Enbridge Consent Decree – Civil Action No. 1:16-cv-914
Independent Third Party Review and Evaluation of Enbridge Submittal:
Section VII, Paragraph 132.b. and
Section IX, Paragraphs 143 - 148
Report on Enbridge First Semi-Annual Report

May 31, 2018

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Prepared for:

The United States
Environmental Protection
Agency

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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 at the request of the Environmental Protection Agency (EPA) and pursuant to CD requirements. 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. This report, and the assessment reflected herein, supersedes any report previously prepared by the ITP.

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 EPA remains, in all circumstances, the party which will officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD.

Executive Summary

Section IX, Reporting Requirements, of the Enbridge Consent Decree (CD), requires Enbridge to prepare and submit to the Environmental Protection Agency (EPA) a report documenting Enbridge's compliance with the CD on a semi-annual basis. CD Paragraph (¶) 143 provides that the first *Semi-Annual Report* (*SAR*) shall be submitted not later than 240 Days after the CD Effective Date (i.e., no later than January 18, 2018) and that the first *SAR* shall document activities over the first six months following the CD Effective Date.

Below is a summary of the Independent Third Party's (ITP's) process of evaluating Enbridge's *SAR*:

- January 18, 2018: Enbridge submitted its first Semi-Annual Report entitled Enbridge Semi-Annual Report - May 23, 2017 to November 22, 2017.
- January 19, 2018: The ITP commenced its review and evaluation of the *SAR* in accordance with CD ¶132.b.
- February 14, 2018: The ITP submitted a request to Enbridge for additional information on 39 of the items reported in the *SAR*. The EPA was provided a copy of that request.
- March 19, 2018: Enbridge provided a partial response to the ITP's request for additional information.
- March 26, 2018: Enbridge provided a response to the remainder of the ITP's request for additional information.
- April 9, 2018: The ITP provided Enbridge and the EPA with the ITP's general findings relating to the *SAR*, as well as six specific preliminary findings (PFs) arising out of the ITP's evaluations as of that date.
- April 16, 2018: Enbridge provided to the EPA and the ITP its response to the six specific PFs.
- May 9, 2018: EPA requested that the ITP submit a report of the ITP's evaluations of Enbridge's *SAR*.

The CD identifies the types and categories of information that is to be provided in each semi-annual report for Enbridge to demonstrate compliance with the various injunctive measures stipulated in CD Section VII (the ITP does not address spill response requirements). In its evaluations of the information provided in the *SAR*, the ITP assessed:

- The information for its completeness.
- Whether the information complies with CD prescriptive requirements.
- Whether the information provided is supported by the facts.
- Whether the information provided in the *SAR* demonstrates the application of best engineering judgment.

In summarizing the ITP's findings and conclusions of whether the information in the *SAR*, supplemented by the ITP's body of knowledge, demonstrates compliance with a particular CD requirement, the ITP established the following categories:

- Compliant
- Compliant using additional information (AI)[1]
- Discussion Item
- Not Compliant

Given the limited scope and content of the summaries and discussions, and supporting facts, presented within the *SAR*, the ITP has relied in large part upon its body of knowledge in evaluating the *SAR*. Table 1 summarizes the ITP's evaluations with respect to the various entries in the *SAR*.

Table 1: Summary of ITP's evaluation regarding the CD Paragraphs as reported on in the *SAR*

	Compliant	Compliant Using AI	Discussion Item	Not Compliant
SAR Paragraphs[2]	108	17	7	3

In evaluating the first *SAR*, the ITP also considered whether the *SAR* contains the various types and categories of information stipulated in CD ¶144 and ¶145. The ITP provides examples of instances where the *SAR* does not does not provide complete discussion and analysis of actions taken toward achieving compliance, or does not provide either the factual bases, or sources of the factual bases, underlying its conclusions of compliance. Those examples are representative of certain categorical deficiencies discussed in the body of this report. The ITP concludes, therefore, that the *SAR* is Not Compliant with the CD due to these deficiencies. This matter will be further discussed with Enbridge and the EPA.

To the extent the ITP finds the information in the *SAR* demonstrates compliance with, or not with, CD requirements, such finding is for the sole purpose of informing the EPA of the ITP's independent conclusions. The EPA remains, in all circumstances, the party which will officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD.

Given that CD Section VII, Subsection H, Spill Response and Preparedness is specifically excluded from the ITP's scope, the ITP's evaluations of the *SAR* did not include CD Section VII, Subsection H. Nor did the ITP evaluate any of the *SAR* related to CD Section VII, Subsection J, relating to Independent Third Party Consent Decree Compliance Verification.

[1] AI includes Enbridge responses to the ITP's additional information requests and preliminary findings.
[2] The reference "SAR paragraphs" refers to a grouping of CD Paragraphs, sub-paragraphs, or logical groupings thereof that Enbridge used in the *SAR*.

The ITP identified three paragraphs in the *SAR* where the ITP could not establish that the information provided in the *SAR*, even when supplemented with requested AI and the ITP's body of knowledge, demonstrated Enbridge's compliance with the applicable CD requirements (i.e. "**Not Compliant**"). Those three *SAR* paragraphs were related to:

- CD ¶23: Evaluation of Replacement of Portions of Line 10 within the United States
- CD ¶29: Submission of a schedule identifying each In-Line Inspection (ILI) scheduled on any pipeline within 30 Days of the CD Effective Date
- CD ¶144-145: Information and discussion that Enbridge shall include in the *SAR*.

In seven other instances, the ITP found that the information reported in the *SAR*, supplemented by requested AI and the ITP's body of knowledge, did not enable the ITP to determine the compliance status and that further discussions or actions among Enbridge, the ITP, and/or the EPA are needed to resolve the status (i.e. "**Discussion Item**"). Those seven *SAR* paragraphs were related to:

- CD ¶22.a: Replacement of Line 3 in the United States
- CD ¶28.a-b: Scheduling and completion of periodic ILI re-inspections
- CD ¶34.c: Resolution of identified data quality concerns
- CD ¶46.a: Dig selection criteria
- CD ¶68.a: Integrity protection of the Line 5 Dual Pipelines from ice, currents and vessel anchors
- CD ¶75: Integrity management personnel access to OneSource
- CD ¶102: Rupture Detection System Alarm

As noted in Table 1 (on page 5), for 17 of the *SAR* paragraphs, the ITP found that when requested AI was coupled with the information in the *SAR* and the ITP's body of knowledge, the totality of that information was sufficient to demonstrate compliance with the applicable CD stipulation(s) (i.e. "**Compliant using AI**").

As noted in Table 1 (on page 5), for 108 of the *SAR* paragraphs, the ITP found the information provided in the *SAR* when coupled with the ITP's body of knowledge was sufficient to demonstrate Enbridge's compliance with the applicable CD requirements (i.e. "**Compliant**").

Definitions[3]

Term	Definition
AI	Additional information
AIR	Additional Information Request
ALD	Alternative leak detection
API	American Petroleum Institute
API RP	API Recommended Practice
APR	Alternate pressure restriction
ART	Alarm Response Team
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."
AUV	Autonomous underwater vehicle
BIWP	*Biota Investigation Work Plan*
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 [of the Consent Decree])."
CD ¶	Consent Decree Paragraph. Paragraph is defined in the CD as "a portion of this Decree identified by an Arabic numeral." The ¶ symbol is not used to denote paragraphs from any other document.
C-FER	C-FER Technologies, Inc.
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 [that is] 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."
CPM	Computational pipeline monitoring. A technology that uses computer software to monitor and process real-time values of pressure, temperature, flow, and fluid properties to identify leaks.

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

Term	Definition
Crack Feature	Defined in the CD as "any feature on a pipeline [that is] 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.'"
CRO	Control Room Operator
DAS	Distributed acoustic sensing. A technology whereby fiber optic cable is used to sense acoustic vibration as an indication of a potential leak.
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 [F]eatures, Corrosion [F]eatures and Geometric [F]eatures required to be excavated in accordance with [CD] Section VII.D."
DQA	Data quality assessment
DTS	Distributed temperature sensing. A technology whereby fiber optic cable is used to detect temperature and uses temperature differential as an indication of a potential leak.
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.
AE	Engineering assessment
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	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."

Term	Definition
Field Burst Pressure	Defined in the CD as "the Predicted Burst Pressure of such feature calculated based on field measurements of feature length and depth obtained during examination of the feature at the time of excavation." It applies to Crack Features and Corrosion Features "located on any section of a Lakehead System Pipeline that is excavated, whether for repair or mitigation of features, investigation of features or otherwise."
Finding	An observation made during the process of review and evaluation that may indicate compliance, or non-compliance, with a CD requirement.
FRE	Feature Requiring Excavation. Defined in CD ¶36 as "any Crack [F]eature, Corrosion [F]eature, or Geometric [F]eature that meets one or more of the dig-selection criteria in [CD] Subsection VII.D (V)." CD ¶47-52 and CD ¶55-57 provide the specific criteria.
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 Semi-Annual 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."
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 Alarm Response Team (CD ¶105) and provides capability for addressing leak alarms.
LDS	Leak detection system
LSIRP	*Lakehead System Integrity Remediation Process*

Term	Definition
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."
MFG	Manufacturing (features)
MOC	Management of change. Refers to a formal process for implementing change to a pipeline system.
MOP	Maximum operating pressure
NDE	Non-destructive examination
New Lakehead Pipeline	Defined in the CD as having "the meaning set forth in [CD] 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 [CD] Effective Date, the term "New Lakehead Pipeline" shall also apply to such pipeline."
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 [CD] Paragraph 94.
Parties	Defined in the CD as "United States and Enbridge."
PCSLD	Pipeline Control Systems and Leak Detection
PF	Preliminary findings
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 [F]eature, Corrosion [F]eature, or Geometric [F]eature 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."

Term	Definition
RDS	Rupture detection system. Refers to the software application within the Enbridge leak detection system that monitors SCADA to detect pipeline ruptures.
Remaining Life	Defined in the CD as "the estimated period [of] time remaining before a Crack [F]eature or Corrosion [F]eature 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 [CD] Paragraph 84.b" which defines it as "any modification of a Lakehead System Pipeline after the [CD] 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
RS	Reporting segment
S&A	*Stipulation and Agreement*
SAR	*Semi-Annual Report*
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."
Sectionalize	Defined in the CD as "the closure of all Remotely-Controlled Valves within any portion of a pipeline."
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
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.”
USCG	United States Coast Guard
WLOA	Weekly list of alarms

Introduction

The Independent Third Party (ITP) for the Enbridge Consent Decree (CD), O.B. Harris, LLC, was engaged effective January 11, 2017. As required by CD Paragraph (¶) 132.b, the ITP has reviewed and evaluated the *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017* (*SAR*) that Enbridge submitted on January 18, 2018.

Subsequent to the January 18, 2018 submission, on May 9, 2018, the Environmental Protection Agency (EPA) requested that the ITP evaluate the *SAR* and prepare this report, the *Independent Third Party Review and Evaluation of Enbridge Submittal First Semi-Annual Report (ISR).* In accordance with CD ¶132.b, this report is due on June 25, 2018, within 45 Days of the EPA's request.

The ITP had the following exchanges with Enbridge and the EPA subsequent to submission of the January 18, 2018 *SAR*.

- On February 14, 2018, the ITP transmitted *SAR – Additional Information Request (AIR)* containing 39 items, to Enbridge and the EPA. (See Appendix A: Additional Information Request.)
- Enbridge replied to the ITP's *AIR* in two phases:
  - Phase 1 on March 19, 2018
  - Phase 2 on March 26, 2018

  (See Appendix B: Additional Information Request Response.)
- On April 9, 2018, the ITP sent the *ITP First SAR Preliminary Findings (PFs)* to Enbridge and the EPA which outlined 6 preliminary findings.[4]
- On April 16, 2018, Enbridge replied to the ITP PFs with *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report (Response to PF).* (See Appendix C: Enbridge Response to Preliminary Findings.)
- On May 9, 2018, the EPA requested that the ITP evaluate the *SAR* and prepare this report. In accordance with CD ¶132.b, this report is due within 45 Days of the EPA's request or June 25, 2018].

[4] Additional information (AI) provided by Enbridge in response to AIR or PF was used to supplement the SAR for purposes of developing the PFs.

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, and a technical writer, and an ILI administrator. O.B. Harris and the 10 SMEs have a total of 405 years experience in the oil and gas industry of which about 70% is in pipeline operations.

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 EPA on April 12, 2017 in Chicago.

The ITP team has logged approximately 1300 person-days from January 2017 through the date of the Enbridge *SAR*.

ITP Methods and Processes

The ITP has implemented the CD-required tasks from CD ¶132 and ¶134 using the following methods and processes:

- **Understanding CD Requirements:** In the ITP's February 2017 kick-off meeting, the team discussed the duties and responsibilities of the ITP, and the SMEs presented an overview of their portions of the CD, to develop a consensus understanding of the requirements. This SME discussion included a summary of each CD requirement and due dates where applicable. Following this meeting, the ITP SMEs prepared further descriptions of CD requirements along with the ITP plans for compliance evaluation, which were presented in the April 2017 EPA 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 the date of the *SAR*, 164 requests have been submitted, and Enbridge has responded with approximately 1,100 documents. Enbridge has worked with the ITP to:
  - Streamline the process for transmitting documents.
  - 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 CD requirements for In-Line Inspection (ILI) are applicable to all ILI runs initiated over the life of the CD. To facilitate the ITP access to this data, Enbridge has provided secure access to certain data repositories for the ITP's ILI SMEs.

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

- **Meetings with Enbridge and EPA:** Beginning with the March 2017 orientation through January 18, 2018, the ITP has participated various meetings with Enbridge and the EPA.

  - Onsite meetings: Five meetings in Enbridge's Edmonton offices or EPA's Chicago office. These meetings involved Enbridge and the ITP SMEs and leadership. The EPA participated in-person or via video or phone conference.

  - Monthly Planning Meetings – Beginning in May 2017, a monthly phone conference has been held with Enbridge, EPA, and the ITP SMEs.

  - Weekly Planning Meeting: Beginning the end of June 2017, a weekly phone conference has been held with Enbridge, EPA, and ITP leadership.

  - Monthly Technical Meetings: Pipeline Control Systems and Leak Detection (PCSLD)/Control Center Operations (CCO) and ILI technical exchanges began at the end of August 2017. These are conducted as a web conference with the ITP, EPA, and Enbridge SMEs. Standing agendas provide updates on Enbridge activities over the previous month and specific agenda items provide a forum to respond to technical issues.

  - Special meetings: Teleconferences or web conferences between Enbridge, EPA, and the ITP via phone or web conferencing have been held to exchange information related to various compliance assessment activities. Approximately 20 such meetings have been held through the date of the *SAR*.

- **Task 2 Reports:** CD ¶132.b Task 2 - Review of Plans, Reports, and Other Deliverables, requires that the ITP review and evaluate CD-required Enbridge submittals and, upon request from EPA, provide a written report within 45 Days. The ITP developed a process that has been used for preparation of six Task 2 reports through the date of the *SAR* with an additional four reports in-process. The process is designed for the ITP to request additional information and share preliminary findings which provides Enbridge with an opportunity to refine the ITP's body of knowledge or otherwise to address ITP concerns.

- **Task 3 Measures:** CD ¶132.c Task 3 - Review of Implementation of Compliance Measures, 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 review upon the CD Effective Date as Enbridge activities to meet CD requirements were on-going. The ITP is required to complete a Verification Report to document this review on September 24, 2018, roughly two months after Enbridge submits its second Semi-Annual Report.

- **Peer Review:** The ITP employs a peer review process throughout its compliance verification activities. For example, Task 2 review, evaluation and report preparation involves an SME who leads the evaluation with at least two SMEs with relevant expertise (peer reviewers). In Task 3 compliance verification, one or more peer reviewers evaluate the analysis and conclusions of the lead SME. Through this peer review process, the ITP produces compliance evaluation results that reflect a broad range of relevant technical expertise.

- **Field and Onsite Observations:** Where the ITP determines that observation of field or Control Center operations is necessary to evaluate compliance, the ITP has traveled to those locations. Thus far, the ITP has conducted observations of five separate activities:

  - Installation of valves
  - Commissioning of valves
  - Various Control Center Operations
  - The Line 5 hydrotest of the Dual Pipelines
  - Biota investigations and coating repairs in the Straits of Mackinac.

- **ILI Milestone Compliance Verification Process:** Approximately 145 separate CD requirements exist for ILI that are repeated for each of the estimated 140 ILI tool runs over the life of the CD. This results in over 20,000 points of verification over the period. 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 from running the tool to establishing the appropriate period until the next Tool Run. Figure 1 (page 17) illustrates the 10 ILI Milestones in the ILI review cycle.

  See Appendix D: Milestone Designations for *SAR* Paragraphs for a listing of ILI Milestones and *SAR* paragraphs.

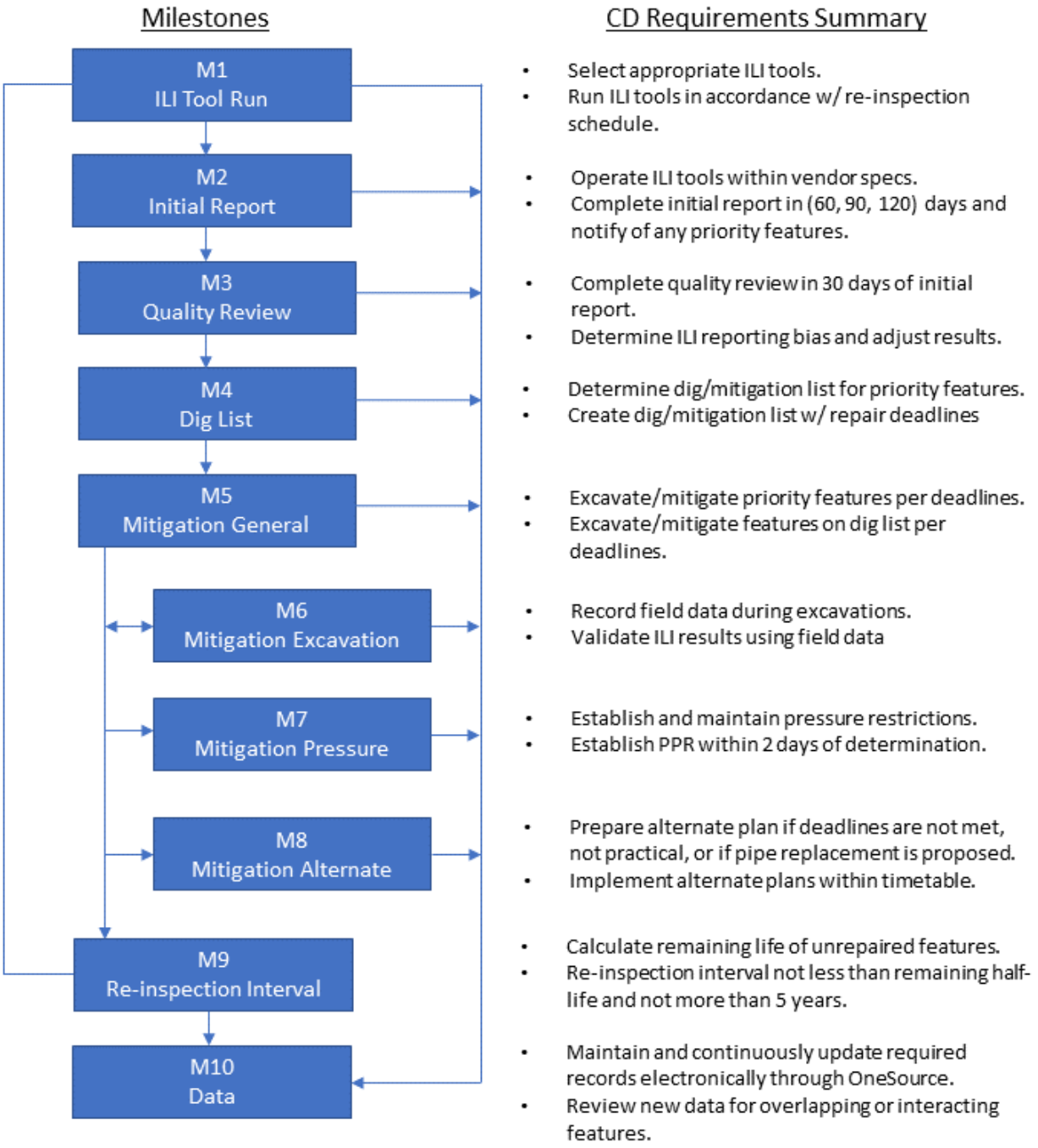

Figure 1: ILI milestone process

Scope of ITP First *SAR* Report

The *ITP SAR Report (ISR)* reviews and evaluates the Enbridge *SAR* that covers the first six-month period from the CD Effective Date (May 23, 2017 through November 22, 2017). For purposes of this report, the ITP's analysis covers the period from February 2017 (kick-off of the ITP) through January 18, 2018, the date that Enbridge submitted the *SAR*. In limited cases, the ITP also refers to information received after January 18, 2018.

The *SAR* states, "This Semi-Annual Report addresses the requirements in Subsections VII.A-J of the Consent Decree that became due and/or were required to be complied with by Enbridge during the reporting period." The ITP observes that the CD language surrounding the scope and content of the *SAR* (generally CD ¶132.b, ¶134.e, and ¶144) does not to limit the scope of the *SAR* as Enbridge states. Rather, the ITP interprets the language of the cited CD Paragraphs to include ongoing matters drawn from CD ¶144:

- Status of compliance
- Completion of milestones
- Status of permit applications
- Operation and maintenance issues

Moreover, with respect to a portion of the CD Paragraph requirements, the *SAR* does not provide complete discussion and analysis of actions taken toward achieving compliance, nor does it necessarily provide either the factual bases, or sources of the factual bases, underlying its conclusions of compliance.

Given the limited scope or nature of the summaries and discussions presented within the *SAR*, the ITP has relied in large part upon its body of knowledge in evaluating the *SAR*. The ITP's body of knowledge is derived from:

- Relevant factual data and information provided previously to the ITP by Enbridge.
- Factual data and information included within various reports and analyses provided previously to the ITP by Enbridge, including the *SAR.*
- The ITP's various reports relating to specific compliance actions that Enbridge previously has undertaken and reported upon.
- The collective experience and expertise of the individuals comprising the ITP SMEs.

The scope of the ITP's review included the entire *SAR* with the exception of:

- CD Subsection H, relating to spill response and preparedness (CD ¶125).
- CD Subsection J, relating to the ITP.

ITP First *SAR* Report Methodology and Contents

SAR Paragraph Analysis

Enbridge organized the *SAR* to discuss compliance activities for each CD Paragraph, sub-paragraph, or logical grouping thereof (*SAR* paragraphs). These *SAR* paragraphs are arranged to report the compliance status for related CD Paragraphs. References to these *SAR* paragraphs are designated as *SAR* # (for example, *SAR* 42) throughout this report.

The ITP organized its evaluation and reporting structure as follows:

- To organize the *ISR*, the ITP grouped the 135 Enbridge *SAR* paragraphs into 33 ITP reporting segments (RSs).
- The RSs are organized to present the ITP's analysis for related CD Paragraphs. For example, RS 24 is Operation of the Material Balance System (MBS) Leak Detection, a portion of CD Section VII, Sub-section G. The Enbridge *SAR* reports individually on the nine *SAR* paragraphs regarding MBS Leak Detection while the *ISR* consolidates this into a single RS (RS 24).
- The ITP verified that all CD Paragraphs have been accounted for in the ITP reporting segments. Appendix E: CD Paragraphs and ITP Reporting includes a table that shows the ITP reporting segment for each CD Paragraph.
- For ILI and data integration requirements of the CD in Sub-Sections D, E, and F, the RSs align with the 10 ILI Milestones discussed in the ITP Methods and Processes section (page 14).
- Table 2 presents these RSs.

Table 2: Reporting segments organization

CD Section and Sub-section	ITP Reporting Segment
VII	
A	RS 1. Enjoined from operating US Line 6B
B	RS 2. Replacement and Deactivation US Line 3
	RS 3. Operating of Line 3 Pending Replacement
	RS 4. Line 10 Replacement Evaluation
C	RS 5. Hydrostatic Pressure Testing Requirements
B, D, E	RS 6. ILI Milestone 1: ILI Tool Run
D	RS 7. ILI Milestone 2: Initial Report
D	RS 8. ILI Milestone 3: Quality Review
D	RS 9. ILI Milestone 4: Dig List
D	RS 10. ILI Milestone 5: Mitigation General
D	RS 11. ILI Milestone 6: Mitigation Excavation
D	RS 12: ILI Milestone 7: Mitigation Pressure
D	RS 13. ILI Milestone 8: Mitigation Alternate
D	RS 14. ILI Milestone 9: Inspection Interval

CD Section and Sub-section	ITP Reporting Segment
D, F	RS 15. ILI Milestone 10: Data
E	RS 16. Dual Pipelines, Span Management
	RS 17. Dual Pipelines, Biota Investigation
	RS 18. Dual Pipelines, Axially-Aligned Cracks/Pipeline Movement
	RS 19. Dual Pipelines, Acoustic Leak Detection
F	RS 20. Data Integration – General
G	RS 21. ALD Technology Report
G	RS 22. Straits of Mackinac-ALD Report
G	RS 23. Leak Detection for new pipelines
G	RS 24. Operation of MBS leak detection on each Lakehead System Pipeline
G	RS 25. New Equipment at Remote Controlled Valves
G	RS 26. Operate and test new Rupture Detection System
G	RS 27. Alarm Response Team and Alarm System Capability
G	RS 28. Alarm Clearance Procedures
G	RS 29. Shutdown Procedures in Response to LD Alarms
G	RS 30. LD Alarm Compliance Certification
G	RS 31. Shutdown Procedures in Response to Non-LD alarms
I	RS 32. New Remotely-Controlled Valves
IX	
	RS 33. Reporting Requirements

- For each reporting segment, the Analysis section of this report includes the following:

  A: ITP Review and Evaluation – Summary of the CD requirements, summary of the *SAR* content, description of the ITP's evaluation, and a conclusion regarding the *SAR* compliance. Additional information (AI) provided by Enbridge in response to *AIR* or PF has been used to supplement the *SAR*.

  B: Relevant Documents and Reports – List of procedures, reports, and other documents reviewed or generated by the ITP.

ITP's Review and Reporting

Evaluation Criteria

The ITP's review and evaluation applied the following criteria:

1. The ITP assessed whether the *SAR* includes the information that is expressly required by CD ¶29, ¶31, ¶49, ¶96, and ¶110.c, as required in turn by CD ¶144.

2. For each *SAR* paragraph, the ITP examined the information in the *SAR* (including the Enbridge AIR *Response* and *Response to PF*) to assess whether that information presents or includes the following:

   - Summary and discussion of the status of compliance with CD requirements (CD ¶144, ¶132.b)
   - Factual and/or analytical elements demonstrating completeness (CD ¶132.b)
   - The factual bases supporting the *SAR* and AIR responses (CD ¶134.e)
   - Demonstration of the application of best engineering judgment in support of the responses (CD ¶134.e)

3. For each *SAR* paragraph, the ITP assessed whether the *SAR* (including the AI) presented the following subject matter required by CD ¶144:

   - Completion of milestones
   - Problems encountered or anticipated (together with implemented or proposed solutions)
   - Status of permit applications
   - Operation and maintenance issues
   - Reports to state agencies
   - Number, by types, of features repaired or mitigated during the reporting period
   - The number of features, by type, planned for future repair or mitigation

4. For applicable *SAR* paragraphs where Enbridge failed to comply with any CD requirement or anticipates that it will violate a requirement in the future, CD ¶145 requires that the *SAR* include various information and analysis.

Evaluation Categories

The ITP established the following categories for summarizing its findings and conclusions regarding whether the information in the *SAR*, supplemented by the ITP's body of knowledge, demonstrated compliance with a particular CD requirement or set of CD requirements:

- **Compliant -** The information reported in the *SAR* demonstrates compliance.
- **Compliant using AI** – The information reported in the *SAR*, supplemented by AI, demonstrates compliance.
- **Discussion Item –** The information reported in the *SAR*, supplemented by AI, does not enable the ITP to determine the compliance status. Further discussion or actions among Enbridge, the ITP, and/or the EPA are needed to resolve the status.
- **Not Compliant** – The information reported in the *SAR*, supplemented by AI, does not demonstrate compliance with the CD.

