US Line 3 between Neche, North Dakota and Superior, Wisconsin.
Findings	CD ¶22.a: • Enbridge is executing the permitting process in accordance with the applicable CD Requirements. • Enbridge has provided additional information regarding completion of the project after permit approvals. • As permitting activity progresses, the ITP intends to request further information to assess the degree to which permitting, planning, design and construction is being undertaken as expeditiously as possible. CD ¶22.b and e – Since Original US Line 3 remains in operation, these requirements did not come into effect during the Covered Work Period.
Conclusions	• CD ¶22.a – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶22.b and e – These CD Requirements were not in effect during the Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

Type	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• Briefing Presentation: *DOJ Consent Decree: Line 3 Replacement.* Enbridge. October 2017. • *Final Environmental Impact Statement; Line 3 Project*. Minnesota Department of Commerce. August 17, 2017. • *Enbridge Line 3 Website*. http://www.enbridge.com/projects- and-infrastructure/public-awareness/minnesota-projects/line-3-replacement-project. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018. • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report*. Enbridge. April 16, 2018.
Observations and Interviews	None
ITP Task 2 Documents and Reports	None

Type	Document Title
Other Documents, Reports, Standards, Industry Practices	None

RS 3. Line 3 MOP Management Pending Replacement

CD ¶	¶ Title	Assessment
22.c	Original US Line 3 MOP	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶22.c requires Enbridge to: • Limit the operating pressure in each segment of Original US Line 3 to not exceed maximum operating pressures (MOPs) established within the CD. • Maintain those operating pressure limits until decommissioning of Original US Line 3, unless Enbridge has completed a hydrostatic pressure test and validates the use of an increased operating pressure.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated Enbridge's processes, procedures, and systems to manage MOP limits. As part of its evaluations, the ITP reviewed and took into consideration: – Applicable federal regulations. – Generally accepted industry practice. • Reviewed and evaluated the monthly reports of the maximum pressures recorded on each of the Original US Line 3 segments. These reviews were undertaken in a monthly meeting the ITP holds with Enbridge. • Confirmed, from the monthly reports, the operating pressures of the various segments of Original US Line 3 experienced for that month.
Findings	• Enbridge's processes and procedures for managing MOP limits are: – Thorough, involving its Engineering Services group and Control Center Operations group. – Provide adequate control of the Original US Line 3 MOP limits. – Conform with applicable federal regulations and generally accepted industry practice. • The operating pressures in each segment of Line 3 have not exceeded the MOP limits established within the CD. • Enbridge did not conduct any hydrostatic pressure tests during the Covered Work Period; therefore, Enbridge is unable to, and has not, increased operating pressure above the specified MOP limits.
Conclusions	CD ¶22.c – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Control Room Management Plan (CRM)*, Version # 8.0. Enbridge. August 1, 2011. Revised March 3, 2015. • *CCO Alarm Management Plan*, Version # 4.4. Enbridge. July 26, 2011. Revised May 26, 2017. • Flow Chart. *Enbridge Maximum Operating Pressure Process.* Enbridge. • Line Specific Integrity Plan; *Line 3* Version # 1.0. Enbridge. May 16, 2017. • *Maximum Operating Pressure Algorithm for Mainline Piping*. Enbridge. January 1, 2001. • Procedure EP-ES-07-P-0003: Engineering Services Procedure; *MOP Turnover Requirements for Mainline Pipe*, Version # 1.1. October 5, 2015. , Revised October 5, 2017. • Capacity Management Procedure; *MOP Verification (EBSS Model)*, Version # 1.0. Enbridge. May 30, 2017. • Facilities Management Procedure; *Operating Limits (OPLM2 Simulator)*. Enbridge. December 2010. • Procedure P003: CCO Engineering Procedure; *Determining Operating Limits*. Enbridge. February 7, 2017. • Procedure P004: CCO Procedure; *Implementing Operating Limits LPM – Line Pressure Monitor System*. Enbridge. June 2, 2017. • CCO Procedure; *Pipeline Operating Limit Verification,* Version # 1.1. Enbridge. June 30, 2015. Revised June 6, 2016. • CCO Procedure; *Suspected Pipeline Overpressure Response,* Version #17.0.0. Enbridge. September 9, 2017. • Recurring Presentation: Enbridge monthly presentations with a record of actual maximum pressures achieved -vs- MOPs for each Segment on Line 3.
Meetings	• Recurring Meeting. Monthly meetings (both face-to-face and by web-conference) with Enbridge's Compliance, CCO, and PCSLD groups with a standing agenda and roundtable topics.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• 49 CFR 195.406, Subpart F: Code of Federal Regulations; *Transportation of Hazardous Liquids by Pipeline; Operation and Maintenance; Maximum Operating Pressure*. United States Government Publishing Office. • 49 CFR 195.446, Subpart F: Code of Federal Regulations; *Transportation of Hazardous Liquids by Pipeline; Operation and Maintenance; Control Room Management.* United States Government Publishing Office.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Recommended Practice 1168*: Pipeline Control Room Management*. American Petroleum Institute. February 2015. • *United States Environmental Protection Agency Website.* "Enbridge Revised Maximum Operating Pressure Values." https://www.epa.gov/enbridge-spill-michigan/enbridge-revised-maximum-operating-pressure-values.

RS 4. Line 3 Operation Pending Replacement

CD ¶	¶ Title	Assessment
22.d(3)	Line 3 Cleaning and Biocide Treatment	Compliant

A: ITP Analysis

Summary of CD Requirements	CD ¶22.d(3) requires that, after December 31, 2017, Enbridge shall clean Original US Line 3 and use biocide treatment on a quarterly basis.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated Enbridge's cleaning and biocide treatment documentation. • Examined the chemicals for the biocide treatment of Original US Line 3 that were injected at the Gretna and Clearbrook stations, in particular: – The generic chemistry of two products used (bio-dispersant and biocide) for appropriateness. – The target concentration. – The quantity of chemicals injected. – The injection rate. – The injection duration. – The injection frequencies (quarterly). – The type of pig used to transport the chemical batch. • Reviewed quarterly reports provided by Enbridge which document quarterly cleaning and biocide treatment of Line 3 (Gretna and Clearbrook) during 2018.
Findings	• The cleaning and biocide treatment detailed by Enbridge complies to the CD Requirements and is consistent with industry operational standards and practices. • The Enbridge records show Enbridge completed cleaning and biocide treatment in March and June 2018, as scheduled and as required by the CD. • The quantities of chemicals injected met Enbridge's target values. • The injection durations were close to target values, and the deviations were not significant. • The injection rates were close to target values, and in all cases higher. • The ITP considers these variations from target values to be within industry practice. • The CD does not specify the types and concentrations of chemicals to use. Both the bio-dispersant and the biocide chemicals are commonly used by industry for this purpose. • The biocide and bio-dispersant concentrations are within the range used in typical pipeline applications.

Findings	• The quarterly cleaning and biocide treatment frequency is within industry standard practice for pipelines transporting sales-quality crude oil. • The type of pig used to transport the chemical batch and clean the pipeline is typical of industry practice.
Conclusions	CD ¶22.d(3) – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• File name: *B22 2018.04.18 Line 3 Biocide IR Responses.pdf.* Enbridge. April 23, 2018. • File name: *B023 2018 Q1 Line 3 Quarterly Biocide Injection Report.pdf*. ChemTreat. April 23, 2018. • File name: *7.3.18 B023 2018 Q2 Line 3 Quarterly Biocide Injection Report.pdf.* ChemTreat. June 6, 2018. • Safety Data Sheet. *ChemTreat PT2450*. ChemTreat May 31, 2017. • Safety Data Sheet. *ChemTreat CL2212*. ChemTreat March 3, 2017.
Observations and Interviews	None
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 5. Line 10 Replacement Evaluation

CD ¶	¶ Title	Assessment
23	Line 10 Replacement Evaluation	Discussion Item

A: ITP Analysis

Summary of CD Requirements	CD ¶23 requires that, within 120 Days of the CD Effective Date (i.e. by September 20, 2017), Enbridge must submit a report that: • Evaluates replacement of the entirety of US Line 10. • Includes a separate evaluation of the two segments of US Line 10 that cross forks of the Niagara River. • Includes an evaluation of the number, density and severity of Crack and Corrosion features in US Line 10 and includes a comparison of those features to a 21-mile segment of US Line 10 that Enbridge is replacing in Ontario, Canada.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Confirmed that a copy of Enbridge's original report, dated September 18, 2017, of its evaluations of Line 10 was submitted to the EPA within 120 Days of the Effective Date of the CD (i.e., by September 20, 2017). • Reviewed and evaluated Enbridge's September 18, 2017, report and, based on that review, developed and submitted to the EPA and Enbridge: – A request for additional information. – A set of preliminary findings in relation to that report. • Reviewed and evaluated Enbridge's: – Responses to the additional information request and the ITP's preliminary findings. – Revision to the September 18, 2017, US Line 10 report that Enbridge submitted on April 16, 2018, containing various corrections of the original report. • The ITP's review and evaluation of Enbridge's two reports included: – Verifying the underlying ILI data, records, and reports that Enbridge used and cited in their evaluations. – Verifying that the two reports addressed the requirements in CD ¶23 (a) to provide a separate evaluation of the two segments of US Line 10 that cross forks of the Niagara River, (b) to evaluate the entire US Line 10, and (c) to provide a comparison of Crack features and Corrosion features on US Line 10 against a 21-mile segment of Line 10 being replaced in Canada. – Verifying the calculations of the Rupture Pressure Ratios (RPRs) and average safety factors that were provided in the two reports.

Verification Activity	• As part of establishing the context or scope of an "evaluation" as required by CD ¶23 in comparison to the scope of the evaluations provided in Enbridge's two reports, the ITP reviewed and took into consideration: – Enbridge's *Pipeline Replacement Assessment Procedure* (*PI-69*). – Kiefner's report concerning evaluating the replacement of pre-regulation pipelines developed for the Pipeline and Hazardous Materials Safety Administration. – Dynamic Risk Assessment Systems' report on alternatives to replacing Dual Pipelines that cross the Straits of Mackinac in Michigan. • The ITP did not have access to the data, records, or reports that would be used in performing a "…thorough fitness for service analysis…" as noted in Enbridge's two US Line 10 evaluation reports. • The ITP did not review or evaluate the financial analysis included in Enbridge's two US Line 10 evaluation reports.
Findings	• The summaries of the number, density, and severity of Corrosion and Crack features existing within the four segments that comprise US Line 10 is an accurate reflection of the underlying ILI data. • The average safety factors and RPRs for each of the four segments, as presented in the two reports, are calculated in accordance with industry practice and are based on the underlying ILI data. • The ITP was not able to verify the statements in the two reports that, as part of their evaluations, Enbridge considered the: – Results of a thorough fitness for service analysis. – Threats from third party mechanical damage and geotechnical damage. • The EPA, the ITP, and Enbridge are in continuing discussions concerning the completeness of the evaluations provided in Enbridge's two US Line 10 evaluation reports with respect to the requirement in CD ¶23 to "evaluate replacement of the entire US Line 10."
Conclusions	CD ¶23 – Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with applicable CD Requirements.
Recommendations	Further discussion and information are required to verify compliance with the scope of the evaluations required by the CD.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Application Submitted to NEB; Appendix 6.1; Environmental and Socio-Economic Assessment; Line 10 Westover Segment Replacement Project*. CH2M Hill and Dillon Consulting. November 2015. • Procedure PI-69: *Pipeline Replacement Assessment Procedure, Version 4.0.* Enbridge. January 4, 2013. Revised March 8, 2016.

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• Line Specific Integrity Plan; *Line 10 – US*, Version 1.3. Enbridge. May 17, 2017. • *Evaluation of Replacement of Portions of Line 10 within the United States*. Enbridge. September 18, 2017. • Transmittal Letter: *Re: Submission of Line 10 Replacement Evaluation Report*. Steptoe & Johnson, LLP. September 20, 2017. • Enbridge provision of Additional Information via Enbridge SharePoint Site pertaining to spreadsheets of ILI data and supporting documents related to Line 10 in Canada. Accessed on November 14, 2017. • *Evaluation of Replacement of Portions of Line 10 within the United States September 18, 2017*. Enbridge. Revised April 13, 2018 • Transmittal Letter: *Re: Revised Line 10 Replacement Evaluation Report.* Steptoe & Johnson, LLP. April 16, 2018. • *Response to ITP's DRAFT Preliminary Findings ref: Enbridge's Evaluation of Replacement of US Portion of Line 10*. Enbridge. Transmitted April 16, 2018.
Observations and Interviews	None
ITP Task 2 Documents and Reports	• *Enbridge Line 10 Evaluation Report; ITP Request for Additional Information.* O.B. Harris, LLC. October 24, 2017. • *Grocery List Request for Additional Information re: Line 10 Evaluation Report.* O.B. Harris, LLC. November 3, 2017. • *ITP's DRAFT Preliminary Findings ref: Enbridge's Evaluation of Replacement of US Portion of Line 10.* O.B. Harris, LLC. January 18, 2018 • *ITP Additional Information Request for Enbridge First Semi-Annual Report* O.B. Harris, LLC. February 14, 2018.
Other Documents, Reports, Standards, Industry Practices	• *Repair/Replace Considerations for Pre-Regulation Pipelines – Final Report.* Kiefner and Van Auker. March 11, 2015. • *Alternatives Analysis for Straits Pipeline.* Dynamic Risk Assessment Systems, Inc. June 27, 2017

RS 6. Hydrostatic Pressure Testing Requirements

CD ¶	¶ Title	Assessment
24	Hydrostatic Pressure Testing Plan and Schedule	**Compliant**
25	Procedures for Hydrostatic Pressure Testing	**Compliant**
26	Line Failure During Hydrostatic Pressure Testing	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	CD ¶24, ¶25, and ¶26 establish various requirements for the planning and conduct of any hydrostatic pressure tests Enbridge performs on any pipeline subject to the CD, along with reporting of any line failure during a test.
Verification Activity	The ITP notes that only two hydrostatic pressure tests (hydrotests) were conducted during the Covered Work Period. The two pipelines on which hydrotests were conducted were the Line 5 Dual Pipelines that cross the Straits of Mackinac. The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated the *Hydrostatic Pressure Test Plan* and the *Hydrostatic Pressure Test Plan Rev 2* that Enbridge submitted to the EPA and ITP in accordance with CD ¶71.b. As requested by the EPA, the ITP prepared a written Task 2 report of its evaluations of the Hydrostatic Test Plans and submitted the report to the EPA and Enbridge. • Attended on-site and observed the final preparations for, as well as the undertaking and completion of, the hydrostatic pressure tests during the period of June 10 – 16, 2017: – During this time in the field, the ITP observed arrangements for isolating the test segments and the fitting of various instruments to monitor the pressure on the pipelines during the periods of pressurization. – Performed regular walkarounds of the site where the hydrotests were being conducted. – Took readings from the field instruments as a means to verify the pressures that were being reported and recorded by the test control center. • Reviewed and evaluated the two August 2017 reports that Enbridge submitted to the EPA and that ITP as the final reports of: – The activities undertaken as part of hydrotesting the Dual Pipelines. – The results of the tests. As requested by the EPA, the ITP prepared and submitted a written Task 2 report to the EPA and Enbridge of the ITP's evaluations of the two hydrostatic pressure tests. • Investigated the experience and competency of the Enbridge contractors who were key to the planning and execution of the hydrotests.

Findings	CD ¶24 and ¶25: • The preparations for and the conduct of the hydrotests of the two pipelines were completed in conformance to the various requirements in: – CD ¶24 and ¶25. – The approved *Hydrostatic Pressure Test Plan Rev 2.* – Generally accepted industry practice. The ITP's November 16, 2017, Task 2 report of the hydrotests noted that the two reports Enbridge submitted of the hydrotests conformed with applicable CD Requirements. • The results of the two hydrotests met the criteria within the *Hydrostatic Pressure Test Plan Rev 2* for passing the tests. • The Enbridge contractors who planned and implemented the hydrotests had the experience and competency to complete the tests CD ¶26 – Neither of the two pipelines failed during their hydrostatic pressure tests, hence the provisions in CD ¶26 did not come into effect.
Conclusions	• CD ¶24 and ¶25 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶26 – The applicable CD Requirement did not come into effect during the Covered Work period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• 07-03-03: Enbridge Operations and Maintenance Manual; Book 3: Pipeline Facilities; Section: Procedures; *Calculating Theoretical Pressure-Volume Relationship.* Enbridge. Revised April 1, 2006. • 07-03-04: Enbridge Operations and Maintenance Manual; Book 3: Pipeline Facilities; Section: Procedures; *Calculating Pressure-Temperature Reconciliation*. Enbridge. Revised March 31, 2009. • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan,* Rev 1. Enbridge. March 1, 2017. • *Enbridge ITP Response on Line 5 Hydrostatic Pressure Test*. Enbridge. April 25, 2017 • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan*, Rev 2. Enbridge. April 25, 2017. • *Re: Notice of Planned Line 5 Hydrotest.* Steptoe & Johnson LLP. May 9, 2017. • *Final Report: Enbridge Line 5–East Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-153*. Lake Superior Consulting, LLC. August 28, 2017

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Final Report: Enbridge Line 5–West Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-154*. Lake Superior Consulting, LLC. August 28, 2017.
Observations and Interviews	Attendance and observation of the final preparations for and completion of the hydrotests during the period of June 10-16, 2017. Throughout the time the ITP was on-site observing the hydrotests, the ITP had regular interactions and conversations with the various key individuals from Enbridge and key contractors to Enbridge. These conversations typically sought information on the status or prospects for the tests (e.g., when the next phase or step in the hydrotest was planned such as line water fill, pressuring the line to start the water temperature stabilization period, or the location of where a particular instrument was mounted).
ITP Task 2 Documents and Reports	• *ITP Review and Evaluation of Enbridge Submittal: ¶71 and 24-26, Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan.* O.B. Harris, LLC. May 8, 2017. • *ITP Review and Evaluation of Enbridge Submittal: ¶25 and 71, Line 5 Dual Pipelines Hydrostatic Pressure Tests.* O.B. Harris, LLC. November 16, 2017.
Other Documents, Reports, Standards, Industry Practices	• *Straits of Mackinac Pipeline Easement*. Conservation Commission of the State of Michigan. April 23, 1953. • *Hydrostatic Pressure Testing as Part of an Integrity Management Program: A Case Study.* Presented at 2016 International Pipeline Conference. IPC2016-64566

RS 7. ILI Milestone 1: ILI Tool Run

VR CD ¶	¶ Title	Assessment
22.d.1.	Annual ILI in Line 3 for Crack, Corrosion, and Geometric Features	**Compliant**
27	Timely Identification and Evaluation of All Features	**Compliant**
28.a-b	Periodic ILI Requirements until CD Termination	**Compliant***
28.c	Incomplete or Invalid ILI	**Compliant**
29	12-Month ILI Schedule	**Compliant***
30	ILI Schedule Modification	**Compliant**
53.a	ILI Tool Adequate for Assessing Axial Features	**Compliant**
70.a	Corrosion and Circumferential Crack ILI Timing (Dual Pipelines)	**Compliant**
70.b	Geometric Feature ILI Timing (Dual Pipelines)	**Compliant**

* Complies after consideration of the terms of the *Stipulation & Agreement* filed with the Court on May 2, 2018. See Findings, below.

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 1**. The ILI Tool Run is the initial ILI Milestone in the ILI process that assesses the ILI tool's appropriateness for the potential feature populations and the timing of re-inspection. Specific CD Requirements of Milestone 1 are provided in Appendix B: ILI Milestones and CD Requirements (on page 131). A listing of specific Milestones completed during the Covered Work Period is provided by Appendix C: Milestone Status Summary (on page 132).
Verification Activity	The ITP undertook the following activities to verify compliance with the CD Requirements included within this Milestone for each of 64 ILI Tool Runs completed during the Covered Work Period: • Reviewed Enbridge's *12-Month Lakehead ILI Schedule* that lists the ILI runs to be completed within the first 12 months of the CD Effective Date. • Verified the ILI re-inspection schedules provided by Enbridge, based on information provided in their *PipeTrax* and *OneSource* data bases. • Verified that the 64 ILI Tool Runs completed within the Covered Work Period, between May 23, 2017 and May 22, 2018, were completed within the schedule deadlines required by the CD. • Reviewed the listing of Enbridge approved ILI tools, and ILI Vendor Tool Specifications related to each ILI Tool Run for each pipeline segment scheduled. • Verified that the ILI tools used are appropriate based on Integrity Plans prepared by Enbridge for each pipeline segment. Integrity Plans identify the threat type, susceptibility, and appropriate ILI technologies to be used for inspection. • Monitored the ILI CD Registry Spreadsheet that was developed by Enbridge to communicate the progress and status of each Lakehead System ILI Program.

Verification Activity	• Reviewed ILI run status information posted by Enbridge on their *PipeTrax* database that indicates run success or failure and the run completion dates. • Reviewed statements made by Enbridge regarding Milestone 1 ILI Tool Run requirements in its *SAR1* and *SAR2* reports. • Reviewed Enbridge procedures, work instructions, and other work products applicable to the ILI Tool Run Milestone. • Conducted monthly meetings with the Enbridge Pipeline Integrity team to review the status of ILI programs and clarify processes, documents and records reviewed by the ITP. • Prepared an ITP Milestone Record to document verification activity and evaluation of each ILI Tool Run Milestone, following a process and report template developed by the ITP. The ITP reviewed these records as part of the verification activities for this VR.
Findings	The ITP finds: • ¶22.d(1) – In 2018, Enbridge has completed or scheduled all annual Crack, Corrosion, and Geometry Tool Runs on all segments of Original US Line 3. • ¶27 – The ILI Tool Runs performed by Enbridge were appropriate to find all features that could leak or rupture. • ¶28.a – Enbridge conducted all ILI Tool Runs using the most appropriate tools in accordance with re-inspection requirements and identified failed runs. • ¶28.b – In the *12-Month Lakehead ILI Schedule* submitted on June 23, 2017, six Tool Runs were found to be outside the deadlines established by the CD. This was resolved by a *Stipulation & Agreement* filed with the Court on May 2, 2018 (see discussion in Reporting Segment 14 on page 70). • ¶28.c – Enbridge required its ILI vendors to immediately notify Enbridge of any failed Tool Runs, and all failed Tool Runs were reported immediately. • CD ¶29: – In the *12-Month Lakehead ILI Schedule* submitted on June 23, 2017, six Tool Runs were found to be outside the deadlines established by the CD. This was resolved by a *Stipulation & Agreement* filed with the courts on May 2, 2018 (see discussion in Reporting Segment 14 on page 70). – In each submitted SAR, Enbridge provided an updated list of ILI Tool Runs to be completed in the next 12 months. • ¶30 – Enbridge performed ILI Tool Runs according to the required schedules. • ¶53.a – Enbridge determined and specified ILI tools adequate for the assessment of the specified axial and seam area features. • ¶70.a – Enbridge has conducted Corrosion and Circumferential Crack inspections as required for the Dual Pipelines. • ¶70.b – Enbridge has conducted Geometric inspections as required for the Dual Pipelines.

Conclusions	The ITP has verified that Enbridge Covered Work is currently in compliance with the applicable requirements of the ILI Tool Run Milestone during the Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Inline Inspection Reporting Profile Standard. Rev. 8.1*. Enbridge. February 1, 2017. • Procedure PI-41: *Re-Inspection Interval Determination*. Rev. 5.0. Enbridge. January 10, 2017. • *Procedure PI-141: Assessment Tool Selection Procedure*. Ver 1.0. Enbridge. January 3, 2017. • *12-month Re-Inspection Interval Determination pursuant to PIPES Act.* updated within each SAR. • CD ILI Registry for each ILI Tool Run of Lakehead System pipeline segment. • Initial ILI Reports for each ILI Tool Run of Lakehead System pipeline segments. • Line Specific Integrity Plans for each Lakehead System pipeline segment. • *Vendor ILI Tool Performance Specifications, for each ILI Tool Run of Lakehead System pipeline segments.* • Approved Tool Listing continuously updated as needed. • *Enbridge 12-Month ILI Schedule,* Rev 1.1. Enbridge. July 14, 2017. • ILI Tool Run Schedule located in the PipeTrax database. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	The ITP met with Enbridge during the week of July 9 to conduct observations of the procedures that are followed by integrity management personnel. Observations of Edmonton office personnel were conducted on July 9 & 10, 2018, and Field project personnel were observed performing NDE activities at a dig site on Line 6A at Milepost 10.4 on July 12, 2018.
ITP Task 2 Documents and Reports	*In-Line Inspection Schedule for the Initial 12 Month Period*. O.B. Harris, LLC. September 22, 2017. Amended September 27, 2017.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Standard 1163: *In-line Inspection Systems Qualification Standard*. American Petroleum Institute Standard. April 1, 2013. • NACE Standard Practice 0102: *In-Line Inspection of Pipelines*. NACE International. Revised March 13, 2010. • *Stipulation and Agreement Regarding Assessment and Payment of Stipulated Penalties Relating to Timeliness of Certain In-line Inspections.* United States of America. May 2, 2018.

