
Enbridge Consent Decree – Civil Action No. 1:16-cv-914
Independent Third Party Review and Evaluation of Enbridge Submittal:
Section E Paragraph 69
Biota Investigation Work Plan – Final Report

July 27, 2018

Prepared by:
O.B. Harris, LLC
Independent Third Party

Prepared for:



The United States
Environmental Protection
Agency

Written by:	Gary Kenney
Reviewed by:	Bob Franco Jeryl Mohn Dave Norton
Approved by:	O.B. Harris

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

ITP’s Assessment – Enbridge’s BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Table of Contents

Executive Summary.....	4
Definitions.....	8
Introduction.....	9
Summary of the Consent Decree Requirements.....	11
Summary of Enbridge’s <i>BIWP Report</i>	12
Analysis of Enbridge’s <i>BIWP Report</i>	14
Scope.....	14
Compliance of the <i>BIWP Report</i> with Applicable CD Requirements.....	15
Compliance with CD Requirements.....	15
Conformance with Enbridge Work Plans.....	16
Is Supported by Facts, is Complete, and Uses Best Engineering Judgment.....	17
Assessment #1- Impact on the coating and pipeline metal.....	17
Assessment #2 – Creation of a corrosive environment.....	17
Assessment #3 – Impact on structural integrity.....	19
Recommendation.....	20
Information Considered.....	21
Federal Documents and Regulations.....	21
Industry Standards and Papers.....	21
Enbridge Documents.....	21
EPA Documents.....	22
ITP Documents.....	22
Communications with Key Individuals.....	22
APPENDIX A – ITP’s EVALUATION OF THE <i>BIWP REPORT</i> ’s COMPLIANCE WITH CD REQUIREMENTS and CONFORMANCE TO THE BIWP and CRWP.....	23
Compliance of the <i>BIWP Report</i> with Applicable CD Requirements.....	23
Conformance with Enbridge’s <i>Biota Investigation Work Plan (Rev 2)</i>	25
Conformance with Enbridge’s <i>Coating Repairs Work Plan (Version 3.0)</i>	27

Table of Tables

Table 1: Chronology of Interactions between Enbridge, the EPA and the ITP.....	9
Table 2: Main sections of Enbridge’s <i>BIWP Report</i>	12
Table 3: The headings or titles of the <i>BIWP Report</i> appendices.....	12
Table 4: The headings or titles of Appendix F (GEI Consultant’s Report).....	12
Table 5: ITP assessment of CD compliance for the fieldwork and analysis.....	15
Table 6: ITP’s assessment of work plan conformance for the fieldwork and analysis.....	16
Table 7: Summary of the results of the tests for the presence of bacteria.....	18
Table 8: Compliance of the <i>BIWP Report</i> with applicable CD Requirements.....	23
Table 9: Conformance of the <i>BIWP Report</i> with applicable sections of the <i>BIWP (Rev 2)</i>	25
Table 10: Conformance of the coating repairs with applicable sections of the <i>CRWP v3</i>	27

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

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 on this subject 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.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Executive Summary

The Independent Third Party (ITP) for the Enbridge Consent Decree (CD), O.B. Harris, LLC, was engaged effective January 11, 2017. The role of the ITP per the CD is to conduct a comprehensive verification of Enbridge's compliance with the requirements of the CD.¹

On March 29, 2018 Enbridge submitted a report of their biota investigations of the Dual Pipelines that cross the Straits of Mackinac. The report is entitled *Enbridge Line 5; Straits of Mackinac, MI; Biota Investigation Work Plan; Final Report (BIWP Report)*. As required by CD Paragraph (¶) 132.b, the ITP has reviewed and evaluated the *BIWP Report*. On June 21, 2018 the Environmental Protection Agency (EPA) requested that the ITP prepare and provide a written report of the ITP's evaluation of the *BIWP Report*.

CD ¶69.a requires Enbridge to conduct an investigation of whether the biota found on the Dual Pipelines that cross the Straits of Mackinac impact the integrity of the pipelines. The CD requires that investigation assess whether:

- The biota is impacting the coating and the underlying metal of the pipelines.
- The mussels and other biota are creating a corrosive environment by fostering the growth of anaerobic bacteria.
- The biota is introducing features to the pipelines that may threaten the integrity of the pipelines due to their weight or pressure caused by current and ice movement in those sections of the pipelines that are suspended above the floor of the Straits of Mackinac.

CD ¶69.b requires Enbridge to prepare and submit a proposed plan to carry-out this investigation.

CD ¶69.c sets-out:

- Timelines for Enbridge to undertake this investigation upon receipt of the EPA's approval.
- Requirements for the submission to the EPA of a report of the investigation.

The ITP reviewed and evaluated:

- The various activities associated with the collection of biota samples
- The taking of various measurements during the field portion of the work
- The tests and analyses that were performed pursuant to the *BIWP*.