Table 1 shows the distribution of the *SAR* paragraphs in each of these evaluation categories.

Table 3: *SAR* paragraph distribution per evaluation category

	Compliant	Compliant using AIR	Discussion Item	Not Compliant
Number of *SAR* paragraphs	108	17	7	3

Evaluation Summary

Table 4 shows a listing of each *SAR* paragraph with the ITP's evaluation category. For each *SAR* paragraph that is a Discussion Item or Not Compliant, Table 4 includes a comment and a reference to the *ISR* page containing the analysis of that *SAR* paragraph.

Table 4: Evaluation summary

	Compliant
AI	Compliant using Additional Information
	Discussion Item
	Not Compliant

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
RS 1. Enjoined from Operating US Line 6B			
21	Original US Line 6B	AI	
RS 2. Replacement and Deactivation US Line 3			
22a	Replacement of Line 3 in US		Enbridge has not provided complete information about the Line 3 replacement following receipt of all approvals needed to construct the line. Refer to page 33 for details
22.b	Line 3 Deactivation		
22.e	Prohibition Regarding Use of Line 3 Following Replacement		
RS 3. Operating of Line 3 Pending Replacement			
22.c	Original US Line 3 MOP		
22.d	Requirement for Use of Original US Line 3		
RS 4. Line 10 Replacement Evaluation			
23	Line 10 Replacement Evaluation		The *SAR* does not include information regarding the change in feature counts used in Enbridge's Evaluation of the Replacement of US Line 10 and related changes from the original September 20, 2017 report. CD ¶144-145 set out requirements where Enbridge encounters such a problem. Refer to page 37 for details
RS 5. Hydrostatic Pressure Testing Requirements			
24	Hydrostatic Pressure Testing Plan and Schedule		
25	Procedures for Hydrostatic Pressure Testing		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
25.a	Use of Test Segment for Hydrostatic Pressure Testing		
25.b	Continuous 8-hour Hydrostatic Pressure Test		
25.b(1)	Maintain Pressure of at Least 1.25 X MOP for 4 hrs		
25.b(2)	Maintain Operating Pressure of Not Less Than 1.10 X MOP for remainder of test		
25.c	Complete Hydrostatic Pressure Testing Less Than 270 Days from EPA's Receipt of Plan		
25.d	No Additional Water to be Added Once Testing Underway		
25.e	Written Notification Prior to Hydrostatic Pressure Testing		
25.f	Hydrostatic Pressure Testing Report		
26	Line Failure During Hydrostatic Pressure Testing		
26.a	Prevent Discharge from Failure Reaching a Body of Water		
26.b	Line Failure Investigatory Report		
RS 6. ILI Milestone 1: ILI Tool Run			
27	Timely Identification and Evaluation of all Features		
28.a-b	Periodic In-Line Inspection and ILI Schedule		The *SAR* does not explain the error in scheduling the Line 2 tool runs. Refer to page 40 for details
28.c	Incomplete or Invalid ILI	AI	
29	12-month ILI Schedule		The *SAR* does not provide information about the revised ILI schedule. As required by CD ¶144-145, the *SAR* does not discuss the deficiencies in the both the revised schedule and the six noted ILI runs as specified in the *S&A*. Refer to page 41 for details
30	ILI Schedule Modification	AI	
70.a	Corrosion and Circumferential Crack ILI Timing		
70.b	Geometric Feature ILI Timing		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
RS 7. ILI Milestone 2: Initial Report			
31	ILI compliance with Tool Specifications		
32.a-c	Initial ILI Reports: • Cracks 120 Days. • Corrosion 90 Days • Geometric 60 Days		
33.a	Immediate Feature Notification	AI	
33.b	Priority Feature Definition	AI	
RS 8. ILI Milestone 3: Quality Review			
34.a	Preliminary Review of Initial ILI Report	AI	
34.b	Evaluation of Features Requiring Excavation		
34.c	Resolution of Identified Data Quality Concerns		The *SAR* does not discuss the initial use of incorrect pipeline data in the ENO-EMA pipeline assessment as required in CD ¶144. Refer to page 47 for details.
34.d	ILI Data Quality Evaluation Timeliness		
34.e	Discrepancies Between Two Successive ILI Runs		
34.f-g	Investigative Digs		
RS 9. ILI Milestone 4: Dig List			
35	Evaluation of Each Feature in Initial ILI Report for Features Requiring Excavation		
36	Feature Requiring Excavation Definition		
37	Deadlines for Adding Features Requiring Excavation	AI	
38.a	Excavation and Repair Deadlines		
38.b	Establish Pressure Reduction if Required		
40	Fields Data Comparison to ILI Data		
42	Predicted Field Burst Pressure		
43	Predicted Field Burst Pressure Definition		
44.a-b	Initial predicted Field Burst Pressure Calculation and Initial Remaining Life Calculations	AI	

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
47	Crack Feature		
48	Crack Feature Mitigation Timelines		
49	Dig Timeline Extensions		
50	Corrosion Features		
51	Corrosion Feature Mitigation Timelines		
53	Dig Selection Criteria for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features		
55	Dig Selection Criteria for Dents and Other Geometric Features		
56	Dents and Other Geometric Feature Mitigation Timelines		
58	Dig Selection Criteria for Interacting Features	AI	
RS 10. ILI Milestone 5: Mitigation General			
33.c-d	Priority Feature Review and Mitigation if Required	AI	
RS 11. ILI Milestone 6: Mitigation Excavation			
39.a-b	Field Measurements of Excavated Features	AI	
RS 12: ILI Milestone 7: Mitigation Pressure			
52	Corrosion Feature Pressure Restrictions		
54	Pressure Restrictions for: • Axial Slotting • Axial Grooving • Selective Seam Corrosion • Seam Weld Anomaly A/B Features		
57	Dents and other Geometric Feature Pressure Restrictions		
59	Pressure Restrictions for Interacting Features		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
RS 13. ILI Milestone 8: Mitigation Alternate			
46	Dig Selection Criteria (CD ¶46.a)		Enbridge and the ITP are discussing the CD requirements for assessment of crack features intersecting with metal loss features. Refer to page 60 for details
46	Dig Selection Criteria (CD ¶46.b and g)	AI	
46	Dig Selection Criteria (CD ¶46.c-f and h-i)		
RS 14. ILI Milestone 9: Inspection Interval			
60	Remaining Life		
61	Remaining Life Clarifications		
62	Operating Pressure Used When Determining the Remaining Life of Crack Features		
63	Crack Feature Remaining Life Calculations		
64	Corrosion Growth Rate		
65	Maximum Interval Between Successive ILIs		
66	Maximum Interval Between Successive ILIs		
RS 15. ILI Milestone 10: Data			
41	ILI Electronic Records		
45	Retention of Electronic Records		
75	Integrity Management Personnel Access to Feature Integration Database		While the required schematic diagram described in the *SAR* has been demonstrated for the ITP, it is not yet clear that it can be viewed by all integrity management personnel. The ITP will evaluate as part of the Task 3 verification process. Refer to page 65 for details
76	Successive ILI Data Sets		
78.a	OneSource ILI Updates		
78.b	OneSource Interacting Features		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
RS 16. Dual Pipelines, Span Management			
67, 68.b-f	Inspections, Screw Anchors, and Inspections	AI	
68.a	Integrity Protection from Currents, Ice, Spans or Vessel Anchors-Span Management		The *SAR* notes that a report assessing options to mitigate the risk of a vessel's anchor impairing the integrity of the Dual Pipelines is due June 30, 2018. Refer to page 67 for details
17. Dual Pipelines, Biota Investigation			
69.a,b,c	Biota Investigation, Work Plan, Work Plan Implementation		
18. Dual Pipelines, Axially-Aligned Cracks, Pipeline Movement			
71	Investigation and repair of Axially Aligned Cracks		
72	Pipeline Movement Investigation		
19. Dual Pipelines, Acoustic Leak Detection			
73	Quarterly Inspections Using Acoustic Leak Detection Tool		
RS 20. Data Integration – General			
74	Feature Integration Database	AI	
77	Update of OneSource Database		
RS 21. ALD Technology Report			
79-80	Create and Submit ALD Report		
RS 22. Straits of Mackinac ALD Report			
81-83	Create and Submit ALD Report-Mackinac Report		
RS 23. Leak Detection for New Pipelines			
84	New Lakehead Pipelines and Replacement Segments; Applicability		
85	Installation of Flowmeters		
86	Installation of Flowmeters on Lines That Utilize In-line Batch Interface Tools		
87	Installation of Other Instrumentation		
88	Establishment of MBS Segments		
89	Leak Detection Sensitivity Requirements		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
90	Demonstration of Compliance with Leak Detection Sensitivity Design and Construction Requirements		
91	Establishment and Optimization of Alarm Thresholds		
RS 24. Operation of MBS Leak Detection on Each Lakehead System Pipeline			
92	Operation of MBS Leak Detection System		
93	Temporary Suspension of MBS Leak Detection Capabilities		
94	Overlapping MBS Segments		
95	Alternative Leak Detection Requirements		
96	Reporting MBS Outages		
97	Reporting Requirements		
98	Tolling Requirements		
101	Transient-State Sensitivity Analysis		
103	"24 hour" Alarm		
RS 25. New Equipment at Remote Controlled Valves			
99	Installation of New Equipment at Remotely-Controlled Valves		
100	Requirements for Valve Excavation		
RS 26. Operated and test New Rupture Detection System			
102	Rupture Detection System Alarm		The ITP has received a report on additional testing being performed by Enbridge and the ITP review and evaluation is in process. Refer to page 83 for details
RS 27. Alarm Response Team and Alarm System Capability			
104	Leak Detection Requirements for Control Room: Applicability		
105	Alarm Response Team		
106	Remote Notification of Alarm Response Team		
107	Audible and Visual Alarms		
RS 28. Alarm Clearance Procedures			
108	Alarm Clearance Procedures		
108.a	Alarm Clearance Requirements		
108.b	Alarm Clearing Restrictions		
108.c	Confirmation of Leak Detection System Functioning		
108.d	Independent Alarm Investigation		

SAR CD¶	*SAR* CD¶ Title	Assessment	Comment
108.e	ART Procedures for Column Separation		
108.f	Electronic Records of Alarm Response		
RS 29. Shutdown Procedures in Response to LD Alarms			
109	Unscheduled Shutdown in Response to an Alarm		
109.a	Ten-minute Rule		
109.b	Column Separation - Running Pipelines		
109.c	Column Separation - Pipeline Shutdown	AI	
109.d	Confirmed Leak Rule		
109.e	Shutdown and Restart Record	AI	
RS 30. LD Alarm Compliance Certification			
110.a	Weekly List of Alarms		
110.b	Record of Alarms		
110.c	Alarm Submittal to EPA		
110.d	Certification of Reporting Period		
RS 31. Shutdown Procedures in Response to Non-LD alarms			
111	Unscheduled Shutdown Procedures in Response to Other Events		
112	Reporting of Events from Paragraph 111		
RS 32. New Remotely-Controlled Valves			
121-122	Installation of 14 Remotely-Controlled Valves		
123	Enbridge Computer Modeling for Valve Locations		
124	Valve Design and Closure	AI	
RS 33. Reporting Requirements			
143-145	Content of the *SAR*		The *SAR* does not contain complete information and discussion as required by CD ¶144 and 145. Refer to page 95 for details.
146-148	Discharges from a Lakehead System Pipeline		

Compliance Considerations

To the extent that the ITP finds that Enbridge is in compliance with, or not in compliance with, CD requirements, such finding is for the sole purpose of informing the EPA of the ITP's independent conclusions. The EPA remains, in all circumstances, the party which will officially determine whether Enbridge is in compliance with, or is not in compliance with, the CD.

Section VII.A: Original US Line 6B

RS 1. Enjoined from Operating Original US Line 6B

CD Section VII, Subsection A, ¶21

A: ITP Review and Evaluation

SAR 21 [Original Line 6B]

Compliant

CD ¶21 enjoins Enbridge from permanently operating or allowing anyone else to operate Original US Line 6B for purpose of transporting oil, gas, diluent, or any hazardous substance.

The *SAR* states that Enbridge permanently disconnected Line 6B from the Enbridge system. From the information provided in the *SAR* and the ITP's review of 18 records, the ITP finds the Original Line 6B was disconnected from the Enbridge system prior to the CD Effective Date and is currently inoperable.

CD ¶206 stipulates that restrictions on resumption of operation of Original Line 6B shall remain in effect and enforceable until 10 years after the CD Effective Date, or until Enbridge has satisfied requirements for the CD termination. In response to an ITP *AIR*, Enbridge stated, "Original Line 6B could not physically be operated by Enbridge or any other entity during the period provided in the [Consent] Decree, in full compliance with Paragraph 206."

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• A1 Line 6B schematic • Facility as-builts (17): – A1 Griffith: 01212, 20135 – A1 Howell: 10693 – A1 Laporte – A1 Marshall – A1 Mendon – A1 Niles – A1 Ortonville: 16095 – A1 St Clair: 03199 – A1 Stockbridge: 07354, 10716, 15065, 15066, 15067, 16416, 21532, 25245, • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

Section VII.B: Replacement of Line 3; Evaluation of Replacement of Line 10

RS 2. Replacement and Deactivation of Line 3

CD Section VII, Subsection B, ¶22.a,b, and e

A: ITP Review and Evaluation

SAR 22.a [Replacement of Line 3 in the United States]

Discussion Item

CD Requirement - The CD requires that Enbridge seek all approvals necessary to replace Line 3 as expeditiously as practicable. The CD further requires that, if Enbridge receives all the approvals required to replace Line 3, Enbridge shall complete the replacement as expeditiously as practicable.

Enbridge *SAR* and AI - In the *SAR*, Enbridge states they have been "vigorously pursuing all avenues to complete the replacement of Line 3 as quickly as possible." The *SAR* supports this statement through:

- A discussion of the permitting process in the three States traversed by the pipeline.
- A table listing 29 separate permits required.

There is no information in the *SAR* regarding completion of the replacement following approvals.

In the *AIR* and PF, the ITP requested information describing the overall schedule of the work, including specific information regarding preparations needed to complete the replacement following receipt of approvals (i.e.,design, procurement, and construction). Enbridge provided some high-level information on project schedule and major preparations but stated the following objections:

- "There is no requirement in the [C]onsent [D]ecree 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."

ITP's Analysis – The ITP disagrees with these two objections.

The CD states, that following approvals, Enbridge shall complete the replacement "as expeditiously as practicable." Therefore, the *SAR* must include information regarding the project phases needed to complete the replacements.

The *SAR* should contain information regarding a number of 'long-lead' activities such as design, procurement of pipe and other major equipment, and construction plans that should be completed in the period covered by this *SAR*.

The *SAR* and AI do not provide detailed discussion of the status of each permit; however, the ITP acknowledges the statement in the *SAR* that Enbridge is "vigorously pursuing all avenues" to complete the project including the permitting process. Regarding completion of the project following approval,

the *SAR* must include detailed information about preparations currently underway and future plans for major project activities.

In their AI, Enbridge stated they are "willing to answer additional scheduling questions from the ITP". Therefore, the ITP classifies this as a discussion item pending receipt and review of additional information.

SAR 22.b [Line 3 Deactivation]; 22.e [Prohibition Regarding the Use of US Line 3 Following Replacement]

Compliant

Both ¶22.b and ¶22.e are not yet effective because Enbridge has not completed steps that activates these requirements (i.e., replacement of the Original US Line 3).

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• Line 3 Replacement ITP briefing, October 2017. • Minnesota Department of Commerce, Final EIS Line 3 Project, August 17, 2017. • Enbridge Line 3 Web Site: http://www.enbridge.com/projects- and-infrastructure/public-awareness/minnesota-projects/line-3-replacement-project • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)* • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report (April 16, 2018)*

RS 3. Operation of Line 3 Pending Replacement

CD Section VII, Subsection B, ¶22.c-d

A: ITP Review and Evaluation

SAR 22.c [Original US Line 3 Maximum Operating Pressure (MOP) Until Decommissioned]

Compliant

CD ¶22.c requires Enbridge to limit the operating pressure in each segment of Original US Line 3 in accordance with requirements stipulated in an addendum to the CD until Original US Line 3 is decommissioned.

Enbridge states in the *SAR* that they have limited the operating pressure of all Line 3 pipeline segments in accordance with MOP values in the specified EPA.gov hyperlink document. Enbridge states that they have not increased operating pressures above those MOP values, so hydrostatic pressure testing has not been required in accordance with this CD requirement. Enbridge also states that they have not exceeded the MOP values submitted to the EPA during this reporting period. Based upon the information provided in the *SAR*, along with ITP's body of knowledge, the ITP finds Enbridge to be compliant with the requirements as stipulated in CD ¶22.c for this reporting period.

SAR 22.d [Requirements for the Use of Original US Line 3]

Compliant

CD ¶22.d establishes a series of additional requirements Enbridge must undertake if Original US Line 3 is not taken out of service by December 31, 2017.

Enbridge states in their *SAR* that the requirements of this CD Paragraph will be implemented in 2018, since Original U.S. Line 3 was not removed from service by December 31, 2017.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy, Program and Procedures	• *MOP Process Flow Chart* • *Line 3 Specific Integrity Plan & CD imposed MOP values* • *MOP Algorithm (01-02-01)* • *Engineering Services Procedure – MOP Turnover Requirements for Mainline Pipe (EP-ES-07-P-0003)* • *Capacity Management Procedure - MOP Verification (EBSS Model)* • *Facilities Management Procedure – Oper Limits (OPLM2 Simulator)* • *CCO Engineering Procedure – Determining Operating Limits (P003)* • *CCO Procedure – Implementing Operating Limits (P004), LPM – Line Pressure Monitor System* • *CCO Procedure – Pipeline Operating Limit Verification* • *CCO Procedure - Suspected Pipeline Overpressure Response* • *Control Room Management Plan (CRM)*
Enbridge Work Products	• Enbridge Monthly Presentations with a Record of Actual Max Pressures Achieved -vs- MOPs for each Segment on Line 3

RS 4. Line 10 Replacement Evaluation

CD Section VII, Subsection B, ¶23

A: ITP Review and Evaluation

SAR 23 [Line 10 Replacement Evaluation]

Not Compliant

The ITP cannot establish that the section of the *SAR* summarizing or discussing CD ¶23 demonstrates Enbridge's compliance with the applicable requirements in CD ¶23 as supplemented by the requirements in CD ¶144 and ¶145.

CD ¶23 requires Enbridge to submit a report, within 120 Days of the CD Effective Date, evaluating replacement of the entire portion of the Line 10 oil transmission pipeline between the Canadian border near Niagara Falls, NY and the terminus of the pipeline near West Seneca, NY. CD ¶23 sets out various factors that Enbridge must address or consider in its evaluation of US Line 10.

Enbridge notes in the *SAR* that, in accordance with CD ¶23, they submitted a report containing a discussion of the Crack and Corrosion Features in US Line 10 and a comparison of those features to those on a 21 mile section of Line 10 in Ontario, Canada. The *SAR* also notes they submitted the report of their evaluations on September 20, 2017 (i.e. within 120 Days of the CD Effective Date).

The *SAR* also notes that, late in 2017, Enbridge identified the feature counts used in their Line 10 evaluations and in the September 20 report were higher than exist in the line. The *SAR* notes that analysis of the revised features was on-going as of the date the *SAR* was submitted to the EPA (i.e. January 18, 2018). No timeline for completing the analysis of the revised feature counts and for submission of any findings or conclusions based on the analysis of the revised feature counts was provided in the *SAR*.

CD ¶144 notes that, in respect to the Semi-Annual Report, Enbridge shall discuss such matters as "…problems encountered or anticipated in implementing the requirement…" and "…operations and maintenance issues…" CD ¶145 sets out certain requirements where Enbridge may fail to comply with a deadline under the CD. Those requirements include discussing the facts and circumstances that led to the issue, the steps Enbridge is taking to rectify the issue, and providing dates that such steps will be taken. Other than noting that the analysis of the feature counts was on-going, the *SAR* does not discuss the facts and circumstances that led to identifying the errors in the feature counts, the steps Enbridge was planning to take, or provide a date or dates for completion of that work.

As part of the ITP's *AIR* submitted to Enbridge on February 14, 2018, the ITP requested that Enbridge to provide the analysis of revised feature counts and a discussion of the drivers or reasons for the revised feature counts. As of April 1, 2018 (i.e., 192 elapsed days from the date the CD required Enbridge to submit its Line 10 evaluation report), Enbridge had not provided the ITP with the results of its evaluations of the revised feature counts.

Enbridge submitted to EPA and the ITP, on April 16, 2018, a revised report of the Line 10 evaluation. The ITP will review and evaluate that report pursuant to CD ¶132.b.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reports and Documents	• *Evaluation of Replacement of Portions of Line 10 with the United States (September 18, 2017)* • *Enbridge Transmittal Letter – Re: Submission of Line 10 Replacement Evaluation Report (September 20, 2017)* • *Enbridge provision of Additional Information via Enbridge SharePoint Site (November 14, 2017)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017; DJ# 90-5-1-1-100099 (January 18, 2018)*
ITP Task 2 Documents and Reports	• *Enbridge Line 10 Evaluation Report – ITP Request for Additional Information (October 24, 2017)* • *Grocery List Request for Additional Information re: Line 10 Evaluation Report (November 3, 2017)* • *ITP's DRAFT Preliminary Findings ref: Enbridge's Evaluation of Replacement of US Portion of Line 10 (January 18, 2018)* • *ITP Additional Information Request for Enbridge First Semi-Annual Report (February 14, 2018)*

Section VII.C – Hydrostatic Pressure Testing

RS 5. Hydrostatic Pressure Testing Requirements

CD Section VII, Subsection C, ¶24-26

A: ITP Review and Evaluation

SAR 24, 25, 25.a, 25.b, 25.b(1), 26.b(2), 25.c, 25.d, 25.e, 25.f, 26, 26.a, 26.b [Hydrotesting Pressure Testing Requirements]

Compliant

CD ¶24 -26 set-out various requirements for the planning, conduct, and reporting of any hydrostatic pressure tests Enbridge performs on any pipeline under the CD.

Enbridge notes in the *SAR* that, during the first reporting period, it conducted hydrostatic pressure tests (hydrotests) of the east and west segments of the Line 5 Dual Pipelines that cross the Straits of Mackinac. The *SAR* summarizes and discusses the various steps or activities Enbridge undertook in planning for, conducting and reporting the results of those hydrotests pursuant to the applicable requirements of the CD.

The *SAR* notes that, on November 16, 2017, the ITP completed a CD ¶132.b Task 2 compliance verification report of the hydrostatic pressure tests of the two pipelines and concluded that the tests conducted on the east and west segment of the Line 5 Dual Pipelines complied with CD requirements.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans, Documents and Reports	• *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan Rev 1 (March 1, 2017)* • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan Rev 2 (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 (August 28, 2017)* • *Final Report: Enbridge Line 5–West Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-154 (August 28, 2017)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017 DJ# 90-5-1-1-10099 (January 18, 2018)*
ITP Task 2 Reports	• *ITP Review and Evaluation of Enbridge Submittal: ¶71 and 24-26, Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan (May 8, 2017)* • *ITP Review and Evaluation of Enbridge Submittal: ¶25 and 71, Line 5 Dual Pipelines Hydrostatic Pressure Tests (November 16, 2017)*

Section VII. D & E: ILI and Straits of Mackinac Spill Prevention

RS 6. ILI Milestone 1: ILI Tool Run

CD Section VII, Subsection D, ¶27-30

CD Section VII, Subsection E, ¶70.a-b

A: ITP Review and Evaluation

This ILI Tool Run Milestone aggregates Paragraphs of the CD prescribed by Section VII, Subsections D and E of the CD. The ILI Tool Run is the initial milestone in the ILI process and assesses the appropriateness of ILI tools for the potential feature types and populations, as well as the timing of re-inspection intervals.[5]

These requirements apply to each of the ILI runs physically completed within the *SAR* period. Enbridge conducted 21 ILI of 14 segments in 6 Lakehead System pipelines over the reporting period, as identified in Table 4 of the *SAR.*

SAR 27 [Timely Identification and Evaluation of All Features]

Compliant

This CD Paragraph requires the implementation of CD requirements to assure timely identification and evaluation of all features. The *SAR* states Enbridge implementation of requirements in CD ¶27-31 "for the timely identification and evaluation of features of significance is set forth in the following sections." The ITP has reviewed Enbridge records, and with consideration of provisions in the *Stipulation and Agreement* (*S&A*) approved on May 1, 2018, the ITP finds that Enbridge has conducted timely identification and evaluation of all features during the *SAR* period. (See discussion of *SAR* 28.a-b.)

SAR 28.a-b [Periodic In-line Inspections ("ILI") and ILI Schedule]

Discussion Item

ILI Runs Required by the CD

CD ¶28.a-b, along with CD ¶28, require the periodic inspection of each Lakehead Pipeline by appropriate ILI tools on a period determined by CD ¶65, ¶66 and ¶70. Table 4 of the *SAR* provided a list of 29 ILIs in 21 Tool Runs (eight were combination tools with two inspection technologies on board) that were completed during the first six-month effective period, including those inspections required in the Straits of Mackinac by CD ¶70. The ITP reviewed Enbridge records and identified two items for discussion, one of which has been resolved by AI.

Periodic ILI and ILI Schedule

In an *AIR*, the ITP requested an explanation regarding a geometry Tool Run apparently missing in Table 4 of the *SAR*. The Enbridge July 14, 2017 *Revised ILI Schedule* indicated that a corrosion and geometry tool

[5] ILI tool types and the respective technologies applied by each are presented in Appendix F: ILI Tool Types.

was scheduled for Line 6A, PE-AM.[6] Enbridge responded to the *AIR*, explaining that the July schedule was in error and that the September Gemini tool was actually a rerun of a March 2017 Tool Run in which the geometry data had been collected but the corrosion sensors had been damaged. Therefore, only the corrosion data was collected in the rerun.

Line 2 Hydrostatic Pressure Test In Lieu of ILI

Enbridge conducted a hydrotest of Line 2 in 2015. Considering this hydrotest to be an integrity test, Enbridge based its scheduling of the next ILI for all threats on the date of the hydrotest. Although hydrostatic pressure testing can constitute a valid integrity test, the CD makes no provision for them in lieu of ILI. Therefore, the ILI runs should have used the previous ILI runs as the basis for scheduling. While the *S&A* was approved and put in place on May 1, 2018, it was not in place during the period of the *SAR*. Considering the *SAR* reporting requirements of CD ¶144, the ITP believes the error in scheduling the Line 2 Tool Runs should have been explained with more detail in the *SAR*. Therefore, the ITP classifies this as a Discussion Item.

SAR 28.c [Incomplete or Invalid ILI]

Compliant using AI

CD ¶28.c requires that ILI vendors notify Enbridge immediately upon discovery of an incomplete or failed ILI tool run. The *SAR* noted two failed ILIs during the *SAR* period. The ITP has reviewed Enbridge records and finds that they support *SAR* 28.c with regard to the failed runs.

The *SAR* also states that ILI vendor contracts stipulate that vendors are required to submit Data Quality Assessments (DQA) according to deadlines and that all work must be completed in accordance with the terms and conditions of the CD. In an *AIR*, the ITP requested a listing of ILI vendor contract execution dates and examples of stipulating language as evidence of a system requiring CD ¶28.c notifications. Enbridge's response noted that the CD requirements are not only a specific component of vendor contracts, but that other mechanisms implement this CD requirement.

SAR 29 [12-Month ILI Schedule]

Not Compliant

Submittal of ILI Schedule for the Initial Period

The ITP cannot establish that *SAR* 29 demonstrates compliance with the applicable requirements in CD ¶29 as supplemented by the requirements in CD ¶144-145.

The *SAR* notes that, as required by CD ¶29, Enbridge submitted a *12-Month Lakehead ILI Schedule* to the EPA on June 22, 2017. The SAR further notes that Enbridge submitted a revised *12-Month Lakehead ILI Schedule Rev 1.1* on July 14, 2017.

As required by CD ¶132.b, the ITP reviewed the June 22, 2017 submittal and identified ILI runs in the *12-Month Lakehead Schedule* that did not meet the ILI frequency intervals specified in CD ¶65-66. The ITP submitted a report of its findings and conclusions to EPA on September 22, 2017 (subsequently amended on September 27, 2017).

[6] Line segments are identified by unique abbreviations which are defined in SAR Table 3.