RS 8. ILI Milestone 2: Initial Report

CD ¶	¶ Title	Assessment
31	ILI Compliance with Tool Specifications	**Compliant**
32.a-c	Initial ILI Reports Were Submitted within: • (Cracks) 120 Days. • (Corrosion) 90 Days • (Geometric) 60 Days	**Compliant**
33.a	Require Vendors to Provide Priority Notification	**Not Compliant**
33.b	Priority Feature Definition	**Not Compliant**
33.c	Review and Evaluate Priority Features within two Days of Notification	**Not Compliant**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 2**. The Initial Report Milestone verifies that the ILI tool was run within the vendor specifications of variables such as velocity, temperature, and sensor operations. The Initial Report Milestone also examines whether the initial report was received in a timely manner and that Priority Notifications were processed as prescribed by the CD. Specific CD Requirements of Milestone 2 are provided in Appendix B: ILI Milestones and CD Requirements (on page 131). A listing of specific Milestones completed during the VR Period is provided in Appendix C: Milestone Status Summary (on page 132).
Verification Activity	The ITP undertook the following activities to verify compliance with the CD Requirements included within this Milestone for each of 50 Initial ILI Reports completed during the Covered Work Period. Information from four additional Initial ILI Reports (Noted in Appendix C: Milestone Status Summary (on page 132) as "Records Posted Late") could not be fully reviewed by the ITP because it was not posted by Enbridge in time for verification activity. A partial review of these four Initial ILI Reports was performed, indicating compliance similar to Initial ILI Reports which were reviewed. • Reviewed the 54 ILI Tool Runs with Initial ILI Reports completed within the Covered Work Period. • Monitored the ILI CD Registry Spreadsheet developed by Enbridge to communicate the progress and status of each Lakehead System ILI Program. • Reviewed Enbridge ILI run status information on Enbridge's *PipeTrax* database indicating run success or failure, run completion dates, and Initial ILI Report receipt dates. • Reviewed vendor Initial ILI Reports and vendor Data Quality Assessments for each Tool Run to verify run status, completion date, report submission, and ILI tool performance within specifications. • Reviewed Initial ILI Reports, ILI CD Registry Spreadsheets, and posted records of vendor communication regarding Priority Feature notifications.

Verification Activity	• Reviewed Initial ILI Reports and communications provided for identification of Priority Features and compared with Enbridge's response. • Reviewed statements made by Enbridge regarding Initial Report Milestone requirements in *SAR1* and *SAR2*. • Compiled and reviewed Enbridge procedures, work instructions, and work products applicable to the Initial Report Milestone to better understand Enbridge's processes and to evaluate for compliance with CD Requirements where such documents were presented as evidence of compliance in the SARs. • Conducted periodic meetings with Enbridge integrity management personnel to clarify the processes, procedures, and information used to ensure compliance with applicable CD Requirements. • Reviewed Enbridge's OneSource database and other posted information to replicate the Enbridge analysis and then verify compliance with applicable CD Requirements. • Prepared an ITP Milestone Record to document verification activity and evaluation of each Initial Report Milestone, following a process and report template developed by the ITP. The ITP reviewed these records as part of the verification activities for this VR.
Findings	The ITP finds: • CD ¶31 –ILI tools were operated within vendor specifications. • CD ¶32 – Enbridge ILI vendors submitted Initial ILI Reports in accordance with the required schedule. • CD ¶33.a and ¶33.b – CD Appendix A provides the specific criteria for the Priority Notifications required by CD ¶33.b and specifies that Geometric features >5% of outside diameter (OD) meet these criteria. The Enbridge *ILI Reporting Profile Standard* (*RPS*) Table 2 provides Enbridge's ILI vendors with instructions for reporting ILI features, including criteria for Priority Notification of Geometric features (among others). *RPS* Table 2, however, excludes ovality features from Priority Notifications for Geometric features greater than 5% and refers to *RPS* Table 3. *RPS* Table 3 provides Priority Notification criteria for ovality features which are dependent upon pipe diameter, generally equating to approximately 10% of OD. The ITP found that, as a result, approximately 275 ovality features greater than 5% and less than 10% were not the subject of the CD's Priority Notification requirement. As a result, the ITP found that Enbridge did not conform to the CD Priority Notification requirement with regard to those 275 ovality features. Enbridge has responded that the structure of CD Appendix A allows Enbridge to choose alternate criteria; however, the ITP does not believe the structure of CD Appendix A is intended to allow Enbridge to set less stringent reporting requirements than the reporting requirements expressly provided by the CD. • CD ¶33.c – The ovality features >5% for which there was no Priority Notification did not conform with requirements for their review.

Conclusions	Enbridge complies with the CD Requirements for the Initial Report Milestone, with the exception of Priority Notifications for ovality features >5%. The ITP and Enbridge currently are discussing the CD ¶33 and CD Appendix A requirements for Priority Notification for ovality features >5% and <≈10%
Recommendations	Resolve the interpretation of Appendix A with regard to Ovalities >5% and <≈10%.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Inline Inspection Reporting Profile Standard, Report Schedule, and Appendix G. Rev. 8.1.* Enbridge. February 1, 2017. • Procedure PI-29: *Priority Notifications*. Rev. 3.1. Enbridge. January 31, 2017. • *CD ILI Registry* for each ILI Tool Run of Lakehead System pipeline segments. • *Initial ILI Report for each ILI Tool Run of Lakehead System pipeline segments.* • OneSource Analytic Database System • PipeTrax Database. • Priority Date Tracking Table for each ILI Tool Runs of Lakehead System pipeline segments. • ILI Vendor Data Quality Assessment (DQA) for each ILI Tool Runs of Lakehead System pipeline segments. • Priority PI Listing, for ILI Tool Runs of Lakehead System pipeline segments generated for specific Milestones.
Observations and Interviews	The ITP met with Enbridge during the week of July 9 to conduct observations of the procedures that are followed by integrity management personnel. Observations of Edmonton office personnel were conducted on July 9 & 10, 2018, and Field project personnel were observed performing NDE activities at a dig site on Line 6A at Milepost 10.4 on July 12, 2018.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Standard 1163: *In-line Inspection Systems Qualification Standard*. American Petroleum Institute Standard. April 1, 2013. • NACE Standard Practice 0102: *In-Line Inspection of Pipelines*. NACE International. Revised March 13, 2010.

RS 9. ILI Milestone 3: Quality Review

VR CD ¶	¶ Title	Assessment
34.a	Preliminary Review of Initial ILI Report	**Compliant**
34.b	Evaluation of Features Requiring Excavation	**Compliant**
34.c	Resolution of Identified Data Quality Concerns	**Discussion Item**
34.d	ILI Data Quality Evaluation Timelines	**Compliant**
34.e	Discrepancies Between Two Successive ILI Runs	**Compliant**
34.f-g	Investigative Digs	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 3**. The Quality Review Milestone is the third milestone in the ILI process and verifies that feature severity, density, and type are not significantly different from the previous inspection. Should a concern arise, Enbridge must investigate and either resolve the issue with the ILI vendor or conduct an investigative dig program to quantify and correct potential tool bias. The Quality Review Milestone sets deadlines so that each function is accomplished in a timely manner. Specific CD Requirements of Milestone 3 are provided in Appendix B: ILI Milestones and CD Requirements (on page 131). A listing of specific Milestones completed during the VR Period is provided in Appendix C: Milestone Status Summary (on page 132).
Verification Activity	The ITP undertook the following activities to verify CD compliance with the CD Requirements included within this Milestone for each of the 44 Quality Reviews completed during the Covered Work Period. Four Quality Review Milestones (Noted in Appendix C: Milestone Status Summary (on page 132) with "Records Posted Late") could not be reviewed because the records were not posted by Enbridge prior to the ITP's July 23, 2018 cutoff date for verification activity. • Verified basic data – Pipe wall thickness, diameter, grade, interaction rules for metal loss, seam type, age, and MOP. • Reviewed the ILI Program Summary Document that details Enbridge's data quality review with respect to Enbridge procedure *Data Quality Review, In-Line Inspections (PI-36*), and CD Requirements. This includes feature density, feature distribution, and an examination of accuracy with respect to previous excavations. • Reviewed the CD ILI Registry spreadsheet to understand Enbridge's progress and status in meeting CD Requirements. • Checked timing with respect to receipt of the Initial ILI Report and Enbridge data quality final review. Checked timing with respect to the tool pull date and Enbridge data quality final review. • Reviewed any trending bias relative to previous inspections and recoats. • Reviewed Enbridge's OneSource Database and other relevant information to verify compliance with CD Requirements.

Verification Activity	• Reviewed Enbridge OneSource database to examine full ILI reports and independently compare density, sizing, and distribution of features between previous and present inspections. • Reviewed a detailed feature listing in Assessment Sheets provided by Enbridge to verify the criticality of specific threats in relation to the previous inspection. • Conducted interviews with respect to the data quality process and Enbridge personnel involved. • Reviewed statements made by Enbridge regarding CD Requirements in *SAR1* and *SAR2*. • Prepared a Milestone 3 Quality Review Record for each Tool Run to provide a review and evaluation of Enbridge compliance with CD Requirements As of July 23, 2018, the ITP discussed the following Quality Review Milestone issues with Enbridge: • CD ¶34.a – In the first year Enbridge identified data concerns within eight Initial ILI reports as reported in *SAR1* and *SAR2*. The ILI vendors corrected and re-issued each report in a timely fashion. The ITP has reviewed seven of the Enbridge records and found that they support the resolution of those data quality concerns. The eighth record has not been provided; therefore, the record has not been verified as of this writing. • CD ¶34.c – An ITP finding from *SAR1* was that Enbridge did not adequately explain a data quality issue regarding a corrosion ILI Tool Run, on the east segment of the Line 5 Dual Pipelines, that involved multiple instances of incorrect pipe wall thickness data used by the vendor to evaluate Corrosion features. The ITP identified these incorrect data in the OneSource database and in the Assessment Sheet for this Tool Run. Enbridge corrected the data after the ITP called attention to the issue. The ITP submitted an Additional Information Request for an explanation of the *SAR1* entry. Enbridge responded that it did not consider the error "material" as it did not affect the outcome of any feature assessments or calculations. CD ¶144 sets the content requirement for SARs and specifically requires a SAR to discuss such matters as "problems encountered or anticipated in meeting the requirement (together with implemented or proposed solutions)," and "operation or maintenance issues." The ITP does not find that CD ¶144 sets a materiality threshold and found that the omission to address the Dual Pipelines ILI Data Quality Milestone concerns to be inconsistent with CD ¶144. • CD ¶34.e – In its *Analysis of Quality Review (PI-36*) procedure, Enbridge established a process that examines and documents discrepancies found when comparing previous ILI data to present ILI data. Twelve segments were found to have a variance of +/- 20% in reported feature density. Of the four inspections that were geometric, the variances were dents being called at or around a 2% depth where Enbridge has a different reporting designation for "Dents" (≥2% OD) and "Geometric Anomalies" (<2% OD). All the deformations were reported but were characterized by the

Verification Activity	different terms according to their size. All four corrosion ILI had a greater number of newly reported Corrosion features between the 10% and 20% depth that skewed the results. The four crack inspections each had a decrease in feature density said to be due to the next generation tool having greater discrimination ability. The ITP has reviewed all but two of the Enbridge records and accepts the explanation of the feature density concerns. Two corrosion records were not reviewed as they were not provided before the ITP's July 23, 2018 cutoff for verification activity.
Findings	• Enbridge met CD Requirements for CD ¶34.a-b, and CD ¶34.d-e during the VR period. • CD ¶34.f-g did not apply during the VR period. • CD ¶34.c – The ITP has found that the Line 5 ENO-EMO MFL inspection of April 12, 2017 had a number of incorrect wall thicknesses provided by the vendor and entered into OneSource by Enbridge. Enbridge has added a second issue of these data into OneSource that is correct. Although Enbridge has corrected the pipe data with no changes to the list of Features Requiring Excavation and is conforming with requirements of this Paragraph in all other ILI run programs, discussions are continuing to understand the root cause of the undetected data error and any lessons learned to prevent recurrence.
Conclusions	• Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with CD ¶34.c requirements. • The ITP has verified that the Enbridge Covered Work complies with all other applicable CD Requirements.
Recommendations	Continue discussions to resolve concerns related to CD ¶34.c.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • NDE Uncertainty Report generated as needed. • ILI Program Summary Document for each ILI Tool Runs of Lakehead pipelines and segments. • CD ILI Registry for each ILI Tool Run and pipeline segment. • Initial ILI Report for each ILI Tool Runs of the Lakehead System pipeline segments. • NDE Reports generated as needed. • OneSource Analytic Database System • Data Quality Review for each ILI Tool Runs of Lakehead pipelines and segments. • Trending Sheet for each ILI Tool Run for specific Milestones.

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports	• Tool Run and Tool History Listing for each ILI Tool Run for specific Milestones. • PI Listing and Approval e-mail for ILI Tool Runs of Lakehead System pipeline segments generated for specific Milestones. • Assessment Sheets generated for each ILI Tool Run during the applicable Milestone. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	Interviewed a Planning Group SML in July 2018 and observed the Enbridge process of review.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Standard 1163: *In-line Inspection Systems Qualification Standard*. American Petroleum Institute Standard. April 1, 2013. • NACE Standard Practice 0102: *In-Line Inspection of Pipelines*. NACE International. Revised March 13, 2010.

RS 10. ILI Milestone 4: Dig List

VR CD ¶	¶ Title	Assessment
22.d(2)	Mitigate Features from Line 3 ILI Runs	**Compliant**
33.d	Adding Priority Notification FRE to the Dig List	**Discussion Item**
35	Evaluation of Each Feature in Initial ILI Report for Features Requiring Excavation	**Not Compliant**
36	Feature Requiring Excavation Definition	**Compliant**
37	Deadlines for Adding Features Requiring Excavation	**Discussion Item**
38.a	Excavation and Repair Deadlines	**Compliant**
38.b	Establish Pressure Restrictions if Required	**Compliant**
40	NDE Data Comparison to ILI Data	**Compliant**
42	Calculate Predicted Burst Pressure for Crack and Corrosion Features	**Compliant**
43	Predicted Burst Pressure Definitions (CD Appendix B)	**Compliant**
44.a-b	Initial Predicted Burst Pressure Calculations and Initial Remaining Life Calculations for Crack and Corrosion Features	**Compliant**
47	Dig Selection Criteria and Pressure Restriction Requirements for Crack Features	**Compliant**
48	Crack and Interacting Feature Mitigation Timelines	**Compliant**
49.a-b	Dig Timeline Extensions	**Compliant**
50	Corrosion and Interacting Feature Mitigation Timelines	**Compliant**
51	Corrosion Feature Mitigation Timelines	**Compliant**
53	Dig Selection Criteria, Pressure Restrictions, and Mitigation Deadlines for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features • Interacting Features	**Discussion Item**
55	Dig Selection Criteria for Dents and Other Geometric Features	**Compliant**
56	Dents and Other Geometric Feature Mitigation Timelines	**Compliant**
58	Dig Selection Criteria for Interacting Features	**Not Compliant**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 4**. The Dig List Milestone verifies that Enbridge evaluates each feature identified by an Initial ILI Report and, after Quality Review, identifies and establishes excavation and repair deadlines, determines required pressure restrictions, and ensures all Features Requiring Excavation are added to the Dig List. Specific timelines are prescribed in the CD with respect to data assessments and pressure restriction evaluations.
Verification Activity	The ITP undertook the following activities to verify compliance with the CD Requirements included within this Milestone for each of the 44 Tool Runs, which added 274 digs to the Enbridge dig list, during the Covered Work Period. Four Dig List Milestones (Noted in Appendix C: Milestone Status Summary (on page 132) as "Records Posted Late") could not be reviewed because they were not posted by Enbridge by the July 23, 2018 cut-off date for ITP verification activity. The general process used by the ITP to verify this milestone is to review the ILI Program Summary document that details the Quality Review of potential features for excavation that may require engineering judgment. The Program Summary also provides the number of CD and non-CD excavations added to the Dig List. • The ITP reviews the detailed feature listing in the Assessment Sheets provided by Enbridge for each Tool Run to verify the characterization of all features identified by the ILI tool for the present inspection. In this step, the ITP: – Verifies that the data in OneSource matches that of the ILI report. – Considers any issues found in Milestone 3 Quality Review. – Confirms burst pressures. – Confirms the MOP to verify safety factors and RPRs. – Checks listed corrosion growth rates (CGR) to verify that either a rate has been determined by feature match or that the pipe is new, as well as to verify that the CGR is within the CD Requirements. – Reviews Remaining Life calculations with specific CGR determinations for agreement. – Examines select joints/full inspections to verify growth rates. – Reviews FRE for conformance with CD Tables 1 through 5. – Reviews interacting features identified during threat integration. – Verifies previous excavation locations to identify unmitigated features. – Verifies excavation timing to align with CD scheduling requirements. – Verifies that CD-required pressure restrictions are implemented. – Reviews additional FRE on the Dig List regarded as "non-CD" to determine reasoning and to verify that they are not CD-required.

Verification Activity	• In addition, the ITP: – Examined the Pipeline Integrity listing to ensure all excavations indicated by Priority Notification in accordance with CD Appendix A, and/or identified by the assessment sheet, have been added to the Dig List. – Prepared a Milestone 4 Dig List Record for each Tool Run completed during the reporting period, and for which Enbridge provided the data, to document the ITP review and evaluation of Enbridge compliance with the CD. – Conducted observations of Enbridge integrity management personnel as they demonstrated the Data Quality and Dig List processes. – Reviewed statements made by Enbridge regarding CD Requirements for the Dig List Milestone in *SAR1* and *SAR2*.
Findings	CD ¶33.d – CD Appendix A provides the specific criteria for the Priority Notifications required by CD ¶33.b and specifies that Geometric features >5% of OD meet these criteria. Enbridge instructions to ILI vendors for Priority Notification of ovality features does not match the criteria in CD Appendix A (see the CD ¶33.a-b discussion in Reporting Segment 7 Findings on page 47). CD ¶33.d requires Enbridge to excavate and repair Priority Notification features after an evaluation that determines they are FRE. Certain ovality features that are not identified for Priority Notification also are not evaluated to determine if they are FRE; therefore, the ITP cannot determine whether Enbridge has complied with the requirements of this CD Paragraph. CD ¶35, ¶53.d, and ¶58: • These Paragraphs set requirements for mitigation of all dents interacting with other feature types. In its *RPS*, which provides instruction to its ILI vendors, Enbridge has established dent and Geometric anomaly definitions: – "Dent – Depression causing gross disturbance in curvature of the pipe wall. A feature shall be classified as a dent if the depth is ≥2% of the OD." – "Geometric anomaly – A depression that causes a disturbance in the curvature of the pipe wall. A feature shall be classified as a geometric anomaly if the depth is < 2% of the NPS, or if the geometric anomaly has been detected by a technology other than a caliper. All geometric anomalies ≥ 1% of the NPS shall be reported. Geometric anomalies ≥ 0.5% shall be reported if they are in close proximity to another dent or geometric anomaly." The foregoing dent identification criteria are inconsistent with CD ¶59 which requires excavation and pressure restrictions for all dents interacting or intersecting with other features. • Enbridge does not determine interactions of manufacturing (MFG) features with other types of metal loss features as Enbridge considers them to be stable, non-growing entities. Enbridge does, however, include the MFG features in their "FeatureMatch" macro routine to determine whether a MFG feature interacts with a Corrosion feature. The MFG feature then

Findings	would be considered if interaction takes place. The ITP has accepted this approach but will assess it further during future verification activity. CD ¶37: • The schedule of deadlines in CD ¶37 requires Enbridge to complete the identification of FRE on the basis of Predicted Burst Pressure calculations and Remaining Life calculations, then to add them to the Dig List, within five Days of performing those calculations. The ITP has observed that Enbridge performs those calculations using the "Deterministic Analysis" (DA) in the Assessment Sheets. The dates of the calculations are reported in ILI Assessment Sheets in the "Heading" tab under "Deterministic Analysis" for corrosion or for crack assessments within the "LOG" tab. However, the dates shown for these calculations in the Assessment Sheets do not match the dates reported in *SAR2*. Using the calculation dates reported in the Assessment Sheets, it appears that the timing of the calculations exceeded the CD deadlines in at least 12 instances. Enbridge has responded that the dates indicated by the Assessment Sheets are not actually the calculation dates. The ITP and Enbridge have scheduled discussions to resolve the conflicting records.
Conclusions	The ITP finds that Enbridge has conformed with the requirements of the CD Paragraphs and subparagraphs of the Dig List Milestone with the following exceptions: • CD ¶35 and ¶58 – Nonconforming with requirements for adding interactions with dents <2% to the Dig List. • CD ¶33.d – Discussion Item to determine whether ovality features requiring Priority Notification should have been added to the Dig List. • CD ¶37 – Discussion Item to resolve conflicting information regarding actual dates for calculation of Predicted Burst Pressure and Remaining Life FRE and the deadlines to add indicated FRE to the Dig List. • CD ¶53.d – Discussion Item to determine whether there were unreported dents <2% interacting with seam weld features.
Recommendations	Report all Priority Notifications for (a) ovality features >5% and <≈10%, and (b) evaluate all interacting Dent features <2%.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • *In-line Inspection Reporting Profile Standard*, Rev. 8.1. Enbridge. February 1, 2017.

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• PI-04: *Pressure Restrictions Procedure*, Rev. 5.1. Enbridge. August 25, 2016. • Procedure PI-29: *Priority Notifications Process*, Rev. 3.1. Enbridge. January 31, 2017. • Procedure PI-37: *ILI Feature Fitness for Service Evaluation,* Rev. 4.0. Enbridge. January 4, 2017. • Procedure PI-38: *Mitigation Selection &PI Listing Approval,* Rev 5.0. Enbridge. December 23, 2016. • CD ILI Registry for each ILI Tool Runs of Lakehead System pipeline segments. • Initial ILI Report for each ILI Tool Runs of Lakehead System pipeline segments. • Extended Deadline Dig Documentation generated as needed. • Trending Sheet or Trending Assessment Sheets generated as needed. • Priority Notification Tracking Table updated as needed. • Feature Match Spreadsheet generated as needed. • OneSource Analytic Database System • PipeTrax Listing continuously updated • PI Listing and Approval e-mail, for ILI Tool Runs of Lakehead System pipeline segments generated for specific Milestones (Date stamped to this Milestone) • PPR Database • Assessment Sheets and Assessment e-mails generated for each ILI Tool Run during the applicable Milestone. • eDig Database Listing continuously updated. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report*, Phase 2. Enbridge. March 26, 2018. • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report,* Enbridge. April 16, 2018.
Observations and Interviews	Interviewed a Planning Group subject matter lead in July 2018 and observed the Enbridge process of review.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Standard 1163: *In-line Inspection Systems Qualification Standard*. American Petroleum Institute Standard. April 1, 2013. • American Society of Mechanical Engineers Standard B31G 2012: *Manual for Determining the Remaining Strength of Corroded Pipelines*. American Society of Mechanical Engineers. October 24, 2012. Reaffirmed 2017. • American Petroleum Institute Recommended Practice 579-1 and American Society of Mechanical Engineers Standard FFS-1: *Fitness for Service*. American Petroleum Institute and American Society of Mechanical Engineers. June 2016.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• American Society for Testing and Materials E1049-85: *Standard Practices for Cycle Counting in Fatigue Analysis.* American Society for Testing and Materials. February 22, 1985. Reapproved June 1, 2017.

RS 11. ILI Milestone 5: Mitigation General

VR CD ¶	¶ Title	Assessment
34.g	Repair or Mitigate Any Feature Found During Investigative Digs	**Not Applicable**
39	Mitigate Features on Dig List. Obtain Field Measurements and Record Data Excavation	**Compliant**
46	Excavate and Repair or Mitigate Features on Dig List	**Compliant**
46.a	Complete Mitigation within Time Frames Dependent on Severity	**Compliant**
53.c	Mitigation of Crack Features when Located in an HCA	**Compliant**
53.d	Mitigation of Axial and Interacting Features if Located Outside of an HCA	**Compliant**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 5**. The Mitigation General Milestone verifies that all required features placed on the approved Dig List have been excavated within the required time frames and mitigated as required, and that all exposed features were documented.
Verification Activity	Four ILI Tool Run programs completed the Mitigation General Milestone, for which 118 excavations were added to the Dig List, during the Covered Work Period. Another 14 ILI Tool Run programs had no FRE. The ITP performed the following activities to verify that Enbridge met the requirements of the Mitigation General Milestone on the four programs completed during the period. The general process used by the ITP to verify this Milestone is: • Review the excavation schedule spreadsheet, eDig, to verify consistency with the Assessment Sheet and PI listing. • Review the excavation, measurement, and repair records of each feature on the Enbridge Shared Drive after each NDE report is approved by Enbridge. • Review the NDE reports from the field to verify the actual timing and mitigation are consistent with the eDig listing.
Findings	• CD ¶34.g – There have been no CD-defined investigative digs during the Covered Work Period. • CD ¶39 – All CD-required measurements were taken. Features that have been mitigated on the Dig List have had their field measurements and appropriate data recorded during excavation. • CD ¶46 – All excavations completed and reviewed during the Covered Work Period have been mitigated as appropriate. • CD ¶46.a – All mitigation during the Covered Work Period has been completed within CD time requirements. • CD ¶53.c-d – All mitigation during the Covered Work Period has met the requirements for seam-related features as defined by the CD.