¹ CD ¶125.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

In conducting its analysis and assessment of the *BIWP Report*, the ITP applied the following standards that are described in the CD:

1. Evaluate whether the *BIWP Report* is complete and complies with the prescriptive requirements of the CD.²
2. Assess whether the results, findings, and conclusions presented in the *BIWP Report* are supported by the facts and best engineering judgment.³

As required by CD ¶169.b, Enbridge prepared and submitted a plan to carry-out the investigations. On June 13, 2017, the EPA approved Enbridge's *Biota Investigation Work Plan Revision 2.0 (BIWP Rev 2)*.

The ITP has evaluated Enbridge's *BIWP Report* and finds that it complies with the prescriptive requirements of CD ¶169.a and CD ¶169.c

The field work to collect biota samples from the pipelines and take various related measurements was undertaken during the period of August 15 to September 8, 2017. From the ITP's on-site observations and its evaluation of the *BIWP Report*, the ITP finds that this work and Enbridge's *BIWP Report* conforms with the requirements of *BIWP Rev 2* as supplemented by Addendum A to the *BIWP Rev 2*.

During the course of the *BIWP*-related field work, divers identified eight sites where they observed bare metal or where potential existed for bare metal to be present. Following completion of the *BIWP*-related field work, Enbridge undertook to repair the coatings at these eight sites. Based upon the ITP's attendance and observations of the coating repairs at six of the eight sites and the ITP's evaluation of that work, as described in the *BIWP Report*, as supplemented with *Enbridge's Interim Status Report*, the ITP finds that the coating repairs conform to the requirements stipulated in Enbridge's *Coating Repairs Work Plan Version 3.0 (CRWP v3)*.

Enbridge's *BIWP Report* is organized around three "Assessments." These three assessments align with the requirements in CD ¶169.a, as described earlier in this section. Enbridge's findings and conclusions with regard to the three assessments are summarized below and are followed by the ITP's findings of its evaluations of Enbridge's conclusions.

Assessment #1 – Enbridge's *BIWP Report* (in section 6.0) concludes as follows:

"The accumulation of mussels and/or other Biota are not causing coating deterioration or other harmful effects to the Dual Pipelines." The ITP finds this conclusion to be supported by the facts, is complete, and demonstrates use of best engineering judgment when supplemented with the information provided in Appendix F to the *BIWP Report*.

² CD ¶132.b.

³ CD ¶134.e.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Assessment #2 – Enbridge's *BIWP Report* (in section 4.5) concludes as follows:

“The presence of Biota on the Dual Pipelines combined with the observed absence of external corrosion metal loss through any form of inspection (ILI [in-line inspection] or dive) on the Dual Pipelines demonstrates that the Biota attached to the pipe coating have not created a corrosive environment at the pipe surface.”

“There is no evidence that the presence of Biota (mussels and periphyton) is creating a more hospitable environment for microorganisms that could impact corrosion of metal.”

The ITP finds that the portion of Enbridge's Assessment #2 conclusion, of no metal loss due to corrosion is supported by the facts (i.e. the results of the divers' inspections at various sites along the length of the two pipelines and, separately, the results of In-Line Inspections that have been performed on the Dual Pipelines).

Regarding the portion of the Assessment #2 conclusion, that “There is no evidence that the presence of the Biota (mussels and periphyton) is creating a more hospitable environment...,” the ITP notes that the field test kits found the presence of sulfate reducing bacteria (SRBs) in 69 of 70 biota samples at levels considered ‘heavy’ and the quantitative polymerase chain reaction-deoxyribonucleic acid (qPCR-DNA) analyses found the presence of SRBs in 66 of 70 Biota samples at levels considered ‘significant’ per industry practice. The tests of the 4 samples of lakebed sediment yielded similar results to those found in the biota samples, namely that the field test kits identified the presence of SRB's at levels considered ‘heavy’ and the qPCR-DNA tests identified the presence of SRBs at levels considered ‘significant.’ In contrast, tests of six samples of the Straits lake water for the presence of SRBs using the field tests yielded results considered ‘generally insignificant’ which correlated with results of the qPCR-DNA analyses of the lake water samples (i.e. results considered ‘low’ per industry practice).

As a result, the ITP finds that Enbridge's conclusion that there is “...no evidence...” that the biota is creating a more hospitable environment for bacteria to colonize does not align with the results of the field test kits and the qPCR-DNA analyses for the presence of SRBs (i.e. the ITP finds that part of Assessment #2 lacks factual support).

As noted above, though, while the results of the field test kits and qPCR-DNA analyses showed the presence of SRB's at ‘heavy’ or ‘significant’ levels in the samples of the biota collected from the external coating of the two pipelines, the results of various inspections support the conclusion that the pipelines have experienced no notable metal loss due to corrosion.

Assessment #3 – With regards to this assessment, the *BIWP Report* (in section 6.0) concludes “In the areas where the pipelines are suspended above the lake floor, the structural integrity assessment shows the presence of Biota on the Dual Pipelines has little impact...” on the structural integrity of the pipelines. The ITP finds that this conclusion is supported by the facts, is complete, and demonstrates use of best engineering judgment when supplemented with the information provided in Appendices F and H to the *BIWP Report*.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Recommendation

CD ¶69.c requires that EPA review and approve Enbridge's final report.