The CD ¶28.a-b discussion in the *SAR* refers to a pending *Stipulation and Agreement* (*S&A*) regarding ILI runs in Line 2. The *S&A* notes that the July 14, 2017 *Revised ILI schedule* did not satisfy the requirements of the CD and concludes that six separate ILIs conducted by Enbridge did not satisfy the ILI frequency intervals specified in the CD. Enbridge does not refer to those provisions from the *S&A* in the *SAR* discussion for CD ¶29.

CD ¶144 notes that, in the *SAR*, Enbridge shall discuss such matters as "problems encountered or anticipated in implementing the requirement" and "operations and maintenance issues." Further, CD ¶145 requires that if Enbridge failed to comply with any CD requirements or deadline during the *SAR* period, Enbridge shall include certain information in the *SAR* (including discussion of the facts and circumstances that led to the issue and the steps Enbridge is taking to rectify the issue including dates that such steps will be taken). Other than note that Enbridge submitted a *Revised 12-Month Lakehead ILI Schedule*, the *SAR* does not present any discussion required by CD ¶145. Considering these omissions, the *SAR* is Not Compliant with the CD.

Submittal of ILI Schedule for November 23, 2017 – November 22, 2018

CD ¶29 also requires an ILI schedule in each Semi-Annual Report for the 12-month period commencing after the close of the reporting period. Enbridge provided this schedule in Table 6 of the *SAR*. The ITP has reviewed the ILI scheduling records provided by Enbridge and finds the table to be compliant with consideration of the provisions in the *S&A* approved on May 1, 2018.

Line 62 Omission from the *SAR* Table 7

Enbridge included Line 62 in the ILI schedule submitted in June, 2017. However, no ILI was run in Line 62 during the reporting period, and Line 62 is not noted among the scheduling changes listed in Table 7 of the *SAR*. In response to an *AIR*, Enbridge explained that Line 62 has been idled and that the EPA and Enbridge are working towards a modification that will allow deferment of ILI in the idled line until such time that the line resumes transportation of hydrocarbons. The ITP has determined that this is accurate. However, with the modification not yet in place, the ITP believes changes to Line 62's ILI schedule should be included in the *SAR*.

SAR 30 [ILI Schedule Modification]

Compliant using AI

CD ¶30 allows modifications of the ILI schedule without Court approval as long as the revised schedule complies with CD ¶29, ¶65, ¶66, and ¶70. The Enbridge *SAR* has detailed the ILI schedule modifications in Tables 5 and 7. The ITP has reviewed Enbridge records and finds that they support *SAR* Tables 5 and 7.

In the *AIR*, the ITP questioned the references in *SAR* 30 to a list in *SAR* 27. In its response, Enbridge clarified that the reference was in error and should have referred to Table 4 in *SAR* 28.a-b. The ITP reviewed the ILI records provided by Enbridge and finds they support *SAR* 30 and *SAR* Table 4.

SAR 70.a [Corrosion and Circumferential Crack ILI Timing]

Compliant

CD ¶70.a requires ILI to detect Corrosion and circumferential Crack Features in the Dual Pipelines in the Straits of Mackinac to be completed before the deadline of July 31, 2017. The *SAR* indicates that these

inspections were completed in April 2017. The ITP has reviewed Enbridge records and finds that they support *SAR* 70.a.

SAR 70.b [Geometric Feature ILI Timing]

Compliant

CD ¶70.b requires ILI to detect Geometric Features in each of the Dual Pipelines in the Straits of Mackinac to be completed before one year after the CD Effective Date (thus, May 23, 2018), or five years after the previous geometry ILI, whichever is later. The *SAR* indicates that these inspections were completed in April 2017 and are timely under CD ¶70.b. The ITP has reviewed Enbridge records and finds that they support *SAR* 70.b.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *Inline Inspection Reporting Profile Standard* • *PI-41 Re-Inspection Interval Determination* • *PI-141 Assessment Tool Selection Procedure* • *12-month Re-Inspection Interval Determination pursuant to PIPES Act*
Enbridge Work Products	• *CD ILI Registry* • *Initial ILI Report Integrity Plan* • *ILI Vendor Notification Communication* • *EPA Agreement Correspondence to Enbridge Variance Requests* • *Vendor ILI Tool Performance Specifications* • *Approved Tool Listing* • *Enbridge 12-Month ILI Schedule* • *Pipe Trax Listing of ILI Tool Run Schedule* • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*
Task 2 Reports	• *September 27, 2017 ITP Report on Paragraph 29, In-Line Inspection Schedule for the Initial 12 Month Period*

RS 7. ILI Milestone 2: Initial Report

CD Section VII, Subsection D, ¶31, ¶32.a-c, and ¶33.a-b

A: ITP Review and Evaluation

This Initial Report Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The Initial Report is the second milestone in the ILI process and assesses whether the ILI tool is 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 whether priority notifications were handled appropriately and in a timely manner.

These requirements apply to each of the ILI runs physically completed within the *SAR* period that had the Initial Report due date also within this period. Of the 21 ILI's conducted, 12 segments received Initial Reports over the reporting period, as identified in Table 11 of the *SAR*.

SAR 31 [ILI Compliance with Tool Specifications]

Compliant

CD ¶31 sets requirements for tool performance and requires investigation and *SAR* reporting of all instances during the *SAR* period in which a tool did not meet performance specifications. The *SAR* reports that two inspections were found to have been deficient as determined during the ILI vendor DQA and provides details in *SAR* Table 9 and *SAR* Table 10. The ITP has reviewed Enbridge records and finds that they support *SAR* 31 and *SAR* Table 9 and *SAR* Table 10.

SAR 32.a-c [Initial ILI Reports for Crack (120 Days), Corrosion (90 Days) and Geometric (60 Days) Features]

Compliant

CD ¶32.a-c set a time limit for the vendor to provide Initial Reports for each tool type. *SAR* Table 11 summarizes the 12 Initial Reports issued during the *SAR* reporting period and indicates that all were issued within the specified time limits. The ITP has reviewed Enbridge records and finds that they support *SAR* 32.a-c and *SAR* Table 11.

SAR 33.a [Immediate Priority Feature Notification]

Compliant with AI

CD ¶33.a states that Enbridge shall require their vendors to notify Enbridge of Priority Features as specified in CD ¶33.a-b. As with *SAR* 28.c, the ITP submitted an *AIR* requesting copies of vendor contracts to verify the requirement. Enbridge's response noted that the CD requirements are not only a specific component of vendor contracts, but that there are other mechanisms that implement this CD requirement. In future verification activity, the ITP will review contract language that establishes this vendor requirement.

SAR 33.b [Priority Feature Definition]

Compliant with AI

CD ¶33.b defines the term 'Priority Feature' and requires Enbridge to define the term in its contracts and work orders with vendors, using the criteria of CD Appendix A as a minimum. The *SAR* refers to an Enbridge document that implements this requirement, the *In-Line Inspection Reporting Profile Standard (ILI Reporting Standard).* Although one of Appendix A requirements is missing from the list shown in the *SAR,* the ITP has verified that the list of Priority Features in the ILI Reporting Standard contains all of the criteria listed in CD Appendix A. In future verification activity, the ITP will review contract language that establishes this vendor requirement.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *Inline Inspection Reporting Profile Standard, Report Schedule, and Appendix G* • *PI-29 Priority Notifications Procedure*
Enbridge Work Products	• *CD ILI Registry* • *Initial ILI Report* • *ILI Vendor Notification Communication* • *ILI Vendor Work Order* • *Priority Date Tracking Table* • *ILI Vendor Data Quality Assessment (DQA)* • *Priority PI Listing – Date Stamped to this Milestone*

RS 8. ILI Milestone 3: Quality Review

CD Section VII, Subsection D, ¶34.a-g

A: ITP Review and Evaluation

This Quality Review Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The Quality Review is the third milestone in the ILI process and verifies that the feature severity, density, and type are not significantly disparate relative to the previous inspection. Should an issue arise, Enbridge is to investigate and complete one of the following:

- Resolve the issue with the ILI vendor.
- Conduct an investigative dig program to quantify and correct potential tool bias.

The Quality Review Milestone incorporates CD deadlines that provide for each function to be accomplished in a timely manner.

These requirements apply to each of the ILI runs physically completed within the *SAR* period that had the Initial Report due date also within this period. Of the 21 ILIs conducted, eight segments have a quality review deadline within the reporting period, as identified in *SAR* Table 13. *SAR* Table 13 also includes four ILI runs where the report was received within the *SAR* reporting period, but the review due date was outside the prescribed period.

SAR 34.a [Preliminary Review of Initial ILI Report]

Compliant using AI

CD ¶34.a requires Enbridge to complete a preliminary review of Initial ILI Report data quality within 30 Days of receiving the report. *SAR* Table 13 summarizes the 12 Initial ILI Reports received during the *SAR* period and indicates that eight of the reports had Data Quality Review due dates within the *SAR* period. *SAR* Table 13 indicates that all eight were completed within the 30 Day requirement. The ITP has reviewed Enbridge records and finds that they support *SAR* Table 13.

SAR 34.a and *SAR* Table 13 indicate that one of the eight Preliminary ILI Reports for which a Data Quality Review was due during the *SAR* reporting period, Line 5 PE-IR USWM+, had data quality concerns. The details of the concern and resolution are provided in *SAR* 34.a and *SAR* Table 14. The ITP has reviewed Enbridge records and finds that they support *SAR* 34.a and Table 14 with regard to this Tool Run.

SAR 34.a also provides details of two other Initial ILI Reports which raised data quality questions between Enbridge and the vendor. The two Gemini Corrosion ILI runs in the Straits of Mackinac Dual Pipelines reclassified a number of historical manufacturing features (MFG) as corrosion. The vendor reviewed its data and the historical data and subsequently reclassified the features as MFG. The ITP has reviewed Enbridge records and accepts this reclassification. However, the ITP was not made aware of the reclassification before noting inconsistencies in the records and requesting additional information. The ITP and Enbridge are working to cause any data revised in the future more readily available to the ITP.

SAR 34.b [Evaluation of Features Requiring Excavation]

Compliant

CD ¶34.b requires Enbridge immediately to determine whether mitigation is required for all pipeline sections and features for which no data quality concerns have been identified during the preliminary review. *SAR* 34.b indicates that Enbridge complied with this requirement during the reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 34.b.

SAR 34.c [Resolution of Identified Data Quality Concerns]

Discussion Item

CD ¶34.c requires Enbridge to resolve data quality concerns as expeditiously as possible. *SAR* 34.c and *SAR* Table 13 do not identify and detail the quality concerns for the two corrosion ILIs of the Dual Pipelines in the Straits of Mackinac (see *SAR* 34.a discussion). A second data quality issue regarding the Line 5 ENO-EMA (East Dual Pipeline) corrosion ILI 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 data base and in the Assessment Sheet for this Tool Run. Enbridge corrected the data after the ITP called attention the issue. The ITP submitted an *AIR* requesting an explanation. 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 *SAR*s. Specifically, CD ¶144 requires the *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 *SAR* 144 sets a materiality threshold and finds the omission of the Dual Pipelines corrosion ILI Data Quality concerns to be inconsistent with CD ¶144.

SAR 34.d [ILI Data Quality Evaluation Timelines]

Compliant

CD ¶34.d requires all data quality evaluations to be completed within 180 Days of the ILI tool pull date. *SAR* Table 15 lists the six ILI runs for which completion of the data quality review was due during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 34.d and *SAR* Table 15.

SAR 34.e [Discrepancies between Two Successive ILI Runs]

Compliant

CD ¶34.e requires Enbridge to investigate certain defined discrepancies in data between successive Tool Runs. *SAR* 34.e and Table 16 provide details of the investigation and resolution of the Line 5 ENO-EMA geometry run, which initially identified a significantly higher density of dent features. The ITP has reviewed Enbridge records and finds that they support *SAR* 34.e and *SAR* Table 16.

SAR 34.f – g [Investigative Digs]

Compliant

The CD requires timely identification of Features Requiring Excavation and completion of Dig Lists during the investigative dig process. In the *SAR*, Enbridge states "*No investigative digs were required during this reporting period of the Consent Decree.*" The ITP has reviewed Enbridge records and finds that they support *SAR* 34.f-g.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *NDE Uncertainty Report*
Enbridge Work Products	• *CD ILI Registry* • *Initial ILI Report* • *NDE Reports* • *Trending Sheet* • *Threat Specific Summary Document* • *PipeTrax Listing (Date Stamped to this Milestone)* • *PI Listing and Approval e-mail (Date Stamped to this Milestone)* • *Assessment Sheets (Date Stamped to this Milestone)* • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

RS 9. ILI Milestone 4: Dig List

CD Section VII, Subsection D, ¶35-37, ¶38.a-b, ¶40, ¶42-43, ¶44.a-b, ¶47-51, ¶53, ¶55-56, and ¶58

A: ITP Review and Evaluation

This ILI Dig List Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The Dig List Milestone is the forth milestone in the ILI process and identifies and establishes excavation and repair deadlines, determines required pressure restrictions, and requires that all features requiring mitigation are added to the Dig List. Specific timelines are denoted in the CD with respect to the data assessments and pressure restriction evaluations.

These requirements apply to each of the six ILI runs physically completed within the *SAR* period that have the Quality Review completed within this reporting period. The list of inspections meeting this milestone are identified in the *SAR* Table 15.

SAR 35 [Evaluation of Each Feature in Initial ILI Report for Feature Requiring Excavation]

Compliant

CD ¶35 requires Enbridge to evaluate each feature from the Initial Report to determine whether the feature is a Feature Requiring Excavation (FRE) as defined in the CD. In *SAR* 35, Enbridge refers to the *Lakehead System Integrity* Process as the implementation document and the Assessment Sheets for each ILI as the records of meeting this requirement. The ITP has reviewed Enbridge records and finds that they support *SAR* 35.

SAR 36 [Feature Requiring Excavation Definition]

Compliant

CD ¶36 defines FRE and the methods for identifying the various types of FRE. *SAR* 36 describes Enbridge's processes and the implementing document for identifying FREs in accordance with CD Section VII, Subsection D.(V). The ITP has reviewed records and documents provided by Enbridge and finds that they support *SAR* 36.

SAR 37 [Deadlines for Adding Features Requiring Excavation on the Dig List]

Compliant using AI

CD ¶37 defines the 'Dig List' and establishes time limits for adding FREs to the Dig List. *SAR* 37 states that Enbridge added all FREs identified during the reporting period to the Dig List within the prescribed time limits. The ITP reviewed Enbridge records and noted an addition to the Line 5 PE-IR USWM Dig List after the *SAR* reporting period and outside the time limits of CD ¶37. In response to an *AIR*, Enbridge stated that the additional dig was not for an FRE as defined in the CD and was in addition to the CD-required excavations. The ITP reviewed the records and found that they support this response.

SAR 38.a [Excavation and Repair Deadlines]

Compliant

CD ¶38.a requires Enbridge to establish deadlines for excavation and repair of FREs, and 38.a sets time limits for those deadlines by reference to CD Subsection VII.D.(V). *SAR* 38.a states that Enbridge complied with these CD requirements during the reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 38.a.

SAR 38.b [Establish Pressure Restrictions if Required]

Compliant

CD ¶38.b requires Enbridge to set point pressure restrictions (PPR) pursuant to CD Subsection VII.D.(V) for every FRE. *SAR* 38.b states that Enbridge complied with these requirements during the reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 38.b.

SAR 40 [Field Data Comparison to ILI Data]

Compliant

CD ¶40 requires Enbridge to compare field data collected during excavations against ILI data to identify ILI errors within 30 Days of completing all excavations on a pipeline segment. *SAR* 40 states that there were no deadlines for this comparison that fell with the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 40.

SAR 42 [Predicted Burst Pressure]

Compliant

CD ¶42 requires Enbridge to, with certain exceptions, calculate the Predicted Burst Pressure of all Crack and Corrosion Features identified by ILI tools in accordance with CD Section VII, Subsection D.(V). *SAR* 42 states that Enbridge met this requirement. The ITP has reviewed Enbridge records and finds that they support *SAR* 42.

As required by the CD, Enbridge states in the *SAR* that they "calculated the Predicted Burst Pressure of all Crack and Corrosion Features identified by ILI tools, in accordance with the requirements of Subsection VII.D.(IV) of the Consent Decree." The ITP has reviewed the records and found that they confirm that the calculations were performed by Enbridge during this *SAR* reporting period.

SAR 43 [Predicted Burst Pressure Definition]

Compliant

CD ¶43 defines 'Predicted Burst Pressure' and requires calculations of Predicted Burst Pressure to comply with CD Appendix B. *SAR* 43 states that Enbridge complied with these requirements during the reporting period and cites the *Lakehead System Integrity Remediation Process* and Assessment Sheets as evidence of compliance. The ITP has reviewed the records and documents provided by Enbridge and finds that they support *SAR* 43.

SAR 44.a – b [Initial Predicted Burst Pressure Calculations and Initial Remaining Life Calculations]

Compliant using AI

CD ¶44.a-b set time limits for calculating initial Predicted Burst Pressure and initial Remaining Life for all Crack and Corrosion Features, with certain exceptions. *SAR* Table 18 indicates that all calculations required by CD ¶44 met the established time limits.

The ITP questioned Note 2 of *SAR* Table 18, which indicated that the deadline for calculations was based on resolving the Data Quality issue for the Line 5 *PE-IR* Corrosion ILI. The ITP determined that the specific Data Quality issue (characterization of a set of dent features as "Wrinkles") should not have affected the CD ¶44 calculations for Corrosion and Crack Features and should not have influenced the due date. The ITP subsequently issued a Preliminary Finding. Enbridge responded, stating that Note 2 should be disregarded and that the calculations were, in fact, conducted within the required timeframe. The ITP has reviewed Enbridge records and finds that they support *SAR* 44.a-b and that the dates given in *SAR* Table 18 are within the timeframes specified in the CD.

SAR 47 [Crack Features]

Compliant

CD ¶47, which refers to CD Tables 1 and 5, establishes requirements and timelines for mitigating FREs that include Crack Features. *SAR* 47 states that no Crack Features were identified during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 47.

SAR 48 [Crack Feature Mitigation Timelines]

Compliant

CD ¶48 establishes criteria and timeline selection when more than one provision of CD Tables 1 and 5 apply to a Crack Feature. *SAR* 48 states that no such Crack Features were identified during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 48.

SAR 49 [Dig Timeline Extensions]

Compliant

CD ¶49 provides relief from CD Tables 1 through 5 FRE repair deadlines when the deadline cannot be met due to certain seasonal considerations or unusual circumstances. *SAR* 49 states that Enbridge did not apply any extensions under this CD paragraph. The ITP has reviewed Enbridge records and finds that they support *SAR* 49.

SAR 50 [Corrosion Features]

Compliant

CD ¶50, with reference to Tables 2 and 5 of the CD, establishes the dig selection criteria and timelines for mitigation of FREs that include Corrosion Features. *SAR* 50 and *SAR* Table 21 summarize five

Corrosion FREs and indicate that their deadlines are beyond the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 50 and *SAR* Table 21.

SAR 51 [Corrosion Feature Mitigation Timelines]

Compliant

CD ¶51 establishes criteria and timeline selection when more than one provision of CD Tables 2, 3, and 5 apply to a Corrosion Feature. *SAR* 50 states that Enbridge complied with this CD Paragraph by selecting the shortest timeline and lowest pressure restriction applicable to all Corrosion Features identified during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 51.

SAR 53 [Dig Selection Criteria for Axial Slotting, Axial Grooving, Selective Seam Corrosion, and Seam Weld Anomaly A/B Features]

Compliant

CD ¶53, with references to CD Tables 3 and 5, establishes requirements and timelines for mitigating FREs that include Axial Slotting, Axial Grooving, Selective Seam Corrosion, and Seam Weld Anomaly A/B features.

Enbridge states in the *SAR* that "During this reporting period, no Axial Slotting, Axial Grooving and Selective Seam Corrosion, and Weld Anomaly A/B Features Requiring Excavation were identified as the result of ILIs conducted since the Effective Date." The ITP has reviewed Enbridge records and found that they confirm this statement.

SAR 55 [Dig Selection Criteria for Dents and other Geometric Features]

Compliant

CD ¶55, which refers to CD Tables 4 and 5, establishes requirements and timelines for mitigating FREs that include dents and other defined Geometric Features. *SAR* 55 states that no dent or other Geometric Features meeting dig criteria were identified during the *SAR* reporting period with the exception of interacting FREs in *SAR* 59 and *SAR* Table 23. The ITP has reviewed Enbridge records and finds that they support *SAR* 55.

SAR 56 [Dents and other Geometric Feature Mitigation Timelines]

Compliant

CD ¶56 establishes criteria and timeline selection when more than one provision of CD Tables 4 and 5 may apply to a dent or other Geometric Feature. *SAR* 50 states that no dent or other Geometric Feature met the Dig Selection Criteria (with the exception of interacting Features discussed in *SAR* 59 and *SAR* Table 23). The ITP has reviewed Enbridge records and finds that they support *SAR* 59.

SAR 58 [Dig Selection Criteria for Interacting Features]

Compliant using AI

CD ¶58, with reference to CD Table 5, establishes requirements and timelines for mitigating FREs that include intersecting or interacting features. *SAR* 58 and *SAR* Table 23 identify four ILI runs, each with one interacting FRE. However, neither *SAR* 58 nor Table 23 describe the features that were identified as interacting. The ITP submitted an *AIR* requesting the missing information. Enbridge responded to the *AIR* with a revised Table 23 that describes the two interacting features and the ILIs that identified them in each instance. The ITP has reviewed Enbridge records and finds that they support *SAR* 58 and the revised *SAR* Table 23.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *PI-04 Pressure Restrictions Procedure* • *PI-29 Priority Notifications Process* • *PI-37 Fitness for Service Calculations* • *PI-38 Mitigation Selection and PI Listing Approval*
Enbridge Work Products	• *CD ILI Registry* • *Initial ILI Report* • *Extended Deadline Dig Documentation* • *Trending Sheet or Trending Assessment Sheets* • *Priority Notification Tracking Table* • *Feature Match Spreadsheet* • *PipeTrax Listing (Date stamped to this Milestone)* • *PI Listing and Approval e-mail (Date stamped to this Milestone)* • *PPR Database (Date stamped to this Milestone)* • *Assessment Sheets and Assessment e-mails (Date stamped to this 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 (March 26, 2018) • Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report (April 16, 2018)

RS 10. ILI Milestone 5: Mitigation General

CD Section VII, Subsection D, ¶33.c-d

A: ITP Review and Evaluation

This ILI Mitigation General Milestone aggregates Paragraphs of the CD that are within Subsections D and E of the CD. The ILI Mitigation General milestone is the fifth milestone in the ILI process and verifies that, following notification from the vendor, Enbridge shall evaluate all Priority Features and, if required:

- Place them on the approved Dig List.
- Determine whether a pressure restriction is required.
- Mitigate such Priority Features within the required timeframes.

These requirements apply to the Priority Features identified in the six ILI runs listed in *SAR* Table 15 that were physically completed within the *SAR* reporting period and have the Quality Review completed.

SAR 33.c-d [Priority Feature Review and Mitigation if Required]

Compliant using AI

CD ¶33.c-d set time limits for reviewing Priority Features and determining whether they are FREs in accordance with CD Subsection VII.D.(III). *SAR* 33.c-d and *SAR* Table 12 identify three Priority Feature notifications during the *SAR* reporting period, two of which were for the same dent feature. Both Priority Features were determined to have been previously repaired. In an *AIR*, the ITP requested an explanation of the *SAR* 33.c-d indication that only the Line 2 GF-CR Priority Feature was excavated "to confirm the historical repair." Enbridge responded that the decision to excavate the Line 2 historical repair was primarily driven by a need to understand the underlying dent feature's risk to future ILI tools, and the feature was subsequently cut out in 2018 to eliminate that risk. The ITP has reviewed Enbridge records and finds that they support *SAR* 33.c-d and the explanation provided in response to the *AIR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *PI-29 Priority Notifications Process* • *O&MM Book 3, Determining Remediation Method*
Enbridge Work Products	• *CD ILI Registry* • *NDE Reports* • *On Call Summary Form* • *PI Listing and Approval e-mail (Date stamped to this Milestone)* • *PPR Database (Date stamped to this Milestone)* • *Assessment Sheets and Assessment e-mails (Date stamped to this 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 (March 26, 2018)*

RS 11. ILI Milestone 6: Mitigation Excavation

CD Section VII, Subsection D, ¶39.a-b

A: ITP Review and Evaluation

This ILI Mitigation Excavation Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The ILI Mitigation Excavation is the sixth milestone in the ILI process and reviews all features placed on the approved Dig List that have been mitigated by excavation and repair. It also examines the trending and validation of the associated ILI.

These requirements apply to each of the eight ILI runs physically completed within the *SAR* period that have the Quality Review Milestone completed within this reporting period. The list of six inspections meeting this milestone are identified in the *SAR* Table 15.

SAR 39.a - b [Field Measurements of Excavated Features]

Compliant using AI

CD ¶39.a-b establish requirements for recording features unreported by ILI but observed and measured during excavations. It further requires Enbridge to include this information in the following *SAR*, but only requires reporting of the number of such features in instances where there is "a high volume of unreported features." *SAR* 39.a-b state that Enbridge obtained and recorded field measurements of unreported features, but the *SAR* does not provide the details other than to indicate that Enbridge "didn't discover any pipe segments that contained a high volume of unreported features."

In the *AIR*, the ITP requested more detail in the form of a listing of the unreported features discovered during excavation. Enbridge responded that one excavation of an FRE was performed during the *SAR* reporting period (see *SAR* Table 23), no unreported features that fell within the ILI tool tolerance were discovered, Enbridge provided the ITP with access to the field data. The ITP has reviewed Enbridge records and finds that they support *SAR* 39.a-b and the *AIR* response.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *PI-29 Priority Notifications Process* • *O&MM Book 3, Determining Remediation Method*
Enbridge Work Products	• *CD ILI Registry* • *NDE Reports* • *On Call Summary Form* • *PI Listing and Approval e-mail (Date stamped to this Milestone)* • *PPR Database (Date stamped to this Milestone)* • *Assessment Sheets and Assessment e-mails (Date stamped to this 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 (March 26, 2018)

RS 12. ILI Milestone 7: Mitigation Pressure

CD Section VII, Subsection D, ¶52, ¶54, ¶57, and ¶59

A: ITP Review and Evaluation

This ILI Mitigation Pressure Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The ILI Mitigation Pressure is the seventh milestone in the ILI process and reviews the pressure restrictions imposed for features placed on the approved Dig List from an Initial Report and examines compliance with those restrictions throughout the excavation process.

These requirements apply to each of the six ILI runs physically completed within the *SAR* period that had the Initial Report, Data Quality Review, and Dig List completed within this period (see *SAR* Table 15). Table 20 in the *SAR* lists four identified digs covered by this milestone that are complete or in process during this reporting period.

Enbridge provides a periodically updated list of all pressure restrictions that have taken place or that are presently in place with respect to the CD-required excavations. The ITP has yet to corroborate pressure limits and set periods, and the ITP is working with Enbridge to establish a process for so doing.

SAR 52 [Corrosion Feature Pressure Restrictions]

Compliant

CD ¶52, which refers to CD Table 2, establishes requirements and timelines for pressure restrictions for Corrosion Features. *SAR* 52 and *SAR* Table 22 describe the two Corrosion Features for which a pressure restriction was imposed. The ITP has reviewed Enbridge records and finds that they support *SAR* 52 and *SAR* Table 22.

SAR 54 [Pressure Restrictions for Axial Slotting, Axial Grooving, Selective Seam Corrosion, and Seam Weld Anomaly A/B Features]

Compliant

CD ¶54, which refers to CD Table 3, establishes requirements and timelines for pressure restrictions for Axial Slotting, Axial Grooving, Selective Seam Corrosion, and Seam Weld Anomaly A/B features. *SAR* 54 states that no CD Table 3 features were identified during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 54.

SAR 57 [Dents and Other Geometric Feature Pressure Restrictions]

Compliant

CD ¶57, with reference to CD Table 4, establishes requirements and timelines for pressure restrictions for dent features. *SAR* 57 states that no dent or other Geometric Features were identified during the *SAR* reporting period. The ITP has reviewed Enbridge records and finds that they support *SAR* 57.