Conclusions	The ITP has verified that the Enbridge Covered Work is in compliance with the applicable requirements of the Mitigation General Milestone during the Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • Procedure PI-29: *Priority Notifications Procedure,* Rev. 3.1. Enbridge. January 31, 2017. • O&MM Book 3: *Determining Remediation Method.* • CD ILI Registry for each ILI Tool Run and pipeline segment. • NDE Reports generated as needed. • On-Call Summary Form generated as needed. • PI Listing and Approval e-mail generated for each ILI Tool Run specific to the applicable Milestone. • PPR Database. • Assessment Sheets and Assessment e-mails generated for each ILI Tool Run during the applicable Milestone. • eDig database listing (Date stamped to this Milestone. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report*, Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	Observed a Planning Group subject matter lead perform NDE review in the Edmonton office on July 10, 2018.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 12. ILI Milestone 6: Mitigation Excavation

VR CD ¶	¶ Title	Assessment
39.a-b	Field Measurements of Excavated Features	**Compliant**
40	ILI Validation and Trending	**Compliant**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 6.** The Mitigation Excavation Milestone reviews all features placed on the approved Dig List that have been mitigated by excavation and repair. It also examines trending and validation of the associated ILI.
Verification Activity	Four ILI Tool Run programs completed the Mitigation General Milestone, for which 118 excavations were added to the Dig List, during the Covered Work Period. Another 14 ILI Tool Run programs had no FRE. The general process used by the ITP to verify this Milestone is: • Review the excavation schedule spreadsheet, eDig, to verify that it agrees with the information contained in the Assessment Sheet and PI listing. • Review the excavation, measurement, and repair records of each feature on the Enbridge Shared Drive after each NDE report is approved by Enbridge. • Review the Enbridge trending assessments in each completed ILI Program Summary document for any significant differences among the following items that may require modifications to the Assessment Sheets and Dig List: – The Initial ILI Report – Field NDE measurements – Previous ILI runs
Findings	• CD ¶39.a-b – All features that have been mitigated during the Covered Work Period have had field measurements and made appropriate data recorded during excavation. • CD ¶40 – Trending of the data from the ILI Programs with excavation data has indicated actual conditions are within the tolerance of the respective ILI tools.
Conclusions	The ITP has verified that the Enbridge Covered Work currently is in compliance with the applicable requirements of the Mitigation Excavation Milestone during the Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • Procedure PI-29: *Priority Notifications Procedure*, Rev 3.1. Enbridge. January 31, 2017. • CD ILI Registry for each ILI Tool Run and pipeline segment. • NDE Reports, generated as needed. • On-Call Summary Form, generated as needed. • OneSource Analytic Database System. • PI Listing and Approval e-mail, generated for each ILI Tool Run specific to the applicable Milestone. (Date stamped to this Milestone) • PPR Database, updated throughout Milestone Process. (Date stamped to this Milestone) • Assessment Sheets and Assessment e-mails , generated for each ILI Tool Run during the applicable Milestone. • eDig Database Listing, updated throughout Milestone process. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	Observed a Planning Group subject matter lead perform trending in the Edmonton office on July 10, 2018.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 13. ILI Milestone 7: Mitigation Pressure

VR CD ¶	¶ Title	Assessment
46.b	Establish and Maintain Interim Pressure Restrictions	**Compliant**
49.c-d	Pressure Restriction Limitations Depending on Feature Type	**Compliant**
52.a-b	Corrosion Feature Pressure Restrictions	**Compliant**
54	Pressure Restrictions for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features	**Compliant**
57.a-b	Dents and Other Geometric Feature Pressure Restrictions	**Compliant**
59.a	Pressure Restrictions for Crack and Corrosion Interactions	**Compliant**
59.b	Pressure Restrictions for Dent Interactions	**Not Compliant**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 7.** The Mitigation Pressure Milestone reviews the pressure restrictions established and maintained for FRE until the FRE are mitigated by excavation.
Verification Activity	Four ILI Tool Run programs completed the Mitigation Pressure Milestone, for which 118 excavations were added to the Dig List, during the Covered Work Period. Another 14 ILI Tool Run programs had no FRE. The ITP performed the following activities to verify that Enbridge met the requirements of the Mitigation Pressure Milestone on the four programs completed during the Covered Work Period. The general process used by the ITP to verify this Milestone is: • Review Enbridge's Pressure Restrictions table and the eDig excavation schedule spreadsheet to verify that pressure restrictions are determined and communicated to Control Center Operations. • Review the Assessment Sheet for each ILI program to ensure that the required pressure restrictions for each FRE are appropriate. In face-to-face meetings and monthly conference calls with Enbridge pipeline integrity personnel, the ITP reviewed Enbridge's process for determining and establishing pressure restrictions, for ensuring they are received and implemented by the Control Center, and for removing the pressure restrictions after FRE are mitigated.
Findings	• The ITP finds that Enbridge has conformed with the requirements of the following CD Paragraphs of the Mitigation Pressure Milestone. – CD ¶46.b – Establish and maintain interim pressure restrictions – CD ¶49.c-d – Pressure restriction limitations depending on feature type – CD ¶52.a-b – Corrosion feature pressure restrictions – CD ¶54 – Pressure restrictions criteria for seam-related features

Findings	– CD ¶57.a-b – Dents and other Geometric feature pressure restrictions – CD ¶59.a – Pressure restrictions for Crack/Corrosion interacting features. • ¶59.b - The ITP finds that pressure restrictions were not consistently implemented in accordance with requirements for dents <2%. See discussion for CD ¶58 regarding these features in the Reporting Segment 9 findings discussion (on page 54).
Conclusions	The ITP has verified that the Enbridge Covered Work is in compliance with the applicable requirements of the Mitigation Pressure Milestone during the Covered Work Period, with the exception of ¶59.b.
Recommendations	Evaluate all Dent features <2% interacting with other features.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver. 1.0. Enbridge. May 23, 2017. • CD ILI Registry for each ILI Tool Run and pipeline segment. • NDE Reports for Digs requiring Pressure Restriction, generated as needed during the Milestone process. • PPR Database. • PI Listing for each ILI Tool Run specific to Mitigation Pressure Milestone. • Assessment Sheet for each ILI Tool Run generated during the Mitigation Pressure Milestone. • eDig Database Listing.
Observations and Interviews	Interviewed a Planning Group subject matter lead in July 2018 and observed the Enbridge process of review.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 14. ILI Milestone 8: Mitigation Alternate

VR CD ¶	¶ Title	Assessment
46.c	Allowance for Alternate Plans (APs): • Excavation timetables not practicable due to extraordinary scope or complexity • If pipe replacement is proposed	**Not Applicable**
46.d	Allowance for Alternate Pressure Restriction (APR) if Prescribed Pressure Restriction Would Significantly Impact Operations	**Compliant**
46.e	Limit 40 APs/APRs During Life of CD	**Compliant**
46.f	Alternate Plan Not Allowed for Rupture Threat	**Compliant**
46.g	Conditions for AP/APR: • Engineering Assessment • Demonstrate equal or greater level of safety • Written EPA notification	**Discussion Item**
46.h	Interim Pressure Restrictions for AP	**Compliant**
46.i	Compliance with Laws and Regulations	**Compliant**
46.j	Implementation of AP/APR in Accordance with Plan's Timetable	**Compliant**
46.k	Documentation of AP/APR	**Compliant**
46.l	Summary of AP/APR in Semi Annual Report	**Compliant**
46.m	EPA Disapproval of an AP	**Not Applicable**
49.c	Maintenance of Pressure Restrictions for Excavations Not Completed within 180 Days	**Not Applicable**
49.e	Report Mitigation Not Completed in 180 Days in Semi Annual Report	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 8.** The Mitigation Alternate Milestone reviews the Enbridge justification for any of the following that varies from the process established by the CD: • Alternate excavation timing • Alternate point pressure restrictions • Pipe replacement that varies from the established CD process
Verification Activity	The ITP performed the following activities to verify compliance with the CD Requirements included within the two Mitigation Alternate Milestones completed during the Covered Work Period: • Reviewed the notices provided by Enbridge for implementation of APRs on Line 5 BC-RW and Line 3 CR-PW. • Reviewed and evaluated Engineering Assessments submitted by Enbridge against industry practices and standards, as well as regulatory and CD Requirements.

Verification Activity	• Participated in conference calls and face-to-face meetings with Enbridge to understand and evaluate the Finite Element Analysis (FEA) modeling that provided a basis for the Engineering Assessments. The ITP reviewed and evaluated the Enbridge implementation of APRs for two locations of dents with interacting metal loss features.
Findings	The ITP finds that: • Both APRs were due to potential operational issues indicated by hydraulic modeling of the prescriptive pressure restrictions in the CD. • An Engineering Assessment using FEA modeling was used to assess the remaining strength and determine the pressure restriction applied. • Three reports were issued for the two APRs: – One for the first APR – A preliminary report for the second APR – A supplemental report for the second APR. The ITP noted significant inconsistency in the detail and quality of the reports. The supplemental report of the second APR was found to have the highest quality, and it was the only one of the three reports that provided sufficient detail to evaluate the Engineering Assessment. • Enbridge may not have conformed with the CD ¶46.g requirement to demonstrate a level of safety equal to or greater than the prescribed pressure restriction when it implemented an APR higher than the pressure seen in the 60 Days prior to discovery of the dent with metal loss feature on Line 5 BC-RW on November 15, 2017. In *SAR2* Table 23-1, Enbridge stated, "It is not possible to compare the level of safety."
Conclusions	• The ITP has verified that Enbridge Covered Work is in compliance with the applicable requirements of the Mitigation Alternate Milestone during the Covered Work Period, with the exception of CD ¶46.g. • Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with CD ¶46.g requirements. • Enbridge does not have a procedure in place to ensure consistent and repeatable results from an Engineering Assessment using FEA.
Recommendations	Enbridge should develop a comprehensive procedure for the conduct, reporting, and recording of FEA for evaluating Dent features interacting with metal loss features when an APR is implemented. In this procedure, Enbridge should demonstrate how its application achieves a level of safety equal to or greater than would be achieved through compliance with the requirements of CD ¶59.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver. 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver 1.0. Enbridge. May 23, 2017. • CD ILI Registry for each ILI Tool Run and pipeline segment. • NDE Reports for Identified Features for each dig location. • Alternate Plan Documentation for each ILI Tool Run when applicable. • EPA Notification and Correspondence as initiated by Enbridge according to CD requirement when needed. • Extended Dig Deadline Documentation for each ILI Tool Run when applicable. • PPR Database • Assessment Sheets for each ILI Tool Run as needed. • eDig Database Listing. • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report.* Enbridge. April 16, 2018.
Observations and Interviews	Interviewed a Planning Group subject matter lead in July 2018 and observed the Enbridge process of review.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 15. ILI Milestone 9: Re-Inspection Interval

VR CD ¶	¶ Title	Assessment
60	Determine Remaining Life of Corrosion and Crack Features	**Compliant**
61	Features Not Requiring Remaining Life Calculations	**Compliant**
62	Representative Values for Remaining Life Calculations	**Compliant**
63	Models for Crack Feature Remaining Life Calculations	**Compliant**
64	Corrosion Growth Rate Calculations.	**Compliant**
65	Re-Inspection Interval Not Greater than 1/2 Remaining Life	**Compliant***
66	Re-Inspection Interval Not Greater than 5 Years	**Compliant***

* Complies after consideration of the terms of the *Stipulation & Agreement* filed with the Court on May 2, 2018. See Findings section, below.

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 9.** The Re-Inspection Interval Milestone reviews the dates set for ILI re-inspection based on the shorter of the following intervals to ensure timely re-inspection in accordance with the CD: • One-half of the estimated Remaining Life of all unmitigated features • A maximum interval of five years
Verification Activity	The ITP performed the following activities to verify compliance with the CD Requirements included within the 12 Re-Inspection Interval Milestones completed during the Covered Work Period and as noted in Appendix B: ILI Milestones and CD Requirements (on page 131): • Reviewed the Remaining Life as provided in the Assessment Sheets with respect to corrosion growth rate or crack growth rate assessment. • Reviewed Assessment Sheets by independently checking calculations. The pressure spectrum for the worst cycling quarter is provided by Enbridge. • Reviewed the most recent ILI for each threat type with respect to the CD required inspection interval, determined the inspection interval, and compared the inspection interval to Enbridge's inspection schedule that was submitted as required by CD ¶29.
Findings	• The ITP finds that Enbridge has conformed with the requirements of the following CD Paragraphs of the Mitigation Pressure Milestone. – CD ¶60 – Determine Remaining Life of Corrosion features and Crack features – CD ¶61 – Features not requiring Remaining Life calculations – CD ¶62 – Representative values for Remaining Life calculations – CD ¶63 – Models for Crack feature calculations – CD ¶64 – Corrosion Growth Rate calculations • The ITP found that six inspections in Enbridge's first *12-Month Lakehead ILI Schedule*, submitted in June 2017, did not conform with CD Requirements for reinspection intervals. The EPA concurred and found Enbridge non-compliant. The non-compliance was subsequently resolved through a

Findings	*Stipulation & Agreement* (*S&A*) filed with the Court on May 2, 2018. With this *S&A* in place, the ITP finds that Enbridge also complies with the requirements of the following CD Paragraphs: – CD ¶65 – Re-inspection interval not to exceed one-half Remaining Life – CD ¶66 – Re-inspection interval not to exceed five years
Conclusions	The ITP has verified that Enbridge Covered Work is currently in compliance with the applicable requirements of the Inspection Interval Milestone during the Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver 1.0. Enbridge. May 23, 2017. • CD ILI Registry for each ILI Tool Run and pipeline segment. • Line -Specific Integrity Plans for each Lakehead System pipeline segment. • Long Range Plan for each Lakehead System pipeline segment. • Pressure history, for each Lakehead System pipeline segment. • Program-specific Assessment Sheets for each ILI Tool Run specific to Inspection Interval Milestone.
Observations and Interviews	Interviewed a Planning Group subject matter lead in July 2018 and observed the Enbridge process of review.
ITP Task 2 Documents and Reports	*In-Line Inspection Schedule for the Initial 12 Month Period*. O.B. Harris, LLC. September 22, 2017. Amended September 27, 2017.
Other Documents, Reports, Standards, Industry Practices	*Stipulation and Agreement Regarding Assessment and Payment of Stipulated Penalties Relating to Timeliness of Certain In-line Inspections.* United States of America. May 2, 2018.

RS 16. ILI Milestone 10: Data

VR CD ¶	¶ Title	Assessment
41	ILI Electronic Records	Compliant
45	Retention of Electronic Records	Compliant
75	Integrity Management Personnel Access to Feature Integration Database	Compliant
76	Successive ILI Data Sets	Compliant
78.a	OneSource ILI Updates	Discussion Item
78.b	OneSource Interacting Features	Compliant

A: ITP Analysis

Summary of CD Requirements	**ILI Milestone 10.** The Data Milestone reviews the information management of all Pipeline Integrity data generated in the course of completing the first nine ILI Milestones.
Verification Activity	The ITP performed the following activities to verify compliance with the CD Requirements included within the 12 Data Milestones completed during the Covered Work Period and as noted in Appendix B: ILI Milestones and CD Requirements (on page 131): • Verified the contents of ILI data, individual pipe joint information containing: – Properties. – Feature calls from multiple ILIs. – Excavation information in the OneSource feature integration database. • Reviewed the OneSource feature integration database for re-issued Initial ILI Reports and, if any, compared to: – The original Initial ILI Report. – Any other databases that may be affected. – Any indicated revisions to the Dig List. • Reviewed OneSource to examine each feature for interaction and to verify that the features have been addressed as required by the CD. The ITP conducted three observations as Enbridge pipeline integrity personnel demonstrated their ability to use the OneSource database in accordance with CD ¶75. After discussions following the ITP's review of *SAR1*, a fourth demonstration was observed by video conference.
Findings	The ITP finds that Enbridge has conformed with the requirements of the following CD Paragraphs: • CD ¶41 – Enbridge is retaining the various ILI electronic records described within this CD Paragraph. • CD ¶45 – Enbridge is maintaining databases in accordance with the retention period for ILI electronic records.

Findings	• CD ¶76 – Enbridge has retained all ILI data sets in electronic format as required. • ¶78.b – Enbridge has met the deadlines for identifying interacting features added to OneSource. The ITP held discussions with Enbridge regarding CD ¶75: • In the three demonstrations of the OneSource database observed by the ITP prior to the ITP's July 23, 2018 cut-off date for verification activity related to this VR, the ITP did not observe that the schematic image required by CD ¶75 displayed the ILI, feature, and wall thickness data required by CD ¶75.b-d. In only two of the three demonstrations did the ITP observe the CD ¶75.a data displayed with a schematic image. • On August 10, 2018, the ITP observed a fourth demonstration of the schematic image required by CD ¶75. During this demonstration, schematic images of pipe joints were displayed with all information required by CD ¶75.a-d displayed in tabular form on the same screen. • Future verification activity by the ITP should assess whether all integrity management personnel have the capability to access and view the schematic image and its required information. CD ¶78.a – An apparent inconsistency exists between the CD ¶34.a requirement to complete the Data Quality Review (DQR) within 30 Days of the Initial ILI Report, and the ¶78.a requirement to enter Initial ILI Report data into OneSource after the DQR but not later than 29 Days after the Initial ILI Report. The ITP has observed that Enbridge has completed some DQRs on the 30th Day, but has entered the Initial ILI Report data prior to the DQR in compliance with the 29-Day deadline. The ITP has not observed any instances where OneSource was not subsequently revised as may have been indicated by a DQR.
Conclusions	• The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements for CD ¶41, ¶45, ¶76, and ¶78.b. • While the schematic image required by CD ¶75 does not strictly meet the CD requirement that "each schematic image of a Joint shall show" the required information, the ITP believes the display of the required data on the same screen of the schematic image substantially meets the intent of the requirement and that Enbridge therefore complies with CD ¶75. Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with applicable CD Requirements for CD ¶34.a and ¶78.a.
Recommendations	• The requirements of CD ¶34.a and ¶78.a should be further discussed to ensure clarity.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver 1.0. Enbridge. May 23, 2017. • *Procedure PI-08:, In-Line Inspection and Tracking Report Collection, Processing and Storage*, Rev 6.0. Enbridge. January 8, 2016. • Procedure PI-09: *Non-Destructive Examination Field Report Collection, Processing and Storage*, Rev. 4.0. Enbridge. January 29, 2016. • Instruction WI-32: *ILI Data Integration*, Ver 1.0. February 10, 2017. • CD ILI Registry for each ILI Tool Run and pipeline segment. • Pipeline Integrity Joint Fact Sheet, updated at the end of each Milestone. • Initial ILI Report for each ILI Tool Run. • OneSource Analytic Database System. • Assessment Sheets, for each ILI Tool Run generated throughout Milestone process. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report*, Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	Observed demonstrations of the CD ¶75 schematic image by an Enbridge subject matter lead in July and October of 2017 and in July and August of 2018.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 17. Dual Pipelines – Span Management

CD ¶	¶ Title	Assessment
68.a	Integrity Protection from Currents, Ice, Vessel Anchors and Spans	**Discussion Item**
68.b	Screw Anchor Support	**Compliant**
68.c	Periodic Visual Inspection	**Compliant**
68.d	Underwater Inspection Repairs	**Compliant**
68.e	Screw Anchor Report	**Not Applicable**
68.f	Periodic Visual Inspection of Dual Pipelines	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	CD ¶68.a requires that Enbridge operate and maintain the Line 5 Dual Pipelines to ensure the pipelines are well supported and to reduce the risk of the integrity of either pipeline being impaired by currents, ice or a vessel' anchor. CD ¶68.b-f require that Enbridge undertake periodic underwater visual inspections of the submerged sections of the Dual Pipelines: • To ensure that they are buried where water depths are 65 feet or less. • For those sections in water deeper than 65 feet, to ensure that they are supported, at all times, with a series of screw anchor pipe supports. • To undertake repairs where the underwater inspections reveal one or more areas are not adequately covered or supported.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed video footage of the 2016 underwater Remotely Operated Vehicle (ROV) surveys of the uncovered portions of the Dual Pipelines. • Reviewed and evaluated reports of the 2016 ROV surveys of the uncovered portions of the Dual Pipelines. • Reviewed and evaluated diagrams of the span profiles and anchor locations on the east and west segments. • Requested additional information in relation to Enbridge's statement in *SAR1* that it operates and maintains the Dual Pipelines to prevent or reduce the risk of the integrity of the pipelines being impaired, and reviewed and evaluated Enbridge's response. • Attended on the work barge during the periods of August 15-October 12, 2017 (during the *Biota Investigation Work Plan* field work) and May 22-July 2, 2018 (during the installation of 19 screw anchors) with the opportunity to view live video feeds of the pipeline, the installation of screw anchors, and other various diver activities.

Verification Activity	• Participated in a face-to-face meeting with the EPA and Enbridge on November 20, 2017, to discuss criteria Enbridge have proposed to modify the language in CD ¶68.b regarding the placement of screw anchors along the length of the Dual Pipelines. – Subsequent to this meeting, participated in various teleconferences with the EPA and Enbridge about these criteria and the development and submission of a CD modification. – Reviewed and evaluated various spreadsheets, diagrams and information Enbridge developed for installing 70 additional screw anchors on the Dual Pipelines in accordance with the proposed criteria. • Reviewed and evaluated a *Screw Anchor Work Plan* Enbridge submitted to the EPA for the installation of 22 screw anchors. At the request of the EPA, the ITP prepared and provided written comments to the EPA and Enbridge regarding the scope and completeness of this plan. • Reviewed various information, reports, and materials that Enbridge provided to the EPA and the ITP following the alleged April 1, 2018, vessel anchor strike that damaged the Dual Pipelines. • Reviewed the report that Enbridge submitted to the State of Michigan describing possible means and methods to prevent or reduce the risk of a vessel anchor strike impairing the integrity of the Dual Pipelines.
Findings	CD ¶68.a: • The CD requires that Enbridge take measures to reduce the risk of vessel anchor damage to the Dual Pipelines. The April 1, 2018, vessel anchor strike demonstrates that current measures did not prevent the alleged event from occurring. • Information in the report to the State of Michigan concerning the placement of a "Do Not Anchor" sign and the pipeline corridor being a Do Not Anchor Zone does not strictly align with information Enbridge has stated in its SARs. A previous requirement by PHMSA requiring such signs has been discontinued. CD ¶68.b – Screw anchors have been installed on both of the Dual Pipelines to ensure there are no spans in excess of 75 feet. CD ¶68.c – A visual inspection of the submerged sections of the Dual Pipelines was completed in 2016. CD ¶68.d – As part of the screw anchor installation process, repairs to the coating were undertaken where the potential for bare metal existed. CD ¶68.e-f – Did not come into effect during the Covered Work Period
Conclusions	• CD ¶ 68.a – Further discussion and information is required to verify whether the Enbridge Covered Work complies with applicable CD Requirements regarding the implementation of measures to prevent anchor strikes. • CD ¶ 68.b-d – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶68. e-f – The applicable CD Requirements were not in effect during the Covered Work Period.