CD ¶132.b states that in the event EPA is required to take action under ¶137 (Approval of Deliverables), the ITP shall make a recommendation to the EPA as to the action it should take. CD ¶137 provides options for EPA to approve, approve with conditions, or disapprove a given Enbridge submission.

In light of the requirements in CD ¶137, the ITP recommends that EPA approve the report entitled *Enbridge Line 5; Straits of Mackinac, MI; Biota Investigation Work Plan; Final Report*, dated March 29, 2018, upon one of the following alternative conditions:

- That Enbridge provide additional factual evidence, along with an explanation of the technical basis, for the conclusion that there is no evidence that the biota is providing a more hospitable environment for the colonization of SRBs on the external coating of the pipelines.
- That Enbridge revise their Assessment #2 conclusions to align more accurately with the facts.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Definitions⁴

Item	Definition
APB	Acid producing bacteria
ATS	Ann Arbor Technical Services, Inc.
BIWP	<i>Biota Investigation Work Plan</i>
CD	Consent Decree. <i>United States of America v. Enbridge Energy, Limited Partnership, et al; Civil Action No. 1:16-cv-914</i> . 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 note paragraphs from any other document.
CRWP	<i>Coating Repairs Work Plan v3</i>
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.
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 referred to as the east segment or west segment of the Line 5 Dual Pipelines.
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.”
GEI	GEI Consultants, Inc.
ILI	In-line inspection
ITP	Independent Third Party. CD Section J outlines the responsibilities of the ITP. O.B. Harris, LLC serves as the ITP for the CD.
qPCR-DNA	Quantitative polymerase chain reaction-deoxyribonucleic acid. This type of analysis measures living, inactive, and dead microorganisms and may be used to quantify the total number of microorganisms or a specific genus or species of microorganisms in nearly any type of sample, including fluids or solids.
Section (of CD)	Defined in the CD as “a portion of the Decree identified by a Roman numeral.”
VIV	Vortex induced vibration

⁴ Definitions from the CD are found in CD ¶10.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Introduction

The Independent Third Party (ITP) for the Enbridge Consent Decree (CD), O.B. Harris, LLC, was engaged effective January 11, 2017.

CD Paragraph (¶) 69 requires Enbridge to conduct an investigation of whether any of the biota found on the Dual Pipelines that cross the Straits of Mackinac impact the integrity of the Dual Pipelines. Below is a chronology of interactions between Enbridge, the Environmental Protection Agency (EPA), and the ITP concerning the biota investigations.

Table 1: Chronology of Interactions between Enbridge, the EPA and the ITP

Date	Item
May 18, 2017	Enbridge submits the <i>Line 5 Biota Investigation Work Plan Revision 2.0 (BIWP Rev 2)</i> to the EPA for the EPA's review and approval.
June 13, 2017	The EPA approves Enbridge's <i>BIWP Rev 2</i> .
August 15 – September 8, 2017	The field work portion of the biota investigations was undertaken and completed in the Straits of Mackinac. The ITP attended during this entire time and observed the collection of all the biota samples from all designated sites and all related measurements undertaken as described in the <i>BIWP Rev 2</i> .
August 27, 2017	Enbridge submits Addendum A to the <i>BIWP Rev 2</i> to the EPA and the ITP. Addendum A formalized various revisions to the <i>BIWP</i> that were previously informally approved by the EPA.
August 30, 2017	Enbridge submits its <i>Coating Repairs Work Plan Version 1.0 (CRWP v1)</i> to the EPA and ITP.
September 4, 2017	The ITP submits its comments on the <i>CRWP v1</i> to the EPA and Enbridge.
September 8, 2017	Enbridge submits its <i>Coating Repairs Work Plan Version 2.0 (CRWP v2)</i> to the EPA and ITP.
September 10, 2017	The ITP submits its comments on the <i>CRWP v2</i> to the EPA and Enbridge.
September 13, 2017	Enbridge submits its <i>Coating Repairs Work Plan Version 3.0 (CRWP v3)</i> to the EPA and ITP.
September 17, 2017	The ITP submits its comments on the <i>CRWP v3</i> to the EPA and Enbridge. The EPA issues a letter conditionally approving the <i>CRWP v3</i> .
September 20, 2017	The EPA issues an addendum to their September 17, 2017, approval letter noting they were not approving Modified Method 2 and establishing the requirement for Enbridge to provide a report on completion of the repairs.
September 21 – October 12, 2017	Coating repairs were undertaken at six of eight sites along the Dual Pipelines. The ITP attended and observed that work.
December 8, 2017	Enbridge submits Addendum B to the <i>BIWP Rev 2</i> . The EPA took no action with regard to Addendum B.
December 15, 2017	Enbridge submits the report <i>Status Update; Coating Repairs Work Plan; Summary of Activities Completed to Date</i> . The ITP reviewed this report in pursuant to CD ¶132b; however, the EPA did not request that the ITP provide a report of the ITP's evaluations.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

On March 29, 2018, Enbridge submitted their report of the biota investigation entitled *Enbridge Line 5, Straits of Mackinac, Biota Investigation Work Plan, Final Report (BIWP Report)* to the EPA and the ITP. As required by CD ¶132.b, the ITP has reviewed and evaluated Enbridge's *BIWP Report*.