SAR 59 [Pressure Restrictions for Interacting Features]

Compliant

CD ¶59, which refers to CD Table 5, establishes requirements and timelines for pressure restrictions for intersecting or interacting features. *SAR* 59 and *SAR* Table 24 indicate that two interacting features required pressure restrictions during the *SAR* reporting period and that both were implemented within the required timelines. The ITP has reviewed Enbridge records and finds that they support *SAR* 59 and *SAR* Table 24.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process*
Enbridge Work Products	• *CD ILI Registry* • *NDE Reports for Digs requiring Pressure Restriction* • *PPR database Date Stamped to this Milestone.* • *PI Listing Date Stamped to this Milestone* • *Assessment Sheet Date Stamped to this Milestone* • *eDig Date Stamped to this Milestone*

RS 13. ILI Milestone 8: Mitigation Alternate

CD Section VII, Subsection D, ¶46

A: ITP Review and Evaluation

This ILI Mitigation Alternate Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The ILI Mitigation Alternate is the eighth milestone in the ILI process and reviews the Enbridge justification for requiring alternate excavation timing, point pressure restrictions, or pipe replacement that varies from the stipulated CD process.

These requirements apply to each of the ILI runs physically completed within the *SAR* period that had the Initial Report, Data Quality Review, completed Dig List, and identification of the need for an Alternate Plan completed within this period. Six ILI runs listed in the *SAR* Table 15 were evaluated under this requirement.

SAR 46 [Dig Selection Criteria]

CD ¶46 establishes the Dig Selection Criteria for all FREs under the CD. *SAR* 46 broadly states that "During this reporting period, Enbridge followed the *Lakehead System Integrity Remediation Process*, which meets requirements set out in CD ¶46." The ITP's evaluation of this statement is grouped according to the 13 subparagraphs of CD ¶46.

CD ¶46.a, Assessment of Crack Features with Metal Loss

Discussion Item

CD ¶46.a requires Enbridge to complete the excavation, repair, and mitigation of all FREs in accordance with CD Tables 1 through 5. The ITP has reviewed relevant Enbridge records and finds that, during the *SAR* reporting period, Enbridge has met the timing requirements of CD Tables 1 through 5 for mitigation of FREs. However, the ITP noted a discrepancy between the CD Table 5 requirements and the requirements shown in Table 4 of the *Lakehead System Integrity Remediation Process* (*LSIRP*). The *LSIRP* is cited in *SAR* 46 as the implementing document for CD repair criteria. *LSIRP* Table 4 states that a Crack Feature intersecting with a metal loss feature should be "assessed as a Crack-like feature using only the Crack feature depth and neglecting the Corrosion depth." In contrast, CD Table 5 does not prescribe "neglecting the Corrosion depth" when assessing the interacting feature.

The ITP issued a Preliminary Finding regarding the discrepancy. Discussions between the ITP and Enbridge regarding the appropriate method for assessing Crack Features intersecting with metal loss features are ongoing at the time of this report.

CD ¶46.b and g, Line 5 BC-RW Alternate Pressure Restriction Proposal

Compliant using AI

CD ¶46.b sets criteria for point pressure restrictions (PPRs) at the location of an FRE while the excavation and repair are pending. CD ¶46.d and g allow for an alternate pressure restriction (APR) in certain circumstances and set conditions for implementing an APR, including a requirement for an engineering assessment (EA) to verify the APR. CD ¶46.l requires inclusion in each *SAR* a discussion of

"all instances during the reporting period in which Enbridge adopted and/or implemented … an alternate interim pressure restriction as provided for in Subparagraph 46.d."

Note 2 in *SAR* Table 20 identifies an APR imposed in the Line 5 BC-RW segment on November 17, 2017. The ITP has reviewed Enbridge records and finds that this PPR was implemented in a timely manner and in accordance with the requirements of CD ¶46.g. However, the details of the APR and the required EA are not discussed in the *SAR* as required by CD ¶46.l. Instead, Note 2 in *SAR* Table 20 states that the notification provided to the EPA in accordance with CD ¶42.g was after the end of the *SAR* reporting period, and that, therefore, the APR will be reported in the following *SAR*.

The ITP issued a PF stating that the APR and EA occurred during the *SAR* reporting period, and that, therefore, the APR should have been discussed in the *SAR under review*. Enbridge responded by restating its original position given in Note 2 in *SAR* Table 20. However, Enbridge has provided the ITP and EPA with reports of the rationale and the EA for the Line 5 BC-RW APR.

CD ¶144 sets the content requirement for *SAR*s. Specifically, CD ¶144 requires that Enbridge "summarize and discuss the status of compliance with respect to all other requirements of Subsections VII.A-J (Injunctive Measures)." The ITP finds the omission of the Line 5 BC-RW APR implemented during the *SAR* reporting period to be inconsistent with CD ¶144.

CD ¶46.c-f, h-k, and m Implementation and Documentation of Alternate Plans

Compliant

The ITP has reviewed Enbridge records and finds that they support these subparagraphs of CD ¶46.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process*
Enbridge Work Products	• *CD ILI Registry* • *NDE Reports for identified features* • *Alternate Plan Documentation* • *EPA Notification and Correspondence* • *Extended Dig Deadline Documentation* • *PPR database, Time Stamped to this Milestone* • *Assessment Sheets, Time Stamped to this Milestone* • *eDig, Time Stamped to this Milestone* • *Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report (April 16, 2018)*

RS 14. ILI Milestone 9: Inspection Interval

CD Section VII, Subsection D, ¶60-66

A: ITP Review and Evaluation

This ILI Inspection Interval Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The ILI Inspection Interval is the ninth milestone in the ILI process and reviews the dates set for ILI re-inspection with respect to the estimated Remaining Life of all unmitigated features to ensure timely re-inspection in accordance with the CD.

Five ILI runs listed in *SAR* Table 25 have completed the Initial Report, Data Quality Review, and Dig List milestones. The Remaining Life determination, as part of the Dig List process, is made for each feature described within an inspection.

SAR 60 [Remaining Life]

Compliant

CD ¶60 requires Enbridge to perform Remaining Life calculations for all Crack and Corrosion Features identified by ILI but not meeting the Dig Criteria. *SAR* 60 states that Enbridge completed all required Remaining Life calculations and that they are found in the Assessment Sheets. The ITP has reviewed Enbridge records and finds that they support *SAR* 60.

SAR 61 [Remaining Life Clarifications]

Compliant

CD ¶61 provides exceptions for performing Remaining Life calculations for all Crack and Corrosion Features identified by ILI but not meeting the Dig Criteria. *SAR* 61 states that there are no injunctive measures required by this CD Paragraph. The ITP concurs.

SAR 62 [Operating Pressure Used when Determining the Remaining Life of Crack Features]

Compliant

CD ¶62 sets requirements for using representative operating conditions to perform Remaining Life calculations. *SAR* 62 states that Enbridge uses actual operating parameters that have been recorded and that use of this data complies with the specific requirements of CD ¶62. The ITP has reviewed Enbridge records and finds that they support *SAR* 62.

SAR 63 [Crack Feature Remaining Life Calculations]

Compliant

CD ¶63 requires Enbridge to perform Remaining Life calculations for all Crack Features identified by ILI using one of two models, whichever yields the shortest Remaining Life. *SAR* 63 states that Enbridge used both models and determined Remaining Life with the model yielding the fastest projected growth rate and shortest Remaining Life. The ITP has reviewed Enbridge records and finds that they support *SAR* 63.

SAR 64 [Corrosion Growth Rate]

Compliant

CD ¶64 requires Enbridge to perform Remaining Life calculations for all Corrosion Features identified by ILI using a corrosion growth rate (CGR) based on the results of successive ILIs. *SAR* 64 states that Enbridge completed all CGR determinations as prescribed in CD ¶64. The ITP has reviewed Enbridge records and finds that they support *SAR* 64.

SAR 65 [Maximum Interval Between Successive ILIs]

Compliant

CD ¶65 requires Enbridge to perform successive Crack and Corrosion ILIs at an interval not to exceed one-half the shortest Remaining Life calculated for all Features in the pipeline. *SAR* 65 states that Enbridge completed all ILI that were required by CD ¶65 during the *SAR* reporting period "with the possible exception of Line 2." The ITP has reviewed Enbridge records and finds that they support *SAR* 65. (See discussion of Line 2 in Milestone 1, CD Paragraph 28.a-b, on page 40.)

SAR 66 [Maximum Interval Between Successive ILIs]

Compliant

CD ¶66 requires Enbridge to perform all ILIs at a maximum interval of five years, with the exception of Original Line 3, which is to be inspected annually after December 31, 2017 for as long as this line remains in service. *SAR* 66 states that Enbridge completed all ILIs during the reporting period within the maximum five-year interval and refers to *SAR* 28 and 29, which include *SAR* Tables 4, 5, and 6. The ITP has reviewed Enbridge records and finds that they support *SAR* 66.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process*
Enbridge Work Products	• *CD ILI Registry* • *Integrity Plan* • *Long Range Plan* • *Pressure history* • *Integrity Plan* • *Assessment Sheets, Date Stamped to this Milestone.*

RS 15. ILI Milestone 10: ILI Data

CD Section VII, Subsection D, ¶41 and ¶45

CD Section VII, Subsection F, ¶75-76 and ¶78.a-b

A: ITP Review and Evaluation

This ILI Data Milestone aggregates Paragraphs of the CD prescribed by Subsections D and E of the CD. The ILI Data is the final milestone in the ILI process and reviews the management of all pipeline integrity data generated in the course of completing the first nine ILI milestones.

The extent of data compilation is dependent on the ILI milestone completion status of each ILI run at the end of the *SAR* reporting period. *SAR* Table 28 displays the 12 ILI runs where data have been loaded into Enbridge's pipeline integrity information management system, OneSource, during this *SAR* reporting period.

Enbridge has established for the ITP access to most ILI data (including OneSource) required to verify compliance. This access has enabled the ITP to track the timeliness, review threat assessments, and verify the accuracy of Enbridge completion of CD ILI-related data management requirements.

SAR 41 [ILI Electronic Records]

Compliant

CD ¶41 sets specific requirements for the types and categories of data to be electronically recorded and maintained by Enbridge. *SAR* 41 states that Enbridge maintained electronic records relating to ILI including, but not limited to, all 14 categories specified in CD ¶41. The ITP has reviewed Enbridge records and finds that they support *SAR* 41.

SAR 45 [Retention of Electronic Records]

Compliant

CD ¶45:

- Requires Enbridge to maintain electronic records related to all Predicted Burst Pressure calculations and Remaining Life calculations
- Sets retention time requirements for electronic records.

SAR 45 states that Enbridge maintains electronic records for these calculations as prescribed by CD ¶45. The ITP has reviewed Enbridge records and finds that they support *SAR* 45.

SAR 75 [Integrity Management Personnel Access to Feature Integration Database]

Discussion Item

CD ¶75:

- Requires Enbridge to provide access to the OneSource data integration database required by CD ¶74 for all integrity management personnel on their desktop computers.
- Requires that such personnel be able to search for, and view, a schematic image of each Joint of pipe in the Lakehead System.
- Lists the specific data that must be displayed in the schematic image.

SAR 75 states that all integrity management personnel have access to OneSource and that "Personnel are able to search for, and view, a schematic image of each joint of each Lakehead System pipeline." *SAR* 75 goes on to list the specific requirements listed in the CD and states that the schematic images include those requirements.

SAR 75 also states that "step-by-step" instructions for searching and viewing the schematic images was provided to the ITP during a working session in October 2017. The ITP was given instruction for accessing OneSource during this work session. However, access to the schematic images was only demonstrated during a meeting with Enbridge and EPA personnel following the work session. No instructions were provided to the ITP for accessing the schematic images.

In an *AIR*, the ITP requested access and step-by-step instructions for accessing the schematic images. Enbridge responded that step-by-step instructions were provided to ITP on December 18, 2017. However, the cited event also was a demonstration. Enbridge further responded that access has not been granted to the ITP since such access would include pipelines that are outside the scope of the CD. Enbridge presented options for further demonstrations.

The ITP agrees that the schematic image demonstrated to the ITP meets the requirements of CD ¶75. However, the ITP is not able to establish that the schematic image can be viewed by all integrity management personnel on their desktop computers as required. As part of its future Task 3 verification process (CD ¶132.c), the ITP will conduct interviews and observations of integrity management personnel performing tasks required by the CD, including searching and viewing the schematic images required by CD ¶75.

SAR 76 [Successive ILI Data Sets]

Compliant

CD ¶76 requires Enbridge to maintain data from at least two successive Tool Runs in the OneSource data integration database. *SAR* 76 states that OneSource includes the ILI data sets from 1992 to present, and that such data sets not be deleted from OneSource. The ITP has reviewed Enbridge records and finds that they support *SAR* 76.

SAR 78.a [OneSource ILI Updates]

Compliant

CD ¶78.a requires Enbridge to update the OneSource database within 29 Days of receiving an Initial Report from the vendor. *SAR* 78.a states that all new ILI reports have been uploaded to OneSource within 29 Days of receiving the Initial ILI Report, and *SAR* Table 28 provides the relevant dates. The ITP has reviewed Enbridge records and finds that they support *SAR* 78.a.

SAR 78.b [OneSource Interacting Features]

Compliant

CD ¶78.b requires Enbridge to review the data in OneSource to identify interacting features as soon as practicable, but in no case longer than 180 Days from the date that the ILI tool is removed from the pipeline. *SAR* 78.b states that Enbridge completes its ILI data review for identification of interacting features that qualify as FREs within 180 Days. The ITP has reviewed Enbridge records and finds that they support *SAR* 78.b.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *PI-08 In-Line Inspection and Tracking Report Collection, Processing and Storage* • *PI-09 Non-Destructive Examination Field Report Collection, Processing and Storage* • *WI-32 Threat Integration*
Enbridge Work Products	• *CD ILI Registry* • *Pipeline Integrity Joint Fact Sheet* • *Initial ILI Report* • *OneSource* • *Assessment Sheets, Date Stamped to each respective Milestone* • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

Section VII.E: Measures to Prevent Spills in the Straits of Mackinac

RS 16. Dual Pipelines, Span Management Program

CD Section VII, Subsection E, ¶67 and ¶68.a-f

A: ITP Review and Evaluation

SAR 67 and 68.b-f [Screw Anchors and Inspections]

Compliant using AI

CD ¶67 and ¶68.b-f require Enbridge to undertake various inspections to ensure that:

- Certain sections of the Dual Pipelines in water depths of 65 feet or less are buried.
- Those sections of the Dual Pipelines that are uncovered are supported.

The *SAR* notes that remotely operated vehicle (ROV)/autonomous underwater vehicle (AUV) surveys carried out in June 2016 confirmed that:

- The sections of the pipelines in water depths of 65 feet or less were buried.
- Four spans in the sections of the pipeline that are uncovered were reported to have lengths in excess of 75 feet.

The *SAR* reports that permits to install screw anchors to address the unsupported spans were filed and approved, and the installation of four screw anchors was completed by November 5, 2016. The *SAR* also reports that the application filed to install the four screw anchors included the installation of an additional 18 screw anchors. The *SAR* also reports that, on September 8, 2016, Enbridge submitted a notice of force majeure under CD Section XII in relation to the installation of the eighteen additional screw anchors and that, on September 28, 2016, the EPA agreed to an extension of time based upon the circumstances. The *SAR* further reports that, on June 1, 2017, the EPA and Enbridge filed the First Modification to the CD with the Court to extend the date for installation of all screw anchor supports until October 1, 2018.

The *SAR* reports that Enbridge plans to complete another underwater survey of the Dual Pipelines on or before July 31, 2018, in accordance with CD ¶68.c-e.

As part of the ITP's *AIR*, the ITP requested that Enbridge provide copies of any ROV or diver inspection reports of the anchors fitted to the Dual Pipelines that were provided to the State of Michigan. Copies of the requested reports were provided to the ITP on March 7, 2018.

SAR 68.a – [Integrity Protection from Currents, Ice, Spans, or Vessel Anchors-Span Management]

Discussion Item

CD ¶68.a requires Enbridge to operate and maintain the Dual Pipelines to ensure that the pipelines are well supported and to reduce the risk of the integrity of either pipeline being impaired by currents, ice, or a vessel's anchor.

The *SAR* discusses or summarizes various steps or provisions Enbridge has implemented to address the requirements provided in CD ¶68.a.

In its *AIR*, the ITP requested that Enbridge provide or discuss engineering or administrative controls that Enbridge employs as part of operating and maintaining the Dual Pipelines to ensure their integrity is not impaired by ice or currents and to prevent anchor strikes.

Enbridge responded to the *AIR* noting the following:

- **Ice Damage** – Enbridge monitors the ice data published on the United States Coast Guard (USGS) website and performs routine surveys of the shoreline areas to ensure ice does not impair the Dual Pipelines.
- **Prevention of Anchor Strikes -** Enbridge entered into an agreement with the State of Michigan obligating Enbridge to complete a report assessing options to mitigate the risk of a vessel's anchor impairing the integrity of the Dual Pipelines. That report is due June 30, 2018.

Upon receipt, the ITP will review and evaluate Enbridge's June 30, 2018 report addressing the risk of a vessel's anchor impairing the integrity of the Dual Pipelines.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Documents 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 (1/3/2017)* • *Re: Submittal of Reports Required by Paragraph 68.e of the Proposed Consent Decree; Steptoe & Johnson LLP (January 4, 2017)* • *Coating Inspections, Findings and Repairs from Activities Completed in 2017 – Anchor Inspection Work Plan: Interim Report (January 16, 2018)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017 DJ# 90-5-1-1-1099 (January 18, 2018)* • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report, Phase 1 (March 19, 2018)* • *Response to ITP's Information Request related to Enbridge's First Semi-Annual Report, Phase 2 (March 26, 2018)*
EPA Documents	• *Re: Proposed Consent Decree – September 8, 2016 Notice of Potential Force Majeure Event: EPA (September 28, 2016)* • *Notice of First Modification of Consent Decree, Civil Action No. 1:16-cv-914; (June 01, 2017)*
ITP Task 2 Reports	• *ITP Additional Information Request for Enbridge First Semi-Annual Report (February 14, 2018).*

RS 17. Dual Pipelines, Biota Investigation

CD Section VII, Subsection E, ¶69.a-c

A: ITP Review and Evaluation

SAR 69.a -c – [Biota Investigation, Work Plan, and Work Plan Implementation]

Compliant

CD ¶69.a-c. requires Enbridge to prepare and submit a plan to investigate whether any of the biota found on the pipeline impacts the integrity of the Dual Pipelines, conduct that investigation in accordance with the plan, and prepare and submit a report of its investigation.

The *SAR* summarizes and discusses the activities Enbridge carried out and completed during the first *SAR* reporting period in relation to the requirements of the applicable CD paragraphs. The *SAR* notes that, on completion of the work as described in the approved *Biota Investigation Work Plan* (*BIWP*) and *Coating Repairs Work Plan,* Enbridge will submit a final report of Enbridge's investigations in accordance with the schedule in the approved *BIWP*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• *Biota Investigation Work Plan, Revision 2 (May 18, 2017)* • *Biota Investigation Work Plan: Addendum A (August 27, 2017)* • *Coating Repairs Work Plan Line 5 Dual Pipelines (August 30, 2017)* • *Coating Repairs Work Plan Line 5 Dual Pipelines Version 2.0 (September 8, 2017)* • *Coating Repairs Work Plan Line 5 Dual Pipelines Version 3.0 (September 13, 2017)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017 DJ# 90-5-1-1-1099 (January 18, 2018)*
EPA Related Documents	• *Re: Enbridge Line 5 Biota Investigation Work Plan (Revision 2); (June 13, 2107)* • *Re: Enbridge Line 5 Coating Repairs Work Plan (Version 3.0) September 14, 2017*
ITP Task 2 Reports	• *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines (August 30, 2017) dated (September 4, 2017)* • *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines; Version 2 (September 8, 2017) dated (September 10, 2017)* • *ITP Review of Enbridge Document: Coating Repairs Work Plan Line 5 Dual Pipelines; Version 3 (September 13, 2017) dated (September 14, 2017)*

RS 18. Dual Pipelines, Axially-Aligned Crack Mitigation

CD Section VII, Subsection E, ¶71

A: ITP Review and Evaluation

SAR 71 [Investigation of Axially-Aligned Crack Features]

Compliant

CD ¶71 requires Enbridge to (a) perform either an ILI of the Dual Pipelines for detecting and sizing Axially-Aligned Crack Features in accordance with the requirements in CD ¶71.a or (b) conduct a hydrotest of each of the Dual Pipelines in accordance with the requirements in CD ¶71.b. The CD requires these actions to be completed by December 31, 2017.

The *SAR* reports that Enbridge elected to conduct a hydrotest of the Dual Pipelines. In accordance with CD ¶71.b, Enbridge completed hydrotests of the west and east segments of the Dual Pipelines on June 10, 2017, and June 16, 2017, respectively. The *SAR* also notes that the hydrotests were conducted in accordance with the requirements in CD Section VII, Subsection C and that Enbridge submitted reports of the hydrotests to the EPA within the CD required timeframe. As noted in RS 5 of this report (page 39), the ITP's evaluations and findings of the *SAR* discussions of the conduct and completion of the hydrotests of the Dual Pipelines demonstrate compliance with the applicable requirements of CD Section VII, Subsection C.

SAR 72 [Pipeline Movement Investigation]

Compliant

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 the cracking. The *SAR* reports that, since no Crack Features have been identified on the Dual Pipelines that meet excavation criteria, the requirements of CD ¶72 have not been triggered.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan Rev 1 (March 1, 2017)* • *Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan Rev 2 (April 25, 2017)* • *Final Report: Enbridge Line 5–East Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-153 (August 28, 2017)* • *Final Report: Enbridge Line 5–West Straits of Mackinac Hydrostatic Test; Hydrostatic Test # 5-17-154 (August 28, 2017)* • *ITP's Review and Evaluation of the Line 5 Dual Pipelines Hydrostatic Pressure Tests (November 16, 2017)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017 DJ# 90-5-1-1-1099 (January 18, 2018)*
ITP Task 2 Reports	• *ITP Review and Evaluation of Enbridge Submittal: ¶71 and ¶24-26, Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan, May 8, 2017.* • *ITP Review and Evaluation of Enbridge Submittal: ¶25 and ¶71, Line 5 Dual Pipelines Hydrostatic Pressure Tests, November 16, 2017.*

RS 19. Dual Pipelines, Acoustic Leak Detection Tool

CD Section VII, Subsection E, ¶73

A: ITP Review and Evaluation

SAR 73 – [Quarterly Inspections Using Acoustic Leak Detection Tool]

Compliant

CD ¶73 requires that Enbridge conduct quarterly inspections of the Dual Pipelines using an acoustic in-line leak detection tool. CD ¶73 also requires that Enbridge immediately shut-down and Sectionalize the pipeline if a leak should be detected.

Enbridge's *SAR* notes that, in accordance with CD ¶73, an acoustic leak detection tool (i.e. a SmartBall®) was run in each of the two Dual Pipelines in March, May, August, and October of 2017. The *SAR* also notes that these acoustic inspections revealed no auditory signals that would indicate a leak.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits East Leg; Pure HM; (March 31, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits West Leg; Pure HM; (March 31, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits East Leg; Pure HM; (June 20, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits West Leg; Pure HM; (June 20, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits East Leg; Pure HM; (August 29, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits West Leg; Pure HM; (August 29, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits East Leg; Pure HM; (November 17, 2017)* • *SmartBall® Dual Inspection Report-Line 5 – Makinaw Straits East Leg; Pure HM; (November 17, 2017)* • *Enbridge Semi-Annual Report May 23, 2017 to November 22, 2017 DJ# 90-5-1-1-1099 (January 18, 2018)*

RS 20. Data Integration General

CD Section VII, Subsection F, ¶74 and ¶77

A: ITP Review and Evaluation

This RS covers the CD Section VII, Subsection F requirements that include the OneSource system development and functionality but which are not focused on data generated in each ILI run (see RS 15, ILI Milestone 10, on page 64 for ILI data management).

SAR 74 [Feature Integration Database]

Compliant using AI

CD ¶74 requires that Enbridge, as of the CD Effective Date, operate and maintain the feature integration database, OneSource, for pipelines in the Lakehead System. In *SAR* 74, Enbridge states that it has operated and maintained OneSource for all pipelines in the Lakehead System since August 14, 2013. Enbridge also describes four OneSource 'views.'

The ITP has accessed and verified three of the four views. The ITP has not had access to the FeatureMatchInventoryDetail_V view to verify that it enables integrity management personnel to identify and evaluate features, detected by different types of ILI tools, that may overlap or otherwise interact, as stated in the *SAR*.

In an *AIR*, the ITP requested access to this fourth view. Enbridge responded that the statement regarding this view in the *SAR* was premature and that the view currently is empty for CD pipeline segments. Enbridge identified another tool, Feature Match Macro (Macro), which uses data from OneSource to accomplish the data integration described in the *SAR* for the FeatureMatchInventoryDetail_V view. The Macro was demonstrated to the ITP in October 2017, and it provides input regarding interacting features to the Assessment Sheets to which the ITP has access.

SAR 77 [Update of OneSource Database]

Compliant

CD ¶77 sets requirements for updating OneSource with field data gathered from non-destructive examination (NDE) methodologies during excavations. In *SAR* 77, Enbridge states that NDE data has been included in OneSource since 2014. However, CD ¶77 is not effective during the *SAR* reporting period; therefore, the ITP has not conducted a review and evaluation of *SAR* 77.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reference Documents	• *Lakehead System Integrity Remediation Process* • *Lakehead System Integrity Program Logistics Exception Process* • *Pipeline Integrity Joint Fact Sheet*
Enbridge Work Products	• *Integrity Plan* • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

Section VII.G Leak Detection and Control Room Operations

RS 21. ALD Technology Report

CD Section VII, Subsection G, ¶79 and ¶80

A: ITP Review and Evaluation

SAR 79-80 [Create and Submit ALD Report]

Compliant

CD ¶79-80 require that Enbridge prepare and submit a report regarding the feasibility and performance of various types of alternative leak detection (ALD) technologies. CD ¶79 requires this report to be submitted to the EPA within 120 Days of the CD Effective Date (i.e., no later than September 20, 2017).

The *SAR* reports that:

- Enbridge submitted the *ALD Report* within 120 Days of the CD Effective Date.
- The *ALD Report* summarizes the feasibility and performance of the leak detection technologies specified in CD ¶79.a-c.
- Enbridge fully complied with CD ¶80 by including the content specified in the CD.
- On November 30, 2017 the ITP provided to the EPA its Task 2 (CD ¶132.b) report of Enbridge's *ALD Report* to the EPA. The ITP's Task 2 report concluded that the *ALD Report* complied with the requirements in CD ¶79-80.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans 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.
ITP Task 2 Reports	• *Independent Third Party Review and Evaluation of Enbridge Submittal: Section VII.G Paragraph 79 and 80 Assessment of Alternative Leak Detection Technologies*, Independent Third Party, November 30, 2017

RS 22. Straits of Mackinac ALD Report

CD Section VII, Subsection G, ¶81-83

A: ITP Review and Evaluation

SAR 81-83 [Create and Submit ALD Mackinac Report]

Compliant

CD ¶81-83 require that Enbridge prepare and submit a report regarding the feasibility of installing an alternative leak detection system at the Straits of Mackinac. CD ¶81 requires that this report be submitted to EPA within 180 Days of the CD Effective Date (i.e., no later than November 19, 2017).

The January 2018, *SAR* reports that:

- Enbridge submitted the *ALD Straits Report* within 180 Days of the CD Effective Date.
- The *ALD Straits Report* assesses the feasibility of installing an alternative leak detection system at the Straits of Mackinac to supplement its existing leak detection systems.
- The *ALD Straits Report* summarizes the feasibility and performance of leak detection technologies including; fiber optic cable (acoustic and temperature), vapor sensing tube, negative pressure wave, and hydrocarbon sensing cable.
- In accordance with CD ¶82, the *ALD Straits Report* evaluates each of the technologies, required in CD ¶81.
- In accordance with CD ¶83, the *ALD Straits Report* evaluates the relative performance of the technologies specified in CD ¶ 81 with regards to the factors enumerated in CD ¶82.