Recommendations	To verify compliance with the requirements in CD ¶68.a, the ITP recommends that Enbridge provide: • Additional information on the means, methods, and/or measures Enbridge plans to undertake to reduce the risk of a vessel anchor strike impairing the Dual Pipelines. • A schedule for implementing the means, methods, and/or measures to reduce the risk of a vessel anchor strike impairing the Dual Pipelines.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Re: Span Management Program Update/Notification of Potential Force Majeure Event.* Steptoe & Johnson, LLP. September 8, 2016. • *Re: Span Management Program Update/Notification of Force Majeure Event*. Steptoe & Johnson, LLP. September 16, 2016. • *Re: Span Management Program*. Steptoe & Johnson, LLP. November 9, 2016. • *2016 Straits of Mackinac Pipeline Inspections and Maintenance Project.* Ballard Marine Construction. January 3, 2017. • Transmittal Letter. *Re: Submittal of Reports Required by Paragraph 68.e of the Proposed Consent Decree*. Steptoe & Johnson, LLP. January 4, 2017. • *Enbridge Response to the ITP's Grocery List Request E005*. Enbridge. August 3, 2017. • *Coating Inspections, Findings and Repairs from Activities Completed in 2017 – Anchor Inspection Work Plan: Interim Report*. Enbridge. January 16, 2018. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	• Attendance on the Barge during the period of May 21 to July 2, 2018. Throughout the time the ITP was on-site observing the installation of screw anchors and repairs to the coating in preparation for installing an anchor, the ITP had regular interactions and discussions with individuals from Enbridge and various key consultants and contractors to Enbridge. These conversations typically sought information such as identifying the locations at which an anchor was to be installed or the schedule for completing installation of the anchors.
ITP Task 2 Documents and Reports	*ITP Additional Information Request for Enbridge First Semi-Annual Report*. O.B. Harris, LLC. February 14, 2018.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• *Re: Proposed Consent Decree – September 8, 2016 Notice of Potential Force Majeure Event*. United States Environmental Protection Agency. September 28, 2016. • *Notice of First Modification of Consent Decree, Civil Action No. 1:16-cv-914*. United States of America. June 01, 2017. • DN VGL Recommended Practice F105: *Free spanning pipelines*. DN VGL. June 2017. • DNV GL Offshore Standard F101: *Submarine Pipeline Systems.* DNV GL.. August 2012.

RS 18. Dual Pipelines – Biota Investigation

CD ¶	¶ Title	Assessment
69.a	Biota Investigation	**Compliant**
69.b	Biota Investigation Work Plan (BIWP)	**Compliant**
69.c	BIWP Implementation	**Discussion Item**

A: ITP Analysis

Summary of CD Requirements	CD ¶69.a-c. require that Enbridge: • Prepare and submit a plan to the EPA to investigate whether any of the biota found on the Dual Pipelines impacts the integrity of the Dual Pipelines. • Conduct that investigation in accordance with the *BIWP*. • Prepare and submit a final report of this investigation to the EPA. • In the event the investigation finds that the biota impairs, or threatens to impair, the Dual Pipelines, supplement the final report with a proposed work plan to address such impairments.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed Enbridge's *Biota Investigation Work Plan Revision 2.0* (*BIWP Rev 2*). • Attended on the barge during the period of August 15 to September 8, 2017 and observed, directly and by live video-feed, the collection of all biota samples and all biota related measurements. • Reviewed Addendum A to *BIWP Rev 2* and provided comments to the EPA and Enbridge on the matters described in Addendum A. • Reviewed and evaluated Versions 1, 2, and 3 of Enbridge's *Coating Repairs Work Plan* (*CRWP*). At the request of the EPA, the ITP provided the EPA and Enbridge written comments on the completeness of those plans. • Attended on the work barge during the period of September 21 to October 12, 2017 and observed the coating repairs that were performed on six of the eight sites where divers had identified bare metal, or the potential for bare metal, on the exterior wall of the Dual Pipelines. • Reviewed and provided comments to the EPA on a proposed draft Addendum B to *BIWP Rev 2*. • Reviewed and evaluated Enbridge's interim status report of the coating repairs made on the Dual Pipelines as of December 15, 2017. • Reviewed and evaluated Enbridge's *Biota Investigation Work Plan; Final Report* (*BIWP Report*). – Confirmed Enbridge's *BIWP Report* was submitted within the timeframes as required in the CD and the *BIWP Rev 2*. – Prepared and submitted to the EPA and Enbridge a written request for additional information following an initial review of the Enbridge's BIWP Report and reviewed and evaluated Enbridge's response to that request.

Verification Activity	– Verified the backgrounds, experience, expertise, and qualifications of various key consultants, contractors, and analytical laboratories that participated in or were utilized either in the collection and preparation of the biota samples and/or the various analyses performed on those samples. – Compared the analytical techniques or methods employed against industry standards or recommended practices. – Compared the quality assurance/quality control processes of the various laboratories that analyzed the biota samples against industry standards or recommended practices. – Verified and confirmed various structural integrity calculations that were undertaken as part of the engineering analysis. – Prepared and submitted a Task 2 report, as requested by the EPA, of the ITP's evaluations, findings, and recommendations.
Findings	CD ¶69.a-b: • The processes and procedures defined in the *BIWP* were consistent with CD Requirements. • The collection of the biota samples and the taking of related measurements or readings were in accordance with the *BIWP Rev 2* and its Addendum A. • The various analyses performed on the samples that were collected were in accordance with the *BIWP Rev 2*. • The consultants, contractors, and analytical laboratories that were used are accepted within the industry as being competent within their individual areas of expertise. • The various techniques used to analyze the biota samples were in accordance with industry standards or recommended practices. • The engineering analysis of the impact of the biota on the structural integrity of the Dual Pipelines was in accordance with industry standards or recommended practices. CD ¶69.c: • The conclusions stated in Assessments #1 and #3 of Enbridge's *BIWP Report* (i.e. that the biota is not causing coating deterioration and that the biota is having little impact on the structural integrity of the pipelines) are supported by the facts and complete. • With regard to that part of Assessment #2 in Enbridge's *BIWP Report* that the biota is not providing a more hospitable environment for sulfate-reducing bacteria (SRB) to colonize, the ITP did not find that statement to be supported by the facts or to be complete. • The repairs to six of the eight sites where bare metal existed, or the potential for bare metal existed, were completed in accordance with the *CRWP Version 3*.

Conclusions	• CD ¶69.a-b – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶69.c – Further discussion and information are required to verify whether the Enbridge Covered Work is compliant with the applicable CD Requirements, in the context of Assessment #2 in Enbridge's *BIWP Report*.
Recommendations	The ITP repeats the recommendation made in the ITP's report of its evaluation of Enbridge's *BIWP Report* namely, that EPA approve the report entitled *Enbridge Line 5; Straits of Mackinac, MI; Biota Investigation Work Plan; Final Report,* dated March 29, 2018, upon one of the following alternative conditions: • That Enbridge provide additional factual evidence, along with an explanation of the technical basis, for the conclusion that there is no evidence that the biota is providing a more hospitable environment for the colonization of SRBs on the external coating of the pipelines. • That Enbridge revise their Assessment #2 conclusion, regarding whether the biota provides a more hospitable environment for microorganisms to colonize, to align more accurately with the facts.
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Biota Investigation Work Plan*, Revision 2. Enbridge. May 18, 2017. • *Biota Investigation Work Plan: Addendum A*. Enbridge. August 27, 2017. • *Coating Repairs Work Plan Line 5 Dual Pipelines*. Enbridge. August 30, 2017. • *Coating Repairs Work Plan Line 5 Dual Pipelines*, Version 2.0. Enbridge. September 8, 2017. • *Coating Repairs Work Plan Line 5 Dual Pipelines*, Version 3.0. Enbridge. September 13, 2017. • *BIWP-draft Addendum B; Additional Sampling and Testing*. Enbridge. December 8, 2017. • *Enbridge Line 5: Straits of Mackinac, MI; Status Update Coating Repairs Work Plan: Summary of Activities Completed to Date*. Enbridge. December 15, 2017. • *Enbridge Line 5 Straits of Mackinac, MI; Biota Investigation Work Plan: Final Report*. Enbridge. March 29, 2018. • *Response to ITP's Information Request related to Enbridge Biota Investigation Work Plan*. Enbridge. May 31, 2018.

	Document Title
Observations and Interviews	• Attendance on the barge during the periods of: – August 15 – September 8 to observe the biota related field work, and – September 21 – October 12, 2017 to observe the repairs to the coating undertaken at six of eight sites. Throughout the time that the ITP was on-site observing the collection of biota samples and taking of various related measurements, the ITP had regular interactions and discussions with individuals from Enbridge and various key consultants and contractors to Enbridge. These conversations typically sought information such as identifying the exact location at which biota samples or measurements were to be taken, the collection of samples, preparation of samples, and the status of bacteria field tests. During the coating repairs, the discussions typically sought information regarding the cleaning and preparation of the pipeline surface for conducting the coating repairs and the application of the coating epoxy, fiberglass overwrap and banding.
ITP Task 2 Documents and Reports	• *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines*. O.B. Harris, LLC. September 4, 2017. • *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines*, Version 2. O.B. Harris, LLC. September 10, 2017. • *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines,* Version 3. O.B. Harris, LLC. September 14, 2017)
Other Documents, Reports, Standards, Industry Practices	• *Re: Enbridge Line 5 Biota Investigation Work Plan (Revision 2)*. United States Environmental Protection Agency. June 13, 2107. • *Re: Enbridge Line 5 Coating Repairs Work Plan (Version 3.0)*. United States Environmental Protection Agency. September 14, 2017. • *Re: Enbridge Line 5 Coating Repairs Work Plan (Version 3.0).* United States Environmental Protection Agency. September 20, 2017. • NACE Standard TM106-2016: *Detection, Testing and Evaluation of Microbiologically Influenced Corrosion (MIC) on External Surfaces of Buried Pipelines*. NACE International. March 20, 2016. • NACE Standard TM0497-2012: *Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems.* NACE International. December 22, 1997. Revised June 23, 2012. • *Volume 1: Management and Technical Requirements for Laboratories Performing Environmental Analysis*. The NELAC Institute. 2016.

RS 19. Dual Pipelines – Axially-Aligned Cracks, Pipeline Movement

CD ¶	¶ Title	Assessment
71	Investigation and Repair of Axially Aligned Cracks	**Compliant**
72	Pipeline Movement Investigation	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	• CD ¶71 requires that Enbridge complete one of the following activities before December 31, 2017: – Perform an ILI of the Line 5 Dual Pipelines for detecting and sizing Axially Aligned Crack features in accordance with the requirements in CD ¶71.a; or – Conduct a hydrostatic pressure test of each of the Line 5 Dual Pipelines in accordance with the requirements in CD ¶71.b. • CD ¶72 requires that Enbridge investigate the cause of any cracks identified in the Line 5 Dual Pipelines as an FRE and to identify and implement corrective measures to repair or remediate the cause of any such cracking.
Verification Activities	The ITP completed the following during the ITP Verification Period: • Confirmed that the hydrotests conducted on the Dual Pipelines conformed to the requirements of CD ¶71.b and CD Section VII, Subsection C. • Reviewed, evaluated, and confirmed that ILI Tool Runs of the Dual Pipelines for circumferentially aligned cracks did not identify any Crack features that are FRE or are related to movement in the pipeline. • Reviewed, evaluated, and confirmed that ILI data related to the positioning of the Dual Pipelines have not identified any appreciable movement of the pipelines.
Findings	CD ¶71 and ¶71.b: • Reporting Segment 5 (on page 41) of this VR summarizes the ITP's verification activities, findings, and conclusions that the hydrotests of the east and west segments of the Dual Pipelines were completed in accordance with CD Requirements and with the provisions in the EPA-approved *Hydrostatic Pressure Test Plan*. • The hydrotests of the east and west segments of the Dual Pipelines were planned, conducted, and completed before December 31, 2017. • The tests were successful, in that each of the tests met the criteria established in the EPA-approved *Hydrostatic Pressure Test Plan*. CD ¶72 • ILIs of the Dual Pipelines have not identified any Crack features which were FRE. • Underwater visual inspections and ILI geo-spatial data have not identified any notable movement of the Dual Pipelines.

Conclusions	• CD ¶71 and ¶71.b – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶72 – The applicable CD Requirement did not come into effect during this Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *07-03-03:* Enbridge Operations and Maintenance Manual; Book 3: Pipeline Facilities; Section: Procedure; *Calculating Theoretical Pressure-Volume Relationship*. Enbridge. Revised April 1, 2006. • *07-03-04:* Enbridge Operations and Maintenance Manual; Book 3: Pipeline Facilities; Section: Procedure; *Calculating Pressure-Temperature Reconciliation*. Enbridge. Revised March 31, 2009. • *Enbridge ITP Response on Line 5 Hydrostatic Pressure Test*. Enbridge. April 25, 2017. • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan,* Rev 1. Enbridge. March 1, 2017. • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan*, Rev 2. Enbridge. April 25, 2017. • *Re: Notice of Planned Line 5 Hydrotest.* Steptoe & Johnson, LLP. May 9, 2017. • *Final Report: Enbridge Line 5–East Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-153.* Lake Superior Consulting, LLC. August 28, 2017. • *Final Report: Enbridge Line 5–West Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-154.* Lake Superior Consulting, LLC. August 28, 2017.
Observations and Interviews	• Attendance and observation of the final preparations for, and completion of, the hydrotests during the period of June 10-16, 2017. • Throughout the time the ITP was on-site observing the hydrotests, the ITP had regular interactions and conversations with the various key individuals from Enbridge and key consultants and contractors to Enbridge. These conversations typically sought information on the status or prospects for the tests (e.g., when the next phase or step in the hydrotest was planned such as line water fill, pressuring the line to start the water temperature stabilization period, or the location of where a particular instrument was mounted).

	Document Title
ITP Task 2 Documents and Reports	• *ITP Review and Evaluation of Enbridge Submittal: ¶71 and 24-26, Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan.* O.B. Harris, LLC. May 8, 2017. • *ITP Review and Evaluation of Enbridge Submittal: ¶25 and 71, Line 5 Dual Pipelines Hydrostatic Pressure Tests.* O.B. Harris, LLC. November 16, 2017.
Other Documents, Reports, Standards, Industry Practices	• *Straits of Mackinac Pipeline Easement.* Conservation Commission of the State of Michigan. April 23, 1953. • *Hydrostatic Pressure Testing as Part of an Integrity Management Program: A Case Study.* Presented at 2016 International Pipeline Conference. IPC2016-64566.

RS 20. Dual Pipelines – Acoustic Leak Detection

VR CD ¶	¶ Title	Assessment
73	Quarterly Inspections Using Acoustic Leak Detection Tool	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶73 requires that Enbridge conduct inspections of the Line 5 Dual Pipelines using an acoustic ILI tool, capable of detecting sounds associated with a small leak, once per calendar quarter. CD ¶73 also requires that Enbridge immediately shut down and sectionalize the pipeline if a leak should be detected.
ITP's Verification Activities	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated six reports of the acoustic ILI Tool Runs completed of the east segment of the Dual Pipelines over the period March 2017 to April 2018. The ITP confirmed that the reports concluded that no acoustic signals indicative of a leak were identified. • Reviewed and evaluated six reports of the acoustic ILI Tool Runs completed of the west segment of the Dual Pipelines over the period March 2017 to April 2018. The ITP confirmed that the reports concluded that no acoustic signals indicative of a leak were identified. • Confirmed that the dates of the Tool Runs met the once per calendar quarter requirement. • Reviewed publicly available information about the selected acoustic ILI tool.
Findings	• An acoustic ILI tool inspection of each of the two segments of the Dual Pipelines has been conducted once per calendar quarter during the Covered Work Period. • The tool did not detect an acoustic signal, during any of these runs, that was indicative of a leak.
Conclusions	CD ¶73 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits East Leg*. Pure HM. March 31, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. March 31, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits East Leg*. Pure HM. June 20, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. June 20, 2017. • *SmartBall® Dual Inspection Report*-Line 5 – Mackinaw Straits East Leg. *Pure HM. August 29, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. August 29, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits East Leg*. Pure HM. November 17, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. November 17, 2017. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits East Leg.* Pure HM. March 21, 2018. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. March 21, 2018. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits East Leg.* Pure HM. April 18, 2018. • *SmartBall® Dual Inspection Report-Line 5 – Mackinaw Straits West Leg*. Pure HM. April 18, 2018.
Observations and Interviews	None
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	Information on the capabilities of the selected acoustic ILI tool from the vendor's website. *Pure Hm*. www.purehm.net

RS 21. Data Integration – General

VR CD ¶	¶ Title	Assessment
74	Feature Integration Database	**Compliant**
77	Update of OneSource Database	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	• CD ¶74 requires that Enbridge operate and maintain a feature integration database, OneSource, that integrates information about Crack features, Corrosion features, and Geometric features both from multiple ILIs of the pipelines and from field measurement devices. The CD requires that the database enable pipeline integrity management personnel to identify and evaluate features that may overlap or otherwise interact, and it sets maximum timing requirements for updating the database. • CD ¶77 requires that, within 365 Days of the CD Effective Date, Enbridge complete an OneSource update incorporating information from inspections using NDE methodologies.
Verification Activity	The ITP was given extensive access to the OneSource database through the Covered Work Period. Shortly after being given access, members of the ITP team involved in pipeline integrity verification were given training at Enbridge's Edmonton office and on-line. OneSource has been a primary tool for ITP verification of Enbridge's compliance with the CD's injunctive measures for pipeline integrity; through its use, the ITP has clearly observed the capabilities and utility of OneSource.
Findings	• CD ¶74 – The OneSource feature integration database has been in place and has met all applicable CD Requirements since the Effective Date of the CD. • CD ¶77 has not been in effect through the Covered Work Period.
Conclusions	• CD ¶74 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶77 – This CD Requirement was not in effect during this Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Lakehead System Integrity Remediation Process*, Ver 1.0. Enbridge. May 23, 2017. • *Lakehead System Integrity Program Logistics Exception Process*, Ver 1.0. Enbridge. May 23, 2017. • Pipeline Integrity Joint Fact Sheet, updated at the end of each Milestone. • Line -Specific Integrity Plans for each Lakehead System pipeline segment. • OneSource Analytic Database System • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	None
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 22. Assessment of Alternative Leak Detection Technologies

VR CD ¶	¶ Title	Assessment
79	Prepare and Submit a Report of Alternative Leak Detection (ALD) Technologies	**Compliant**
80	ALD Report to Include a Description of All Tests and Summarize Findings	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶79 requires that Enbridge prepare and submit a report regarding the feasibility and performance of various alternative leak detection (ALD) technologies That report is required to be submitted within 120 Days of the CD Effective Date (i.e., not later than September 20, 2017). CD ¶79 and ¶80 set out requirements for the various types of leak detection technologies that are to be discussed in the report and various issues or matters Enbridge must address with respect to each of the leak detection technologies identified in CD ¶79.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated Enbridge's *Alternative Leak Detection Technology Report* (*ALD Technology Report*) that was submitted on September 20, 2017. – As part of its evaluations of Enbridge's *ALD Technology Report*, the ITP reviewed and considered available industry reports and practices of this rapidly evolving technology. – Reviewed the API Recommended Practice 1130, *Computational Pipeline Modeling for Liquids* (*API RP 1130*) which was used by Enbridge as a guideline for performing its analysis of ALD technologies. The ITP reviewed *API RP 1130* to compare its guidance to the approach applied by Enbridge in the *ALD Technology Report*. • Reviewed and evaluated Enbridge's response (dated October 24, 2017) to the ITP's request for additional information. Enbridge clarified: – The field tests and evaluations performed by Enbridge in the five years preceding the *ALD Technology Report*. – Information in the *ALD Technology Report* related to aerial technology laser-based spectroscopy. – Specific developments in ALD technologies since certain submissions to PHMSA. • Reviewed and evaluated Enbridge's summary of compliance with the requirements of CD ¶79-80 provided in *SAR1* and *SAR2*. • Conducted teleconferences between the EPA, Enbridge and the ITP concerning the ITP's preliminary findings for the *ALD Technology Report*.

Findings	CD ¶79 – Enbridge's *ALD Technology Report* was submitted on September 20, 2017 (i.e., within 120 Days of the CD Effective Date) as required by the CD. CD ¶79-80 –Enbridge's *ALD Technology Report,* when supplemented with the additional information the ITP requested, discussed the various types of leak detection technologies as required by CD ¶79, discussed the matters or issues stipulated in CD ¶80, and was in accordance with generally accepted industry practice.
Conclusions	CD ¶79-80 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Alternative Leak Detection Technology (ALD) Report*, Version 1.0. Enbridge. September 15, 2017. • *Enbridge Response to ITP Information Request on Section G (1) Assessment of Alternative Leak Detection Technologies*, Version 1.0. Enbridge. October 24, 2015.
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017. • *PCSLD Technical Meeting at Enbridge in Edmonton.* July 25 & 26, 2017.
ITP Task 2 Documents and Reports	• *ALD Report - Additional Information Request*. O.B. Harris, LLC. October 13, 2017. • *Independent Third Party Review and Evaluation of Enbridge Submittal: Section VII.G Paragraph 79 and 80 Assessment of Alternative Leak Detection Technologies*. O.B. Harris, LLC. November 30, 2017.
Other Documents, Reports, Standards, Industry Practices	• *Pipeline Leak Detection Technology Conference: Pipeline Leak Detection Technology; 2011 Conference Report; Final Report.* Alaska Department of Environmental Conservation. March 2012. • DTPH56-11-D-000001: *Leak Detection Study; Final Report*. Keifner & Associates, Inc. Dr. David Shaw, et. al. December 10, 2012. • *A Feasibility Study of Internal and External Based System for Pipeline Leak Detection in the Upstream Petroleum Industry*. Fani Sulaimi, M., et. al. Australian Journal of Basic and Applied Science. March 2014. • Guidance Note. *Leak Detection Based Pipeline Integrity Systems*. TUV NEL Ltd. 2010. • *Leak Detection Systems Global Market 2016-2021*. Prakash, J, et. al. June 2017.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• *Oil and Gas Pipeline Leak Detection Equipment Market to Reach US$3.65B by 2021*. Transparency Market Research. November 2017. • American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 23. Straits of Mackinac ALD Report

CD ¶	¶ Title	Assessment
81	Create and Submit an ALD Report for the Dual Pipelines Crossing the Straits of Mackinac	**Compliant**
82	Evaluate ALD Effectiveness, Practicality and Net Present Costs	**Compliant**
83	Compare ALD Relative Performance and Evaluate Risks and Benefits	**Compliant**

A: ITP Analysis

Summary of CD Requirements	• CD ¶81 requires that Enbridge prepare and submit a report regarding the feasibility of installing an alternative Leak Detection System (LDS) on the Line 5 Dual Pipelines which cross the Straits of Mackinac. CD ¶81 requires that Enbridge: – Assess four different types of leak detection technologies to supplement Enbridge's existing Material Balance System (MBS) LDS. – Submit a report of its assessments, within 180 Days of the CD Effective Date (i.e., no later than November 20, 2017). • CD ¶82 requires that the ¶81 report evaluate the potential effectiveness, the practicability of deploying and operating each technology, and the net present cost of each of the four technologies identified in CD ¶81. • CD ¶83 requires that the ¶81 report compare the relative performance and the risks and benefits of each of the evaluated technologies.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated Enbridge's *Feasibility of Installing an Alternative Leak Detection System at the Straits of Mackinac* report (*ALD Straits Report*) that was submitted on November 19, 2017. As part of its evaluations, the ITP undertook a search of what might be considered the state of the technology being deployed offshore (i.e. subsea) to monitor for, identify, and alarm upon a leak or rupture in a subsea pipeline. From that search, the ITP identified, reviewed, and considered: – *API RP 1130*, *Computational Pipeline Modeling for Liquids* that was used by Enbridge as a guideline for performing its analysis of alternative LDSs. The ITP reviewed *API RP 1130* to compare its guidance to the approach used by Enbridge in the *ALD Straits Report*. – The report of a 2014 DNVGL facilitated Joint Industry Project (JIP) to evaluate various types of LDSs being supplied and used in the offshore sector of the oil and gas industry. – DNVGL Recommended Practice DNVGL-RP-F302, *Offshore Leak Detection* describes a process, similar to the process outlined in the CD, that Enbridge employed in analyzing various alternative LDSs. – A 2014 study of LDSs used in the offshore upstream oil and gas industry published in the Australian Journal of Basic and Applied Science.