Subsequent to the March 29, 2018 *BIWP Report* submission, the ITP had the following exchanges with Enbridge and the EPA:

- On May 3, 2018, the ITP transmitted to Enbridge and the EPA a request for additional information on nine items contained in the *BIWP Report*.
- On May 31, 2018, Enbridge provided a response to the ITP's request for additional information.
- On June 21, 2018, the EPA requested that the ITP evaluate the *BIWP Report* and prepare this report. In accordance with CD ¶132.b, this report is due within 45 Days of the EPA's request, or August 6, 2018.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Summary of the Consent Decree Requirements

CD ¶169.a requires that Enbridge conduct an investigation of whether the biota found on the Dual Pipelines that cross the Straits of Mackinac impact the integrity of the pipelines. The CD requires the investigation to assess whether:

- The biota is impacting the coating and the underlying metal of the pipelines.
- The mussels and other biota are creating a corrosive environment by fostering the growth of anaerobic bacteria.
- The biota is introducing features to the pipelines that may threaten the integrity of the pipelines due to their weight or pressure caused by current and ice movement in those sections of the pipelines that are suspended above the floor of the Straits of Mackinac.

CD ¶169.b requires that Enbridge prepare and submit a proposed plan and schedule for completing the biota investigation. The CD requires that the EPA review and approve the plan.

CD ¶169.c requires that Enbridge prepare and submit to the EPA, for the EPA's approval, a final report describing the findings and results of their investigation within 60 Days of completing the investigation. The CD requires that the EPA review and approve the report. CD ¶169.c also requires that, in the event the investigation finds biota have impaired or threaten to impair the integrity of the Dual Pipelines, for Enbridge to submit a plan to address such impairments along with a schedule for completing the work. Following completion of the repairs, the CD requires Enbridge to submit a report of this work to the EPA for review and comment.

CD Section VII, Subsection J, ¶132.b requires:

- That the ITP review and evaluate all proposed plans, reports, and other deliverables that Enbridge is required to submit to the EPA under the CD.
- That the ITP review and evaluate the completeness of the Enbridge submittal and its compliance with the prescriptive requirements of the CD.
- That, if the EPA requests the ITP to submit a written report of its evaluations, the report is due within 45 Days of the request.
- In the event the submittal requires action by the EPA, that the ITP make a recommendation as to the action the EPA should take.

CD ¶134.e requires that the ITP assess whether Enbridge's submittals are supported by the facts and best engineering judgment.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Summary of Enbridge's BIWP Report

On March 29, 2018, Enbridge submitted their *BIWP Report* consisting of a total of 705 pages inclusive of appendices. The main body of the Report is 33 pages in length. Table 2 lists the sections of the *BIWP Report*.

Table 2: Main sections of Enbridge's *BIWP Report*

Section #	BIWP Report Sections	Adobe Pg #s	Section #	BIWP Report Sections	Adobe Pg #s
1	Summary	7	5	Assessment #3 Biota Impact on the Structural Integrity	19-22
2	Introduction to Work Plan	8-10	6	Conclusions	23
3	Assessment #1 Biota Impact on Coating and Underlying Metal	11-16	7	References	24
4	Assessment #2 Biota Impact on Corrosion Threat	17-19		Tables & Figures	25-33

Table 3 lists the eight appendices of the *BIWP Report* that make up the remainder of the 705 pages of the report.

Table 3: The headings or titles of the *BIWP Report* appendices

Appendix	Appendix Title	Adobe Pg #s	Appendix	Appendix Title	Adobe Pg #s
A	Biota Investigation Work Plan (Rev 2)	34-97	E	Cathodic Protection Measurements	189-201
B	Addendum A	98-102	F	Line 5 Biota Investigation Plan (GEI Consultants)	202-627
C	Addendum B	103-105	G	Coating Repairs Work	628-660
D	Coating Inspection Reports	106-188	H	Engineering Stress Analysis (Kiefner)	661-705

As seen in Table 3, Appendix F (i.e. the report from GEI Consultants) consists of 425 pages. GEI's report in and of itself includes a number of reports from other laboratories or analytical services groups as appendices to their report. To assist the reader, Table 4 provides an overview of GEI's report and associated appendices.