On March 6, 2018, the ITP provided to the EPA its Task 2 (CD ¶132.b) review and evaluation of the *ALD Straits Report,* noting that Enbridge's *ALD Straits Report* complied with the applicable requirements of CD ¶81-83.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Plans and Reports	• *Report on Feasibility of Installing an Alternative Leak Detection System at the Straits of Mackinac*, Version 1.0. Enbridge. November 19, 2017.
ITP Task 2 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*, Independent Third Party, February 19, 2017, Amended March 6, 2018
Industry Standards and Papers	• *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 23. Leak Detection Requirements for New or Replacement Pipelines

CD Section VII, Subsection G, ¶84-91

A: ITP Review and Evaluation

SAR 84-91 [Requirements for New Lakehead Pipelines and Replacement Segments]

Compliant

CD ¶84-91 provide requirements that apply to new or replacement line segments as defined in the CD. Enbridge has not installed any new or replacement line segments, as defined by CD ¶84(b), during the period covered by the first *SAR*. Therefore, CD ¶84-91 were not triggered during the *SAR* reporting period.

B: Relevant Reports and Documents

No additional reports or documents have been reviewed for this *SAR* section.

RS 24. Operation of MBS Leak Detection on Each Lakehead System Pipeline

CD Section VII, Subsection G, ¶92-98, ¶101, and ¶103

A: ITP Review and Evaluation

SAR 92-98, 101, and 103 [Leak Detection Requirements for Pipelines]

Compliant

CD ¶92-98 provide requirements for the operation of a Material Balance System (MBS) leak detection system on the Lakehead Pipelines.

CD ¶101 requires Enbridge to perform a Transient-State sensitivity analysis on the MBS within 180 Days of the CD Effective Date.

CD ¶103 requires Enbridge to install and implement a 24-hour volume balance alarm within 270 Days of the CD Effective Date.

The *SAR* reports that:

- Enbridge has continuously operated the MBS.
- Enbridge has implemented procedural controls to track the three categories of temporary MBS suspension.
- Enbridge has implemented an overlapping volume balance algorithm in the event of a temporary loss or suspension of MBS leak detection capability.
- Enbridge has implemented a procedural control for occurrences of a loss or suspension of MBS leak detection capability in a pipeline end segment; therefore, leak detection capability is maintained by use of alternative leak detection.
- No reportable outages occurred during the *SAR* reporting period.
- No outages requiring tolling occurred during the *SAR* reporting period.
- Enbridge performed the Transient-State sensitivity analysis required under CD ¶101 on November 19, 2017, which was within 180 Days of the CD Effective Date.
- That Enbridge is planning to implement the 24-hour volume balance alarm within 270 Days of the CD Effective Date.

The ITP's evaluation of the MBS during this *SAR* reporting period supports these *SAR* paragraphs. The ITP continues to evaluate system performance including the Transient-State sensitivity and the 24-hour alarm implementation.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy & Procedure	• *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • *Leak Detection Ultrasonic Flow Meter Planned Maintenance Procedure Flow*, Swim Lane Diagram • *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 • *Consent Decree Grocery List IRs, G39, Flow Meter Outage Tracking Workflow,* September 25, 2017.
Enbridge Reports	• *Consent Decree Grocery List IRs, G33, Documentation of fluid withdrawal tests in the 12 months prior to CD Effective Date.* September 11, 2017 • *Consent Decree Grocery List IRs, G34, MBS Performance Tests.* September 22, 2017. • *Consent Decree Grocery List IRs, G37, LDS Model Routine Maintenance.* September 25, 2017. • *Consent Decree Grocery List IRs, G38, Report of use of Alternative Leak Detection.* September 25, 2017. • Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018) • Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report (April 16, 2018)
Enbridge Meetings & Monthly PCSLD/CCO Presentations	• *ITP Orientation Meeting at Enbridge in Edmonton,* March 7 & 8, 2017 • *PCSLD Meeting at Edmonton,* July 25 & 26, 2017 • *Monthly PCSLD Technical Meeting,* Conference Call, August 25, 2017 • *Monthly PCSLD Technical Meeting,* Conference Call, September 28, 2017 • *PCSLD Technical Meeting and Valve Commissioning Observation,* Edmonton, October 17, 2017 • *Monthly PCSLD Technical Meeting,* Conference Call, October 26, 2017 • *Monthly PCSLD Technical Meeting,* Conference Call, August 25, 2017
Industry Standards and Papers	• American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 25. New Equipment at Remote -Controlled Valves

CD Section VII, Subsection G, ¶99-100

A: ITP Review and Evaluation

SAR 99-100 [Installation of New Equipment upon Valve Excavation]

Compliant

Enbridge reports in the *SAR* that, during the reporting period, it has not excavated a valve that triggers the requirements of ¶99 or ¶100.

B: Relevant Reports and Documents

No additional reports or documents have been reviewed for this *SAR* section.

RS 26. Operate and Test a Rupture Detection System

CD Section VII, Subsection G, ¶102

A: ITP Review and Evaluation

SAR 102 [Rupture Detection System Alarm]

Discussion Item

CD ¶102 provides requirements for testing and the continuous operation of a rupture detection system (RDS) which is to be integrated with Enbridge's Supervisory Control and Data Acquisition (SCADA) and MBS Leak Detection systems.

The *SAR* reports that:

- Enbridge has implemented and continuously operates the RDS,
- Enbridge submitted its *RDS Report* to the EPA and ITP on August 18, 2017, and that the report included:
  - An explanation of the manner in which the RDS would alarm in the event of a sudden pressure drop on both sides of a pump station.
  - A summarization of historical data, with an assertion that the RDS alarmed on all simulated historical rupture event values, as a means of testing the RDS.
- The ITP's October 23, 2017 Task 2 (CD ¶132.b) review and evaluation of Enbridge's report concluded that the RDS was state of the art and generally followed recommended industry practice.
- The ITP's Task 2 report also raised questions about Enbridge's *RDS Test Report*.
- As of the time of the *SAR*, the Parties continue to discuss and consider the questions raised by the ITP's Task 2 report.

The ITP provided Enbridge and the EPA with a set of PFs arising from the ITP's review and evaluation of Enbridge's *SAR* on April 9, 2018. One of the ITP's PFs noted that Enbridge's *RDS Report* omitted the capability to detect an abnormal increase in flow rate as a feature of the RDS. In response to that finding, Enbridge responded that it was in the final stages of completing such a test and that it would submit a report of those tests to the ITP by April 30, 2018.

The ITP received the supplemental test report as scheduled and is in the process of evaluating that additional information.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy & Procedure	• *Leak Detection Systems (LDS) General Manual*, Version 1.0. Enbridge. May 11, 2017. • *Mainline Leak Detection Equipment, D12-105 – (2015),* Version 2.0. Enbridge. October 28, 2015
Enbridge Reports	• *Rupture Detection System Test Report*, Version 1.0. August 18, 2017. • *Enbridge Response to ITP Information Request on p.102 Rupture Detection System*, Version 1.0. August 28, 2017. • *Enbridge Response to ITP Information Request on p.102 Rupture Detection System*, Version 2.0. September 29, 2017. • *Enbridge Response to September 25, 2017 ITP Preliminary Findings on Consent Decree RDS Report (Paragraph 102)*. October 13, 2017.
Enbridge Meetings	• *In-person 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. • Presentation. Enbridge, EPA (by phone), and ITP (by phone) to forward RDS discussion. November 20, 2017.
Industry Standards and Papers	• American Petroleum Institute Recommended Practice 1130: *Computational Pipeline Monitoring for Liquids*. American Petroleum Institute. April 2012.

RS 27. Alarm Response Team and Alarm System Capability

CD Section VII, Subsection G, ¶104-107

A: ITP Review and Evaluation

SAR 104-107 [Leak Detection Requirements for Control Room]

Compliant

CD ¶104-107 provide various requirements for the control room, including applicable leak detection alarms, implementing an Alarm Response Team (ART), implementing remote notification of the ART, and implementing audible and visual alarms for the ART.

Enbridge states in the *SAR* that it has:

- Incorporated the alarms generated by both the MBS Leak Detection System and the RDS into the requirements of CD Section VII, Subsection G.(V), Leak Detection Requirements for Control Room.
- Implemented an ART within 180 Days after the CD Effective Date.
- Implemented a remote notification system within 180 Days following the CD Effective Date.
- Implemented both audible and visual alarms within 180 Days following the CD Effective Date.
- The ITP's evaluation of the implementation of CD ¶104-107 during this *SAR* reporting period supports the *SAR*.

The ITP's evaluation of the implementation of CD ¶104-107 during this *SAR* reporting period supports the *SAR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy, Program and Procedures	• *Process Flow – ART Roles & Responsibilities Leak Alarm Response Process v5* • *LDAM System Remote Notification Overview* • *LDAM System Alarm Display & Volume Control Procedure* • *LDAM Training Plan (redacted)* • *LDAM Rollout Training Presentation* • *LDAM Trainer Checklist* • *LDAM Training Records (redacted)* • *Training Needs Analysis – LDAM Implementation (redacted)* • *LDAM (MOC) Change Implementation Checklist (redacted)* • *LDAM (MOC) Deployment Change Bulletin (redacted)* • *CCO Portal – LDAM (MOC) Electronic Change Notification & Acknowledgement (redacted)* • *CCO Alarm Management Plan* • *Control Room Management Plan (CRM)*
Enbridge Work Products	• Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics.

RS 28. Alarm Clearance Procedures

CD Section VII, Subsection G, ¶108.a-f

A: ITP Review and Evaluation

SAR 108 [Alarm Clearance Procedures]

Compliant

CD ¶108 provides requirements Enbridge is to fulfill to implement procedures, within 180 Days after the CD Effective Date, that are to be used to clear LDS alarms.

Enbridge reports in the *SAR* that:

- Enbridge has employed alarm clearance procedures within 180 Days of the CD Effective Date, and that the procedures fulfill CD requirements.
- To clear an alarm, the ART members are required to execute the leak detection alarm management procedures.
- Enbridge's procedural controls and electronic recording process prohibit the resolution of alarms based upon adjustments to alarm system inputs, directly or otherwise.
- Enbridge has implemented procedures for LDAM that involve the evaluation of the leak detection systems to ensure proper functioning and validation of alarms.
- ART members employ procedures and conduct independent analyses of leak alarms.
- ART members are required to employ their Column Separation procedures when determining the cause of an alarm.
- Enbridge has implemented an electronic record keeping system for managing all required ART response information, which is included in Appendix 1 of the *SAR* as the *Lakehead Leak Alarm Report*.

The ITP's evaluation of the implementation of CD ¶108 during this *SAR* reporting period supports the *SAR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy, Program and Procedures	• *Process Flow – ART Roles & Responsibilities Leak Alarm Response Process v5* • *LDAM System Remote Notification Overview* • *LDAM System Alarm Display & Volume Control Procedure* • *LDAM Training Plan (redacted)* • *LDAM Rollout Training Presentation* • *LDAM Trainer Checklist* • *LDAM Training Records (redacted)* • *Training Needs Analysis – LDAM Implementation (redacted)* • *LDAM (MOC) Change Implementation Checklist (redacted)* • *LDAM (MOC) Deployment Change Bulletin (redacted)* • *CCO Portal – LDAM (MOC) Electronic Change Notification & Acknowledgement (redacted)* • *Leak Alarm Response Procedure Flowing Pipeline* • *Leak Alarm Response Procedure Non-Flowing Pipeline* • *Leak Alarm Response Procedure 10 Minute Rule* • *Leak Alarm Response Procedure Leak Triggers* • *Leak Alarm Response Procedure Column Separation* • *Leak Alarm Response Procedure Rupture Detection Alarm* • *Shift Change Form of LDAM Review* • *Shift Transfer Online Report (test sample)* • *CCO Alarm Management Plan* • *Control Room Management Plan (CRM)*
Enbridge Work Products	• Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics.

RS 29. Shutdown Procedures in Response to LD Alarms

CD Section VII, Subsection G, ¶109.a-b and d

A: ITP Review and Evaluation

SAR 109, 109.a-b and d [Alarm Clearance and Investigation]

Compliant

CD ¶109 and ¶109.a-b, and d provide requirements for employing procedures to shut down a pipeline in response to an alarm which procedures were due no later than 50 Days after the CD Effective Date.

Enbridge reports in the *SAR* that, within 50 Days following the CD Effective Date, it implemented operating procedures requiring the Control Room Operator (CRO) to shut down and Sectionalize an operating pipeline within 10 minutes of the start of the alarm, as well as procedures to address Column Separation within an operating pipeline, and procedures for addressing a confirmed leak.

The ITP's evaluation of the implementation of these CD requirements during this *SAR* reporting period supports the *SAR*.

SAR 109.c [Column Separation – Pipeline Shutdown]

Compliant using AI

CD ¶109.c provides requirements for addressing, not later than 50 Days after the CD Effective Date, Column Separation that forms in a pipeline after a shutdown.

Enbridge reports in the *SAR* that, within 50 Days of the CD Effective Date, it implemented procedures to address Column Separation within a pipeline after Shutdown. The procedures require that a Column Separation fill time be calculated with appropriate review and approval from management.

The ITP submitted an *AIR* requesting the calculation and the amount of time needed to fill the Column Separation, as well as the appropriate level of management approval. Enbridge responded to the *AIR* with a table listing this information for each Column Separation alarming event that occurred during the *SAR* reporting period. Enbridge noted that the CD does not require that this information be included in the *SAR.*

The ITP's evaluation of the implementation of CD 109.c during this *SAR* reporting period supports the *SAR* (using AI).

SAR 109.e [Shutdown and Restart Record]

Compliant using AI

CD ¶109.e provides requirements for resuming pumping operations after the Shutdown of a pipeline not later than 50 Days following the CD Effective Date.

Enbridge reports in the *SAR* that, "following a pipeline shutdown, controllers "execute a procedural control and electronic recording measure process that: identifies the root cause of the alarm, verifies

that applicable emergency procedures have been completed and electronically validated by the appropriate accountable parties, and generates a record of how the cause of the alarm was determined and/or how the integrity of the line was verified, including the critical information that was considered in this decision-making process."

The ITP submitted an *AIR* on CD ¶109.e. (iii), noting that, to verify compliance with this requirement, the ITP requested all records of alarms (ROAs) where the CRO initiated a Shutdown, covering the period from January 1, 2107 through the CD Effective Date. Enbridge responded by providing a list of all such Shutdowns and restarts.

The ITP's evaluation of the implementation of CD ¶109.e during this *SAR* reporting period supports the *SAR* (using AI).

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy, Program and Procedures	• *Process Flow – ART Roles & Responsibilities Leak Alarm Response Process v5* • *LDAM System Remote Notification Overview* • *LDAM System Alarm Display & Volume Control Procedure* • *LDAM Training Plan (redacted)* • *LDAM Rollout Training Presentation* • *LDAM Trainer Checklist* • *LDAM Training Records (redacted)* • *Training Needs Analysis – LDAM Implementation (redacted)* • *LDAM (MOC) Change Implementation Checklist (redacted)* • *LDAM (MOC) Deployment Change Bulletin (redacted)* • *CCO Portal – LDAM (MOC) Electronic Change Notification & Acknowledgement (redacted)* • *Leak Alarm Response Procedure Flowing Pipeline* • *Leak Alarm Response Procedure Non-Flowing Pipeline* • *Leak Alarm Response Procedure 10 Minute Rule* • *Leak Alarm Response Procedure Leak Triggers* • *Leak Alarm Response Procedure Column Separation* • *Leak Alarm Response Procedure Rupture Detection Alarm* • *Leak Alarm Response Procedure Confirmed Leak* • *Leak Alarm Sectionalizing Valves* • *Shift Change Form of LDAM Review* • *Shift Transfer Online Report (test sample)* • *CCO Alarm Management Plan* • *Control Room Management Plan (CRM)*
Enbridge Work Products	• Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics. • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

RS 30. LD Alarm Compliance Certification

CD Section VII, Subsection G, ¶110.a-d

A: ITP Review and Evaluation

SAR 110.a-d [Certification of Compliance with 10-Minute Rule]

Compliant

CD ¶110 provides requirements for certifying compliance with the 10-Minute rule and other requirements relating to alarms under CD Section VII, Subsection G.(V).

Enbridge reports in the *SAR* that it has prepared an electronic weekly list of alarms (WLOA), an electronic ROA, and a summary of alarms (SOA). These documents were provided in Appendix 1 to the *SAR*. Also, included on page 83 of the *SAR* is a signed statement by the Vice President of Pipeline Control that certifies compliance during the *SAR* reporting period.

The ITP's evaluation of the implementation of CD ¶110 during this *SAR* reporting period supports the *SAR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Work Products	• Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics. • Lakehead Leak Alarm Reports (WLOA and SOA)

RS 31. Shutdown Procedures in Response to Non-LD Alarms

CD Section VII, Subsection G, ¶111-112

A: ITP Review and Evaluation

SAR 111-112 [Unscheduled Shutdown Procedures in Response to Other Events]

Compliant

CD ¶111-112 provide requirements for responding to events other than alarms that are emergency phone calls received by the Control Center concerning a potential leak or rupture.

Enbridge reports in the *SAR* that it has implemented procedural controls to ensure that all emergency phone calls received by the Control Center concerning a potential leak or rupture are investigated within 10 minutes. If the investigation identifies evidence consistent with a leak or rupture, or if the investigation is not completed within 10 minutes, the procedures require the CRO to immediately shut down and Sectionalize the pipeline without further consultation or notification. Furthermore, the CD-required information related to these events during the reporting period is provided in Appendix 2 to the *SAR*.

The ITP's evaluation of the implementation of CD ¶111-112 during this *SAR* reporting period supports the *SAR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Policy, Program and Procedures	• *Reported Emergency Pipeline Procedure on Emergency Phone or to Shift Supervisor Phone* • *Incident Information Form* • *10 Minute Rule* • *Leak Alarm Response Procedure Flowing Pipeline* • *Leak Alarm Response Procedure Non-Flowing Pipeline* • *Leak Alarm Response Procedure Leak Triggers* • *Leak Alarm Response Procedure Confirmed Leak* • *Pipeline Shutdown Sectionalizing Valves Procedure* • *Control Room Management Plan (CRM)*
Enbridge Work Products	• Enbridge Monthly Meeting Presentations by both the CCO and PCSLD with a standing agenda and roundtable topics. • Monthly Reports on Response to Potential Leak Events Other than Leak Alarms

Section VII.I: New Remotely-Controlled Valves

RS 32. New Remotely-Controlled Valves

CD Section VII, Subsection I, ¶121-124

A: ITP Review and Evaluation

SAR 121-123 [Installation of Remotely Controlled Valves]

Compliant

CD ¶121-123 provide requirements for the installation of 14 new Remotely-Controlled Valves that Enbridge is required to install on the Lakehead System within the term of the CD, including selecting the exact location at which the valves are to be installed.

The *SAR* reported that, during the first reporting period, Enbridge installed four of the 14 valves. Two of the valves became fully operational during the *SAR* reporting period, and the remaining two were commissioned in December 2017. The valves were installed at locations determined by Enbridge to afford maximum protection of environmental resources, while minimizing construction impacts.

CD ¶123 requires that Enbridge employ computer modelling to assess different locations when selecting the exact locations of each of the 14. The *SAR* reports that, to select the exact location where valves will be installed, Enbridge conducted an analysis using its intelligent valve placement methodology. The *SAR* discusses this methodology and the various factors the methodology considers in selecting valve locations. The *SAR* reports that Enbridge met with the ITP to review this methodology in detail and to answer the ITP's questions pertaining to the method, risk, and rationale.

The ITP's evaluation supports the of the location and installation of valves as reported in the *SAR*.

SAR 124 [Valve Design and Closure]

Compliant using AI

CD ¶124 provides that the 14 valves are to be of a design that can be opened and closed remotely, and that they shall fully close and seal within three minutes of the operator engaging the valve-closure control.

In an *AIR*, the ITP requested that Enbridge provide documentation, or an explanation, of the manner in which Enbridge determined that the valves sealed. In Enbridge's *AIR* response, Enbridge referred to the manufacturer's shop tests as the primary means used to verify valve closure timing capability.

The ITP's evaluation supports the of the valve design and closure as reported in the *SAR*.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Procedures	• *Intelligent Valve Placement Procedure ENB-ENG-OE-P-0001* • *Valve Installation and Commissioning Procedures*
Enbridge Plans and Reports	• *DOJ Valves Analysis v3.0* • *OILMAP Land Spill Model Description* • *DOJ Valves Field Site Assessment Report* • *Site Construction Drawings and Plans* • *Valve and Actuator Specifications* • *Valve Manufacturer Shop Drawings* • *Valve Manufacturer Test and Inspection Plan* • *Valve Material and Welding Certifications* • *Pipeline Plan/Profile Drawings and Aerial Photography* • *Valve Installation/Commissioning Reports and Certifications* • *Response to the ITP's Information Request related to Enbridge's First Semi-Annual Report Phase 2 (March 26, 2018)*

Section XI: Reporting Requirements

RS 33. Reporting Requirements

Section IX, ¶143-148

A: ITP Review and Evaluation

SAR 143-145 [Content of the *SAR*]

Not Compliant

CD ¶143-145 include requirements for information and discussion that Enbridge shall include in the *SAR*. CD ¶143 requires submittal of the first Semi-Annual Report no later than 240 days after the Effective Date, and the *SAR* meets that requirement.

In the *Preliminary Findings Report*, and in regard to the ITP evaluation criteria, the ITP made clear statements regarding the degree to which the *SAR* could be found to be incomplete, or otherwise did not meet CD ¶144, concluding that "the *SAR* does not provide complete discussion and analysis of actions taken toward achieving compliance, nor does it necessarily provide either the factual bases, or sources of the factual bases, underlying its conclusions of compliance. Further, the ITP *Preliminary Findings Report* found that the *SAR* did not meet the content requirements of CD ¶144.

Enbridge's response to the ITP *Preliminary Findings Report* addressed the six specific CD Paragraph preliminary findings that the ITP stated; however, the Enbridge response omitted to address the categorical deficiencies stated in the *Preliminary Findings Report*, including those relating to the content required by CD ¶144.

As a result of Enbridge's failure to address the ITP's preliminary findings related to the ITP evaluation criteria, the ITP's preliminary findings with regard to *SAR* failure to satisfy the evaluation criteria remain unaddressed.

The ITP therefore finds that the *SAR* does not comply with CD requirements, in that it:

- Does not fully and consistently summarize and discuss the status of compliance with respect to CD Section VII, Subsections A-J, Injunctive Measures (CD ¶144).
- Does not internally set forth the factual and/or analytical elements necessary to demonstrate completeness (CD ¶132.b).
- Does not set forth the factual bases, or the sources of the factual bases, supporting the *SAR* or the *AIR* responses;
- Does not consistently present the following elements required by CD ¶144:
  - Completion of milestones
  - Problems encountered or anticipated (together with implemented or proposed solutions)
  - Status of permit applications

- Operation and maintenance issues
- Reports to state agencies
- Number, by types, of features repaired or mitigated during the reporting period
- The number of features, by type, planned for future repair or mitigation

CD ¶145 requires that the *SAR* shall include certain information and analysis if Enbridge failed to comply with any requirement or deadline under the CD or if Enbridge anticipates it will violate a requirement in the future. This information includes the likely cause of the event, facts and circumstances that led to the event, the remedial steps taken to rectify, dates for required action, and plans to ensure that non-compliance is not repeated. The evaluation in this report on *SAR* 29 includes discussion of a pending *Stipulation and Agreement* that Enbridge referenced in the *SAR*. As noted, the *SAR* does not include any of the information and analysis required by CD ¶145 on this violation or potential violation. Similar deficiencies are described in the discussion in this report on *SAR* 23.

The ITP finds that the CD is clear and unequivocal in stating the foregoing requirements. In light of its findings, the ITP concludes that the *SAR* is Not Compliant with these CD requirements and intends to discuss the content and completeness of the *SAR* with Enbridge and EPA toward ensuring the completeness of future Semi-Annual Reports.

SAR 146-148 [Discharges from a Lakehead System Pipeline]

Compliant

Enbridge reported three discharges for this *SAR* reporting period. The detailed Pipeline and Hazardous Materials Safety Administration (PHMSA) Accident Reports for each discharge are included in *an* appendix to the *SAR*. Two of the three discharges were at storage terminals, and the third was near the Line 14 launcher/receiver at Mokena Station.

B: Relevant Reports and Documents

Type	Document Title
Enbridge Reports	Enbridge reports: PHMSA Accident Report-Hazardous Liquid Pipeline Systems • No. 20170242-22538, Spill Date 7/13/17, Report 8/10/17 • No. 20170378-22827, Spill Date 10/18/17, Report 11/17/17 • No. 20171410-22936, Spill Date 11/14/17, Report 12/13/17

Appendix A: Additional Information Request

Attached on the following 11 pages is the ITP's Additional Information Request that was provided to Enbridge on January 18, 2018.

ITP Additional Information Request for Enbridge First Semi-Annual Report Dated January 18, 2018

This document may contain information that Enbridge deems to be confidential or otherwise protected by statute.

Introduction

In the initial phase of its evaluation of the Semi-Annual Report (SAR) submitted by Enbridge on January 18, 2018 (the First SAR), the Independent Third Party (ITP) has reviewed the First SAR and identified areas where additional information is needed to allow the ITP to complete its evaluation.

In that initial phase, the ITP performed three types of review:

1. The ITP assessed whether the First SAR includes the information that is expressly required by Consent Decree (CD) Paragraph (¶) 29, ¶31, ¶49, ¶96, and ¶110.c, as required in turn by CD ¶144.

2. The ITP examined Enbridge's responses to each CD Paragraph, Subparagraph, or grouping of Paragraphs or Subparagraphs (the responses) to assess whether (and if so the degree to which) each of the responses presents or includes the following:
   - Summarization and discussion of the status of compliance with CD requirements
   - Factual and/or analytical elements demonstrating completeness
   - The factual bases supporting the responses
   - The application of best engineering judgment in support of the Responses

3. The ITP assessed whether (and if so the degree to which) the First SAR presented, as relevant within the context of each response, the following subject matter:
   - Completion of milestones
   - Problems encountered or anticipated (together with implemented or proposed solutions)
   - Status of permit applications
   - Operation and maintenance issues
   - Reports to state agencies
   - Number, by types, of features repaired or mitigated during the reporting period
   - The number, by type, planned for future repair or mitigation

The table that follows provides, for each response identified therein, the additional information that the ITP requests, along with the rationale for such requests.