Verification Activity	• Confirmed that the *ALD Straits Report* was received within 180 Days of the CD Effective Date. – Following publication of the ITP's Task 2 report on the *ALD Straits Report*, Enbridge requested that the ITP amend its report to include clarifications regarding the definition of abnormal operating condition, sensitivity values in Appendix 2 of the ITP's report, and the Pipeline Research Council International document discussed in Appendix 2 of the *ALD Straits Report*. – Other verification activities performed by the ITP included teleconferences between the EPA, Enbridge, and the ITP concerning the ITP's Task 2 report on the Enbridge *Rupture Detection System Test Report.*
Findings	CD ¶81 – Enbridge submitted its *ALD Straits Report* on November 19, 2017 (i.e., within the 180 Days) as required by the CD. CD ¶81-83 – Enbridge's *ALD Straits Report*: – Assessed and evaluated the various types of leak detection technologies as required by CD ¶81 and the matters or issues stipulated in CD ¶s 82 and 83. – Was in accordance with generally accepted industry practice.
Conclusions	CD ¶81-83 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Report on Feasibility of Installing an Alternative Leak Detection System at the Straits of Mackinac*, Version 1.0. Enbridge. November 19, 2017.
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017. • *PCSLD Technical Meeting at Enbridge in Edmonton.* July 25 & 26, 2017. • *Weekly ITP/EPA/Enbridge Meeting by Conference Call.* February 28, 2018. • *PCSLD Technical Meeting at Enbridge in Edmonton.* March 14, 2018.
ITP Task 2 Documents and Reports	• *Independent Third Party Review and Evaluation of Enbridge Submittal: Section VII.G Paragraphs 81, 82 and 83 Report on Feasibility of Installing an Alternative Leak Detection System at the Straits of Mackinac.* O.B. Harris, LLC. February 19, 2017. Amended March 6, 2018.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• *Pipeline Leak Detection Technology Conference: 2011 Conference Report*. Alaska Department of Environmental Conservation. 2011. • DTPH56-11-D-000001: *Leak Detection Study; Final Report*. Keifner & Associates, Inc. Dr. David Shaw, et. al. December 10, 2012. • *A Feasibility Study of Internal and External Based System for Pipeline Leak Detection in the Upstream Petroleum Industry*. Fani Sulaimi, M., et. al. Australian Journal of Basic and Applied Science. March 2014. • DNVGL Recommended Practice F302: *Offshore leak detection*. DNVGL. April 2016. • Guidance Note. *Leak Detection Based Pipeline Integrity Systems*. TUV NEL Ltd. 2010. • *Leak Detection Systems Global Market 2016-2021*. Prakash, J, et. al. June 2017. • *Oil and Gas Pipeline Leak Detection Equipment Market to Reach US$3.65B by 2021*. Transparency Market Research. November 2017. • American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 24. Leak Detection for New Pipelines

CD ¶	¶ Title	Assessment
84	New Lakehead Pipelines and Replacement Segments: Applicability	**Not Applicable**
85	Installation of Flowmeters	**Not Applicable**
86	Installation of Flowmeters on Lines That Utilize In-Line Batch Interface Tools	**Not Applicable**
87	Installation of Other Instrumentation	**Not Applicable**
88	Establishment of MBS Segments	**Not Applicable**
89	Leak Detection Sensitivity Requirements	**Not Applicable**
90	Demonstration of Compliance with Leak Detection Sensitivity Design and Construction Requirements	**Not Applicable**
91	Establishment and Optimization of Alarm Thresholds	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	CD ¶84-91 – When Enbridge replaces or constructs and commissions a new pipeline, Enbridge is required to install leak detection equipment on those pipelines and to take certain actions as part of commissioning the pipeline and commissioning the required leak detection equipment.
Verification Activity	During the Covered Work Period, Enbridge did not replace a Lakehead Pipeline or install a Replacement Segment.
Findings	None
Conclusions	CD ¶84-91 – The applicable CD Requirements were not in effect during this Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	None
Observations and Interviews	None
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline

VR CD ¶	¶ Title	Assessment
92	Operation of MBS Leak Detection System (LDS)	**Compliant**
93	Temporary Suspension of MBS Leak Detection Capabilities	**Compliant**
94	Overlapping MBS Segments	**Compliant**
95	Alternative Leak Detection Requirements	**Compliant**
96	Reporting MBS Outages	**Compliant**
97	Reporting Requirements	**Compliant**
98	Tolling Requirements	**Compliant**

A: ITP Analysis

Summary of CD Requirements	• CD ¶92 and ¶93 establish various requirements for the continuous operation of the MBS LDS and circumstances under which the MBS system may temporarily be suspended. • CD ¶94 requires that Enbridge automatically establish and maintain MBS coverage in overlapping segments of a pipeline in the event of an MBS LDS failure in one or more segments. • CD ¶95 establishes requirements for maintaining leak detection capability by alternate means in the event MBS LDS coverage is lost in the first or last segment of a pipeline. • CD ¶96 requires that Enbridge restore MBS LDS coverage as soon as practicable and report all MBS LDS outages in the SARs. • CD ¶97 establishes various circumstances, events, and criteria for suspending the reporting requirements in CD ¶96. • CD ¶98 sets out a mechanism such that the 4-hour time period allowed for ILI tool bypass in CD ¶97 may be extended by the duration of a Shutdown (i.e., oil flow in a pipeline is zero).
Verification Activity	The ITP completed the following during the ITP Verification Period: • Attended an Enbridge orientation meeting in March 2017 which included a briefing on Enbridge's leak detection and Supervisory Control and Data Acquisition (SCADA) Systems. • Requested that Enbridge provide documentation describing the overall LDS implemented at Enbridge. The ITP: – Reviewed and evaluated this documentation. – Developed additional questions and documentation requests. – Reviewed and evaluated Enbridge's *LDS General Manual*. • Participated in face to face meetings with Enbridge to further understand the details of the LDS implementation at Enbridge. • Reviewed alarm reports and other documents associated with the LDS dating back to the CD Effective Date.

Verification Activity	• Established a monthly meeting (teleconference) with Enbridge that started in August 2017. The standard agenda for this meeting includes reviewing and discussing: – The Report of Alarms, including MBS fail and MBS coverage alarms. – Use of alternative leak detection. – Instrument outages and resolutions. • Reviewed Enbridge's discussion or summary of compliance with the requirements of CD ¶92-98 provided in *SAR1* and *SAR2* and Enbridge's response to the ITP's request for additional information. • Observed the wet commissioning of a new Remotely-Controlled Valve, including verification of its addition to the MBS LDS. • Observed a fluid withdrawal test, including observation of MBS LDS performance. • Observed a demonstration of team training, including multiple scenarios requiring the interaction between multiple roles in the control center.
Findings	CD ¶92 – Enbridge's MBS LDSs were in operation as of the CD Effective Date (i.e., May 23, 2017). CD ¶92-98: • For this Covered Work Period, reports of the operation, outages, and Enbridge's response to outages of the MBS LDS are in accordance with applicable CD Requirements. • The observed fluid withdrawal test demonstrated that leak detection and response performance comply with CD Requirements.
Conclusions	CD ¶92-98 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • Swim Lane Diagram. *Leak Detection Ultrasonic Flow Meter Planned Maintenance Procedure Flow.* Enbridge. June 28, 2017. • *Mainline Leak Detection Equipment, D12-105 – (2015),* Version 2.0. Enbridge. October 28, 2015 • *Leak Detection – SPS CPM Update Procedure,* Revision 3.1. Enbridge. December 6, 2016 • *SCADA-Leak Detection Change Procedure,* Version 2.0. Enbridge. August 17, 2015 • *Leak Detection End to End Commissioning Procedure,* Revision 1.2. Enbridge. December 15, 2016

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Consent Decree Grocery List IRs; G39; Flow Meter Outage Tracking Workflow*. Enbridge. September 25, 2017. • *Consent Decree Grocery List IRs; G33; Documentation of fluid withdrawal tests in the 12 months prior to CD Effective Date*. Enbridge. September 11, 2017. • *Consent Decree Grocery List IRs; G34; MBS Performance Tests.* Enbridge. September 22, 2017. • *Consent Decree Grocery List IRs; G37; LDS Model Routine Maintenance.* Enbridge. September 25, 2017. • *Consent Decree Grocery List IRs; G38; Report of use of Alternative Leak Detection.* Enbridge. September 25, 2017. • *Fluid Withdrawal Test Summary.* Enbridge. March 15, 2018. • *Control Center Operations Line 2 FWT.* Enbridge. March 15, 2018. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.*Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report*. Enbridge. April 16, 2018.
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017. • *PCSLD Technical Meeting at Edmonton.* July 25 & 26, 2017. • *Valve Commissioning Observation.* Edmonton, October 17, 2017. • *Fluid Withdrawal Test Observation at Enbridge Control Center*, Edmonton. March 14, 2018. • *Team Training Observation, Edmonton.* August 2, 2018. • PCSLD Monthly Technical Meetings conducted during the period of the Verification Report.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 26. Transient-State Sensitivity Analysis

CD ¶	¶ Title	Assessment
101	Transient-State Sensitivity Analysis	Compliant

A: ITP Analysis

Summary of CD Requirements	CD ¶101 requires that, within 180 Days of the CD Effective Date, Enbridge shall perform an analysis of all Lakehead System pipelines to determine leak sensitivity during Startup and Shutdown conditions for the purpose of establishing Transient-State performance targets.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Attended an Enbridge orientation meeting in March 2017 that included a briefing on Enbridge's leak detection and SCADA systems. • Attended a PCSLD technical meeting in July 2017 that included detailed briefings on MBS tuning and sensitivity targets. • Attended, in October 2017, a presentation by Enbridge's Leak Detection Senior Specialist that walked through Enbridge's approach to creating MBS leak signals and Enbridge's tuning of the MBS. • Participated in a November 28, 2017, teleconference with Enbridge and the EPA where Enbridge presented a walkthrough of the Transient-State sensitivity performance testing and the approach of using forced parameter testing to determine minimum leak detection times. • Reviewed and evaluated Enbridge's November 30, 2017, *Transient-State Sensitivity Analysis Summary* report. • Reviewed and evaluated a more detailed presentation Enbridge provided in December 2017 of the scenarios and detection times achieved during the testing for Steady-State, Startup, and Shutdown, including the calculations used to determine sensitivity and the analysis used to determine performance targets. • Reviewed and evaluated Enbridge's summary of compliance with the requirements of CD ¶101 provided in *SAR1* and *SAR2*. • As part of the ITP's evaluations, the ITP reviewed and took into consideration: – The American Petroleum Institute's Technical Report 1149, *Pipeline Variable Uncertainties and Their Effects on Leak Detectability* as a basis for understanding and analyzing the leak detection sensitivity approach used at Enbridge. – A paper that was co-authored by an Enbridge subject matter expert and presented at the International Pipeline Conference in 2016 entitled *A Novel Approach to Leak Sensitivity Testing of Computational Pipeline Monitoring Systems for Hydrocarbon Liquid Pipelines with Hydraulic Simulators.*

Findings	• Enbridge asserted in *SAR1* that the Transient-State Sensitivity Analysis was completed November 19, 2017 (i.e., within 180 Days after the CD Effective Date). • The *Transient-State Sensitivity Analysis Summary* and other materials Enbridge provided in relation to that analysis conform to the requirements of CD ¶101 and are consistent with generally accepted industry practice.
Conclusions	CD ¶101 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • Presentation. *PCSLD Technical Meeting at Edmonton.* July 25 & 26, 2017. • Presentation. *Leak Detection Analyst Training.* October 17 & 18, 2017 • Presentation. *G92 Operation of MBS LD System.* October 17 & 18, 2017. • Presentation. *Compliance Verification.* Enbridge. November 28, 2017. • *Transient-State Sensitivity Analysis Summary,* Version 1.0. Enbridge. November 30, 2017. • Presentation. *P.101 Transient Sensitivity Analysis Walkthrough.* Enbridge. December 18, 2017. • Presentation. *Leak Detection Sensitivity.* Enbridge. March 14, 2017. • Presentation. *Transient Sensitivity Analysis Walkthrough.* Enbridge. May 3, 2018. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018. • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report*. Enbridge. April 16, 2018.
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017. • *PCSLD Technical Meeting at Enbridge at Edmonton.* July 25 & 26, 2017. • *PCSLD Technical Meeting & Valve Commissioning Observation at Enbridge at Edmonton.* October 17 & 18, 2017. • *Monthly PCSLD Technical Meeting by Conference Call.* Enbridge. November 28, 2017.

	Document Title
Observations and Interviews	• *Monthly PCSLD Technical Meeting by Conference Call.* Enbridge. December 18, 2017. • *Monthly PCSLD Technical Meeting and Fluid Withdrawal Test Observation at Enbridge in Edmonton*. March 14, 2018. • *Transient Sensitivity Analysis Walkthrough by Conference Call.* Enbridge. May 3, 2018. • *Monthly PCSLD Technical Meeting by Conference Call*. June 28, 2018.
ITP Task 2 Documents and Reports	• Briefing Paper. *Enbridge Transient Analysis*. O.B. Harris, LLC. June 20, 2018.
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012. • American Petroleum Institute Technical Report 1149: *Pipeline Variable Uncertainties and Their Effects on Leak Detectability,* Second Edition. American Petroleum Institute.; September 2015. • International Pipeline Conference Paper IPC2016-64698. *A Novel Approach to Leak Sensitivity Testing of Computational Pipeline Monitoring Systems for Hydrocarbon Liquid Pipelines with Hydraulic Simulators.* Proceedings of the 2016 11th International Pipeline Conference. Daniel Hung, Satya Mokamati. September 26-30, 2016.

RS 27. 24-hour Alarm

CD ¶	¶ Title	Assessment
103	24-hour Alarm	Compliant

A: ITP Analysis

Summary of CD Requirements	CD ¶103 requires that Enbridge: • Within 270 Days of the CD Effective Date, modify the MBS Leak Detection System to include a new "24-hour" alarm which is to be integrated into Enbridge's SCADA system (the 24-hour Alarm). • Continuously operate the 24-hour Alarm. • Continuously monitor, track, and model the mass balance of each MBS Segment over any rolling 24-hour period. • Ensure that the MBS LDS shall alarm if it cannot detect, or otherwise account for, 3% or more of oil pumped or injected into a given MBS Segment over any rolling 24-hour period. • The alarm system shall alert each member of the Alarm Response Team (ART) of such a condition in accordance with CD ¶106 and CD ¶107. CD ¶103.c-g do not come into effect until one year following the establishment of the 24-hour Alarm.
Verification Activity	The ITP completed the following during the ITP Verification Period • Attended an Enbridge orientation meeting in March 2017 that included a briefing on Enbridge's leak detection and SCADA systems and its implementation of the 24-hour Alarm. • Participated in face-to-face meeting with Enbridge in July 2017 to further understand the details of implementing the 24-hour Alarm system. • Participated in a face-to-face meeting with Enbridge in October 2017 to understand the details of establishing alarm thresholds and the relationship to the 24-hour Alarm. • Reviewed and evaluated a presentation of Enbridge's annual MBS performance testing and the test results that Enbridge provided in the November 2017 PCSLD meeting. • Participated in a face-to-face meeting with Enbridge in March 2018 to understand the implementation of the 24-hour Alarm. • Reviewed and evaluated Enbridge's *24-hour Alarm Analysis* summary report, which Enbridge submitted on April 9, 2018. The ITP prepared a briefing paper documenting the ITP's analysis of Enbridge's report and submitted this paper to the EPA and Enbridge on June 28, 2018. • Participated in a July 26, 2018, meeting during which Enbridge: – Presented materials clarifying the relationship between the MBS LDS and the MBS LDS's subordinate functions which include the 24-hour Alarm. – Clarified how the MBS coverage alarms and leak alarms flow from the detection algorithm to the system operator. – Demonstrated the 24-hour Alarm.

Findings	• The ITP has confirmed that Enbridge has implemented and that a 24-hour Alarm has been in service since October 18, 2017 (i.e., within the 270-Day requirement) and has been continuously operated from its in-service date. • The ITP has confirmed that Enbridge established the 24-hour Alarm as fully tuned and used in production on February 16, 2018.
Conclusions	CD ¶103 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • Presentation. *ITP CD Orientation Meeting.* Enbridge. Edmonton. March 7 & 8, 2017. • Presentation. *PCSLD Meeting at Edmonton,* July 25 & 26, 2017. • *PCSLD Technical Meeting & Valve Commissioning Observation at Enbridge at Edmonton.* October 17 & 18, 2017. • *Monthly PCSLD Technical Meeting by Conference Call.* Enbridge. November 28, 2017. • *Monthly PCSLD Technical Meeting and Fluid Withdrawal Test Observation at Enbridge in Edmonton*. March 14, 2018. • Paper. *Enbridge 24 Hour Alarm Analysis (CD p.103) 20180409*. April 9, 2018. • *Monthly PCSLD Technical Meeting by Conference Call*. June 28, 2018. • Presentation. *24-Hour Alarm ("AVB").* Enbridge. July 26, 2018 • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018. • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report*. Enbridge. April 16, 2018.
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017 • *PCSLD Technical Meeting at Enbridge in Edmonton.* July 25 & 26, 2017. • *PCSLD Technical Meeting & Valve Commissioning Observation at Enbridge in Edmonton.* October 17 & 18, 2017. • *Monthly PCSLD Technical Meeting by Conference Call.* Enbridge. November 28, 2017. • *Monthly PCSLD Technical Meeting and Fluid Withdrawal Test Observation at Enbridge in Edmonton*. March 14, 2018. • *Monthly PCSLD Technical Meeting by Conference Call*. June 28, 2018. • *Monthly PCSLD Technical Meeting by Conference Call*. July 26, 2018.

	Document Title
ITP Task 2 Documents and Reports	• Briefing Paper. *Enbridge 24 Hour Alarm Analysis*. O.B. Harris, LLC. June 20, 2018.
Other Documents, Reports, Standards, Industry Practices	• *Real-Time Pipeline Leak Detection and Location Using Volume Balancing*. Pipeline & Gas Journal. February 2011. • *Compensated Mass Balance Method for Oil Leakage Detection using SCADA*. International Journal of Computer Science and Security. Volume (9): Issue (6) 2015.

RS 28. New Equipment at Remotely-Controlled Valves

CD ¶	¶ Title	Assessment
99	Installation of New Equipment at Remotely-Controlled Valves	**Compliant**
100	Conditions When the Requirements in CD ¶99 Shall Not Apply	**Not Applicable**

A: ITP Analysis

Summary of CD Requirements	• CD ¶99 requires that Enbridge install pressure and temperature sensors to provide real-time data to Enbridge's SCADA system and MBS LDS if Enbridge excavates a Remotely-Controlled Valve (RCV) or converts a manual valve to an RCV. • CD ¶100 provides that the requirements of CD ¶99 do not apply to emergency excavations or when the new equipment would be duplicative of existing, functionally identical equipment.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and provided comments to an Enbridge document, issued on June 26, 2018, to define their interpretation of these requirements, *Enbridge's Interpretation of Consent Decree ¶ 99, 100, & 124*, June 26, 2018. • Reviewed the discussion in Enbridge's *SAR2* concerning the interpretation of CD ¶99.
Findings	CD ¶99: • Enbridge's interpretation document clarified the following terms: – Remotely-Controlled Valve – Excavates a Remotely-Controlled Valve – Emergency basis – Planned excavation – Functionally identical equipment • Enbridge's interpretation document excludes valves from the three-minute closure time required in CD ¶124, except for the fourteen valves specifically identified in CD ¶121. • Enbridge's discussion in *SAR2* does not discuss Enbridge's interpretation document. • Enbridge reported in *SAR2* that one valve, on Line 4 at Nushka Lake, excavated during the period fell under CD ¶99, and that Enbridge has applied for the permits to install the CD-required instrumentation. *SAR2* noted the required instrumentation is expected to be installed in the 4th Quarter of 2018. CD ¶100 – Enbridge has provided no reports for the Covered Work Period that an emergency excavation of a valve was required or that, when excavating a valve, duplicative instrumentation was in place.

Conclusions	• CD ¶99 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements. • CD ¶ 100 – The applicable CD Requirements did not come into effect during this Covered Work Period.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Enbridge's Interpretation of Consent Decree ¶ 99, 100, & 124*. Enbridge. June 26, 2018.
Observations and Interviews	• The ITP met via teleconference with Enbridge on April 16, 2018 to discuss the draft Interpretation document.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	None

RS 29. Operate and Test New Rupture Detection System

CD ¶	¶ Title	Assessment
102	Rupture Detection System Alarm	Discussion Item

A: ITP Analysis

Summary of CD Requirements	CD ¶102 requires that Enbridge continuously operate a new Rupture Detection System (RDS) alarm system on all Lakehead System pipelines. The RDS is required to be integrated with Enbridge's SCADA system and the MBS LDS. CD ¶102 establishes various requirements for the RDS, including: • Testing of the RDS on at least two separate MBS Segments and the submission of the test results to the EPA within 90 Days of the CD Effective Date. If such testing does not demonstrate compliance, the CD requires that Enbridge submit a corrective action plan. • The RDS shall be a computer-based system that continuously monitors real-time data to detect all of the following conditions: – An abnormally low pressure. – An abnormal pressure drop. – An abnormal increase in flow rate. • The RDS generates an alarm, upon detection of one or more of the above conditions, and issues an alarm to each member of the ART.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Attended an Enbridge orientation meeting in March 2017 that included a briefing on Enbridge's leak detection and SCADA systems. • Requested that Enbridge provide documentation describing the overall RDS on the Lakehead System. The ITP reviewed and evaluated the documentation and developed additional questions and documentation requests. In particular, the ITP reviewed and evaluated Enbridge's *LDS General Manual.* • Participated in face-to-face meetings with Enbridge in July 2017 to further understand implementation details regarding the RDS. • Reviewed MOC documents related to the implementation of the RDS in Enbridge. • Established a monthly meeting (teleconference) with Enbridge commencing in August 2017. The standard agenda for this meeting includes reviewing and discussing standard RDS-related reports and the continuous operation of the RDS for that month. • Reviewed and evaluated Enbridge's *Rupture Detection System Test Report* that was submitted August 18, 2017 (i.e., within 90 Days of the CD Effective Date). As part of the ITP's review and evaluation of that report, the ITP reviewed and took into consideration information from the following sources: – API RP 1130, *Computational Pipeline Modeling for Liquids.* – A white paper prepared jointly by API and the Association of Oil Pipe Lines entitled *Liquid Pipeline Rupture Recognition and Response*.

Verification Activity	• Developed and submitted a request for additional information after review of Enbridge's *Rupture Detection System Test Report*. The ITP: – Reviewed, evaluated, and verified Enbridge's response to the ITP's information request and, in particular, analyzed Enbridge's single station algorithm to identify the specific attributes this algorithm uses to detect a rupture. – Met with Enbridge and discussed the ITP's evaluations and analysis of Enbridge's single station algorithm. • Reviewed and evaluated an Enbridge proposal to perform additional testing to demonstrate MBS performance. • Reviewed and evaluated an Enbridge report, submitted on April 16, 2018, presenting the results of the additional testing. – Prepared a briefing paper regarding the ITP's review and presenting further questions related to leak alarm response when a rupture is detected by the MBS LDS. • Reviewed Enbridge's summary of compliance with the requirements of CD ¶102 provided in *SAR1* and *SAR2*. • Participated in teleconferences between the EPA, Enbridge, and the ITP concerning: – The ITP's preliminary findings for the Enbridge *Rupture Detection System Test Report*. – ITP's Task 2 report on the Enbridge *Rupture Detection System Test Report.* – Enbridge's proposed MBS Leak Detection System rupture testing. – The ITP's briefing paper regarding Enbridge MBS Leak Detection System rupture detection. The ITP did not conduct a detailed analysis of the large data sets used to develop and tune the RDS as referenced in Enbridge's *Rupture Detection System Test Report*.
Findings	• As required by the CD Enbridge has implemented and continuously operated the RDS since the CD Effective Date. • Enbridge submitted the CD-required *Rupture Detection System Test Report* within 90 Days of the CD Effective Date. • RDS testing was performed on at least two separate MBS Segments. • Enbridge provided an explanation demonstrating that the RDS would alarm in the event of a sudden pressure change on both sides of a pump station. • As required by the CD: – The RDS continuously monitors real time data to detect abnormally low pressure, and/or an abnormal pressure drop. – RDS alarms issue an alert to each member of the Alarm Response Team both (a) by remote notification and (b) through both an audible and a visual alarm. • The ITP was unable to verify that the RDS continuously monitors real-time data to detect an abnormal increase in flow rate.

Conclusions	CD ¶102 – Further discussions and information are required to verify whether the Enbridge Covered Work is compliant with applicable CD Requirements.
Recommendations	The ITP recommends one of the following alternative actions: • Enhance the RDS single station algorithm to include real-time monitoring of data to detect an abnormal increase in flow rate. • Modify MBS LDS alarming to distinguish alarms that are caused by an abnormal increase in flow rate such that these alarms generate an immediate Shutdown rather than be subject to the 10-minute rule (see CD ¶109.a).
Schedule for Recommendations	Enbridge should provide responsive information within 90 Days of the issuance of this VR as part of their response in accordance with CD ¶133.b.

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Mainline Leak Detection Equipment, D12-105 – (2015),* Version 2.0. Enbridge. October 28, 2015. • Presentation. *ITP CD Orientation Meeting.* Enbridge. Edmonton. March 7 & 8, 2017. • *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • Presentation. *PCSLD Meeting.* Enbridge. Edmonton, July 25 & 26, 2017. • *Rupture Detection System Test Report*, Version 1.0. Enbridge. August 18, 2017. • *Enbridge Response to ITP Information Request on p.102 Rupture Detection System*, Version 1.0. Enbridge. September 13, 2017. • *Enbridge Response to ITP Information Request on p.102 Rupture Detection System*, Version 2.0. Enbridge. September 29, 2017. • *Enbridge Response to September 25, 2017 ITP Preliminary Findings on Consent Decree RDS Report (Paragraph 102)*. Enbridge. October 13, 2017. • Presentation. *Leak Detection Analyst Training.* Enbridge. Edmonton. October 17 & 18, 2017. • Presentation. *Rupture Detection System.* Enbridge. Edmonton. October 17 & 18, 2017. • *Enbridge Response to EPA/ITP Request for Additional Information on MBS Testing,* Version 1.0. Enbridge. December 19, 2017. • *Enbridge Report on MBS Rupture Testing,* Version 1.0. Enbridge. April 26, 2018. • Presentation. *RDS Test Report.* Conference Call. Enbridge. May 24, 2018. • Presentation. *MBS Rupture Testing ITP Review.* Conference Call. Enbridge. June 28, 2018.