Table 4: The headings or titles of Appendix F (GEI Consultant's Report)

Section/ Appendix	GEI's Report & Appendices	Adobe Pg #s	Section/ Appendix	GEI's Report & Appendices	Adobe Pg #s
	GEI's Report (main body)	203-297	H	GEI Field Data Sheets	429-503
A	Biota Sampling Checklist	298-302	I	GEI Daily Field Activity Logs	504-521
B	BIWP Addendums	303-309	J	GEI Chain of Custody Forms	522-548

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Section/ Appendix	GEI's Report & Appendices	Adobe Pg #s	Section/ Appendix	GEI's Report & Appendices	Adobe Pg #s
C	Photographs of Collection Efforts	310-338	K	Phycotech Laboratory Analysis	549-563
D	BioSan Field Test Kit Instructions	339-341	L	GEI Biota Statistical Analysis	564-567
E	GEI Denver Laboratory SOPs	342-357	M	Water Chemistry Measurements	568-572
F	GEI Laboratory Analysis	358-415	N	Microbial Insights qPCR-DNA Analysis	573-606
G	Microbial Insights SOPs qPCR-DNA extraction analysis	416-428	O	ATS Pipeline Byssal Thread Investigations	607-627

In accordance with the requirements in CD ¶169.a, the *BIWP Report* presents Enbridge's findings and conclusions in the form of three assessments that align with CD ¶169.a. Section 6.0 of the *BIWP Report* presents those findings. Below are excerpts of the conclusions Enbridge reached in regard to the three assessments:

"Assessment #1: The accumulation of mussels and/or other Biota are not causing coating deterioration or other harmful effects of the Dual Pipelines..."

"Assessment #2: The accumulation of mussels and/or other Biota are not creating a corrosive environment by, among other things, fostering the growth of anaerobic SRB [sulphate reducing bacteria] that may cause metal loss..."

"Assessment #3: In the areas where the pipelines are suspended above the lake floor, the structural integrity assessment shows the presence of Biota on the Dual Pipelines has little impact on maximum span lengths (considering operating loads, drag forces, buoyant weight, and VIV [vortex induced vibration]..."

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Analysis of Enbridge's *BIWP Report*

Scope

In conducting its review and evaluation of the *BIWP Report*, the ITP applied the following standards that are described in the CD:

1. Evaluate whether the *BIWP Report's* is complete and complies with the requirements of the CD.⁵
2. Evaluate whether the results, findings, and conclusions presented in the *BIWP Report* are supported by the facts and best engineering judgment.⁶

CD ¶169.b requires that Enbridge prepare a proposed plan to undertake the investigation as required in CD ¶169.a and submit that plan to the EPA for review and approval. On June 13, 2017, the EPA approved Revision 2 of the *BIWP*.

As requested by the EPA, the ITP attended on the barge that was used for performing the field work and observed all the field work which involved:

- Collection of biota samples.
- Taking coating thickness measurements.
- Taking cathodic protection readings.
- Use of the field test kits for detecting the absence / presence of bacteria.
- Measuring the circumference of the pipeline prior to and subsequent to the removal of biota.

During the course of the field work, the divers who were collecting the biota samples and taking the various measurements identified eight sites as areas with bare or potentially bare metal. Following completion of the BIWP related field work, Enbridge submitted to the EPA, in accordance with CD ¶169.c, a plan to repair the external coating at these eight sites. At the request of the EPA, the ITP assisted in the review and approval of the *CRWP*. Subsequent to approval of *CRWP v3*, the ITP attended and observed the completion of coating repairs at six of eight sites where coating repairs were conducted.

⁵ CD ¶132.b.

⁶ CD ¶134.e.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Compliance of the *BIWP Report* with Applicable CD Requirements

The field work that was undertaken and completed during the period of August 15 – September 8, 2017 involved:

- The collection of biota.
- Cleaning the biota from the pipelines.
- Determining whether corrosion had taken place on the pipelines where biota was present by taking measurements of:
 - Coating thickness.
 - Cathodic protection potentials.
 - Circumference of the pipes.

The tests and analyses of the samples and information collected during the field work was completed during the period of September 8, 2017 to February 28, 2018.

Compliance with CD Requirements

Table 5 provides the ITP's assessment with respect to whether the field work and subsequent analyses comply with the prescriptive requirements of the CD.

Table 5: ITP assessment of CD compliance for the fieldwork and analysis

CD ¶	Assessment Category	Discussion
69.a	Compliant	The field work and subsequent analyses, and the findings and conclusions arising from that work, was undertaken and completed in compliance with the applicable requirements of CD ¶69.a.
69.b	Compliant	<ul style="list-style-type: none">• As required by CD ¶69.b Enbridge prepared and submitted to the EPA the <i>BIWP</i>.• On June 13, 2017, the EPA approved the <i>BIWP Rev 2</i>.
69.c	Compliant	<ul style="list-style-type: none">• By February 28, 2018, the last of the investigations and analyses were completed.• On March 29, 2018 (i.e. within 29 Days following completion of the investigation), Enbridge submitted their final report to the EPA in compliance with the requirement to submit a report to the EPA within 60 Days following completion of the investigation. As required by the CD, the <i>BIWP Report</i> presents the results of the investigations and Enbridge's findings and conclusions.• On August 30, 2017, Enbridge submitted their <i>CRWP v1</i> in compliance with the requirement to submit a plan to repair locations with bare metal or potentially bare metal.• On September 17, 2017, the EPA approved the <i>CRWP v3</i>.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