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Additional Information Request Table

Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
SAR General					
1.	Various	All (Mohn)	Various	CD ¶144 requires that Enbridge "shall summarize and discuss the status of compliance with respect to all other requirements." The SAR implies that Enbridge believes they are compliant with all CD requirements, but the SAR provides little discussion and does not express conclusions.	Discuss the status of each CD paragraph or provide an overall SAR statement (i.e., whether Enbridge believes that they are compliant with the CD requirements).
2.	Various	All (Mohn)	Various	The SAR does not address the provision of CD ¶144 to discuss (among other requirements) "reports to state agencies."	Provide reports sent to the state agencies relevant to CD requirements.
Section VII.B					
3.	21	Norton	4	The SAR does not discuss the manner in which Enbridge will ensure that the pipeline is not operated in the future, by Enbridge or anyone else, as a result of Enbridge being permanently enjoined from operating Original Line 6B.	Provide documentation that demonstrates the manner in which Enbridge will ensure that neither Enbridge nor anyone else operates Original US Line 6B for at least the maximum time period provided by CD ¶206.
4.	22.a	Mohn	4	The SAR adequately addresses the permitting process for new Line 3. The SAR does not: • Discuss procurement, design, and construction of the pipeline. • Provide a high-level milestone schedule for the project after permits are received.	Provide: • A discussion about procurement, design, construction, and commissioning. • A high-level milestone schedule.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
5.	23	Kenney	9	The SAR notes that the feature counts used in the charts and analysis in the report for US Line 10 were higher than the features that exist due to some features being duplicated. Enbridge noted that an analysis of the revised feature counts is on-going and revised counts will be provided.	Provide the analysis of the revised feature counts for US Line 10 and a discussion of the drivers or reasons for the revised feature counts.
Section VII.C					
6.	25.e	Kenney	11	The SAR cites Steptoe letters dated Feb 21, March 1, March 17, March 29, and May 9. In a search of the ITP's files and Enbridge's Grocery List, the ITP has not found the letters dated Feb 21, March 17 or March 29.	Provide copies of the Steptoe letters.
Section VII.D					
7.	28.a-b	Lamontagne	15	Table 4 in the SAR does not include Line 6A, PE-AM, Geometry from the 9/29/2017 Gemini inspection. The Enbridge July 14, 2017 revised schedule (*12-Month Lakehead ILI Schedule Rev 1.1)* states that a magnetic flux leakage (MFL) and geometry tool is scheduled.	Explain the omission of the Geometry tool from Table 4.
8.	28.a-b	Shelton	15	The approved tool list referenced in the SAR does not provide line specific applications.	Provide any exceptions where a listed tool is not approved for a specific Lakehead line.
9.	28.c	Johnson	15	The SAR refers to In-line Inspection (ILI) vendor contracts as stipulating compliance with requirements of the CD.	Provide a listing and execution dates of ILI vendor contracts with examples of stipulating language.
10.	29	Shelton	16	Table 7 in the SAR does not provide required completion dates and dates completed. The SAR does not include Line 62 in Table 7.	Update Table 7 to add scheduled dates and completion dates. Explain why Line 62 is not included in Table 7.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
11.	30	Johnson	20	CD ¶30 requires performing ILIs in accordance with the schedule AND the requirements of CD ¶65, ¶66, and ¶70. The SAR states that ILIs were performed as shown in CD ¶27 but does not state or confirm that they were performed as required by this paragraph, including requirements of the CD.	Clarify whether: • Enbridge is stating that all ILI runs, including the two failed runs, during the reporting period complied with the requirements of CD ¶29, ¶65, ¶66, and ¶70. • The SAR reference to CD ¶27 should be a reference to CD ¶28.a-b.
12.	33.c-d	Shelton	25-26	The SAR states that two Priority Features were identified during the reporting period, one on Line 2 and one on Line 5. (There were three called, but two were the same feature called by two different tools.) Enbridge concluded that these features had been previously repaired. However, the Priority Feature on Line 2 was excavated to confirm the historical repair, but the Priority Feature on Line 5 was not. No explanation is provided as to why a confirmation dig was not required for Line 5.	Provide the rationale for performing a confirmation excavation of the Priority Feature on Line 2, but not on Line 5.
13.	34.a	Lamontagne	28	The ITP was not aware that Line 5 ENO and WNO Straits MFL reports had been re-issued until reading it in the SAR.	Provide the background on and an explanation for the change of feature descriptions from metal loss to manufacturing defect.
14.	34.a-d	Johnson	27-29	Table 13 and Table 15 of the SAR list “preliminary report” and “Enbridge review dates” indicating compliance with timeframe requirements.	Explain what is a “preliminary review of an initial report” and how does it relate to completion of the data quality review? How are Enbridge’s review and identification of quality concerns documented?

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
15.	34.c	Lamontagne	28	The SAR does not discuss the Line 5 ENO-EMA wall thickness issue.	Explain why the wall thickness corrections to OneSource and the Assessment Sheets are not included in the SAR's ¶34.c discussion and Table 14. Explain how the incorrect data was entered and the process by which it was discovered and corrected.
16.	34.e	Johnson	30	Table 16 in the SAR and the commentary describes significant discrepancies between successive ILI runs on Line 5 ENO-EMA. Vague reference is made to vendor communication.	Provide correspondence with the Vendor explaining the sensor sensitivity issue and an explanation of the vendor findings.
17.	37	Shelton	31	CD ¶37 requires that all features requiring excavation are to be added to the Dig List within 5 Days of discovery. The second paragraph of the SAR's discussion of CD ¶37 is written awkwardly and states that all features requiring listing "were listed." The SAR does not state that they were "listed within five Days." The ITP notes that Line 5 PE-IR USWM appears to have required two reviews, two months apart, to complete the Dig List.	Provide a clarification of the SAR's discussion of CD ¶37 (second paragraph) and whether all features required to be listed within five Days were listed within five Days.
18.	37	Lamontagne	32	Table 17 in the SAR does not show that two more digs were added (above the eight) in Line 5 PE-IR USWM on 12/15/17 due to high estimated corrosion growth rates (CGRs).	Explain why these high CGRs were not captured during the Initial ILI Assessment in October and during the Initial Dig List creation.
19.	39.a-b	Johnson	33	The SAR implies that excavations on Features Requiring Excavation were completed during this reporting period.	Provide a listing of all features excavated during the reporting period, with dates, and identify specific compliance records for these digs.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
20.	39.a	Shelton	33	CD ¶39.a(2) requires Enbridge to "record the total number of unreported features that are detectible within the ILI specifications and include that information in the next Semi-Annual Report." This is not found in the SAR. The SAR states that there were no pipe segments containing "a high volume" of unreported features, implying that some were found.	Provide the number of unreported features falling within the tool specifications for each segment. If none, so state, and explain why the statement was made that "a high volume" was not found.
21.	44.a-b	Lamontagne	35	Table 18 footnote 2 in the SAR refers to a calculation deadline that was calculated after the issue was resolved. The data quality issue had no bearing on the burst pressure and remaining life analysis for this segment	Clarify whether there was another issue other than the word "wrinkle" in the Initial Report that would affect their data analysis. Was there a data issue germane to the calculations?
22.	44.a-b	Shelton	35	Table 18 in the SAR reports up to October 23, 2017; however, the SAR reporting period ended at November 23, 2017.	Provide a list of reports received up to November 23, 2017, even if the calculation was not complete.
23.	58	Shelton	42	Table 23 in the SAR does not provide information required by the CD regarding: • The types of features intersecting or interacting. • The tool that detected each type of feature.	Provide a revised table that identifies the type of features that are interacting and lists the tool that detected each feature.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
Section VII.E					
24.	68.a	Kenney	46	The SAR notes that the Dual Pipelines are buried near the shoreline areas and that they routinely survey the Dual Pipelines to assure that: • The pipelines are buried in water depths or 65 feet or less. • Enbridge has installed screw anchors on all spans on the uncovered portions of the pipelines of 75 feet or greater. Enbridge's SAR notes that they "operate and maintain the Dual Pipelines to ensure currents or ice do not impair the integrity of either pipeline." Other than the surveys and installation of screw anchors, no other information is provided of measures Enbridge takes to "operate and maintain" the pipelines to ensure they are not impaired by ice or currents.	Provide or discuss engineering and administrative controls, other than that the pipelines are buried and surveyed, that Enbridge employs as part of operating and maintaining the Dual Pipelines to ensure that they are not impaired by ice or currents.
25.	68.a	Kenney	46	The SAR notes that Enbridge meets with the United States Coast Guard once per year and attends Northern Area planning meetings twice per year as part of operating and maintaining the Dual Pipelines to reduce the risk of anchors damaging either of the pipelines. Also, footnote 4 of the SAR notes that Enbridge is evaluating measures to mitigate potential vessel anchor strikes.	Provide a summary and discussion of follow-up actions arising from these meetings that Enbridge has taken, and any reports provided (or under consideration) to the State of Michigan of measures taken to prevent anchor strikes per the page 46 footnote

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
26.	68.c	Kenney	47	The SAR notes that autonomous underwater vehicle (AUV) data was collected between June 3-14, 2016. The ITP has received copies of the videos of the remote operated vehicle (ROV) survey. However, the ITP has not been provided the AUV data.	Provide the AUV data as noted in the SAR, or provide a report of the analyses, findings, and conclusions of the AUV data.
27.	68.d	Kenney	47	The SAR notes that permit applications to install 22 screw anchors on the Dual Pipelines was submitted to the United States Corps of Engineers and the state of Michigan.	Provide a copy of the permit applications for the screw anchors.
28.	68.f	Kenney	48	The SAR notes that, in addition to the visual inspection surveys, Enbridge undertook ROV inspections of all existing screw anchors and had divers further inspect a portion of screw anchor locations.	Provide the reports of the ROV and diver inspections of the existing screw anchor locations that took place in 2017.
Section VII.F					
29.	74	Lamontagne	50, 51	The SAR refers to the OneSource view titled FeatureMatchInventoryDetail_V as evidence that the requirement for OneSource to permit personnel to identify and track any changes to any feature detected by an ILI tool. There are no data in the FeatureMatchInventoryDetail_V view provided to the ITP.	Please provide clarification and correction as appropriate for this statement in the SAR.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
30.	75	Shelton	51	The SAR states that all required personnel have access to schematic images and that the ITP was provided instructions on how to access the diagrams on October 17, 2017. While the ITP has access to the required data in tabular form, the ITP does not have access to required schematic diagrams, nor does the ITP have instructions for how to access the schematic diagrams.	Ensure the ITP has access to the schematic diagrams and provide the step-by-step instructions for accessing them.
Section VII.G					
31.	89.a	Treat	56	The SAR states the following, but does not provide support for these statements: • "Enbridge has fully complied with this Paragraph by designing the new US Line 3…to meet or exceed the defined MBS leak sensitivity targets." • "The estimated steady state performance of the new US Line 3 MBS indicates adherence to each of the targets set forth in this paragraph."	Provide the documentation that supports these statements, specifically: • Design documentation demonstrating that the new US Line 3 is designed to meet leak sensitivity targets. • Documentation demonstrating that the estimated Steady-state performance of US Line 3 indicates adherence to targets.
32.	93	Treat	57	Appendix 3 on pages 176 -177 of the SAR list the number of Material Balance System (MBS) temporary suspension occurrences and the number of those occurrences that exceed the time period. However, there is no list of the specific instances.	Provide a report listing of all instances of temporary suspension of the MBS Leak Detection System including start time, end time, and reason for suspension. This information is needed to verify that none of the instances exceed the timing requirements of CD ¶97.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
33.	94	Treat	57	The SAR states that the algorithm automatically integrates the minimum number of MBS segments necessary to achieve and maintain temporary leak detection capability. In presentations provided to date, this capability has not been described.	Provide a description of how the algorithm accomplishes this function.
34.	95	Treat	57	The SAR states that Enbridge has implemented a procedural method that conforms with *API Recommended Practice 1130*. However, the method is not described. Additionally, there is no documentation in the SAR of the number of events of alternative leak detection (ALD).	• Provide the relevant procedure(s) or other documentation describing the procedural method. • Provide a report of each incidence of ALD including start time, end time, reason for use of ALD, and ALD method employed.
35.	101	Treat	59	The SAR states that a leak test methodology was selected and developed to establish initial transient state targets. While the ITP has been presented the approach and resulting targets, the ITP has not been provided with any analysis.	Provide the relevant analysis.
36.	109.c	Spangler	62	The SAR does not provide evidence that a column separation fill time was calculated with review and approval from management for each of these alarms caused by column separation.	For each of these record of alarm (ROA) alarms, provide: • The calculation and amount of time needed to fill the column separation. • The appropriate level of management approval.
37.	109.e(iii)	Spangler	62	The SAR indicates that ROAs are available for alarms that caused a shutdown to be initiated. CD ¶109.e(iii) requires an electronic record of all associated alarms occurring after December 31, 2016.	Provide all ROAs where the Control Room operator (CRO) initiated a shutdown covering the period prior to the CD becoming effective from January 1, 2017 to May 23, 2017.

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Request #	Enbridge Report CD¶	SME (Last)	Enbridge Report Page	Report Gap/Request Rationale	Information Requested
Section VII.I					
38.	121-122	Norton	72	The SAR does not reference the documentation of valve installations that is needed to give the ITP a complete overview of a project lifespan and compliance.	The following Grocery List items have been pending for a few months and are needed for project documentation: • GL I-26 • GL I-28 • GL I-29 • GL I-33 • GL G-53 (3-minute valve closure documentation)
39.	124	Norton	72	The SAR states in the last sentence of the section that valves sealed during wet commissioning, but the SAR does not provide support or evidence.	Provide documentation or explanation of how Enbridge determined that the valves sealed.

Appendix B: Additional Information Request Response

Enbridge's first response to the ITP's Additional Information Request was provided to the ITP on March 19, 2018.

Enbridge's second response to the ITP's Additional Information Request was sent to the ITP on March 26, 2018 and included content from the first response.

Attached on the following 18 pages is Enbridge's second response to the ITP's Additional Information Request.

Response to ITP's Information Request related to Enbridge's First Semi-Annual Report

Per the requirements of the Consent Decree entered in U.S. vs. Enbridge Energy, Limited Partnership, et al, Section VII, Part B. paragraph 23, Enbridge submitted a First Semi-Annual Report on January 18, 2018. The ITP issued related information requests to Enbridge on February 14, 2018. Phase 1 of the responses was submitted to the ITP on March 16, 2018. The Phase 2 response, which sets forth the remainder of the Enbridge responses, follows. The responses previously provided in Enbridge's Phase I responses are shown below in green, and have not been changed.

GENERAL SAR

Request #1: Discuss the status of each CD paragraph or provide an overall SAR statement (i.e., whether Enbridge believes that they are compliant with the CD requirements).

Response: Enbridge has been compliant with respect to all paragraphs in the consent decree. Enbridge has entered a stipulation to resolve a disagreement with EPA over compliance with the frequency of ILI runs required by paragraphs 29, 65 and 66 of the Decree.

Compliance was demonstrated per each paragraph in the report.

Request #2: Provide reports sent to the state agencies relevant to CD requirements.

Response: During the reporting period of this consent decree semi-annual report, Enbridge provided the following reports to the State of Michigan. ITP has been provided with copies of all of the documents listed below.

- Redacted – Final Report: Enbridge Line 5 – East Straits of Mackinac Hydrostatic Test
- Redacted – Final Report: Enbridge Line 5 – West Straits of Mackinac Hydrostatic Test
- Enbridge Alternative Leak Detection Report Straits of Mackinac 20171119
- Redacted Copies of Enbridge Line 5 BIWP Work which includes
    - Enbridge Line 5 Biota Investigation Work Plan and associated coating inspections (Aug 2017)
    - Report from Stress Engineering Services
    - Product Data Sheets
    - Letter from Manufacturer
    - Application of Underwater Repair Coatings for Line 5 Straits approved by the EPA on September 14, 2017
    - QC Checklist
- Redacted – Enbridge Consent Decree Semi-Annual Report

As stated on page 7 of the semi-annual report, documents submitted by Enbridge to the Minnesota Public Utilities Commission relevant to the replacement of Line 3 are available at the online site identified in footnote 1.

SECTION VII.A

Request #3: Provide documentation that demonstrates the manner in which Enbridge will ensure that neither Enbridge nor anyone else operates Original US Line 6B for at least the maximum time period provided by CD ¶206.

Response: Enbridge stated in the semi-annual report that the original Line 6B was permanently disconnected and is inoperable due to being isolated from all pump stations and terminals and by removing small sections of piping. Accordingly, 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. In October 2017, Enbridge provided the ITP various Engineering records via the Compliance SharePoint site (in Grocery List Responses, Request #A1) to show that Line 6B was permanently disconnected and is inoperable.

SECTION VII.B

Request #4: Provide [for Line 3]:
• A discussion about procurement, design, construction, and commissioning.
• A high-level milestone schedule.

Response: During the reporting period of this consent decree semi-annual report, Enbridge was working to secure permits as described in paragraph 22.a and Table 1 in the semi-annual report. Enbridge was also working to complete construction on a 14-mile segment of the replacement Line 3 within Wisconsin. Enbridge has described activities related to leak detection design within the semi-annual report per the consent decree requirements.

On October 19, 2017, Enbridge met with ITP to discuss the Line 3 Replacement update and the Consent Decree Scope of work. In this discussion, Enbridge proposed that the compliance verification work be tied to the permitting, construction and commissioning of the pipeline. Other than the Leak Detection design requirements identified in Section G, Enbridge notes there are no procurement or design requirements related to Line 3 in the Consent Decree.

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. However, to address the ITP's inquiry, Enbridge offers the following milestone schedule. Enbridge's ability to meet this schedule is dependent on permitting procedures currently in process:

Line 3 Milestone schedule as of March 2018		
L3 Milestone	**Status**	**Notes**
Wisconsin Permits	Complete	
North Dakota Permits	In Progress	
Minnesota Permits	In Progress	
Line 3 Construction - Wisconsin	Complete Q4 2017	Segment 18 (~14 miles) Planning is underway to tie this segment into the terminal.
Line 3 Construction Start – North Dakota + Minnesota	Projected Q4 2018	Pending permits. Note that a segment of Line 3 in North Dakota near the Canadian border has already been replaced.
Line 3 Construction Complete	Projected Dec 2019	

Additional Line 3 information is available at the following link: http://www.enbridge.com/projects-and-infrastructure/public-awareness/minnesota-projects/line-3-replacement-project

Request #5: Provide the analysis of the revised feature counts for US Line 10 and a discussion of the drivers or reasons for the revised feature counts.

Response: This request is being responded to separately. The explanation is being provided in the "Response to the ITP's DRAFT Preliminary Findings ref: Enbridge's Evaluation of Replacement of US Portion of Line 10" along with Enbridge's redline of the previously-issued "Evaluation of replacement of Portions of Line 10 within the United States," which will be issued in March 2018 to the ITP.

SECTION VII.C

Request #6: Provide copies of the Steptoe letters [dated Feb 21, March 1, March 17, March 29, and May 9. In a search of the ITP's files and Enbridge's Grocery List, the ITP has not found the letters dated Feb 21, March 17 or March 29].

Response: These 5 letters have been placed on the Compliance SharePoint site (in Semi-Annual Reports, SAR1). These letters were not sent within the reporting period of the semi-annual report. In addition, Enbridge understands that the semi-annual report is a summary report and accordingly the requested letters were not supplied, nor required to be supplied, in the semi-annual report.

Letters Requested by the ITP	
Date	**Letter Re:**
Feb 21, 2017	United States v. Enbridge Energy, Limited Partnership, et al., Civ. No. 1:16-cv-00914, Proposed Consent Decree [ECF No. 3] – Notice of Planned Line 5 Hydrotest
March 1, 2017	United States v. Enbridge Energy, Limited Partnership, et al., Civ. No. 1:16-cv-00914, Proposed Consent Decree – Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan
March 17, 2017	Line 5 Straits of Mackinac Hydrostatic Pressure Test Plan
March 29, 2017	United States v. Enbridge Energy, Limited Partnership, et al., Civ. No. 1:16-cv-00914, Proposed Consent Decree – Update on Line 5 Straits of Mackinac Hydrostatic Pressure Test
May 9, 2017	United States v. Enbridge Energy, Limited Partnership, et al., Civ. No. 1:16-cv-00914, Proposed Consent Decree [ECF No. 9-5] – Notice of Planned Line 5 Hydrotest

SECTION VII.D

Request #7: Explain the omission of the Geometry tool from Table 4.

Response: Prior to the consent decree Effective Date, a GEMINI combo tool (Caliper and MFL) was run for Line 6A PE-AM segment in March 2017. Caliper data was processed and digs were issued for excavation, but the MFL data couldn't be successfully collected for analysis due to a tool issue (the MFL components/sensors of the tool were damaged). The 9/29/2017 GEMINI tool was run for MFL only for this Line 6A PE-AM segment which is still within the required reassessment interval per the Consent Decree.

The 12-month (May 23, 2017 – May 22, 2018) ILI schedule should have listed this tool's "Threat Monitored" to be "Corrosion" only or the clarification that the "Geometry data was not being gathered" should have been included in the Table 7: Changes to Previous 12-Month ILI Schedule (May 23, 2017 to May 22, 2018) (p 29) in the semi-annual report.

Enbridge provided the ILI completion status for Line 6A PE-AM Gemini (corrosion only) during the monthly ITP meeting on October 26, 2017. At that meeting, Enbridge further explained that the ILI was an in-kind rerun of the 2017-March GEMINI for MFL only.

Request #8: Provide any exceptions where a listed tool is not approved for a specific Lakehead line.

Response: The Approved ILI Tool List is applicable to all Lakehead lines. The selection of a tool or tools from the Approved ILI Tool List for each specific line segment and threat type is described in the Integrity Plans which have been provided to the ITP.

Request #9: Provide a listing and execution dates of ILI vendor contracts with examples of stipulating language.

Response: Prior to the effective date of the consent decree, all approved ILI vendors were sent an updated In-Line Inspection Reporting Profile Standard V8.1, which was updated on February 1, 2017 to contain the Consent Decree reporting requirements. This document is part of the vendors' overall contracts with Enbridge. The ITP was sent this document on May 30, 2017 in Grocery List item D2.

In addition, each ILI program is individually contracted through Enbridge's contract Work Order Process. Even prior to the Effective Date of the consent decree, all existing, renewed and new Enbridge Lakehead work order contracts, including ILI programs, contained and continue to contain the following stipulating language:

"The following are specifically made part of this Work Order Contract and all work shall be performed in accordance with the following:

Company's Consent Decree in United States of America v. Enbridge Energy, Limited Partnership, et al., Case No. 1:16-CV-914, available at https://www.epa.gov/sites/production/files/2017-06/documents/enbridgeentered-cd_0.pdf."

As seen in the language above, contractors are provided with a link to the consent decree document, ensuring that all receive a copy.

Enbridge's approved Consent Decree Line ILI vendors are: BH (Baker Hughes), GE (PII North America LLC), Rosen, NDT Global and TDW (TD Williamson).

Request #10: Update Table 7 to add scheduled dates and completion dates. Explain why Line 62 is not included in Table 7.

Response: The requested information is provided in Table 4 and Table 6 of the semi-annual report.

- Table 4 in the consent decree semi-annual report contains run completion dates "pull date".
- Table 6 in the consent decree semi-annual report contains required completion dates for all runs listed in Table 7.

Line 62 was idled (fully deactivated) by Enbridge on March 30, 2017, prior to the Effective Date of the consent decree. Since the date that Line 62 was idled, Line 62 has remained out of service and does not transport any hazardous liquid. As Enbridge previously informed the ITP, before Line 62 was idled, the line was cleaned, purged, had corrosion inhibitor applied, was injected with nitrogen, and is being properly monitored (pressure monitoring, CP, and ROW patrol). Because Line 62 remains idled and filled with nitrogen, an ILI has not been scheduled; nor can an ILI be conducted on a nitrogen-filled line. This matter has been under discussion between Enbridge and EPA.

Request #11: Clarify whether:• Enbridge is stating that all ILI runs, including the two failed runs, during the reporting period complied with the requirements of CD ¶29, ¶65, ¶66, and ¶70.
• The SAR reference to CD ¶27 should be a reference to CD ¶28.a-b.

Response: All ILI runs, including the scheduled re-runs of the failed ILIs, complied with the requirements of CD paragraphs 29, 65, 66, and 70.

In the semi-annual report, paragraph 27 was incorrectly referenced in the paragraph 30 write-up. Table 4 should have been referenced instead of paragraph 27. The paragraph 30 write-up should have been: "ILIs have been performed as shown in Table 4 above. During this time period there were two unsuccessful ILI runs that required a re-run as discussed in subparagraph 28.c of this Semi-Annual Report. One of the two re-runs was executed outside of the reporting period of this Semi-Annual Report and therefore has been excluded from the list shown in Table 4. Inspections designed to detect crack features on Line 2 are addressed in the Stipulation and Agreement relating to ILI run scheduling agreed to by the Parties and expected to be submitted to the court in the near future."

Request #12: Provide the rationale for performing a confirmation excavation of the Priority Feature on Line 2, but not on Line 5.

Response: Both Line 2 and Line 5 Priority Notification features were previously repaired. It is not Enbridge's standard practice to confirm historical repairs.

Although not required by the consent decree, Enbridge elected to complete an exploratory excavation on Line 2 to better understand the potential risk of tool damage during future tool passage. This segment of pipe was cut-out in early 2018 to prevent future tool passage issues.

There were no concerns with tool passage on Line 5.

Request #13: Provide the background on and an explanation for the change of feature descriptions from metal loss to manufacturing defect.

Response: Enbridge directs the ITP to paragraph 34.a in the Semi-Annual report, which provides a detailed description for the change of feature descriptions from metal loss to manufacturing defect. Enbridge noted similar feature classification issues for both the East and West Straits runs. Enbridge also provided full background on and an explanation for the change of feature descriptions from metal loss to manufacturing defect at a monthly CD ILI meeting with ITP on November 28, 2017, as documented in the meeting minutes. In summary, Baker Hughes classified several Manufacture Features as Metal Loss (Corrosion) because they did not have access to prior inspection data. Enbridge provided prior inspection data and, after revisiting anomaly classification by Baker Hughes, the reclassification of anomalies was deemed necessary to maintain consistency of the analysis process and adherence to the Baker Hughes anomaly classification. Further information is contained in the ILI Assessment documents, which were made available on the PI ShareDrive to which the ITP has access.

Request #14: Explain what is a "preliminary review of an initial report" and how does it relate to completion of the data quality review? How are Enbridge's review and identification of quality concerns documented?

Response: PI-36 "Data Quality Review In-Line Inspection" ensures Enbridge conducts the preliminary review as stipulated in the consent decree.

The review and identification of quality concerns, if any, are documented in the ILI Assessment documents which were made available on the PI ShareDrive to which the ITP has access.

Request #15: Explain why the wall thickness corrections to OneSource and the Assessment Sheets are not included in the SAR's ¶34.c discussion and Table 14. Explain how the incorrect data was entered and the process by which it was discovered and corrected.

Response: During a November 28, 2017 meeting with ITP, it was explained by Enbridge that this wall thickness issue had no impact on any feature assessment or calculations. It is therefore not a material data quality concern and Enbridge accordingly determined that the consent decree does not require that this issue be addressed under subparagraphs 34.c or 34.e of the semi-annual report. Further, on December 18, 2017, Enbridge completed the action item from the November meeting: "Enbridge to confirm that the appropriate reports have been updated with the new wall thickness data".

Enbridge considers data quality issues which have impact on dig selection, feature assessment (remaining life, burst pressure calculation etc.), or confidence in ILI performance, to be data quality concerns. They will be resolved timely and reported in the semi-annual report at a summary level. Other data-related issues – which have no impact on dig selection, feature assessment, or ILI performance, will be considered as data quality improvement items to be resolved with Enbridge's vendor on an as-needed basis. However, Enbridge does not believe that any such matters are appropriate to include in the semi-annual report as they have no bearing on safety or consent decree compliance.

Request #16: Provide correspondence with the Vendor explaining the sensor sensitivity issue and an explanation of the vendor findings.

Response: Enbridge directs the ITP to section 34.e in the Semi-annual report which provides a fulsome explanation of the sensor sensitivity issue and an explanation of vendor findings. In summary, the sensitivity of the 2017 caliper tool sized features outside of the reporting threshold. The discrepancy has been remedied through detailed review of features in the caliper data.

Request #17: Provide a clarification of the SAR's discussion of CD ¶37 (second paragraph) and whether all features required to be listed within five Days were listed within five Days.

Response: Enbridge directs the ITP to Table 17 in the semi-annual report, which stated that all features required to be listed within five days were listed within five days. Enbridge further clarifies that the following statement in the semi-annual report "All features required to be listed within 5 days were listed," means that all features required to be listed within 5 days were listed within 5 days.

Request #18: Explain why these high CGRs were not captured during the Initial ILI Assessment in October and during the Initial Dig List creation.

Response: There were no issues regarding high estimated corrosion growth rates for this Line 5 run.

A total of eight (8) digs on Line 5 PE-IR USWM were placed on the Dig List on October 27, 2017 in accordance with the consent decree requirements, as shown in Table 17 in the semi-annual report.

Enbridge added one (1) dig in January 2018. This additional dig was selected based on Enbridge procedures, which were irrelevant to the corrosion feature growth rate. This additional dig was not required under (i.e., did not meet) consent decree criteria.

Request #19: Provide a listing of all features excavated during the reporting period, with dates, and identify specific compliance records for these digs.

Response: The semi-annual report states that excavations on Features Requiring Excavation were completed during the semi-annual report reporting period. Table 19 in the semi-annual report contains the features that were excavated. Tables 21, 22, and 23 classify the digs from Table 19 into threat types.

The compliance records for the digs, called NDE reports, are uploaded to the PI ShareDrive to which the ITP has access.

Request #20: Provide the number of unreported features falling within the tool specifications for each segment. If none, so state, and explain why the statement was made that "a high volume" was not found.

Response: From the dig that was field excavated during the reporting period (L5 PE-IR GW131800), no unreported features that are detectible within ILI tool specifications were found while repairing or mitigating all identified features requiring excavation.

In addition, in response to paragraph 39.a, no excavated sections of pipe contained a "high volume of unreported features". Enbridge did not intend to imply that some features were found; Enbridge was simply using the language of paragraph 39.a of the consent decree which specifically states "a high volume of unreported features."