	Document Title
Observations and Interviews	• *ITP Orientation Meeting at Enbridge in Edmonton.* March 7 & 8, 2017. • *PCSLD Technical Meeting at Enbridge in Edmonton.* July 25 & 26, 2017. • Presentation. *Monthly PCSLD Technical Meeting.* Presented by Enbridge on August 25, 2017 at the first monthly PCSLD Technical Meeting via teleconference screen share. • Online Meeting. ITP briefed EPA and Enbridge on the preliminary findings from the ITP's preliminary assessment of the original *RDS Test Report*. September 25, 2017. • Presentation. Enbridge, EPA (by phone), and ITP met in Edmonton to discuss the October 13, 2017 submittal, *Response to Preliminary Findings.* October 17, 2017. • *PCSLD Technical Meeting & Valve Commissioning Observation at Enbridge in Edmonton.* October 17 & 18, 2017. • Presentation. Enbridge, EPA (by phone), and ITP (by phone) to forward RDS discussion. November 20, 2017. • Online Meeting. Enbridge, EPA, and ITP to discuss proposed MBS Rupture detection testing. November 27, 2017. • Online Meeting. Enbridge, EPA and ITP to discuss ITP Briefing Paper providing analysis of Enbridge MBS Rupture Testing Report, and state of Enbridge compliance with CD 102. June 28, 2018. • Other Monthly PCLSD/CCO Meetings. Meetings conducted either online or in person covering all leak detection activity during the period beginning with the Effective Date of the CD.
ITP Task 2 Documents and Reports	• *Independent Third Party RDS Test Report Additional Information Request.* O.B. Harris, LLC. August 28, 2017 • *Independent Third Party RDS Test Report Preliminary Findings.* September 25, 2017 • *Independent Third Party Review and Evaluation of Enbridge Submittal: Section VII.G Paragraph 102 Rupture Detection System Test Report*. O.B. Harris, LLC. October 23, 2017. • Briefing Paper. *Enbridge Report on MBS Rupture Testing*. June 14, 2018.
Other Documents, Reports, Standards, Industry Practices	• *Liquid Pipeline Rupture Recognition and Response.* American Petroleum Institute and Association of Oil Pipelines. August 2014. • American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 30. Alarm System and Response Procedures

CD ¶	¶ Title	Assessment
104	Leak Detection Requirements for Control Room: Applicability	Compliant
105	Alarm Response Team (ART)	Compliant
106	Remote Notification of ART	Compliant
107	Audible and Visual Alarms	Compliant
108	Alarm Clearance Procedures	Compliant
108.a	Alarm Clearance Requirements	Compliant
108.b	Alarm Clearing Restrictions	Compliant
108.c	Confirmation of Leak Detection System Functioning	Compliant
108.d	Independent Alarm Investigation	Compliant
108.e	ART Procedures for Column Separation	Compliant
108.f	Electronic Records of Alarm Response	Compliant
109	Unscheduled Shutdown in Response to an Alarm	Compliant
109.a	Ten-Minute Rule	Compliant
109.b	Column Separation - Running Pipelines	Compliant
109.c	Column Separation - Pipeline Shutdown	Compliant
109.d	Confirmed Leak Rule	Compliant
109.e	Shutdown and Restart Record	Compliant

A: ITP Analysis

Summary of CD Requirements	CD ¶104-109 establishes: • A series of requirements for any and all alarms generated by the MBS Leak Detection System and the RDS. • Requirements for a team assigned to respond to these alarms. These CD Paragraphs establish requirements for: • Establishing an Alarm Response Team (ART). • Creating an alarm system for the ART with specified alarm capabilities. • Establishing alarm response procedures to be employed by the ART for clearing alarms or for shutting down a pipeline in response to an alarm.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated applicable documents to develop a full understanding of Enbridge's organizational structure, policies, processes, procedures and systems for: – Establishing the ART, with defined roles and responsibilities (CD ¶105). – Establishing the alarm system capability to address all applicable alarms generated by the MBS Leak Detection System and the RDS (CD ¶104, ¶106, and ¶107). – Establishing all applicable alarm response procedures (CD ¶108 and ¶109). As a part of these evaluations, the ITP took into consideration applicable federal regulations and industry recommended practices.

Verification Activity	• Toured Enbridge's Control Center and observed a demonstration of Enbridge's leak detection alarm manager (LDAM). LDAM is the computer automated system used by the ART and the shift supervisor (SS), and it provides the required alarm system capability. • Reviewed Enbridge's training program used during the initial rollout of the applicable processes, procedures and systems to fully employ these procedures as required by the CD. The ITP also reviewed the ongoing annual training program used to sustain the CD-required skills capability. • Reviewed the MOC documentation covering the rollout of these CD Requirements. • Participated in monthly meetings with Enbridge to: – Review all MBS and RDS leak alarms that have occurred within that month, and to – Report any non-compliance that had occurred. • Observed a fluid withdrawal test (FWT). The FWT was designed to simulate an actual leak. The ART was not informed that the test would occur. The purpose of the FWT was to evaluate the: – Leak alarm response procedures. – Response by ART personnel and their adherence to procedures. – Performance of the MBS LDS. • Observed Enbridge's wet commissioning of two newly installed Remotely-Controlled Valves on Line 5 which included point-to-point testing from the controller SCADA screen to field devices. This included the remote operation of the block valve to confirm the time-to-open and time-to-close.
Findings	• CD ¶105-109 – Enbridge's establishment of the ART; related procedures; an alarm system manager; and training of personnel occurred within the time periods set by the CD relative to the Effective Date, within 180 Days for CD ¶105-108 and within 50 Days for CD ¶109. These measures were implemented during the 4th Quarter of 2016 which preceded the CD Effective Date. • CD ¶104-105 – Roles and responsibilities have been established for ART members to address all alarms generated by the MBS LDS and RDS in accordance with these CD Requirements. • CD ¶106-107 – Alarm system capabilities have been established for each of the ART member roles in accordance with these CD Requirements. • CD ¶108-109: – The applicable procedures for alarm clearance and unscheduled Shutdown in response to an alarm have been employed in accordance with these requirements. – The training program includes procedures and training to sustain the skills capability of the ART on an ongoing basis with entry level training, annual refresher training, and recertification. In addition, the annual training program incorporates team training with the use of a training simulator to further develop the Control Room Operator, the Senior

Findings	Technical Advisor, the Leak Detection Analyst, the Shift Supervisor, and on-call support staff. – Enbridge's LDAM supports the ART's procedural workflow, assisting both in the assessment of alarms as well as documentation of the alarm assessment. – The ITP's observations of the FWT, in the control room, found that the ART adhered to procedures, and that the procedures and the MBS Leak Detection System functioned in compliance with applicable CD Requirements. – The ITP's observations in the control room of the wet commissioning of two Remotely-Controlled Valves verified that the system functions to sectionalize the pipeline during a Shutdown and to isolate a suspected leak, in accordance with CD Requirements. – Enbridge's alarm response conforms with applicable federal regulations and generally accepted industry practice.
Conclusions	CD ¶104-109 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Control Room Management Plan (CRM)*, Version # 8.0. Enbridge. August 1, 2011. Revised March 3, 2015. • *CCO Alarm Management Plan*, Version # 4.4. Enbridge. July 26, 2011. Revised May 26, 2017. • *CCO Portal – LDAM (MOC) Electronic Change Notification & Acknowledgement (redacted*). Enbridge. Acknowledged November 20, 2016. • *LDAM (MOC) Change Implementation Checklist (redacted).,* Enbridge. Submitted July 13, 2016. Completed November 2, 2016. • *LDAM (MOC) Deployment Change Bulletin (redacted)*. Enbridge. Issue Date 11/02/2016, In-Service Date 11/02/2017. • Presentation. *LDAM Rollout Training Presentation.* September 2016. • *LDAM System Remote Notification Overview (LDAM portal*). Enbridge. Viewed July 7, 2017. • *LDAM System Alarm Display & Volume Control Procedure (LDAM portal)*. Enbridge. Viewed July 7, 2017. • *LDAM Trainer Checklist*. Enbridge. September 2016. • *LDAM Training Plan (redacted).* Enbridge. Posted July 7, 2017. • *LDAM Training Records (redacted).* Enbridge. Completed September 14, 2016.

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• *Leak Alarm Response Procedure Flowing Pipeline,* Version 5.0.0. Enbridge. February 28, 2017. • *Leak Alarm Response Procedure Non-Flowing Pipeline,* Version 6.0.0. Enbridge. February 28, 2017. • *Leak Alarm Response Procedure 10 Minute Rule*, Version 2.0.0. Enbridge. December 15, 2016-12-15. • *Leak Alarm Response Procedure Leak Triggers,* Version 23.0.0. Enbridge. June 20, 2017. • *Leak Alarm Response Procedure Column Separation*, Version 19.0.0. Enbridge. June 15, 2017. • *Leak Alarm Response Procedure Rupture Detection Alarm*, Version 10.0.0. Enbridge. June 1, 2017. • *Leak Alarm Response Procedure Confirmed Leak,* Version 11.0.0. Enbridge. June 1, 2017. • *Leak Alarm Sectionalizing Valves Procedure,* Version 1.0.0. Enbridge. August 12, 2014. • *Process Flow – ART Roles & Responsibilities Leak Alarm Response Process*, Version 5. Enbridge. • *Training Needs Analysis – LDAM Implementation (redacted).* Enbridge. July 14, 2016. • *Shift Change Form of LDAM Review*. Enbridge. • *Shift Transfer Online Report (test sample).* Enbridge. • Agendas and Action Items from Enbridge Monthly Meeting Presentations by both the CCO & PCSLD. • Enbridge monthly Lakehead Leak Alarm Reports including any non-compliance events. • *Records of RCV Valve Commissioning Line 5.* Enbridge. October 18, 2017. • *CCO & PCSLD Summary Reports on Line 2 Fluid Withdrawal Test performed on March 15, 2018*. Enbridge. April 26, 2018. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Meetings and Observations	• *Enbridge's Introduction and Orientation Session*. March 7, 2017 • Control Room tour and demonstration of Enbridge's Leak Detection Alarm Manager system (LDAM). July 26, 2017. • Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics. • Observation of RCV Wet Commissioning. October 18, 2018. • Control Room observation of Enbridge's Fluid Withdrawal Test (FWT) on Line 2 performed on March 15, 2018
ITP Task 2 Documents and Reports	• *ITP Additional Information Request for Enbridge First Semi-Annual Report* O.B. Harris, LLC. February 14, 2018. • *Observation Record Installation of RCV Valves Line 5*. O.B. Harris, LLC. October 18, 2018.

	Document Title
Other Documents, Reports, Standards, Industry Practices	• 49 CFR 195.446, Subpart F: Code of Federal Regulations; *Transportation of Hazardous Liquids by Pipeline; Operation and Maintenance; Control Room Management.* United States Government Publishing Office. • American Petroleum Institute Recommended Practice 1168: *Pipeline Control Room Management,* Second Edition. American Petroleum Institute, . February 2015.

RS 31. Leak Detection Alarm Compliance Certification

CD ¶	¶ Title	Assessment
110.a	Weekly List of Alarms	**Compliant**
110.b	Record of Alarms	**Compliant**
110.c	Alarm Submittal to the EPA	**Compliant**
110.d	Certification of Reporting Period	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶110 requires that Enbridge: • Prepare a Weekly List of Alarms (WLOA) covering all alarms. • Prepare a Record of Alarm (ROA) for each alarm requiring an unscheduled Shutdown. • Conduct an investigation within 90 Days of those cases where a required Shutdown did not occur and prepare a Post-Incident Report to document the facts and the corrective action taken. • Include all WLOAs and ROAs occurring during a reporting period in Enbridge's SAR along with a Summary of Alarms (SOA) and any non-compliance that occurred. The Enbridge Vice-President of Pipeline Control must sign the SOA to certify compliance with these reporting requirements.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed Enbridge's monthly Lakehead Leak Alarm Report that includes the WLOAs, ROAs, and the SOA. • Participated in monthly meetings with representatives from Enbridge's CCO and PCSLD. These meetings have a standing agenda that includes review of: – The recent monthly Lakehead Leak Alarm Report covering WLOAs, ROAs, and the SOA. – Any post-incident reports of non-compliance. • Reviewed and evaluated the WLOAs, ROAs, and the SOA provided in Enbridge's *SAR1* and *SAR2* reports. – During the ITP's review of Enbridge's *SAR1*, the ITP made an additional information request for the ROAs covering the period prior to the CD Effective Date, from January 1, 2017 to May 23, 2017, pursuant to CD ¶109.e.(iii). These records were provided and reviewed. – The ITP confirmed that the subject reports are certified by the Vice-President of Pipeline Control, as required by the CD.
Findings	• All records (WLOAs, ROAs, SOAs) provided by Enbridge have been prepared and submitted in accordance with CD Requirements. • No non-compliances have been reported by Enbridge.
Conclusions	CD ¶110.a-d – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.

Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• Monthly Lakehead Leak Alarm Reports including any non-compliance events (WLOA, ROA and SOA) for the period from the CD Effective Date of May 23, 2017 through May 2018). • Enbridge Monthly Meeting Presentations (12 total beginning in July 2017 through June 2018) • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Meetings	• Eleven Enbridge Monthly Meetings with representatives from Compliance, the CCO and PCSLD.
ITP Task 2 Documents and Reports	• *ITP Additional Information Request for Enbridge First Semi-Annual Report* O.B. Harris, LLC. February 14, 2018.
Other Documents, Reports, Standards, Industry Practices	None

RS 32. Shutdown Procedures in Response to Other Events

CD ¶	¶ Title	Assessment
111	Unscheduled Shutdown Procedures in Response to Other Events	**Compliant**
112	Reporting of Events from CD ¶111	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶111 and ¶112 establish requirements for: • Responding to information received about a potential leak from a source other than an alarm. • Investigating and reporting those events.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Reviewed and evaluated relevant documents to develop a full understanding of Enbridge's organizational structure, policies, processes, procedures and systems for responding to emergency calls received by the Control Room concerning a potential leak or rupture from a source other than an alarm. This included taking into consideration the referenced regulation and industry recommended practice. • Participated in monthly meetings with representatives from Enbridge's Control Center Operations (CCO) and Pipeline Control Systems and Leak Detection (PCSLD) to: – Review all such events that have occurred during the month. – Report whether any non-compliances have occurred. • Reviewed and evaluated Enbridge's SARs to verify that these events are being reported in accordance with CD Requirements.
Findings	CD ¶111: • Procedures are established to address responding to, investigating and reporting information received of a potential leak from sources other than alarm. This conforms with regulations and generally accepted industry practices. • Roles and responsibilities are established to respond to these events which include the Shift Supervisor and the ART members. CD ¶112: • Enbridge provides a report of these events in the monthly meetings and in the SARs. • Enbridge has not reported any non-compliance with these requirements.
Conclusions	CD ¶111-112 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)[6]	• *Reported Emergency Pipeline Procedure on Emergency Phone or to Shift Supervisor Phone, Version 15.0.0.* Enbridge. April 18, 2017. • *Incident Information Form (LDAM portal printout).* Enbridge. • *10 Minute Rule, Version 2.0.0*. Enbridge. December 15, 2016. • *Leak Alarm Response Procedure Flowing Pipeline*, Version 5.0.0. Enbridge. February 28, 2017. • *Leak Alarm Response Procedure Non-Flowing Pipeline*, Version 6.0.0. Enbridge. February 28, 2017. • *Leak Alarm Response Procedure Leak Triggers*, Version 23.0.0. Enbridge. June, 20, 2017. • *Leak Alarm Response Procedure Confirmed Leak*, Version 11.0.0. Enbridge. Published June 1, 2017. • *Pipeline Shutdown Sectionalizing Valves Procedure*, Version 1.0.0. Enbridge. August 12, 2014. • *Control Room Management Plan (CRM),* Version 8.0. Enbridge. August 1, 2011. Revised March 15, 2017. • Eleven monthly reports on response to potential leak events other than leak alarms for the period July 2017 to May 2018.
Meetings	• Eleven Enbridge Monthly Meetings with representatives from Compliance, the CCO, and PCSLD.
ITP Task 2 Documents and Reports	None
Other Documents, Reports, Standards, Industry Practices	• 49 CFR 195.446, Subpart F: Code of Federal Regulations; *Transportation of Hazardous Liquids by Pipeline; Operation and Maintenance; Control Room Management.* United States Government Publishing Office. • American Petroleum Institute Recommended Practice 1168: *Pipeline Control Room Management*, Second Edition. American Petroleum Institute. February 2015.

[6] With regard to identified procedures which, as of the date of this VR, are past their expiration dates, the ITP intends to submit a Grocery List request for the republished procedures.

RS 33. New Remotely-Controlled Valves

CD ¶	¶ Title	Assessment
121-122	Installation of 14 Remotely-Controlled Valves	**Compliant**
123	Enbridge Computer Modeling for Valve Locations	**Compliant**
124	Valve Design and Closure	**Compliant**

A: ITP Analysis

Summary of CD Requirements	CD ¶121-124 establish various requirements for the installation of 14 new Remotely-Controlled Valves on certain Lakehead System pipelines for the purpose of minimizing the volume of oil that might be released in the event of a rupture or leak: • CD ¶121 – Enbridge must install 14 new remotely-controlled valves within the period of the CD. • CD ¶122 – The CD identifies the pipelines within the Lakehead System on which the valves are to be installed, as well as the general locations of the new valves. • CD ¶123 – Enbridge must use computer modeling to assess potential valve locations and to estimate the volume of oil that would be released, as well as the use of dispersion modeling to forecast travel of released oil. Three goals are to be advanced by the exact location of each valve: – Reduce the volume of oil released in the event of a leak or rupture. – Protect waterbodies, wetlands, and other sensitive habitat from oil. – Minimize construction impacts to environmental resources. • CD ¶124 – The valves must fully close and seal within three minutes of a control room command.
Verification Activity	The ITP completed the following during the ITP Verification Period: • Met with Enbridge representatives on July 25, 2017 to evaluate Enbridge's proprietary Intelligent Valve Placement Methodology for assigning valve locations and to discuss issues pertaining to the method, its rationale, and calculations of risk. • Observed the installation of two valves on Line 5 at Mile Post (MP) 1474 and MP 1488 in August 2017 and observed the commissioning of these two valves in October 2017, which included verifying their closure time. • Met via teleconference with the EPA on October 3, 2017 to: – Clarify the effect of the new valve installations on consequence reduction. – Confirm the ITP's understanding with the EPA that Enbridge's revised 2018 spill plans will show more effective upstream intercepts of the leading edge of spills due to the additional valves. • Reviewed documentation demonstrating that Enbridge installed: – A valve at Line 5 MP 1601 and MP 1715 in December 2017. These valves have been commissioned. – Two valves on Line 5 at MP 1416 and MP 1518 in May 2018. These valves are planned to be commissioned by December 2018.

Findings	• CD ¶121-122 – Six of the required 14 valves were installed during the Covered Work Period. • CD ¶122-123 – The locations where the six valves were installed are in accordance with requirements specified in the CD. • CD ¶124 – The installation and commissioning of the valves at Line 5 MP 1474 and MP 1488 met the performance requirements specified in the CD.
Conclusions	CD ¶121-124 – The ITP has verified that the Enbridge Covered Work complies with applicable CD Requirements.
Recommendations	None
Schedule for Recommendations	None

B: List of Information Considered by the ITP

	Document Title
Enbridge Reference Documents (Plans, Procedures, and Reports)	• Procedure. ENB-ENG-OE-P-0001: *Intelligent Valve Placement Procedure*, Version 1.2. Enbridge. June 6, 2017. • *EFRD Program Commissioning, Sequence of Events*. Enbridge. September 9, 2017. • Form. ECL-001-18: *Motor Operated Valve Actuator*. Enbridge. Submitted December 11, 2017. • Standard. RTO-100: *Ready to Operate*, Version 3.1. January 31, 2017. • DOJ EFRD Program Dry/Wet Commissioning; Field Device Progress Tracking List. Enbridge. May 16, 2017. • *DOJ Commitment Valves; Valve Analysis*, Version 3.0. Enbridge. January 18, 2017. • *OILMAP Land Spill Model Description*. Enbridge. • *DOJ Valves Field Site Assessment Report*. Enbridge. • Site Construction Drawings and Plans. • Valve and Actuator Specifications. • Valve Manufacturer Shop Drawings. • Certificate of Compliance. M&J Valve and SPXFlow. July 17, 2017. • Valve Material and Welding Certifications. • Pipeline Plan/Profile Drawings and Aerial Photography. • Valve Installation/Commissioning Reports and Certifications. • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report,* Phase 2. Enbridge. March 26, 2018.
Observations and Interviews	• In August the ITP observed stopple and cut-in installations at two valves sites. • In October the ITP observed valve commissioning activities at two field locations, and simultaneously observed commissioning at the control center in Edmonton.
ITP Task 2 Documents and Reports	None

	Document Title
Other Documents, Reports, Standards, Industry Practices	• American Petroleum Institute Specification 6D: *Specification for Pipeline and Piping Valves,* 24th Edition. American Petroleum Institute. August 2014.

List of Information Considered

The EPA requested that the ITP apply CD ¶133.a and identify all information considered by the ITP, identify all persons interviewed by the ITP, and summarize all relevant oral communications.

Note: The documents listed on this page apply to all Reporting Segments. Refer to the resource listings that follow the Reporting Segment analysis for Reporting Segment-specific reference documents.

Federal Documents and Regulations

Consent Decree: *United States of America v. Enbridge Energy, Limited Partnership, et al*; Civil Action No. 1:16-cv-914. United States of America. May 23, 2018.

Enbridge Documents

Enbridge Semi-Annual Report; May 23, 2017 – November 22, 2017. Enbridge. January 22, 2018.

Enbridge Semi-Annual Report; November 23, 2017 to May 22, 2018. Enbridge. July 18, 2018.

Response to ITP's Information Request related to Enbridge's First Semi-Annual Report, Phase 2. Enbridge. March 26, 2018.

Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report. Enbridge. April 16, 2018.

Response to ITP SAR2 Exception Summary. Enbridge. August 17, 2018.

Appendix A: The ITP Leadership and SMEs – Responsibilities and Experience

To meet the requirements of the CD, O.B. Harris, the principal of O.B. Harris, LLC, assembled a team of experts. As subcontractors to Mr. Harris, each of these team members is subject to the independence requirements of CD Section VII, Subsection J, including an annual certification required by CD ¶134.l.

Table 8: ITP leadership and SMEs

Assigned Responsibilities	Name	Role, Experience and Expertise
Appointed ITP	O.B. Harris	O.B. Harris is the appointed ITP and is responsible for completing and discharging the various requirements of the ITP as provided by the CD. O.B. has extensive experience in pipeline operating companies, industry advisory committees, and federal regulatory pipeline advisory committees. He was the assigned Independent Monitoring Contractor for the consent decree between the USA and BP Exploration (Alaska) Inc. from 2011 to 2015.
Project Manager	Jeryl Mohn	Jeryl is responsible for developing and managing the verification processes and CD-required reporting, enabling the ITP team to complete the CD-required third-party services. His qualifications include experience as a gas pipeline operating executive, involvement in various industry organizations and service on the federal gas pipeline advisory committee. Jeryl functioned in a similar capacity on O.B.'s Independent Monitoring Contractor team for the BP Exploration (Alaska) Inc. consent decree.
ILI and Data Integration	Marc Lamontagne	Marc is the lead SME for evaluating Enbridge's compliance with requirements for performing ILIs, including the analysis and integration of ILI and field data. Marc has extensive experience in investigations of the use of ILI and has led a number of industry initiatives to advance the effectiveness and the acceptance of ILI with pipeline regulators.
ILI and Data Integration	Elden Johnson	Elden evaluates ILI Tool Runs, data integration, and the overall effectiveness of pipeline integrity program in meeting CD Requirements. He has over 40 years of professional engineering experience in design, construction, integrity management, and regulatory compliance associated with large crude oil transportation and oil and gas gathering pipeline systems. He has field technical management, supervisory, and SME roles involving ILI, integrity management, and pipeline corrosion maintenance.