CD ¶	Assessment Category	Discussion
		<ul style="list-style-type: none"> On September 20, 2017, the EPA modified their approval, noting they were not approving Modified Method 2 and adding a requirement for Enbridge to provide a report describing the completion of the repairs. As of December 15, 2017 (the end of the 2017 work season), Enbridge had completed repairs to seven of eight sites. Enbridge has verbally reported to the ITP that the coating repairs at the eighth site should be completed during the week of July 23, 2018. The ITP understands that Enbridge will provide a final report to EPA concerning the coating repairs.

Conformance with Enbridge Work Plans

Table 6 provides the ITP's assessment whether the field work and subsequent analyses conform with the prescriptive requirements of *BIWP Rev 2* and the *CRWP v3*.

Table 6: ITP's assessment of work plan conformance for the fieldwork and analysis

Work Plan	Assessment Category	Discussion
<i>BIWP Rev 2</i>	Conforms	<ul style="list-style-type: none"> The biota investigation of the west and east segments of the Line 5 Dual Pipelines was undertaken and completed in conformance with <i>BIWP Rev 2</i>. The <i>BIWP Report</i> conformed to the requirements of <i>BIWP Rev 2</i>.
<i>CRWP v3</i>	Conforms	The coating repairs were conducted in conformance with the requirements of Enbridge's <i>CRWP v3</i> .

The ITP refers the reader to Appendix A of this report for further details on the ITP's findings in regard to (a) the work undertaken as part of the biota investigation and (b) the *BIWP Report* being in compliance with CD requirements and in conformance with the *BIWP Rev 2* and *CRWP v3*.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Is Supported by Facts, is Complete, and Uses Best Engineering Judgment

Assessment #1- Impact on the coating and pipeline metal

Section 6.0 of the *BIWP Report* presents the following regarding Enbridge's findings and conclusions with regard to whether the biota is impacting the coating or underlying metal of the pipelines (as required by CD ¶69.a):

“Assessment #1: The accumulation of mussels and/or other Biota are not causing coating deterioration or other harmful effects of the Dual Pipelines...”

The ITP finds that the discussion in section 3.0 of the *BIWP Report*, and Enbridge's conclusion with respect to Assessment #1, is supported by the facts, is complete, and demonstrates use of best engineering judgment, when supplemented with the reports from GEI Consultants and Ann Arbor Technical Services (ATS) Inc. (Appendix F of Enbridge's *BIWP Report*).

Assessment #2 – Creation of a corrosive environment

Section 6.0 of the *BIWP Report* presents the following findings and conclusions with regard to whether the biota is fostering the growth of anaerobic bacteria (as required by CD ¶69.a):

“Assessment #2: The accumulation of mussels and/or other Biota are not creating a corrosive environment by, among other things, fostering the growth of anaerobic SRB that may cause metal loss...”

In section 4.5, Assessment #2 Conclusions of the *BIWP Report*, the report states:

“Biota samples collected and analyzed during the BIWP indicate that populations of bacteria associated with Biota at the surface of the pipe are lower than the level of bacteria found in bottom sediment samples representing the macro environment in the Straits [of Mackinac].”

“There is no evidence that the presence of Biota (mussels and periphyton) is creating a more hospitable environment for microorganisms that could impact corrosion of metal.”

Section 3.3 of the *BIWP Report* notes that the divers' visual inspections of the pipelines did not identify any metal loss where calcareous deposits were found. Section 3.4 notes that a total of 348 wall thickness measurements were taken as part of the BIWP field work. The wall thickness readings were consistent with the reported nominal wall thickness of the pipe (i.e. 0.812 inches), indicating no notable metal loss due to corrosion. Independent of the BIWP investigation, the ITP has access to the results of the most recent in-line inspection (ILI) runs, which were referenced in section 3.3, and the ITP affirms that the results of those ILI runs indicate corrosion along the pipelines is being managed. The ITP finds that the facts as provided in the *BIWP Report*, and in separate reports of the ILI results, support the conclusion the pipelines have experienced no notable metal loss due to corrosion.

Table 5 presents summary results of the tests for the presence of acid producing bacteria (APBs) and SRBs from the field test kits and the quantitative polymerase chain reaction-deoxyribonucleic acid (qPCR-DNA) analyses presented in Appendix F to the *BIWP Report*. The 70 pipeline biota samples all were collected as part of the BIWP field work. On December 8, 2017, Enbridge submitted Addendum B to *Revision 2* of the *BIWP*. On submittal of Addendum B, the EPA took no action (i.e. the EPA neither

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

approved nor disapproved Addendum B). In December 2017 (i.e. approximately three months after completion of the collection of the biota samples per *BIWP Rev 2*), six samples of lake water from various depths and four samples of lake bottom sediment near the east pipeline segment were collected and analyzed. No samples of biota were collected from the surface of the pipelines at the time.