The NDE report of L5 PE-IR GW131800 is uploaded on the PI ShareDrive to which the ITP has access. That NDE provides the detailed field measurements.

Request #21: Clarify whether there was another issue other than the word "wrinkle" in the Initial Report that would affect their data analysis. Was there a data issue germane to the calculations?

Response: ILI report (version: Issue 2) was reissued by the vendor only to resolve the word "wrinkle" which the vendor had incorrectly stated in the report; there were no other issues that affected data analysis. There were no data issues germane to the ILI assessment /calculations or the Consent Decree dig selection.

Request #22: Provide a list of reports received up to November 23, 2017, even if the calculation was not complete.

Response: Table 11 in the semi-annual report provides a full list of reports received by Enbridge up to November 23, 2017.

Request #23: Provide a revised table that identifies the type of features that are interacting and lists the tool that detected each feature.

Response: Table 23 in the Semi-annual report identifies the ILI programs and the eDig ID for the features that have been selected for excavation based off the intersecting / interacting criteria.
The ILI assessment sheet and PI-Listing provide further detail (e.g. 3% dent with 30% metal loss). In addition, Enbridge has provided the revised table below that contains the interacting features.

Table 23: Interacting Features Requiring Excavation

DigID	Line	Segment	Girth Weld	Tool	Report Received Date	OneSource Load Date	Date of Discovery / Feature Added to Dig List	Repair / Mitigation Deadline	Feature Interaction	Interacting Feature Tool Run	Date of Repair / Mitigation
22956	L0005	BC - RW	56680	GEMINI	10/23/2017	10/27/2017	11/15/2017	1/14/2018	dent with metal loss	2017 BH GEMINI	FR Note[1]
22848	L0005	PE - IR	131800	USWM+	9/29/2017	10/4/2017	10/27/2017	11/26/2017	dent with lamination	2017 BH GEMINI	11/6/2017
22849	L0005	PE - IR	183400	USWM+	9/29/2017	10/4/2017	10/27/2017	10/27/2018	crack with corrosion	2014 GE CD+	FR Note[1]
22852	L0005	PE - IR	201610	USWM+	9/29/2017	10/4/2017	10/27/2017	10/27/2018	crack with corrosion	2014 GE CD+	FR Note[1]

TABLE NOTES:

[1] "FR Note" indicates that this information is outside the reporting window of this semi-annual report and will be included in a future Semi-Annual Report.

Request #24: Provide or discuss engineering and administrative controls, other than that the pipelines are buried and surveyed, that Enbridge employs as part of operating and maintaining the Dual Pipelines to ensure that they are not impaired by ice or currents.

Response: In order to avoid any adverse impacts that could result from ice build-up at the surface of the Straits of Mackinac, the Dual Pipelines are buried near the shoreline areas and thus are not susceptible to direct contact with ice. Enbridge also routinely surveys/monitors the shoreline areas to ensure that ice does not impair the Dual Pipelines. Dynamic Risk, on behalf of the State of Michigan, prepared an independent publicly-available alternatives analysis which confirmed that any ice accumulation at the Straits of Mackinac does not present any risk of impairment to the Dual Pipelines given that the pipelines at the shoreline areas are buried. Dynamic Risk further confirmed that the exposed portions of the Dual Pipelines are located well below the level of any potential ice accumulation and therefore do not face any risk. Enbridge's In-line and ROV and AUV inspections have further confirmed, finding no evidence of any previous ice damage or ice scour on the exposed portions of the Dual Pipelines. Nonetheless, as an added assurance, Enbridge monitors the ice data published on USGS website to confirm that ice does not present any potential risk to the Dual Pipelines' crossing of the Straits of Mackinac.

The Dual Pipelines are also not impaired by water currents within the Straits of Mackinac. Enbridge employs stringent criteria to proactively install anchors to support the exposed portions of the Dual Pipeline. A total of 70 anchors are planned for installation in 2018. The existing and to-be-installed anchors ensure that the Dual Pipelines are adequately anchored to the lake bed, and hence will not be impaired by any water currents. Enbridge has also implemented wave monitoring to prevent damage to the pipelines during periods of high wave activity. In addition, Enbridge performs line patrols along the right of way including the Straits to inspect the site conditions.

Request #25: Provide a summary and discussion of follow-up actions arising from these meetings that Enbridge has taken, and any reports provided (or under consideration) to the State of Michigan of measures taken to prevent anchor strikes per the page 46 footnote

Response: In November 2017, Enbridge entered into an agreement with the State of Michigan which requires Enbridge to complete a report that assesses options to mitigate the risk of a vessel's anchor puncturing, dragging or otherwise damaging the Dual Pipelines. This report is due to the State of Michigan no later than June 30, 2018. The report will, at a minimum, assess the following options such as i) measures to enhance shipping communication and warning technologies; and (ii) the use of protective barriers to further protect the Dual Pipelines from any risks posed by a vessel anchor coming into direct contact with the Dual Pipelines.

Enbridge is currently working on the report and does not have any updates at this time.

Request #26: Provide the AUV data as noted in the SAR, or provide a report of the analyses, findings, and conclusions of the AUV data.

Response: Enbridge provided a final report "2016 Enbridge Energy SOM Report Final 01-03-2017" to the ITP via the Compliance SharePoint site on June 23, 2017. This report provided an analyses, findings and conclusions of the AUV data collected in 2016. Also attached was additional data regarding the spans on both the east and west Straits pipelines; as well as, a summary of Enbridge's Visual Biota Survey of the Straits of Mackinac. If the ITP is looking for additional information, Enbridge requests that further clarification be provided.

Request #27: Provide a copy of the permit applications for the screw anchors.

Response: The permit applications for the screw anchors can be found on the MDEQ website, as specified below:

- Submission number 2RD-DFDK-Y35G, which concerns Enbridge's 2017 application to install 22 screw anchors, is available under the "Documents" tab at https://miwaters.deq.state.mi.us/nsite/profile/2746869251480183093?standalone=1
- Submission number HNC-AR90-WAHM0, which concerns Enbridge's 2018 application to install 48 screw anchors, is available under the "Documents" tab at https://miwaters.deq.state.mi.us/nsite/profile/5274179674137364485?standalone=1

As of March 23, 2018, the State of Michigan has granted the approval of the permits for Enbridge to install 22 anchors.

Request #28: Provide the reports of the ROV and diver inspections of the existing screw anchor locations that took place in 2017.

Response: On January 16, 2018, EPA was provided with a copy of Enbridge's interim report to the State of Michigan on the Anchor Inspection Work Plan. That Work Plan and the interim report were prepared in response to a request made by the State of Michigan and are not consent decree matters. The ROV and diver inspection reports were appended to the interim report.

SECTION VII.F

Request #29: Please provide clarification and correction as appropriate for this statement [FeatureMatchInventoryDetail_V data] in the SAR.

Response: The statement regarding FeatureMatchInventoryDetail_V in Paragraph 74 in the semi-annual report was premature. The FeatureMatchInventoryDetail_V view is empty for Consent Decree segments because data population to this view remains in development. Prior to this point and at this point, PI personnel use a different established tool, referred to as "Feature Match Macro" as part of the ILI feature analysis.

OneSource houses the required ILI data. The "Feature Match Macro" tool uses data from OneSource and permits PI personnel to identify and track changes to features detected by successive tool runs and allows personnel to evaluate features that may overlap or otherwise interact. The outcome of the Feature Match Macro can be found in the Assessment Sheet and the PI-Listing. The ""Feature Match Macro" tool has been demonstrated to ITP in the Enbridge – ITP monthly discussions including the face to face meeting on October 17, 2017, and as demonstrated fulfills both Enbridge Integrity Management and Consent Decree Requirements.

Request #30: Ensure the ITP has access to the schematic diagrams and provide the step-by-step instructions for accessing them.

Response: Step-by-step instructions were provided to ITP on December 18, 2017 (Compliance SharePoint).

The access to the schematic diagrams wasn't directly granted as it includes lines that do not fall under the Consent Decree. Options were communicated to the ITP to allow the ITP to perform verifications on Decree lines during a face-to-face meetings, or Skype meetings.

SECTION VII.G

Request #31: Provide the documentation that supports these statements, specifically:
• Design documentation demonstrating that the new US Line 3 is designed to meet leak sensitivity targets.
• Documentation demonstrating that the estimated Steady-state performance of US Line 3 indicates adherence to targets.

Response: The new US Line 3 is designed to meet leak sensitivity targets. As per Enbridge response to Grocery List IR G002, Enbridge's Mainline Leak Detection Equipment Standard (D12-105) applies to the Line 3 Replacement project. This project has been designed to this standard which will allow the new Line 3 to meet the sensitivity performance targets. Inputs from the design standard were used to model the new Line 3 in order to generate sensitivity targets using API 1149 methodology. Calculations resulted to the negotiated performance targets under paragraph 89.a. Moreover, Enbridge response to Grocery List IR G005 shows the placements of instrumentation in the new Line 3, and response to Grocery List IR G011 describes Enbridge's policy/procedure for demonstrating leak sensitivity performance.

The estimated steady-state performance of US Line 3 also indicates adherence to targets. Please refer to the documentation provided in response to grocery list G002, G005 and G011. API 1149 test results are outlined below.

Line 3 Replacement - API 1149 Calculation Result (September 2016)
The table below summarizes the estimated pipeline leak detection sensitivities for Line 3R Material Balance System (MBS) using the API 1149 methodology. The following assumptions were made to produce these results:

- Sensitivity results will vary with flow rate. For this test, full line rate of 5,035 m3/hr was used.
- Representative operational parameters were used (flow rate, temperature and pressure profiles, linefill).
- The following operational uncertainties were assumed:
  - Flow meter uncertainty – 1.5%
  - Pressure Transmitter uncertainty – 5 psig
  - Temperature transmitter uncertainty – 1.5 deg C
  - Reference density – 940 kg/m3
- Other notes: API 1149 does not account for other uncertainties known to impact sensitivity, such as:
  - Product properties (Density & Viscosity)
  - Temperature modulus, bulk modulus
  - Pipeline wall roughness
  - Pipeline elevation errors
  - Pipe length errors
  - Data quality: Analog/Digital conversions, data truncation, issues related to transmission of data (transmission error)

  - Variations in ground temperature
  - Pipe deformations
- Sensitivity results generated by API 1149 are for steady state performance estimates.
- Site locations currently are not finalized; reported volumes and sensitivities are subject to change.

Summary of API 1149 Result (estimated sensitivity):

	5 Min	20 Min	2 Hr	24 Hr
Leak Sensitivity (% of nominal flow rate)	range: 7% - 13%	range: 3% - 4%	3%	2%

Detailed API 1449 Section by Section Result (estimated sensitivity):

Section		MP (mi)		5 Min		20 Min		2 Hr		24 Hr		Section Volume
Start	**End**	**Start**	**End**	**m3**	**%**	**m3**	**%**	**m3**	**%**	**m3**	**%**	**m3**
DNS	VG	725	760	29	8	45	3	216	3	2564	2	34648
VG	PL	760	788	29	7	45	3	216	3	2564	2	28694
PL	CR	788	821	33	8	48	3	216	3	2564	2	32783
CR	TI	821	866	44	11	56	4	218	3	2564	2	44562
TI	KD	866	915	37	9	51	3	217	3	2564	2	49758
KD	PV	915	970	53	13	63	4	220	3	2564	2	54904
PV	WX	970	1014	38	10	51	3	217	3	2564	2	43933
WX	PW	1014	1056	40	10	53	4	217	3	2564	2	41679

Request #32: Provide a report listing of all instances of temporary suspension of the MBS Leak Detection System including start time, end time, and reason for suspension. This information is needed to verify that none of the instances exceed the timing requirements of CD ¶97.

Response: A list of instances of temporary suspension of the MBS Leak Detection System is provided to the ITP on a monthly basis as part of the monthly technical meeting. The list is in the "Instrumentation Outages and Resolution" section of the presentation, which includes start time, end time, reason for suspension, and duration of the outage. Please refer to the presentation materials on the Compliance SharePoint site.

Request #33: Provide a description of how the algorithm accomplishes this function.

Response: Enbridge provided the ITP the information on Enbridge's implementation of overlapping MBS segments during a face-to-face meeting on July 25, 2017. Please refer to the "Overlapping Volume Balance Segments" section of the presentation, which can be found in the designated folder on the Compliance SharePoint site. The automation of this configuration has been

implemented within the (Synergi Pipeline Simulator) SPS platform. This functionality ensures that the MBS volume balance configuration methodology is consistently applied.

Request #34:
• Provide the relevant procedure(s) or other documentation describing the procedural method.
• Provide a report of each incidence of ALD including start time, end time, reason for use of ALD, and ALD method employed.

Response: Alternate Leak Detection (ALD) methods employed by Enbridge include line balance techniques and enhanced setpoints for pressure/flow monitoring, corresponding with B.1 and B.4 from API RP 1130 Annex B. The ALD methods are also described in the Alternate Leak Detection document (Please refer to the Compliance SharePoint “SAR1001-34-1 ALD Form”). This document is used when developing ALD plans as described in the CCO procedure for ALD implementation (Please refer to the Compliance SharePoint “SAR1001-34-2 CCO ALD Procedure”).

Moreover, Enbridge provided a high level description of when ALD is used and how it is implemented during the face-to-face meeting with the ITP on July 25, 2017. Please refer to the "Temporary Suspension of MBS" section of the presentation.

With regards to instances of use of ALD, Enbridge presents this information to the ITP on a monthly basis as part of the monthly technical meeting (refer to the "Use of Alternate Leak Detection" section). ALD information includes start and end time, reason for use, and affected section.

Request #35: Provide the relevant analysis.

Response: The Transient State Sensitivity Analysis Summary report was submitted to the ITP on November 30, 2017. In addition, on December 18, 2017, Enbridge delivered a presentation to the ITP to describe the transient state sensitivity analysis. Please refer to the "Transient Sensitivity Analysis Walkthrough" section of the December 2017 monthly technical meeting presentation available in the designated folder on the Compliance SharePoint site.

As agreed during the March 14th meeting, Enbridge will facilitate further discussion with ITP to discuss the analysis process from a technical perspective.

Request #36: For each of these record of alarm (ROA) alarms, provide:
• The calculation and amount of time needed to fill the column separation.
• The appropriate level of management approval.

Response: Enbridge has implemented procedures that meet the consent decree requirements of paragraph 109.c; thus, fill time calculation, review, and approval are captured in the procedure ("Column Separation - Suspected - Pipeline" procedure provided to ITP via G022 and G024 IR response). The consent decree does not specifically require reporting of column separation fill time calculation, review and approval, through the Semi-Annual Report.

To facilitate compliance verification, Enbridge presents all alarming column separation events to the ITP during the monthly technical meetings. During these meetings Enbridge comments on adherence to procedures and column separation fill within the approved timeframe. No procedure or fill time deviations have occurred to date. In the event where Enbridge fails to meet the requirements, it will be reported to the ITP through these monthly technical meetings and as required by the Consent Decree.

As agreed during the March 14th meeting, following is the list of alarming column separation events including the two pieces of additional information - approved time to fill and approver role, for the period covering the first Semi-Annual Report (May 23 to Nov 22, 2017).

List of Column S**eparation** A**larming** E**vents** that R**esulted in** S**hutdown for the period of May 23, 2017 to November 22, 2017:**

Note: *Segment or line is being/already shutdown when alarm event occurred.

Alarm Pipeline	Event Doc ID	Alarm Received Time	Alarm Location	Approved Time to Fill (min)	Approver Role
1	7041*	2017-06-26 06:02:59	PL-DR	10	Shift supervisor
		2017-06-26 06:05:59	PL-WL		
		2017-06-26 06:10:58	GF-WL		
	7042*	2017-06-26 10:42:03	PL-WL	10	Shift supervisor
		2017-06-26 10:42:33	PL-DR		
		2017-06-26 10:46:03	GF-WL		
	10809	2017-11-03 21:00:04	DR-GW	10	Shift supervisor
		2017-11-03 21:02:33	DR-PW	10	Shift supervisor
3	10945*	2017-11-11 14:29:06	CM-CR	10	Shift supervisor
		2017-11-11 14:29:06	QU-CR		
14	7707*	2017-07-21 15:56:06	PE-EG	10	Shift supervisor
		2017-07-21 15:56:36	PE-OW		
	9545*	2017-09-11 17:17:22	PE-EG	10	Shift supervisor
	9493*	2017-09-12 03:00:51	PE-EG	10	Shift supervisor
	10407*	2017-10-13 05:29:23	CB-GT	10	Shift supervisor
		2017-10-13 05:30:23	BL-GT		
61	10861*	2017-11-07 02:43:27	SH-VP	10	Shift supervisor
		2017-11-07 02:45:27	SH-OWN		
		2017-11-07 02:48:26	SLS-OWN		

List of Column S**eparation** A**larming** E**vents** that R**esulted in** S**hutdown for the period of May 23, 2017 to November 22, 2017:**

Note: *Segment or line is being/already shutdown when alarm event occurred.

Alarm Pipeline	Event Doc ID	Alarm Received Time	Alarm Location	Approved Time to Fill (min)	Approver Role
		2017-11-07 05:12:26	SH-OWN		
		2017-11-07 05:19:25	SH-VP		
		2017-11-07 06:04:25	SLS-OWN		
	10851*	2017-11-07 06:55:55	DL-BPS	10	Shift supervisor
		2017-11-07 06:56:27	PT-BPS		
		2017-11-07 07:03:27	DL-OPS		
67	8162	2017-08-06 09:30:07	CR-CS	10	Shift supervisor
		2017-08-06 09:30:38	PLN-CS	10	Shift supervisor
		2017-08-06 09:31:08	CR-DR	10	Shift supervisor
	10301*	2017-10-08 11:32:29	LO-DNS	10	Shift supervisor
78	9264*	2017-09-06 04:21:59	FN-GT	10	Shift supervisor
	9301*	2017-09-06 10:12:09	FN-GT	10	Shift supervisor
	10441*	2017-10-13 00:36:43	FN-GT	10	Shift supervisor
		2017-10-13 01:58:14	FN-NL		
06A	7672	2017-07-21 12:56:35	PE-SH	10	Shift supervisor
		2017-07-21 12:56:35	MN-SH	10	Shift supervisor
		2017-07-21 12:56:35	MN-VP	10	Shift supervisor
		2017-07-21 12:57:35	SH-VP	10	Shift supervisor
	10760*	2017-11-01 05:05:41	SH-VP	10	Shift supervisor

Request #37: Provide all ROAs where the Control Room operator (CRO) initiated a shutdown covering the period prior to the CD becoming effective from January 1, 2017 to May 23, 2017.

Response: The ROA covering the period prior to the CD becoming effective from January 1, 2017 to May 23, 2017 is attached. Please refer to the Compliance SharePoint submittal "SAR1001-37 ROA - Jan 1 2017 to May 23 2017".

Request #38: The following Grocery List items have been pending for a few months and are needed for project documentation:
• GL I-26
• GL I-28
• GL I-29
• GL I-33
• GL G-53 (3-minute valve closure documentation)

Response: Please note that an email from the ITP to Enbridge on March 21, 2018 cancelled the request for items:
GL I-26
GL I-28
GL I-29 and
GL I-33.

For GL G-53, please refer to the following documents on the Compliance SharePoint under G53:
G53 ECL-001-18_E1473.92-5-V-1-ACT_Motor Operated Valve Actuator.pdf
ECL-001-18_E1487.76-5-V-1-ACT_Motor Operated Valve Actuator r1.pdf

Valve closure time is indicated near the bottom of the sheets.

Request #39: Provide documentation or explanation of how Enbridge determined that the valves sealed.

Response: The intent of the consent decree is to ensure that for Remotely Controlled Valves, Enbridge designs, installs, completes the required commissioning and operates the valves to ensure that they can be opened or closed to prevent the passage of fluid, from Enbridge's Control Room.

The valve is designed and selected to permit these actions. A critical step is that the valve is then tested by the manufacturer to ensure that the valve can fully close and prevent the passage of liquid, even while under pressure. The steps in this Final Manufacturing Test Protocol verification process follow:

1. Enbridge reviews and approves the valve manufacturer's Inspection and Test Plan – verifying that a seal test is part of the proposed Inspection and Test Plan

2. The completed valve is placed in the test pit at the fabrication shop, in this case at SPX. SPX commences with the shell test to establish pressure rating (please refer to Step 11 on page 1 of the Compliance SharePoint document "SAR1001-39-1 M&J SPX Shop Test Procedures". Note that Enbridge did receive permission to provide to the ITP, but these items are confidential), then proceeds to the seal test (see Steps 17 & 18 on page 2 of the attached SPX Shop Test Procedures.

3. Confirmation of the successfully completed seal test is identified in the final documentation package that is submitted with each valve. Please refer to the Compliance SharePoint "SAR1001-39-2 MP1473 Valve Test Report" and "SAR1001-39-3 MP1487 Valve Test Report" for the Valve Test Reports for two valves.

VALVE MILEPOST-SERIAL NUMBER CROSS-REFERENCE

Valve Milepost Number	Valve Serial Number*
1473	1000003204485
1487	1000003204486

*Valve Serial Number is the unique identifier for each valve in the attached Valve Test Reports (Please refer to Compliance SharePoint “SAR1001-39-2 MP 1473 Valve Test Report” and “SAR1001-39-3 MP 1487 Valve Test Report”.

The valve is installed in the field and a number of commissioning activities are undertaken to ensure that the valve can be fully opened and closed to prevent the passage of fluid, i.e. sealed, both from a physical device standpoint and from a control system standpoint. The valves were confirmed through the control system to be closed, during commissioning. The ITP was on-site for valve commissioning and has been provided with the commissioning documentation per Grocery List G53.

Appendix C: Enbridge Response to Preliminary Findings

Attached on the following 9 pages is Enbridge's response to the ITP's Preliminary Findings that were provided to Enbridge on April 9, 2018. Enbridge's response was provided to the ITP on April 9, 2018.

Response to ITP's Preliminary Findings related to Enbridge's First Semi-Annual Report

Per the requirements of the Consent Decree entered in U.S. vs. Enbridge Energy, Limited Partnership, et al, Section VII, Part B. paragraph 23, Enbridge submitted a First Semi-Annual Report on January 18, 2018. The ITP issued related information requests to Enbridge on February 14, 2018. Phase 1 of the responses was submitted to the ITP on March 16, 2018. Phase 2 which set forth the remainder of the Enbridge responses was issued on March 29, 2018. The ITP Issued Preliminary Findings on April 9, 2018. The responses to the ITP's six preliminary findings related to the First Semi-Annual Report follow.

Preliminary Finding #1: CD Paragraph 22 Replacement of Line 3 in the United States

Preamble: The SAR states that "Enbridge has been vigorously pursuing all avenues to complete the replacement of Line 3 as quickly as possible." In addition, Enbridge provided in the AIR a high-level milestone schedule, along with information summarizing the status of its permitting efforts. This information, supplemented by discussions between Enbridge and the ITP, indicate that permitting in Minnesota to replace the Original Line 3 is currently being prioritized. The ITP has performed a high-level overview of the State of Minnesota's permitting process, including Enbridge's permit applications, and concludes that this statement accurately describes the status of the permitting phase of the Line 3 replacement project. At this writing, issuance of the State of Minnesota permits appears imminent.

In the AIR, the ITP requested a discussion regarding procurement, design, and construction along with a high-level milestone schedule. In its Phase 2 AIR Response, Enbridge declined the opportunity to provide any information regarding project design and pipe and materials procurement, stating that "there are no procurement or design requirements related to Line 3 in the Consent Decree."3 In addition, the information about construction plans provided in the Phase 2 AIR Response showed only a projected start in Q4 2018 and a projected completion in Dec 2019, to the exclusion of other, typical, project milestones which could impact the timing of project execution and completion. In the absence of such information, the ITP is unable to review and evaluate whether, and if so the extent to which, Enbridge is positioned to complete replacement of Line 3 as "expeditiously as practicable." The ITP cannot agree, upon the current record, with Enbridge's position regarding design and procurement scheduling. The last sentence in CD ¶22.a states that, "[i]f Enbridge receives approvals necessary for replacement of Original US Line 3, Enbridge shall complete the replacement of Original US Line 3 … as expeditiously as practicable." Accordingly, the ITP believes that full compliance with CD ¶22.a would entail Enbridge providing information on all major steps in the pipeline replacement process including design, procurement, and construction plans. This information should include a milestone schedule and status for each major element of these project phases.

The ITP's analysis below shows that the SAR, as supplemented by the AIR Response, is not complete. Therefore, the ITP cannot establish that the SAR demonstrates compliance.

Preliminary Finding: Enbridge has not provided any information about design, procurement, or construction status or plans. The ITP concludes that the information provided is not complete; further, on the same grounds, the ITP is unable to assess whether the SAR is compliant with the CD, supported by the facts, or demonstrates best engineering judgment.

Response: 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. Both permitting and leak detection updates were provided in the Semi-Annual Report. Although the Semi-Annual Report is not a forward-looking document, Enbridge is providing the following Line 3 milestone schedule.

Line 3 Milestone schedule as of April 2018		
L3 Milestone	**Status**	**Notes**
Mainline Design Reports	Complete before Q3, 2015	
Facilities Design (Issued for Bid)	Complete Q1 2017	Design was updated to account for route modifications, changes to external codes and regulations, etc.
Procurement for major items – pipe, valves, transformers, etc.	Complete Q1 2018	Some items are still being manufactured, but all purchase orders have been issued.
Wisconsin Permits	Complete	
North Dakota Permits	In Progress	
Minnesota Permits	In Progress	
Line 3 Construction - Wisconsin	Complete Q4 2017	Segment 18 (~14 miles) Planning is underway to tie this segment into the terminal.
Segment 18 Tie-in	Projected Q2 2018	
Superior Terminal Construction Start	Projected Q3 2018	
Execution of Mainline and Facilities Construction Contracts	Projected Q3 2018	
Line 3 Construction Start – North Dakota + Minnesota	Projected Q4 2018	Pending permits. Note that a segment of Line 3 in North Dakota near the Canadian border has already been replaced.
Line 3 Construction Complete	Projected Dec 2019	

Enbridge is willing to answer additional scheduling questions from the ITP.

Preliminary Finding #2: CD Paragraph 23 Line 10 Replacement Evaluation

Preamble: Based upon the information provided in the SAR, the ITP is unable to conclude that Enbridge has demonstrated compliance with the requirement to submit a report evaluating replacement of portions of the Lakehead System Line 10 oil transmission pipeline between the Canadian border near Niagara Falls, NY and the terminus of the pipeline near West Seneca, NY. CD ¶23 provides that the subject report is due within 120 days of the CD Effective Date (i.e., by September 20, 2017).

The SAR notes that on September 20, 2017 Enbridge submitted to the EPA and ITP a report of their evaluations to replace portions of Line 10 within the U.S. (Line 10 Report). The SAR also notes that, in late 2017, Enbridge identified that the feature counts used in the Line 10 Report were higher than the feature counts found to physically exist on Line 10 and that analysis of the revised feature counts was ongoing. On January 10, 2018, Enbridge informed the EPA and the ITP of the discrepancy between the reported and actual feature counts. Enbridge has not communicated the effect these errors may have on their evaluations and on the findings and conclusions of the Line 10 Report.

Preliminary Finding: From the information provided in the SAR, the ITP is unable to conclude that the SAR demonstrates compliance with CD Paragraph 23.

Response: Enbridge apologizes for the extended delay on this submittal. Enbridge's revisions to the "Enbridge Consent Decree Evaluation of Replacement of Portions of Line 10 within the United States" Report originally submitted September 18, 2017 did not change the conclusions of the report. The redlined report, report with redlines accepted, and "Response to the ITP's DRAFT Preliminary Findings ref: Enbridge's Evaluation of Replacement of US Portion of Line 1" will be provided as a separate response.

Preliminary Finding #3: CD Paragraph 44.a-b. Initial Predicted Burst Pressure Calculations and Initial Remaining Life Calculations

Preamble: The SAR states that "all [burst pressure and remaining life] calculations were completed no later than the earlier of (1) eight (8) weeks after completing data quality review with respect to the feature and/or pipeline section where the feature is located; or (2) 175 Days after the ILI tool was removed from the pipeline at the conclusion of the ILI run." Table 18 of the SAR details dates related to the calculations.