Assigned Responsibilities	Name	Role, Experience and Expertise
ILI and Data Integration	Larry Shelton	Larry provides overall coordination and peer review for the pipeline integrity verification process. He also provides peer review in other subject matters. His nearly 40 years of pipeline industry experience cover all levels of pipeline operations and maintenance, including technician, Director of Pipeline Integrity, VP of Operations and Engineering, and VP of Performance Assurance. He has served on numerous industry committees including chairman of API's Pipeline Operations Technical Committee and as a member of the federal liquids pipeline technical advisory committee.
SME – Corrosion and Metallurgy	Robert (Bob) Franco	Bob's role is to provide metallurgical and pipeline corrosion expertise to the ITP. He has 48 years of experience in corrosion control, including control of microbiological influenced corrosion and metallurgical engineering support for oil and gas production operations, pipelines, refining and chemical plants, failure analysis, and integrity management of pressure equipment.
SME – Dual Pipelines and Replacement Assessment	Gary Kenney	Gary's role includes evaluation of Enbridge's compliance with various CD Requirements to prevent leaks in the sections of the pipelines that cross the Straits of Mackinac. He provides expertise in various areas related to failure analysis, competency and training, and alternative plans or measures proposed by Enbridge. He is a worldwide expert in accident investigation in onshore and offshore settings. He has performed disaster and accident investigations, management of safety and environmental policy development, as well as safety and major accident assistance for oil and gas companies and numerous governmental agencies in the United States and abroad.
SME – Pipeline Engineering and Construction	Dave Norton	Dave's role includes evaluation and assessment of CD-related design and construction requirements of pipeline systems including the design, selection, and installation of isolation valves. In addition, Dave will supplement the ITP's team in pipeline integrity analyses. He is a principal in a management and technical consulting firm with over 40 years of experience. He has previously been manager of engineering for a major crude oil pipeline system and a commissioner on a State Oil and Gas Conservation Commission.

Assigned Responsibilities	Name	Role, Experience and Expertise
SME – Engineering Design	Dwight Recht	Dwight's role and experience is in pipeline design engineering including hydrostatic testing. He has been a project design engineer, project manager, and project director for numerous major onshore and offshore crude oil, natural gas, and carbon dioxide pipelines in the United States and overseas.
SME – Control Center Operations	Dan Spangler	Dan's primary role is to evaluate and assess Enbridge's compliance with the CD Requirements related to the management of control room operations and, more specifically, the control room management and response to pipeline leaks or ruptures. He has over 20 years of experience in operating and managing pipeline control rooms, along with additional experience in pipeline operations and engineering.
SME – Leak Detection and SCADA	Russel Treat	Russel's primary role is in evaluating and assessing Enbridge's compliance with CD-related leak and rupture detection and notification system requirements. Russel is President and CEO of an oil and gas software and services company. He has over 25 years of experience in leak detection, SCADA, custody transfer measurement, automation, and software development.

Appendix B: ILI Milestones and CD Requirements

To more efficiently manage the Injunctive Measures of the CD that are related to ILI of the Lakehead System pipelines, the ITP has grouped the numerous specific ILI requirements of the CD into ten Milestones. Milestones represent a logical progression of the ILI process beginning with the Tool Run and ending with the final processing of the generated data.

Table 9 provides a view of the ILI-related CD Paragraphs and subparagraphs by Milestone. The first column under each of the ten Milestones identifies the Subsection of CD Section VII in which the Paragraph is found. The second identifies the relevant CD Paragraphs and subparagraphs by number.

Table 9: CD Subsection and Paragraph by ILI Milestones

M1		M2		M3		M4				M5		M6		M7		M8		M9		M10	
ILI Tool Run		Initial Report		Quality Review		Dig List				Mitigation General		Mitigation Excavation		Mitigation Pressure		Mitigation Alternate		Reinspection Interval		Data	
B	22.d(1)	D	31	D	34.a	B	22.d(2)	D	44.b	D	34.g	D	39.a	D	46.b	D	46.c	D	60	D	41
D	27	D	32	D	34.b	D	33.d	D	44.b(1)	D	39	D	39.b	D	49.c(1)	D	46.c(1)	D	61	D	45
D	28	D	32.a	D	34.c	D	35	D	44.b(2)	D	46	D	40	D	49.c(1a)	D	46.c(2)	D	61.a	F	75.a
D	28.a	D	32.b	D	34.d	D	36	D	47	D	46.a			D	49.c(1b)	D	46.c(3)	D	61.b	F	75.b
D	28.b	D	32.c	D	34.e	D	37	D	48	D	53.c			D	49.c(1c)	D	46.d	D	61.c	F	75.c
D	28.c	D	33.a	D	34.e(1)	D	38	D	49.a	D	53.d			D	49.c(2)	D	46.e	D	62	F	75.d
D	29	D	33.b	D	34.e(2)	D	38.a	D	49.b					D	49.d	D	46.f	D	62.a	F	76
D	30	D	33.c	D	34.e(3)	D	38.b	D	50					D	52.a	D	46.g	D	62.b	F	77.d
D	53.a			D	34.f	D	38.b(1)	D	50.a					D	52.b	D	46.g(1)	D	63	F	78.a
E	70.a					D	38.b(2)	D	50.b					D	54	D	46.g(2)	D	64	F	78.b
E	70.b					D	40.a	D	51					D	57.a	D	46.g(2a)	D	65		
						D	40.b	D	52					D	57.b	D	46.g(2b)	D	66		
						D	40.c	D	53.b					D	57.b(1)	D	46.g(2c)				
						D	42	D	55					D	57.b(2)	D	46.g(2d)				
						D	42.a	D	56					D	59.a	D	46.h				
						D	42.b	D	57					D	59.b	D	46.i				
						D	42.c	D	58							D	46.j				
						D	42.d	D	59							D	46.k				
						D	43									D	46.l				
						D	44									D	46.m				
						D	44.a									D	49.c				
																D	49.e				

Appendix C: Milestone Status Summary

Milestones were evaluated by the ITP after Enbridge provided notification of completion and provided the required records for the ITP to review.

Table 10 on page 133 identifies the Milestones that are within the scope of this VR. The first three columns designate the individual ILI Tool Runs for which at least one Milestone was completed during the Covered Work Period. The Tool Runs are identified by the Line Number, launching and receiving stations, and the ILI technology used. The remaining columns identify the Milestones completed for each Tool Run. (See Appendix B: ILI Milestones and CD Requirements on page 131 for a list of the CD Paragraphs and subparagraphs of each Milestone.)

All shaded Milestones were completed by Enbridge during the Covered Work Period and are within the scope of this VR. Milestones shaded in green were fully evaluated by the ITP as required by CD ¶132.c and ¶133. Milestones shaded in red were not fully evaluated by the ITP due to insufficient time after Enbridge posted the required records. Refer to Reporting Segments 7 through 15 (pages 47-75) for more information on each Milestone.

Table 10: Milestones completed by Enbridge during the Covered Work Period

				ITP Review - Milestone Status Report								
Line	Segment	ILI Type	ILI Run	Initial Report	Quality Review	Dig List	Mitigation General	Mitigation Excavation	Mitigation Pressure	Mitigation Alternate	Inspection Interval	Data
L0002	GF-CR	Corrosion MFL										
L0002	GF-CR	Geometry										
L0002	CR-DR	Corrosion MFL										
L0002	CR-DR	Geometry										
L0002	DR-PW	Corrosion MFL										
L0002	DR-PW	Geometry										
L0003	GF-CR	Corrosion UM										
L0003	GF-CR	Crack UC										
L0003	CR-PW	Corrosion UM										
L0004	GF-DN	Corrosion UM		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0004	GF-DN	Corrosion UC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0004	GF-DN	Corrosion UM										
L0004	GF-DN	Crack UC										
L0004	DN-VG	Corrosion UM										
L0004	DN-VG	Crack UC										
L0004	VG-PL	Corrosion UM										
L0004	VG-PL	Crack UC										
L0004	PL-CR	Corrosion UM										
L0004	PL-CR	Crack UC										
L0004	CR-CS	Corrosion UM										
L0004	CR-CS	Crack UC										
L0004	CS-DR	Corrosion UM										
L0004	CS-DR	Crack UC										
L0004	FW-WR	Corrosion UM										
L0004	FW-WR	Crack UC										
L0004	WR-PW	Geometry					N/A	N/A	N/A	N/A		
L0004	WR-PW	Corrosion UM										
L0004	WR-PW	Crack UC										
L0005	PE-IR	Corrosion UM										
L0005	PE-IR	Crack UC										
L0005	PE-IR	Corrosion CMFL										
L0005	PE-IR	Geometry										
L0005	IR-NO	Crack UCC										
L0005	ENO-EMA	Geometry					N/A	N/A	N/A	N/A		
L0005	ENO-EMA	Corrosion MFL					N/A	N/A	N/A	N/A		
L0005	ENO-EMA	Crack UCC					N/A	N/A	N/A	N/A		
L0005	ENO-EMA	Geometry										
L0005	ENO-EMA	Geometry										
L0005	WNO-WMA	Geometry					N/A	N/A	N/A	N/A		
L0005	WNO-WMA	Corrosion MFL					N/A	N/A	N/A	N/A		
L0005	WNO-WMA	Crack UCC					N/A	N/A	N/A	N/A		
L0005	WNO-WMA	Geometry										
L0005	WNO-WMA	Geometry										
L0005	MA-BC	Crack UCC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0005	MA-BC	Corrosion CMFL										
L0005	BC-RW	Crack UC										
L0005	BC-RW	Corrosion MFL										
L0005	BC-RW	Geometry										
L0005	BC-RW	Crack UCC										
L0006A	PE-AM	Corrosion MFL										
L0006A	PE-AM	Geometry			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0006A	PE-AM	Crack UC										
L0006A	AM-GT	Corrosion MFL		Records Posted Late								
L0006A	AM-GT	Corrosion UM		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0006A	AM-GT	Corrosion UM		Records Posted Late								
L0006A	AM-GT	Geometry		Records Posted Late								
L0010	EB-ENR	Crack UC					N/A	N/A	N/A	N/A		
L0010	ENR-UT	Crack UC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L0010	ENR-UT	Crack UC										
L0064	GL-GT	Corrosion MFL										
L0064	GL-GT	Geometry										
L00078(6B)	SK-RW	Corrosion MFL										
L00078(6B)	SK-RW	Corrosion UM										
L00078(6B)	SK-RW	Geometry		Records Posted Late								

Appendix D: Reporting Segments and CD Requirements

Table 11 provides a listing of each CD Requirement that the ITP is responsible for verifying and the Reporting Segment in which each CD Requirement is evaluated.

Table 11: CD Requirements and Reporting Segments

CD¶	CD¶ Title	Reporting Segment
21	Enjoined from Operating Original US Line 6B	RS 1. Enjoined from Operating Original US Line 6B
22.b	Line 3 Deactivation	RS 2. Replacement and Deactivation of Original US Line 3
22.c	Original US Line 3 MOP	RS 3. Line 3 MOP Management Pending Replacement
22.d(1)	Annual ILI in Line 3 for Crack, Corrosion, and Geometric Features	RS 7. ILI Milestone 1: ILI Tool Run
22.d(2)	Mitigate Features from Line 3 ILI Runs	RS 10. ILI Milestone 4: Dig List
22.d(3)	Line 3 Cleaning and Biocide Treatment	RS 4. Line 3 Operation Pending Replacement
22.e	Prohibition Regarding Use of Line 3 Following Replacement	RS 2. Replacement and Deactivation of Original US Line 3
22a	Replacement of Original Line 3 in US	RS 2. Replacement and Deactivation of Original US Line 3
23	Line 10 Replacement Evaluation	RS 5. Line 10 Replacement Evaluation
24	Hydrostatic Pressure Testing Plan and Schedule	RS 6. Hydrostatic Pressure Testing Requirements
25	Procedures for Hydrostatic Pressure Testing	RS 6. Hydrostatic Pressure Testing Requirements
26	Line Failure During Hydrostatic Pressure Testing	RS 6. Hydrostatic Pressure Testing Requirements
27	Timely Identification and Evaluation of all Features	RS 7. ILI Milestone 1: ILI Tool Run
28.a-b	Periodic ILI Requirements until CD Termination	RS 7. ILI Milestone 1: ILI Tool Run
28.c	Incomplete or Invalid ILI	RS 7. ILI Milestone 1: ILI Tool Run
29	12-month ILI Schedule	RS 7. ILI Milestone 1: ILI Tool Run
30	ILI Schedule Modification	RS 7. ILI Milestone 1: ILI Tool Run
31	ILI compliance with Tool Specifications	RS 8. ILI Milestone 2: Initial Report
32.a-c	Initial ILI Reports Within: • Cracks 120 Days. • Corrosion 90 Days • Geometric 60 Days	RS 8. ILI Milestone 2: Initial Report
33.a	Require Vendors to Provide Priority Notification	RS 8. ILI Milestone 2: Initial Report
33.b	Priority Feature Definition	RS 8. ILI Milestone 2: Initial Report
33.c	Review and Evaluate Priority Features within 2 Days of Notification	RS 8. ILI Milestone 2: Initial Report

CD¶	CD¶ Title	Reporting Segment
33.d	Adding Priority Notification FRE to the Dig List	RS 10. ILI Milestone 4: Dig List
34.a	Preliminary Review of Initial ILI Report	RS 9. ILI Milestone 3: Quality Review
34.b	Evaluation of Features Requiring Excavation	RS 9. ILI Milestone 3: Quality Review
34.c	Resolution of Identified Data Quality Concerns	RS 9. ILI Milestone 3: Quality Review
34.d	ILI Data Quality Evaluation Timelines	RS 9. ILI Milestone 3: Quality Review
34.e	Discrepancies Between Two Successive ILI Runs	RS 9. ILI Milestone 3: Quality Review
34.f-g	Investigative Digs	RS 9. ILI Milestone 3: Quality Review
34.g	Repair or Mitigate Any Feature Found During Investigative Digs	RS 11. ILI Milestone 5: Mitigation General
35	Evaluation of Each Feature in Initial ILI Report for Features Requiring Excavation	RS 10. ILI Milestone 4: Dig List
36	Feature Requiring Excavation Definition	RS 10. ILI Milestone 4: Dig List
37	Deadlines for Adding Features Requiring Excavation	RS 10. ILI Milestone 4: Dig List
38.a	Excavation and Repair Deadlines	RS 10. ILI Milestone 4: Dig List
38.b	Establish Pressure Reduction if Required	RS 10. ILI Milestone 4: Dig List
39	Mitigate Features on Dig List. Obtain Field Measurements and Record Data During Excavation	RS 11. ILI Milestone 5: Mitigation General
39.a-b	Field Measurements of Excavated Features	RS 12. ILI Milestone 6: Mitigation Excavation
40	NDE Data Comparison to ILI Data	RS 10. ILI Milestone 4: Dig List
40	ILI Validation and Trending	RS 12. ILI Milestone 6: Mitigation Excavation
41	ILI Electronic Records	RS 16. ILI Milestone 10: Data
42	Calculate Predicted Burst Pressure for Crack and Corrosion Features	RS 10. ILI Milestone 4: Dig List
43	Predicted Burst Pressure Definition (CD Appendix B)	RS 10. ILI Milestone 4: Dig List
44.a-b	Initial Predicted Burst Pressure Calculation and Initial Remaining Life Calculations for Crack and Corrosion Features	RS 10. ILI Milestone 4: Dig List
45	Retention of Electronic Records	RS 16. ILI Milestone 10: Data
46	Excavate, Repair, or Mitigate Features on Dig List	RS 11. ILI Milestone 5: Mitigation General
46.a	Complete Mitigations within Time Frames Dependent on Severity	RS 11. ILI Milestone 5: Mitigation General
46.b	Establish and Maintain Interim Pressure Restrictions	RS 13: ILI Milestone 7: Mitigation Pressure
46.c	Allowance for Alternate Plan (AP): • Excavation timetables not practicable due to extraordinary scope or complexity • If pipe replacement is proposed	RS 14. ILI Milestone 8: Mitigation Alternate

CD¶	CD¶ Title	Reporting Segment
46.d	Allowance for Alternate Pressure Restriction (APR) if Prescribed Pressure Restriction Would Significantly Impact Operations	RS 14. ILI Milestone 8: Mitigation Alternate
46.e	Limit 40 APs/APRs During Life of CD	RS 14. ILI Milestone 8: Mitigation Alternate
46.f	Alternate Plan Not Allowed for Rupture Threat	RS 14. ILI Milestone 8: Mitigation Alternate
46.g	Conditions for AP/APR: • Engineering Assessment • Demonstrate equal or greater level of safety • Written EPA notification	RS 14. ILI Milestone 8: Mitigation Alternate
46.h	Interim Pressure Restrictions for AP	RS 14. ILI Milestone 8: Mitigation Alternate
46.i	Compliance with Laws and Regulations	RS 14. ILI Milestone 8: Mitigation Alternate
46.j	Implementation of AP/APR in Accordance with Plan's Timetable	RS 14. ILI Milestone 8: Mitigation Alternate
46.k	Documentation of AP/APR	RS 14. ILI Milestone 8: Mitigation Alternate
46.l	Summary of AP/APR in Semi Annual Report	RS 14. ILI Milestone 8: Mitigation Alternate
46.m	EPA Disapproval of an AP	RS 14. ILI Milestone 8: Mitigation Alternate
47	Dig Selection Criteria and Pressure Restriction Requirements for Crack Features	RS 10. ILI Milestone 4: Dig List
48	Crack and Interacting Feature Mitigation Timelines	RS 10. ILI Milestone 4: Dig List
49.a-b	Dig Timeline Extensions	RS 10. ILI Milestone 4: Dig List
49.c	Maintenance of Pressure Restrictions for Excavations Not Completed within 180 Days	RS 14. ILI Milestone 8: Mitigation Alternate
49.c-d	Pressure Restriction Limitations Depending on Feature Type	RS 13: ILI Milestone 7: Mitigation Pressure
49.e	Report Mitigation Not Completed in 180 Days in Semi Annual Report	RS 14. ILI Milestone 8: Mitigation Alternate
50	Corrosion and Interacting Feature Mitigation Timelines	RS 10. ILI Milestone 4: Dig List
51	Corrosion Feature Mitigation Timelines	RS 10. ILI Milestone 4: Dig List
52.a-b	Corrosion Feature Pressure Restrictions	RS 13: ILI Milestone 7: Mitigation Pressure
53	Dig Selection Criteria, Pressure Restrictions, and Mitigation Deadlines for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features • Interacting Features	RS 10. ILI Milestone 4: Dig List
53.a	ILI Tool Adequate for Assessing Axial Features	RS 7. ILI Milestone 1: ILI Tool Run
53.c	Mitigation of Crack Features when Located in an HCA	RS 11. ILI Milestone 5: Mitigation General

CD¶	CD¶ Title	Reporting Segment
53.d	Mitigation of Axial and Interacting Features if Located Outside of an HCA	RS 11. ILI Milestone 5: Mitigation General
54	Pressure Restrictions for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features	RS 13: ILI Milestone 7: Mitigation Pressure
55	Dig Selection Criteria for Dents and Other Geometric Features	RS 10. ILI Milestone 4: Dig List
56	Dents and Other Geometric Feature Mitigation Timelines	RS 10. ILI Milestone 4: Dig List
57. a-b	Dents and Other Geometric Feature Pressure Restrictions	RS 13: ILI Milestone 7: Mitigation Pressure
58	Dig Selection Criteria for Interacting Features	RS 10. ILI Milestone 4: Dig List
59.a	Pressure Restrictions Crack and Corrosion Interactions	RS 13: ILI Milestone 7: Mitigation Pressure
59.b	Pressure Restrictions for Dent Interactions	RS 13: ILI Milestone 7: Mitigation Pressure
60	Determine Remaining Life of Corrosion and Crack Features	RS 15. ILI Milestone 9: Re-Inspection Interval
61	Features Not Requiring Remaining Life Calculations	RS 15. ILI Milestone 9: Re-Inspection Interval
62	Representative Values for Remaining Life Calculations	RS 15. ILI Milestone 9: Re-Inspection Interval
63	Models for Crack Feature Remaining Life Calculations	RS 15. ILI Milestone 9: Re-Inspection Interval
64	Corrosion Growth Rate Calculations	RS 15. ILI Milestone 9: Re-Inspection Interval
65	Re-Inspection Interval Not Greater than 1/2 Remaining Life	RS 15. ILI Milestone 9: Re-Inspection Interval
66	Re-Inspection Interval Not Greater than 5 Years	RS 15. ILI Milestone 9: Re-Inspection Interval
68.a	Integrity Protection from Currents, Ice, Vessel Anchors, and Spans	RS 17. Dual Pipelines – Span Management
68.b	Screw Anchor Support	RS 17. Dual Pipelines – Span Management
68.c	Periodic Visual Inspection	RS 17. Dual Pipelines – Span Management
68.d	Underwater Inspection Repairs	RS 17. Dual Pipelines – Span Management
68.e	Screw Anchor Report	RS 17. Dual Pipelines – Span Management
68.f	Periodic Visual Inspection of Dual Pipelines	RS 17. Dual Pipelines – Span Management
69.a	Biota Investigation	18. Dual Pipelines – Biota Investigation
69.b	Biota Investigation Work Plan (BIWP)	18. Dual Pipelines – Biota Investigation
69.c	BIWP Implementation	18. Dual Pipelines – Biota Investigation
70.a	Corrosion and Circumferential Crack ILI Timing (Dual Pipelines)	RS 7. ILI Milestone 1: ILI Tool Run

CD¶	CD¶ Title	Reporting Segment
70.b	Geometric Feature ILI Timing (Dual Pipelines)	RS 7. ILI Milestone 1: ILI Tool Run
71	Investigation and Repair of Axially Aligned Cracks	19. Dual Pipelines – Axially-Aligned Cracks, Pipeline Movement
72	Pipeline Movement Investigation	19. Dual Pipelines – Axially-Aligned Cracks, Pipeline Movement
73	Quarterly Inspections Using Acoustic Leak Detection Tool	20. Dual Pipelines – Acoustic Leak Detection
74	Feature Integration Database	RS 21. Data Integration – General
75	Integrity Management Personnel Access to Feature Integration Database	RS 16. ILI Milestone 10: Data
76	Successive ILI Data Sets	RS 16. ILI Milestone 10: Data
77	Update of OneSource Database	RS 21. Data Integration – General
78.a	OneSource ILI Updates	RS 16. ILI Milestone 10: Data
78.b	OneSource Interacting Features	RS 16. ILI Milestone 10: Data
79	Prepare and Submit a Report of Alternative Leak Detection Technologies	RS 22. Assessment of Alternative Leak Detection Technologies
80	Report to Include a Description of All Tests and Summarize Findings	RS 22. Assessment of Alternative Leak Detection Technologies
81	Create and Submit an ALD Report for the Dual Pipelines Crossing the Straits of Mackinac	RS 23. Straits of Mackinac ALD Report
82	Evaluate ALD Effectiveness, Practicality, and Net Present Costs	RS 23. Straits of Mackinac ALD Report
83	Compare ALD Relative Performance and Evaluate Risks and Benefits	RS 23. Straits of Mackinac ALD Report
84	New Lakehead Pipelines and Replacement Segments – Applicability	24. Leak Detection for New Pipelines
85	Installation of Flowmeters	24. Leak Detection for New Pipelines
86	Installation of Flowmeters on Lines That Utilize In-Line Batch Interface Tools	24. Leak Detection for New Pipelines
87	Installation of Other Instrumentation	24. Leak Detection for New Pipelines
88	Establishment of MBS Segments	24. Leak Detection for New Pipelines
89	Leak Detection Sensitivity Requirements	24. Leak Detection for New Pipelines
90	Demonstration of Compliance with Leak Detection Sensitivity Design and Construction Requirements	24. Leak Detection for New Pipelines
91	Establishment and Optimization of Alarm Thresholds	24. Leak Detection for New Pipelines
92	Operation of MBS Leak Detection System	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
93	Temporary Suspension of MBS Leak Detection Capabilities	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
94	Overlapping MBS Segments	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline

CD¶	CD¶ Title	Reporting Segment
95	Alternative Leak Detection Requirements	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
96	Reporting MBS Outages	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
97	Reporting Requirements	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
98	Tolling Requirements	RS 25. Operation of MBS Leak Detection on Each Lakehead System Pipeline
99	Installation of New Equipment at Remotely-Controlled Valves	RS 28. New Equipment at Remote Controlled Valves
100	Conditions When the Requirements in CD ¶99 Shall Not Apply	RS 28. New Equipment at Remote Controlled Valves
101	Transient-State Sensitivity Analysis	RS 26. Transient-State Sensitivity Analysis
102	Rupture Detection System Alarm	RS 29. Operated and Test New Rupture Detection System
103	24-hour Alarm	RS 27. 24-hour Alarm
104	Leak Detection Requirements for Control Room: Applicability	RS 30. Alarm System and Response Procedures
105	Alarm Response Team (ART)	RS 30. Alarm System and Response Procedures
106	Remote Notification of Alarm Response Team	RS 30. Alarm System and Response Procedures
107	Audible and Visual Alarms	RS 30. Alarm System and Response Procedures
108	Alarm Clearance Procedures	RS 30. Alarm System and Response Procedures
108.a	Alarm Clearance Requirements	RS 30. Alarm System and Response Procedures
108.b	Alarm Clearing Restrictions	RS 30. Alarm System and Response Procedures
108.c	Confirmation of Leak Detection System Functioning	RS 30. Alarm System and Response Procedures
108.d	Independent Alarm Investigation	RS 30. Alarm System and Response Procedures
108.e	ART Procedures for Column Separation	RS 30. Alarm System and Response Procedures
108.f	Electronic Records of Alarm Response	RS 30. Alarm System and Response Procedures
109	Unscheduled Shutdown in Response to an Alarm	RS 30. Alarm System and Response Procedures
109.a	Ten-Minute Rule	RS 30. Alarm System and Response Procedures
109.b	Column Separation - Running Pipelines	RS 30. Alarm System and Response Procedures

CD¶	CD¶ Title	Reporting Segment
109.c	Column Separation - Pipeline Shutdown	RS 30. Alarm System and Response Procedures
109.d	Confirmed Leak Rule	RS 30. Alarm System and Response Procedures
109.e	Shutdown and Restart Record	RS 30. Alarm System and Response Procedures
110.a	Weekly List of Alarms	RS 31. Leak Detection Alarm Compliance Certification
110.b	Record of Alarms	RS 31. Leak Detection Alarm Compliance Certification
110.c	Alarm Submittal to the EPA	RS 31. Leak Detection Alarm Compliance Certification
110.d	Certification of Reporting Period	RS 31. Leak Detection Alarm Compliance Certification
111	Unscheduled Shutdown Procedures in Response to Other Events	RS 32. Shutdown Procedures in Response to Other Events
112	Reporting of Events from CD ¶111	RS 32. Shutdown Procedures in Response to Other Events
121-122	Installation of 14 Remotely-Controlled Valves	RS 33. New Remotely-Controlled Valves
123	Enbridge Computer Modeling for Valve Locations	RS 33. New Remotely-Controlled Valves
124	Valve Design and Closure	RS 33. New Remotely-Controlled Valves

Appendix E: List of Enbridge Personnel with ITP Interaction

CD ¶133.a requires that the VR include a list of "all persons interviewed by the ITP". The following table, provided by Enbridge, lists those personnel who were involved in one or more of the following activities:

- Meetings between the ITP, EPA, and Enbridge
- Field observation activities
- Coordinated verification activity.