Table 7: Summary of the results of the tests for the presence of bacteria

Samples Tested	Sulfate Reducing Bacteria		Acid Producing Bacteria	
	Field Test Kit	qPCR-DNA cells/gram	Field Test Kit ⁺	qPCR -DNA cells/gram
Pipeline Biota Total of 70 Samples	'Heavy' In 69 of 70 samples	$10^5 - 10^7$ (i.e. significant) In 66 of 70 samples	'Strong' In 70 of 70 samples	$10^5 - 10^7$ (i.e. significant) In 3 of 70 samples
Lake Water Total of 6 Samples	'Generally Insignificant' In all 6 samples	$\sim 10^2$ (i.e. low) In all 6 samples	'No production' to 'Medium' ⁺⁺	$\sim 10^2$ (i.e. low) In all 6 samples
Lake Bottom Sediment Total of 4 Samples	'Heavy' In all 4 samples	$10^5 - 10^8$ (i.e. significant) In all 4 samples	'Strong' In all 4 samples	Below or just above reporting limit In all 4 samples

+ Quality control/quality assurance checks raised questions regarding the reliability of the field test kits for detecting the absence/presence of APBs.

++ Four of the six samples tested yielded a result of "No Production," one sample yielded a result of "Weak," and one sample yielded a result of "Medium."

The ITP finds that the portion of Assessment #2, where Enbridge concludes that the biota is not creating a more hospitable environment for microorganisms to colonize, is not supported by the results of the tests and analyses for the presence of SRBs. The ITP observes that, based upon the results of the SRB Field Test Kits and the qPCR-DNA analyses, the results of the tests for SRBs demonstrated the presence of SRBs in lake water, in lake bottom sediment, and in the Biota present on the surface of the external coating of the pipelines. The tests and analyses also demonstrate that the lake floor sediment and the biota attached to the external coating of the pipeline both are providing environments that allow SRBs to colonize relative to the lake water. The results of the qPCR-DNA analyses of the four sediment samples indicate that the sediment is providing a slightly more hospitable environment for the SRBs to colonize than the environment underneath the biota on the pipeline coating.

The ITP agrees, however, that, despite SRBs being present in the biota collected from the surface of the pipeline coating, the results of the divers' inspection, the wall thickness measurements and ILI results all support the conclusion that the external steel walls of the pipelines have not experienced notable metal loss due to corrosion.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Assessment #3 – Impact on structural integrity

Section 6.0 of the *BIWP Report* presents the following regarding Enbridge's findings and conclusions with regard to whether the mass of the biota is affecting the structural integrity of pipelines in areas where the pipeline is suspended above the lake floor (as required by CD ¶169.a):

“Assessment #3: In the areas where the pipelines are suspended above the lake floor, the structural integrity assessment shows the presence of Biota on the Dual Pipelines has little impact on maximum span lengths (considering operating loads, drag forces, buoyant weight, and VIV [vortex induced vibration])...”

The ITP finds that the discussion in section 5.0 of the *BIWP Report* and Enbridge's conclusion with respect to Assessment #3 is supported by the facts, is complete, and demonstrates use of best engineering judgment when supplemented with:

- The GEI Consultants' report (Appendix F).
- The report by Kiefner and Associates (Appendix H of Enbridge's *BIWP Report*).
- Enbridge's response to the ITP's request for additional information.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Recommendation

CD ¶69.c requires that EPA review and approve Enbridge's final report.

CD ¶132.b provides that, in the event EPA is required to take action under ¶137 (Approval of Deliverables), the ITP shall make a recommendation to the EPA as to the action it should take. CD ¶137 provides four options for, or degrees of, EPA approval or disapproval of a given Enbridge submission, as follows:

1. Approve the submission.
2. Approve the submission upon specified conditions.
3. Approve part of the submission and disapprove the remainder.
4. Disapprove the submission in its entirety.

Given the options allowed by CD ¶137, the ITP recommends that the EPA approve the report entitled *Enbridge Line 5; Straits of Mackinac, MI; Biota Investigation Work Plan; Final Report*, dated March 29, 2018 upon one of the following alternative conditions:

- That Enbridge provide additional factual evidence, along with an explanation of the technical basis, for the conclusion that there is no evidence that the biota is providing a more hospitable environment for the colonization of SRBs on the external coating of the pipelines.
- That Enbridge revise that portion of the Assessment #2 conclusion, regarding whether the biota provides a more hospitable environment for microorganisms to colonize, to align more accurately with the facts.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Information Considered

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

Federal Documents and Regulations

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

Industry Standards and Papers

DNV-GL Offshore Standard F101: *Submarine Pipeline Systems*. DNV-GL. October 2013.

DNV-GL Recommended Practice F105: *Free Spanning Pipelines*. DNV-GL. June 2017.