In the AIR, the ITP questioned Note 2 under Table 18, which indicates that a calculation deadline was exceeded because of a data quality issue that was not resolved until November 29, 2017. Enbridge used this date to begin the eight-week period the CD provides for completing the calculations. The ITP was not aware of any data quality issues related to the Line 5 PE-IR USWM+ tool run (designed to detect metal loss features) other than the characterization of a set of dents as "wrinkles," which would not affect the calculations related to metal loss. At the time, it was unclear as to whether there was a separate issue that had not been reported in this SAR, and the ITP requested additional detail in the AIR.

Enbridge responded, "ILI report (version: Issue 2) was reissued by the vendor only to resolve the word "wrinkle" which the vendor had incorrectly stated in the report; there were no other issues that affected data analysis. There were no data issues germane to the ILI assessment /calculations or the Consent Decree dig selection."

Given the absence of any data quality issues related to metal loss, the ITP finds that the CD ¶44.b.1 requirements were not met regarding completion of the Line 5 PE-IR USWM+ calculations within 8 weeks of the October 27, 2017 Data Quality Review for metal loss features indicated by Table 18.

Preliminary Finding: Note 2 under Table 18 should not exclude the segment from this SAR.

Response: Enbridge did not exceed a calculation deadline under paragraph 44.b for either the earlier of: (1) eight (8) weeks after completing data quality review with respect to the feature and/or pipeline section where the feature is located; or (2) 175 Days after the ILI tool was removed from the pipeline at the conclusion of the ILI run." This was demonstrated in the Semi-Annual Report in Table 18 and Table 11 for Tool Run ID 3662 (Line 5 PE-IR USWM+). An excerpt of the data in Tables 11 and 18 follows for this tool run.

Tool Pull Date	7/12/2017
Initial ILI Report Receipt	9/29/2017
Data Preliminary Review Completed	10/27/2017
Burst Pressure Calculation Date	10/27/2017
Remaining Life Calculation Date	10/27/2017

The calculations were completed the same day as the data quality review and were completed 107 days after the tool pull date.

November 29, 2017 was identified under Note 2, Table 18 only as a contingent date in the event that the data quality issues were required to first be resolved to allow Enbridge to complete the assessment/calculations. However, Enbridge was not required to await the revised ILI data to complete the assessment/calculations, and it completed the evaluations in accordance with the Paragraph 44 timeframes. The ITP should thus disregard the reference to Note 2, Table 18 and instead refer to the dates provided above. While Enbridge complied with all required Paragraph 44.b timing for this feature, we would like to discuss calculation timelines in the event that reports must be reissued due to data quality concerns.

Preliminary Finding #4: CD Paragraph 46. Dig Selection Criteria

Preamble: Enbridge states in the SAR that, "During this reporting period, Enbridge followed the Lakehead System Integrity Remediation Process, which meets requirements set out in Paragraph 46 of the Consent Decree." 5 The ITP has reviewed relevant Enbridge records and finds that Enbridge has met the time requirements of CD ¶46 during the reporting period. However, a discrepancy exists between the CD requirements and the requirements of the cited Lakehead System Integrity Remediation Process with respect to evaluating Crack-like features intersecting or interacting with metal loss features.

The Lakehead System Integrity Remediation Process document, Table 4, indicates that the depth of a corrosion feature should be "assessed as a Crack-like feature using only the Crack feature depth and neglecting the Corrosion depth," while the CD's Table 5 does not prescribe that the corrosion depth be neglected. Discussions are ongoing between Enbridge and the ITP regarding the appropriate consideration of metal loss when evaluating Cracks intersecting with metal loss features.

Preliminary Finding: CD Paragraph 46.a: Complete mitigation within time frames depending on severity – Inconsistencies within Tables 3 through 7 in the Lakehead System Integrity Remediation Process relative to Tables 1 through 5 in the CD

Response: The consent decree does not contain a requirement to add the corrosion depth separately to the interacting crack and corrosion feature depth as detected by the Crack Detection tool.

Enbridge's methodology for crack with corrosion aligns with Consent Decree Table 5 "Any case in which a Crack feature intersects or interacts with a Corrosion feature and the Predicted Burst Pressure of such interacting or intersecting features determined using the CorLAS™ model (assessed as a Crack-like feature)". For crack features interacting with metal loss, the assumption that the crack detection tool is only detecting the crack portion of the interacting, complex feature is inaccurate.

Erroneously adding the corrosion depth to the feature calculation will lead to incorrect results. Therefore Enbridge develops and follows the Lakehead System Integrity Remediation Process to manage the safety of the pipelines.

Enbridge has made a significant effort in investigating crack in corrosion features and the performance of the Crack Detection tool. The investigations have proven and concluded that the corrosion morphologies will contribute to the crack signal; therefore, the total penetration of the interacting, complex feature will be correctly detected by the crack tool. The FfP (Fitness for Purpose) results also confirm that the use of crack ILI depth alone plus tool tolerance is adequate to manage depth measurement uncertainty.

Enbridge investigations on this subject have been broadly presented and accepted by industry[1][2]. Enbridge has included the reference to two papers, authored by Enbridge and by DNV that further explain the scientific basis of Enbridge's treatment of crack and corrosion features. One paper has been previously provided to the ITP: IPC 2016-64429.

Reference [1]:

P. Scholte Mendoza, S. Bott, Y. Hubert Shear-Wave Ultrasonic Crack Inspection Tool Performance For Cracks Associated with Metal Loss International Pipelines Conference IPC2016-64429 September, 2016

Reference [2]:

Line 6B Engineering Assessment Prepared by Det Norske Veritas for Enbridge Energy, Limited Partnership December, 2013 (portions of this Engineering Assessment were published in a pipeline journal therefore publically available)

Enbridge is readily available to further discussions with ITP/EPA on this subject of cracking interacting with metal loss, including the face-to-face meeting planned in Edmonton in late April 2018.

Preliminary Finding #5: CD Paragraph 46. Dig Selection Criteria

Preamble: Table 20 in the SAR identifies pressure restrictions imposed following ILI runs. For PR ID 27050 in Table 20 in the SAR, Enbridge cited Table Note 2 that states "Enbridge implemented an alternate pressure restriction on pipeline joint 566680 on Line 5 BC-RW segment on November 17, 2017, based on a completed Engineering Assessment dated on November 17, 2017. On November 27, 2017, Enbridge provided EPA with written notification of this alternate pressure restriction based on the Engineering Assessment. The Alternate Plan was submitted after this reporting period. As a result, details of the Alternate Plan will be reported in the next Semi-Annual Report."

The ITP notes that the pressure restriction was imposed and the Engineering Assessment was completed on November 17, 2017, prior to the end of this SAR reporting period (November 23, 2017). Therefore, details of the Alternate Pressure Restriction should be reported in the SAR.

Preliminary Finding: CD Paragraph 46.b: Establish and maintain interim pressure restrictions – Details on a Line 5 Alternate Pressure Restriction are not included in the SAR.

Response: Enbridge submitted written notification of the alternate pressure restriction to the EPA on November 27, 2017 which is outside the reporting period of the consent decree. Enbridge did not complete the full process of the Alternate Plan implementation and EPA notification specified in subparagraph 46.l for Semi-Annual Report contents within the reporting period of the consent decree and therefore did not provide these details within the Semi-Annual Report. Enbridge did describe additional implementation activities including the date the Alternate pressure restriction was provided to the EPA and indicated that the further required details will be provided in the next Semi-Annual Report.

Preliminary Finding #6: CD Paragraph 102 Rupture Detection System Alarm

Preamble: Enbridge submitted its Rupture Detection System Test Report (RDS Report) to the EPA on August 18, 2017. The ITP conducted a review of the RDS Report and requested additional information on August 28, 2017. Enbridge submitted its first additional information response on September 13, 2017. The ITP submitted preliminary findings on September 25, 2017, then on September 29, 2017, Enbridge submitted its second additional information response. Enbridge submitted a response to the ITP's preliminary findings on October 13, 2017

The ITP published its Review and Evaluation of the RDS Report to the EPA on October 23, 2017. The ITP found that Enbridge omitted the capability to detect an abnormal increase in flow rate as a feature of the rupture detection system (RDS), and as a result has not fulfilled all of the requirements of CD ¶102, CD ¶102.a, CD ¶102.c, and CD ¶102.e.

Subsequent to publishing the ITP's review and evaluation, the ITP, Enbridge, and the EPA agreed to a path forward that would require Enbridge to perform further testing and prepare a report of those results.

In the SAR, Enbridge states that the ITP's review and evaluation raised certain questions that the parties continue to discuss and consider. The SAR further states that Enbridge has proposed certain tests to determine whether the combined RDS and Material Balance System provide effective coverage for rupture detection and are in full compliance with the CD.

Preliminary Finding: The ITP is awaiting results of additional testing to be performed by Enbridge.

Response: Enbridge is in the final stage of completing the test and the report will be submitted to the ITP by April 30, 2018.

Appendix D: Milestone Designations for *SAR* Paragraphs

SAR Paragraph No.	*SAR* Paragraph Title	Milestone No.	Milestone Name
22.d	Requirements for the Use of Original US Line 3	M1	ILI Tool Run
		M4	Dig List
27	Timely Identification and Evaluation of All Features	M1	ILI Tool Run
28	Periodic In-Line Inspections and ILI Schedule	M1	ILI Tool Run
28.a-b	Periodic In-Line Inspections and ILI Schedule	M1	ILI Tool Run
28.c	Incomplete or Invalid	M1	ILI Tool Run
29	12 Month ILI Schedule	M1	ILI Tool Run
30	ILI Schedule Modification	M1	ILI Tool Run
31	ILI Compliance with Tool Specifications	M2	Initial Report
32	Initial ILI Reports for Crack (120 Days). Corrosion (90 Days) and Geometric (60 Days) Features	M2	Initial Report
32.a-c	Initial ILI Reports for Crack (120 Days). Corrosion (90 Days) and Geometric (60 Days) Features	M2	Initial Reports
33.a	Immediate Priority Feature Notification	M2	Initial Review
33.b	Priority Feature Definition	M2	Initial Review
33.c-d	Priority Feature Review and Mitigation If Required	M2	Initial Review
		M4	Dig List
		M5	Mitigation General
34.a	Preliminary Review of Initial ILI Report	M3	Quality Review
34.b	Evaluation of Features Requiring Excavation	M3	Quality Review
34.c	Resolution of Identified Data Quality Concerns	M3	Quality Review
34.d	ILI Data Quality Evaluation Timelines	M3	Quality Review
34.e	Discrepancies between Two Successive ILI Runs	M3	Quality Review
34.e(1)	Discrepancies between Two Successive ILI Runs	M3	Quality Review
34.e(2)	Discrepancies between Two Successive ILI Runs	M3	Quality Review
34.e(3)	Discrepancies between Two Successive ILI Runs	M3	Quality Review
34.f-g	Investigative Digs	M3	Quality Review
		M5	Mitigation General
35	Evaluation of Each Feature in Initial ILI Report for Feature Requiring Excavation	M4	Dig List
36	Feature Requiring Excavation Definition	M4	Dig List
37	Deadlines for Adding Features Requiring Excavation on the Dig List	M4	Dig List
38	Dig List Actions	M4	Dig List
38.b	Establish Pressure Restrictions if Required	M4	Dig List
39.a-b	Field Measurements of Excavated Features	M5	Mitigation General
		M6	Mitigation Excavation
40	Field Data Comparison to ILI Data	M4	Dig List
		M6	Mitigation Excavation
41	ILI Electronic Records	M10	Data

SAR Paragraph No.	*SAR* Paragraph Title	Milestone No.	Milestone Name
42	Predicted Burst Pressure	M4	Dig List
43	Predicted Burst Pressure Definition	M4	Dig List
44	Initial Predicted Burst Pressure Calculations and Initial Remaining Life Calculations	M4	Dig List
44.a-b	Initial Predicted Burst Pressure Calculations and Initial Remaining Life Calculations	M4	Dig List
45	Retention of Electronic Records	M10	Data
46	Dig Selection Criteria	M5	Mitigation General
		M7	Mitigation Pressure
		M8	Mitigation Alternate
47	Crack Features	M4	Dig List
48	Crack Feature Mitigation Timelines	M4	Dig List
49	Dig Timeline Extensions	M4	Dig List
		M7	Mitigation Pressure
		M8	Mitigation Alternate
50	Corrosion Features	M4	Dig List
51	Corrosion Feature Mitigation Timelines	M4	Dig List
52	Corrosion Feature Pressure Restrictions	M4	Dig List
		M7	Mitigation Pressure
53	Dig Selection Criteria for Axial Slotting. Axial Grooving. Selective Seam Corrosion and Seam Weld anomaly A/B Features	M1	ILI Tool Run
		M5	Mitigation General
54	Pressure Restrictions for Axial Slotting. Axial Grooving. Selective Seam Corrosion and Seam Weld anomaly A/B Features	M7	Mitigation Pressure
55	Dig Selection Criteria for Dents and other Geometric Features	M4	Dig List
56	Dents and other Geometric Feature Mitigation Timelines	M4	Dig List
57	Dents and Other Geometric Feature Pressure Restrictions	M4	Dig List
		M7	Mitigation Pressure
58	Dig Selection Criteria for Interacting Features	M4	Dig List
59	Pressure Restrictions for Interacting Features	M4	Dig List
59	Pressure Restrictions for Interacting Features	M7	Mitigation Pressure
60	Remaining Life	M9	Reinspection Interval
61	Remaining Life Clarifications	M9	Reinspection Interval
62	Operating Pressure Used when Determining the Remaining Life of Crack Features	M9	Reinspection Interval
63	Crack Feature Remaining Life Calculations	M9	Reinspection Interval
64	Corrosion Growth Rate	M9	Reinspection Interval
65	Maximum Interval Between Successive ILIs	M9	Reinspection Interval
66	Maximum Interval Between Successive ILIs	M9	Reinspection Interval

SAR Paragraph No.	*SAR* Paragraph Title	Milestone No.	Milestone Name
70.a	Corrosion and Circumferential Crack ILI Timing	M1	ILI Tool Run
70.b	Geometric Feature ILI Timing	M1	ILI Tool Run
75	Integrity Management Personnel access to Feature Integration Database	M10	Data
76	Successive ILI Data Sets	M10	Data
77	Update of OneSource Database	M10	Data
78	Mandatory Use of Data Integration Database to Prepare Dig List	M10	Data
78.a	OneSource ILI Updates	M10	Data
78.b	OneSource Interacting Features	M10	Data

Appendix E: CD Paragraphs and ITP Reporting Segments

CD¶	*SAR* CD¶ Title	RS	RS Title
21	Original US Line 6B	1	Enjoined from Operating US Line 6B
22.a	Replacement of Line 3 in the US	2	Replacement and Deactivation US Line 3
22.b	Line 3 Deactivation	2	Replacement and Deactivation US Line 3
22.c	Original US Line 3 MOP	3	Operating of Line 3 Pending Replacement
22.d	Requirements for Use of Original US Line 3	3	Operating of Line 3 Pending Replacement
22.e	Prohibition Regarding Use of Line 3 Following Replacement	2	Replacement and Deactivation US Line 3
23	Line 10 Replacement Evaluation	4	Line 10 Replacement Evaluation
24	Hydrostatic Pressure Testing Plan & Schedule	5	Hydrostatic Pressure Testing Requirements
25	Procedures for Hydrostatic Pressure Testing	5	Hydrostatic Pressure Testing Requirements
25.a	Use of Test Segment for Hydrostatic Pressure Testing	5	Hydrostatic Pressure Testing Requirements
25.b	Continuous 8-hour Hydrostatic Pressure Test	5	Hydrostatic Pressure Testing Requirements
25.b(1)	Maintain Pressure of at Least 1.25 X MOP for 4 hrs	5	Hydrostatic Pressure Testing Requirements
25.b(2)	Maintain Operating Pressure of Not Less Than 1.10 X MOP for remainder of test	5	Hydrostatic Pressure Testing Requirements
25.c	Complete Hydrostatic Pressure Testing Less Than 270 Days from EPA's Receipt of Plan	5	Hydrostatic Pressure Testing Requirements
25.d	No Additional Water to be Added Once Testing Underway	5	Hydrostatic Pressure Testing Requirements
25.e	Written Notification Prior to Hydrostatic Pressure Testing	5	Hydrostatic Pressure Testing Requirements
25.f	Hydrostatic Pressure Testing Report	5	Hydrostatic Pressure Testing Requirements
26	Line Failure During Hydrostatic Pressure Testing	5	Hydrostatic Pressure Testing Requirements
26.a	Prevent Discharge from Failure Reaching a Body of Water	5	Hydrostatic Pressure Testing Requirements
26.b	Line Failure Investigatory Report	5	Hydrostatic Pressure Testing Requirements
27	Timely Identification and Evaluation of All Features	6	ILI Milestone 1: ILI Tool Run

CD¶	*SAR* CD¶ Title	RS	RS Title
28.a-b	Periodic In-Line Inspection and ILI Schedule	6	ILI Milestone 1: ILI Tool Run
28.c	Incomplete or Invalid ILI	6	ILI Milestone 1: ILI Tool Run
29	12-month ILI Schedule	6	ILI Milestone 1: ILI Tool Run
30	ILI schedule modification	6	ILI Milestone 1: ILI Tool Run
31	ILI compliance with Tool Specifications	7	ILI Milestone 2: Initial Report
32.a-c	Initial ILI Reports: Cracks 120 Days. Corrosion 90 Days Geometric 60 Days	7	ILI Milestone 2: Initial Report
33.a	Immediate Feature Notification	7	ILI Milestone 2: Initial Report
33.b	Priority Feature Definition	7	ILI Milestone 2: Initial Report
33.c-d	Priority Feature Review and Mitigation if Required	10	ILI Milestone 5: Mitigation General
34.a	Preliminary Review of Initial ILI Report	8	ILI Milestone 3: Quality Review
34.b	Evaluation of Features Requiring Excavation	8	ILI Milestone 3: Quality Review
34.c	Resolution of Identified Data Quality Concerns	8	ILI Milestone 3: Quality Review
34.d	ILI Data Quality Evaluation Timelines	8	ILI Milestone 3: Quality Review
34.e	Discrepancies Between Two Successive ILI Runs	8	ILI Milestone 3: Quality Review
34.f-g	Investigative Digs	8	ILI Milestone 3: Quality Review
35	Evaluation of Each Feature in Initial ILI Report for Feature Requiring Excavation	9	ILI Milestone 4: Dig List
36	Feature Requiring Excavation definition	9	ILI Milestone 4: Dig List
37	Deadlines for Adding Features Requiring Excavation on the Dig List	9	ILI Milestone 4: Dig List
38.a	Excavation and Repair Deadlines	9	ILI Milestone 4: Dig List
38.b	Establish Pressure Reduction if Required	9	ILI Milestone 4: Dig List
39.a-b	Field Measurements of Excavated Features	11	ILI Milestone 6: Mitigation Excavation
40	Fields Data Comparison to ILI Data	9	ILI Milestone 4: Dig List
41	ILI Electronic Records	15	ILI Milestone 10: Data
42	Predicted Field Burst Pressure	9	ILI Milestone 4: Dig List
43	Predicted Field Burst Pressure Definition	9	ILI Milestone 4: Dig List

CD¶	*SAR* CD¶ Title	RS	RS Title
44.a-b	Initial predicted Field Burst Pressure Calculations and Initial Remaining Life Calculations	9	ILI Milestone 4: Dig List
45	Retention of Electronic Records	15	ILI Milestone 10: Data
46	Dig Selection Criteria (CD ¶46.a)	13	ILI Milestone 8: Mitigation Alternate
46	Dig Selection Criteria (CD ¶46.b & g)	13	ILI Milestone 8: Mitigation Alternate
46	Dig Selection Criteria (CD ¶46.c-f & h-i)	13	ILI Milestone 8: Mitigation Alternate
47	Crack Features	9	ILI Milestone 4: Dig List
48	Crack Feature Mitigation Timelines	9	ILI Milestone 4: Dig List
49	Dig Timeline Extensions	9	ILI Milestone 4: Dig List
50	Corrosion Features	9	ILI Milestone 4: Dig List
51	Corrosion Feature Mitigation Timelines	9	ILI Milestone 4: Dig List
52	Corrosion Feature Pressure Restrictions	12	ILI Milestone 7: Mitigation Pressure
53	Dig selection criteria for: Axial Slotting Axial Grooving Selective Seam Corrosion Seam Weld Anomaly A/B Features	9	ILI Milestone 4: Dig List
54	Pressure restrictions for: Axial Slotting Axial Grooving Selective Seam Corrosion Seam Weld Anomaly A/B Features	12	ILI Milestone 7: Mitigation Pressure
55	Dig Selection Criteria for Dents and Other Geometric Features	9	ILI Milestone 4: Dig List
56	Dents and Other Geometric Feature Mitigation Timelines	9	ILI Milestone 4: Dig List
57	Dents and Other Geometric Feature Pressure Restrictions	12	ILI Milestone 7: Mitigation Pressure
58	Dig Selection Criteria for Interacting Features	9	ILI Milestone 4: Dig List
59	Pressure Restrictions for Interacting Features	12	ILI Milestone 7: Mitigation Pressure
60	Remaining Life	14	ILI Milestone 9: Inspection Interval
61	Remaining Life Clarifications	14	ILI Milestone 9: Inspection Interval
62	Operating Pressure Used When Determining the Remaining Life of Crack Features	14	ILI Milestone 9: Inspection Interval

CD¶	*SAR* CD¶ Title	RS	RS Title
63	Crack Feature Remaining Life Calculations	14	ILI Milestone 9: Inspection Interval
64	Corrosion Growth Rate	14	ILI Milestone 9: Inspection Interval
65	Maximum Interval Between Successive ILIs	14	ILI Milestone 9: Inspection Interval
66	Maximum Interval Between Successive ILIs	14	ILI Milestone 9: Inspection Interval
67, 68.b-f	Screw Anchors and Inspections	16	Dual Pipelines, Span Management
68.a	Integrity Protection from Currents, Ice, Spans, or Vessel Anchors-Span Management	16	Dual Pipelines, Span Management
69.a,b,c	Biota Investigation, Work Plan, and Work Plan Implementation	17	Dual Pipelines, Biota Investigation
70.a	Corrosion and Circumferential Crack ILI Timing	6	ILI Milestone 1: ILI Tool Run
70.b	Geometric Feature ILI Timing	6	ILI Milestone 1: ILI Tool Run
71	Investigation and Repair of Axially-Aligned Crack Features	18	Dual Pipelines, Axially-Aligned Cracks, Pipeline Movement
72	Pipeline Movement Investigation	18	Dual Pipelines, Axially-Aligned Cracks, Pipeline Movement
73	Quarterly Inspections Using Acoustic Leak Detection Tool	19	Dual Pipelines, Acoustic Leak Detection
74	Feature Integration Database	20	Data Integration - General
75	Integrity Management Personnel Access to Feature Integration Database	15	ILI Milestone 10: Data
76	Successive ILI Data Sets	15	ILI Milestone 10: Data
77	Update of OneSource Database	20	Data Integration - General
78.a	OneSource ILI Updates	15	ILI Milestone 10: Data
78.b	OneSource Interacting Features	15	ILI Milestone 10: Data
79-80	Create and Submit ALD Report	21	ALD Technology Report
81-83	Create and Submit ALD Report-Mackinac Report	22	Straits of Mackinac-ALD Report
84	New Lakehead Pipelines and Replacement Segments; Applicability	23	Leak Detection for New Pipelines
85	Installation of Flowmeters	23	Leak Detection for New Pipelines
86	Installation of Flowmeters on Lines That Utilize In-line Batch Interface Tools	23	Leak Detection for New Pipelines
87	Installation of Other Instrumentation	23	Leak Detection for New Pipelines
88	Establishment of MBS Segments	23	Leak Detection for New Pipelines

CD¶	*SAR* CD¶ Title	RS	RS Title
89	Leak Detection Sensitivity Requirements	23	Leak Detection for New Pipelines
90	Demonstration of Compliance with Leak Detection Sensitivity Design and Construction Requirements	23	Leak Detection for New Pipelines
91	Establishment and Optimization of Alarm Thresholds	23	Leak Detection for New Pipelines
92	Operation of MBS Leak Detection System	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
93	Temporary Suspension of MBS Leak Detection Capabilities	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
94	Overlapping MBS Segments	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
95	Alternative Leak Detection Requirements	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
96	Reporting MBS Outages	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
97	Reporting Requirements	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
98	Tolling Requirements	24	Operation of MBS Leak Detection on each Lakehead System Pipeline
99	Installation of New Equipment at Remotely-Controlled Valves	25	New Equipment at Remote Controlled Valves
100	Requirements for Valve Excavation	25	New Equipment at Remote Controlled Valves
101	Transient-State Sensitivity Analysis	24	Operation of MBS leak detection on each Lakehead System Pipeline
102	Rupture Detection System Alarm	26	Operated and Test New Rupture Detection System
103	"24 hour" Alarm	24	Operation of MBS leak detection on each Lakehead System Pipeline
104	Leak Detection Requirements for Control Room: Applicability	27	Alarm Response Team, and Alarm System Capability
105	Alarm Response Team	27	Alarm Response Team, and Alarm System Capability
106	Remote Notification of Alarm Response Team	27	Alarm Response Team, and Alarm System Capability
107	Audible and Visual Alarms	27	Alarm Response Team, and Alarm System Capability
108	Alarm Clearance Procedures	28	Alarm Clearance Procedures
108.a	Alarm Clearance Requirements	28	Alarm Clearance Procedures

CD¶	*SAR* CD¶ Title	RS	RS Title
108.b	Alarm Clearing Restrictions	28	Alarm Clearance Procedures
108.c	Confirmation of Leak Detection System Functioning	28	Alarm Clearance Procedures
108.d	Independent Alarm Investigation	28	Alarm Clearance Procedures
108.e	ART Procedures for Column Separation	28	Alarm Clearance Procedures
108.f	Electronic Records of Alarm Response	28	Alarm Clearance Procedures
109	Unscheduled Shutdown in Response to an Alarm	29	Shutdown Procedures in Response to LD Alarms
109.a	Ten-minute Rule	29	Shutdown Procedures in Response to LD Alarms
109.b	Column Separation - Running Pipelines	29	Shutdown Procedures in Response to LD Alarms
109.c	Column Separation - Pipeline Shutdown	29	Shutdown Procedures in Response to LD Alarms
109.d	Confirmed Leak Rule	29	Shutdown Procedures in Response to LD Alarms
109.e	Shutdown and Restart Record	29	Shutdown Procedures in Response to LD Alarms
110.a	Weekly List of Alarms	30	LD Alarm Compliance Certification
110.b	Record of Alarms	30	LD Alarm Compliance Certification
110.c	Alarm Submittal to EPA	30	LD Alarm Compliance Certification
110.d	Certification of Reporting Period	30	LD Alarm Compliance Certification
111	Unscheduled Shutdown Procedures in Response to Other Events	31	Shutdown Procedures in Response to Non-LD Alarms
112	Reporting of Events from Paragraph 111	31	Shutdown Procedures in Response to Non-LD Alarms
121-122	Installation of 14 Remotely-Controlled Valves	32	New Remotely-Controlled Valves
123	Enbridge Computer Modeling for Valve Locations	32	New Remotely-Controlled Valves
124	Valve Design and Closure	32	New Remotely-Controlled Valves
143-145	Content of the *SAR*	33	Reporting Requirements
146-148	Discharges from a Lakehead System Pipeline	33	Reporting Requirements

Appendix F: ILI Tool Types

Tool Type	Description
Geometry (Caliper)	Measures pipe deformations such as dents and ovalities. With an onboard navigational unit, bends, pipe movement and resultant strains can be assessed.
MFL - Magnetic Flux Leakage	Used to size metal loss anomalies such as corrosion or manufacturing defects - flux field is oriented along the longitudinal length of the pipe
CMFL - Circumferential Magnetic Flux Leakage	Transverse flux field - better defines metal loss length; potential to find cracks having a >1mm opening
UM or USWM - Ultrasonic Metal Loss	Uses ultrasound, in liquids lines, to detail metal loss and also finds and discriminates impurities in the steel
UC - Ultrasonic Crack	Uses ultrasound to detect and size axially (longitudinally) oriented cracks
UCC - Circumferential Ultrasonic Crack	Uses ultrasound to detect and size circumferentially (transverse) oriented cracks
PA - Phased Array	Ultrasonic inspection that can vary the ultrasonic waves, primarily used for crack detection
Other	- CPCM provides measurement of cathodic protection - SmartBall - acoustic detection for leaks