This list includes Enbridge employees and, in limited cases, contractors where the contractor was the primary point of contact with the ITP for verification activity. The list provides a job description or title and the number of persons involved with the ITP, categorized by department or function within Enbridge.

Table 12: Enbridge personnel who interacted with the ITP

Enbridge Personnel or Contractor	Number of Persons
Regulatory Affairs Department	
Director, Regulatory Affairs	1
Manager, Regulatory Affairs	3
Specialist, Regulatory Affairs	2
Advisor/Engineer/Sr. Engineer, Regulatory Affairs	4
Control Centre Operations	
Vice President, Control Centre Operations	1
Director, Control Centre Operations	2
Manager, Control Centre Operations	3
Supervisor, Control Centre Operations	4
Specialist, Control Centre Operations	3
Engineer/Coordinator, Control Centre Operations	3
Control Centre Operator	1
Law Department	
Internal Legal Counsel	2
External Legal Counsel	2
Integrated Management Systems	
Manager, Integrated Management Systems	1
Specialist, Integrated Management Systems	1
Line 5 Hydrotest; BIWP; Valve and Screw Anchor Installation Projects	
Ballard Marine, Project Manager	1
Inspector, Screw Anchor Installation	2
Director, Operations	1
Director, Engineering Services	1
Supervisor, Engineering Services	1
Specialist, Engineering Services	2
Vice President Engineering and Projects	1
Manager, Projects	3

Enbridge Personnel or Contractor	Number of Persons
Supervisor, Projects	1
Specialist, Projects	2
Project Manager, Projects	2
Pipeline Control Systems and Leak Detection (PCSLD) Department	
Director, PCSLD	2
Manager, PCSLD	1
Supervisor, PCSLD	5
Specialist, PCSLD	1
Analyst/Engineer/Project Manager, PCSLD	8
Pipeline Integrity Department	
Director, Pipeline Integrity	3
Manager, Pipeline Integrity	10
Supervisor, Pipeline Integrity	3
Specialist, Pipeline Integrity	5
Subject Matter Lead (SML), Pipeline Integrity	6
Project Manager, Pipeline Integrity	4
Technologist/Engineer/Engineer-in-Training/Sr. Engineer Pipeline Integrity	9
Safety Department	
Specialist, Safety	1

Appendix F: Summary of Meetings between the ITP, EPA, and Enbridge

Enbridge, EPA, and the ITP have held numerous meetings since the ITP commenced verification activities. The ITP and EPA follow a protocol by which the EPA is notified of and attends meetings and discussions between the ITP and Enbridge.[7] The meetings typically are guided by an agenda, and notes and action items are recorded and distributed to the attendees.

Table 13 lists the meetings that were held between the parties through the ITP Verification Period. The ITP also observes, from time to time, Enbridge field work activities that are undertaken to fulfill CD Requirements. Those observations are documented in the Analysis Section of the respective Reporting Segments.

Table 13: Meetings between the ITP, EPA, and Enbridge

Date	Location	Meeting Topic
March 7-8, 2017	Edmonton Enbridge Office	ITP Team Orientation from Enbridge
April 12, 2017	Chicago EPA Region 5 Office	Task 1 Project Planning Meeting
April 19, 2017	Web Conference & Phone	ITP briefing for EPA and Enbridge on status of ITP's review of the Enbridge Line 5 Hydrotest Plan
May 10, 2017	Web Conference & Phone	Monthly Planning Meeting
May 23, 2017	Web Conference & Phone	Planning meeting for the ITP Observation of the Hydrotest of the Line 5 Dual Pipelines
May 30-31, June 1, 2017	Edmonton Enbridge Office	ITP Orientation on Enbridge ILI process and procedures
June 14, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
June 28, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 5, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 12, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 19, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 25, 2017	Edmonton Enbridge Office	Enbridge briefing and discussion for the ITP – implementation of various valve-related provisions of the CD

[7] The ITP is not required to notify EPA of communications with Enbridge that relate to administrative matters (e.g., invoicing) or which are purely technical in nature (e.g., seeking an understanding of a given set of data Enbridge has provided).

Date	Location	Meeting Topic
July 25-26, 2017	Edmonton Enbridge Office and Control Center	Orientation to the Enbridge Control Center and various Enbridge presentations regarding the leak detection and control center operations that address CD Requirements.
July 27, 2017	Enbridge Edmonton Office	Enbridge briefing and discussion for the ITP – implementation of various ILI and Data Integration provisions of the CD.
August 2, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
August 9, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
August 23, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
August 24, 2017	Web Conference	Monthly ILI Technical Meeting
August 25, 2017	Web Conference	Monthly PCSLD and CCO Technical Meeting
September 12, 2017	Teleconference	Line 5 Dual Pipelines – The ITP presented comments on Rev 2 of the Enbridge Coating Repair Plan
September 13, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
September 27, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
September 28, 2017	Web Conference	Monthly ILI Technical Meeting
September 28, 2017	Web Conference	Monthly PCSLD and CCO Technical Meeting
September 29, 2017	Web Conference	Enbridge demonstrated for the ITP how to use the Skype web conference application
October 4, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
October 11, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
October 17-18, 2017	Edmonton Enbridge Office and Control Centre	Enbridge briefing and discussion for the ITP – leak detection and control center operations and ITP observation of valve commissioning.
October 19, 2017	Edmonton Enbridge Office	Enbridge briefing and discussion for the ITP – overview of *SAR1*, Line 3 replacement, and various CD provisions

Date	Location	Meeting Topic
October 25, 2017	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
October 26, 2017	Web Conference	Monthly ILI Technical Meeting
October 26, 2017	Web Conference	Monthly PCSLD and CCO Technical Meeting
November 3, 2017	Teleconference	ITP presented additional information request on the CD ¶23 Line 10 replacement evaluation Task 2 report
November 8, 2017	Teleconference	Monthly Planning Meeting - Coordination of the ITP's review of Enbridge compliance activities
November 16, 2017	Teleconference	Enbridge presented their response to the ITP additional information request on the CD ¶23 Line 10 replacement evaluation Task 2 report.
November 20, 2017	Chicago EPA Region 5 Office	Enbridge presented their proposed criteria for screw anchor installation on the Line 5 Dual Pipelines
November 28, 2017	Web Conference	Monthly ILI Technical Meeting
November 28, 2017	Web Conference	Monthly PCSLD and CCO Technical Meeting
December 13, 2017	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities focusing on specific topics
December 18, 2017	Web Conference	Monthly PCSLD and CCO Technical Meeting
December 18, 2017	Teleconference	Discussion of the Biota Investigation Work Plan (BIWP) status and plans
December 20, 2017	Web Conference	Monthly ILI Technical Meeting
January 3, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
January 10, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
January 17, 2018	Teleconference	Enbridge presented their plans to the State of Michigan for installation of additional screw anchors on the Line 5 Dual Pipelines
January 24, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
January 25, 2018	Web Conference	Monthly ILI Technical Meeting
January 25, 2018	Web Conference	Monthly PCSLD and CCO Technical Meeting
January 31, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities

Date	Location	Meeting Topic
January 31, 2018	Teleconference	Enbridge briefing and discussion for the ITP – presentation on the Alternate Pressure Restrictions on Line 3 and Line 5
February 7, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
February 12, 2018	Teleconference	Discussion of the ITP's analysis of the Enbridge proposal for placement of additional screw anchors on the Line 5 Dual Pipelines
February 14, 2018	Teleconference	Monthly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities focusing on specific topics
February 14, 2018	Web Conference	Discussion of the specific location of 17 of the 70 anchors on Line 5 Dual Pipelines
February 21, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
February 22, 2018	Web Conference	Monthly ILI Technical Meeting
February 28, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
March 1, 2018	Teleconference	Discussion of Enbridge proposed CD modification to a Fitness for Service approach to dents interacting with metal loss
March 7, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
March 14-15 2018	Edmonton Enbridge Office and Control Centre	Discussion of PCSLD CD Requirements and observe fluid withdrawal test, along with discussion of future interviews and observations
March 15, 2018	Teleconference	Discussion of Enbridge proposed CD modification to CD ¶59.b using a FEA process
March 22, 2018	Toronto Enbridge Office	Discussion of Enbridge response to ITP questions regarding proposed CD ¶59.b modification; Enbridge demonstration of FEA.
March 28, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
April 4, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
April 11, 2018	Teleconference	Enbridge briefing on the alleged Line 5 Dual Pipelines vessel anchor strike incident

Date	Location	Meeting Topic
April 16, 2018	Teleconference	Clarification of CD ¶99 and ¶100 requirements for valve instrumentation
April 18, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
April 24-25, 2018	Edmonton Enbridge Office	Discussion of various CD ILI requirements
April 26, 2018	Web Conference	Monthly PCSLD and CCO Technical Meeting
May 3, 2018	Teleconference	Discussion of Enbridge implementation of CD ¶101 Transient Sensitivity Analysis
May 9, 2018	Teleconference	Weekly Planning Meeting - Coordination of the ITP's review of Enbridge compliance activities
May 15, 2018	Teleconference	Review of procedures for installation of screw anchors on the Line 5 Dual Pipelines
May 15, 2018	Teleconference	Walk-through of Line 5 Dual Pipelines screw anchor installation process with barge captain and various contractors
May 16, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
May 23, 2018	Teleconference	Weekly Planning Meeting - Coordination of the ITP's review of Enbridge compliance activities
May 24, 2018	Web Conference	Monthly ILI Technical Meeting
May 24, 2018	Web Conference	Monthly PCSLD and CCO Technical Meeting
May 30, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
June 6, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
June 11, 2018	Teleconference	Discussion of Enbridge questions on the ITP *SAR1* Report (*ISR1*).
June 13, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
June 13, 2018	Teleconference	The ITP briefed Enbridge on its conclusions on the Line 10 replacement evaluation report
June 20, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
June 26, 2018	Web Conference	Monthly ILI Technical Meeting
June 27, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities

Date	Location	Meeting Topic
June 27, 2018	Web Conference	Enbridge response to the ITP June 13 briefing of the ITP's conclusions on the Line 10 replacement evaluation report
June 28, 2018	Web Conference	Monthly PCSLD and CCO Technical Meeting
July 6, 2018	Web Conference	Enbridge and the ITP reviewed the Task 2 and Task 3 processes utilized thus far.
July 10-11, 2018	Edmonton Enbridge Office and the pipeline ROW in Wisconsin	Enbridge pipeline integrity experts demonstrated their implementation of CD Requirements.
July 11, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 18, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 18, 2018	Web Conference	Enbridge presented their position on the CD Requirements categorized by the ITP as Discussion Items or Not Compliant in *ISR1*
July 25, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
July 26, 2018	Web Conference	Monthly ILI Technical Meeting
July 26, 2018	Web Conference	Monthly PCSLD and CCO Technical Meeting
August 8, 2018	Teleconference	Weekly Planning Meeting – Coordination of the ITP's review of Enbridge compliance activities
August 10, 2018	Web Conference	Enbridge presented its proposed approach to the Line 10 replacement evaluation report
August 10, 2018	Teleconference	The ITP briefed Enbridge on exceptions from the ITP's review and evaluation of *SAR2* (potential issues and Discussion Items)
August 10, 2018	Web Conference	Enbridge presented their process and information to demonstrate compliance with CD ¶75 relating to the OneSource feature integration database.

Appendix G: Definitions[8]

Term	Definition
ALD	Alternative leak detection
AP	Alternate Plan as described in CD ¶46
API	American Petroleum Institute
API RP	API Recommended Practice
APR	Alternate pressure restriction as described in CD ¶46.
ART	Alarm Response Team
ASME	American Society of Mechanical Engineers
ASTM	ASTM International (formerly known as the American Society for Testing and Materials)
Axial Grooving/ Axial Slotting	Defined in the CD as "any metal loss feature with a width less than 100 millimeters and a length greater that 30 millimeters."
Axially-Aligned Crack	Defined in the CD as "any type of Crack feature that is oriented in the direction of the pipeline's axis as opposed to the pipeline's circumference."
BIWP	*Biota Investigation Work Plan*
Body of Knowledge	The accumulation of the ITP team's knowledge used to evaluate Enbridge compliance with the CD. This knowledge is built upon the ITP's foundation of education and experience, combined with the cumulative exchange of information with Enbridge. See ITP's Body of Knowledge, on Page 15.
CCO	Control Center Operations
CD	Consent Decree. *United States of America v. Enbridge Energy, Limited Partnership, et al; Civil Action No. 1:16-cv-914*. Defined in the CD to include "this Decree and all Appendices attached hereto (listed in Section XXV)."
CD ¶	Consent Decree Paragraph. Paragraph is defined in the CD as "a portion of this Decree identified by an Arabic numeral." The ¶ symbol is only used to denote paragraphs within the CD.
CGR	Corrosion growth rate
Column Separation	Defined in the CD as "the condition where a pipeline segment is not entirely filled with liquid or is partly void."
Control Room	Defined in the CD as "any operations center where Lakehead System Pipelines are remotely monitored, operated, and controlled by personnel using a Supervisory Control and Data Acquisition System, including the operations center in Edmonton, Alberta, Canada."
Corrosion Feature	Defined in the CD as "any feature on a pipeline detected by any tool, field measurement device, or other field observation that detects metal loss due to corrosion." The CD also states that it "shall not include any feature that Enbridge is able to determine reflects metal loss that is attributable to a grinding repair rather than to corrosion."

[8] Definitions from the CD are found in CD ¶10.

Term	Definition
Crack Feature	Defined in the CD as "any feature on a pipeline detected by any tool, field measurement device, or other field observation that detects any crack or crack-like feature on the pipeline, whether the feature type is classified as crack-like, crack field, notch-like, surface-breaking lamination, linear indication, seam-weld manufacturing anomaly, hook cracks, or any other label denoting a crack or cluster of cracks." The CD also provides that Crack feature also includes "Axial Slotting features, Axial Grooving features, selective seam Corrosion features, and features identified in ILI reports as 'seam weld anomaly A/B.'"
CRWP	*Coating Repairs Work Plan*
DA	Deterministic Analysis
Day	Defined in the CD as "a calendar day unless expressly stated to be a business day. In computing any period of time under this Consent Decree, where the last Day would fall on a Saturday, Sunday, or U.S. federal holiday, the period shall run until the close of business of the next business day."
Dig List	Defined in the CD as "the list of Crack features, Corrosion features and Geometric features required to be excavated in accordance with Section VII.D."
DOJ	United States Department of Justice
DQA	Data quality assessment
DQR	Data Quality Review
Dual Pipelines	Refers to the two 20-inch diameter pipelines of Line 5 that cross the Straits of Mackinac. Each is approximately 4.09 miles long. The pipelines, individually, are typically identified as the east segment or west segment, respectively, of the Line 5 Dual Pipelines.
Effective Date	Defined in CD Section XVII as "the date upon which this Consent Decree is entered by the court or a motion to enter the Consent Decree is granted, whichever occurs first." The CD Effective Date is May 23, 2017.
Enbridge	Defined in the CD to include "Enbridge Energy, L.P., Enbridge Pipelines (Lakehead) L.L.C., Enbridge Energy Partners, L.P., Enbridge Energy Management, L.L.C., Enbridge Energy Company, Inc., Enbridge Employee Services Canada Inc., and any of their successors and assigns."
EPA	United States Environmental Protection Agency. Defined in the CD to include "any of its successor departments or agencies."
Established MOP or MOP	Established Maximum Operating Pressure. Refers to the maximum pressure, generally expressed in pounds per square inch (psi), at which a pipeline may be operated. The CD states that the MOP for a pipeline segment is found "in column C of the spreadsheet located at https://www.epa.gov/enbridge-spill-michigan/enbridge-revised-maximum-operating-pressure-values."
FEA	Finite Element Analysis

Term	Definition
Finding	Factual matters determined by the ITP during the process of review and evaluation of Enbridge activities which form the basis for the ITP's conclusions whether Enbridge has complied, or not complied, with a given CD Requirement.
FRE	Feature Requiring Excavation. Defined in CD ¶36 as "any Crack feature, Corrosion feature, or Geometric feature that meets one or more of the dig-selection criteria in Subsection VII.D (V)." CD ¶47-52 and CD ¶55-57 provide the specific criteria.
FWT	Fluid withdrawal test
Geometric Feature	Defined in the CD as "any feature that involves deformation of the pipe as defined in 4.28 of API 1163 (1st Edition), including any bend, buckle, dent, ovality, ripple, wrinkle or other change that affects the roundness of the pipe's cross section or straightness of the pipe."
GL	Grocery list
ILI	In-line inspection. An inspection of a pipeline from the interior of the pipe using an intelligent or smart pig.
ILI Registry	A set of documents maintained by Enbridge to track to the progress of each ILI Tool Run in the Lakehead System as required by the CD. A separate ILI Registry document is prepared by Enbridge for every pipeline segment and the ILI tool technologies which have been applied to a given segment.
Initial ILI Report	The ILI vendor's first comprehensive report of all features detected by an ILI tool.
ISR	*ITP SAR Report*
ITP	Independent Third Party. CD Section J outlines the responsibilities of the ITP. O.B. Harris, LLC serves as the ITP for this CD.
Joint	Defined in the CD as "a single length of pipe, typically 40 feet or less, between two girth welds."
Lakehead System	Defined in the CD as "the portion of the Mainline System within the United States that is comprised of fourteen pipelines – Lines 1, 2B, 3, 4, 5, 6A, 6B, 10, 14, 61, 62, 64, 65, and 67 – all New Lakehead Pipelines." The replacement of Line 6B has been renamed "Line 78."
Lakehead System Pipeline	Defined in the CD as "any pipeline that is part of the Lakehead System."
LDAM	Leak Detection Alarm Manager. Refers to a software application within the Enbridge SCADA system that annunciates, tracks, and routes leak alarms to appropriate members of the ART (CD ¶105) and provides capability for addressing leak alarms.
LDS	Leak Detection System
MBS MBS LDS	Material Balance System MBS Leak Detection System Defined in the CD as "the computational pipeline monitoring system used by Enbridge to detect leaks or ruptures in the Lakehead System."
MBS Segment	Defined in the CD as "a section of pipeline that is bounded on each end by adjacent flowmeters."

Term	Definition
MFG	Metal loss feature due to a manufacturing defect
MOC	Management of Change. Refers to a formal process for implementing change to a pipeline system.
MOP	Maximum Operating Pressure
MP	Mile Post
MPUC	Minnesota Public Utilities Commission
NACE	NACE International (formerly known as the National Association of Corrosion Engineers)
NDE	Non-destructive examination
New Lakehead Pipeline	Defined in the CD as having "the meaning set forth in Paragraph 84.a" which defines it as "the pipeline that will replace Original US Line 3, as well as …any new pipeline that will replace one of the other pipelines that comprise the Lakehead System. In the event that Enbridge resumes operation of any other Lakehead System Pipeline that may be replaced after the Effective Date, the term "New Lakehead Pipeline" shall also apply to such pipeline."
OD	Outside diameter
OneSource	Defined in the CD as "the data-integration database described in Subsection VII.F of the Consent Decree."
Original US Line 3	Defined in the CD as "the segment of the Lakehead System Line 3 oil transmission pipeline currently operating between Neche, North Dakota and Superior that Enbridge is required to replace under Section VII.B of this Consent Decree.
Original US Line 6B	Defined in the CD as "the 285-mile pipeline between Griffith, Indiana and the international border near Sarnia, Ontario that Enbridge replaced in 2014."
Overlapping MBS Segment	Defined in the CD as "a section of pipe integrating two or more MBS Segments for the purpose of establishing and maintaining temporary leak detection capability, as provided in Paragraph 94."
PCSLD	Pipeline Control Systems and Leak Detection
PHMSA	Pipeline and Hazardous Materials Safety Administration. Defined in the CD to include "any of its successor departments or agencies."
PPR	Point pressure restrictions
Predicted Burst Pressure	Defined in the CD as "the lowest estimated pressure at which a feature is predicted to burst or rupture, calculated as specified in this Consent Decree."
Priority Feature	Defined in the CD as having "the same meaning as defined in [CD] Paragraph 33.b" which defines it as "any Crack feature, Corrosion feature, or Geometric feature that may require priority attention over other features based on criteria specified by Enbridge in its contract work order with the vendor for ILI services." Specific criteria for Priority Features are outlined in CD Appendix A.
RDS	Rupture Detection (Alarm) System. Refers to the software application within the Enbridge Leak Detection System that monitors the SCADA system to detect pipeline ruptures.

Term	Definition
Remaining Life	Defined in the CD as "the estimated period [of] time remaining before a Crack feature or Corrosion feature is predicted to grow to the point where its Predicted Burst Pressure is less than or equal to the Established MOP at the location of the feature."
Remotely-Controlled Valve	Defined in the CD as "any valve that is designed to be closed remotely by an operator from a Control Room."
Replacement Segment	Defined in the CD as having "the same meaning as set forth in Paragraph 84.b" which defines it as "any modification of a Lakehead System Pipeline after the Effective Date for the purpose of (1) adding one (or more) pump stations to the pipeline or (2) replacing a section of the pipeline with a volume capacity greater than 45,000 cubic meters ("m^3")."
ROA	Record of alarms
ROV	Remotely Operated Vehicle
RPR	Rupture Pressure Ratios
RPS	*Reporting Profile Standard*
RS	Reporting Segment
S&A	*Stipulation and Agreement* – Specifically referring to the agreement between Enbridge and the USA that was filed with the Court on May 2, 2018.
SAR	An Enbridge Semi-Annual Report (e.g., *SAR1* and *SAR2*)
SCADA	Supervisory Control and Data Acquisition System. Defined in the CD as having the "same meaning as defined by C.F.R § 195.2" which defines it as a "computer-based system or systems used by a controller in a control room that collects and displays information about a pipeline facility and may have the ability to send commands back to the pipeline facility."
Section (of CD)	Defined in the CD as "a portion of the Decree identified by a roman numeral."
Sensitivity	Defined in API RP 1130 as a composite measure of the size of a leak that a system is capable of detecting and the time required to issue an alarm if a leak of that size should occur.
Shutdown	Defined in the CD as "the operational period between (1) the initial cessation of pumping operations in a pipeline, or section of pipeline, through which oil has been actively flowing and (2) the point where the flow rate within the pipeline, or section of pipeline, is zero."
SME	Subject matter expert
SOA	Summary of Alarms
SRB	Sulfate-reducing bacteria
SSA	Single Station Algorithm. Refers to the RDS logic and tuning parameters used by the RDS to detect a rupture.
Tool Run	Defined in the CD as "the process of running an ILI tool with sensors through a pipeline, or section of pipeline, for the purpose of detecting, sizing, and classifying Crack features, Corrosion features, and Geometric features.

Term	Definition
Transient-State	Defined in the CD as “the operational condition when oil is moving through a pipeline, or section of pipeline, at a rate or pressure that is in flux.”
VR	Verification Report
WLOA	Weekly list of alarms