NACE Standard TM0106-2016: *Detection, Testing and Evaluation of Microbiologically Influenced Corrosion (MIC) on External Surfaces of Buried Pipelines*. National Association of Corrosion Engineers. March 20, 2016.

NACE Standard TM0497-2012: *Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems*. National Association of Corrosion Engineers. 2012.

Enbridge Documents

Enbridge Line 5: Straits of Mackinac, MI: Biota Investigation Work Plan Revision 2. Enbridge. May 18, 2017.

Biota Investigation Work Plan: Addendum A. Enbridge. August 27, 2017.

Coating Repairs Work Plan. Enbridge. August 30, 2017.

Coating Repairs Work Plan, Version 2.0. Enbridge. September 8, 2017.

Coating Repairs Work Plan, Version 3.0. Enbridge. September 13, 2017.

Biota Investigation Work Plan: Addendum B. Enbridge. December 8, 2017.

Enbridge Line 5: Straits of Mackinac, MI: Status Update: Coating Repairs Work Plan: Summary of Activities Completed to Date. Enbridge. December 15, 2017.

Enbridge Line 5: Straits of Mackinac, MI: Biota Investigation Work Plan: Final Report. Enbridge. March 29, 2018.

Transmittal Letter. *Re: Biota Investigation Work Plan Final Report*. Steptoe & Johnson, LLP. March 29, 2018.

Response to ITP's Information Request related to Enbridge's Biota Investigation Work Plan. Enbridge. May 31, 2018.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

EPA Documents

Re: Enbridge Line 5 Biota Investigation Work Plan (Revision 2). US EPA. June 13, 2017.

Re: Enbridge Line 5 Coating Repairs Work Plan (Version 3). US EPA. September 17, 2017.

Re: Enbridge Line 5 Coating Repairs Work Plan (Version 3). US EPA. September 20, 2017.

ITP Documents

ITP Review of Enbridge Document: Coating Repairs Work Plan (August 30, 2017). O.B. Harris, LLC. September 4, 2017.

ITP Review of Enbridge Document: Coating Repairs Work Plan Version 2.0 (September 8, 2017). O.B. Harris, LLC. September 10, 2017.

ITP Review of Enbridge Document: Coating Repairs Work Plan Version 3.0 (September 13, 2017). O.B. Harris, LLC. September 14, 2017.

ITP Additional Information Request re: Enbridge's BIWP Report dated March 29, 2018. O.B. Harris, LLC. May 3, 2018.

Communications with Key Individuals

Key individuals with whom the ITP communicated while observing the field work portion of the biota investigations and the repairs to coating, over the periods of August 15 to September 8, 2017, and September 21 to October 12, 2017, include:

- Project Manager, Ballard Marine Construction
- Lead Aquatic Biologist, GEI Consultants
- Chief Inspector, Enbridge
- Pipeline Integrity personnel, Enbridge
- Line 5 PLM representatives, Enbridge
- NACE Coating Inspector, Lake Superior Consulting
- Manufacturer's Representative, Piping Repairs Technology Inc.

Throughout the time that the ITP was on-site observing the collection of biota samples and taking of various related measurements, the ITP had regular interactions and discussions with the individuals identified above. These conversations typically sought information such as identifying the exact location at which biota samples or measurements were to be taken, the collection of samples, preparation of samples, and the status of bacteria field tests. During the coating repairs, the discussions typically sought information regarding the cleaning and preparation of the pipeline surface for conducting the coating repairs and the application of the coating epoxy, fiberglass overwrap and banding.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

APPENDIX A – ITP's EVALUATION OF THE *BIWP REPORT*'s COMPLIANCE WITH CD REQUIREMENTS and CONFORMANCE TO THE BIWP and CRWP

Compliance of the *BIWP Report* with Applicable CD Requirements

The field work to collect biota and to measure coating thickness, cathodic protection potentials and circumference of the pipes with biota present and after cleaning the biota, was undertaken and completed during the period between August 15 and September 8, 2017. The tests and analyses of the information and samples collected during the field work was undertaken and completed during the period between September 2017 and February 28, 2018. Table 8 lists the ITP's assessment regarding whether the field work and subsequent analyses comply with the prescriptive requirements of the CD.

Table 8: Compliance of the *BIWP Report* with applicable CD Requirements

CD ¶	Item	References
69.a	In compliance with the requirement of CD ¶69.b to assess whether the biota is impacting the coating and/or underlying metal of the pipeline, the <i>BIWP Report</i> and supporting appendix present the results, findings, and conclusions of the work undertaken to address this part of the requirements of ¶69.a	<i>BIWP Report</i> : <ul style="list-style-type: none"> • Section 3.0 • Section 6.0 • Appendix F
69.a	In compliance with the requirement of CD ¶69.a to assess whether the biota is creating a corrosive environment by fostering the growth of anaerobic bacteria, the <i>BIWP Report</i> and supporting appendix present the results, findings, and conclusions of the work undertaken to address this part of ¶69.a	<i>BIWP Report</i> : <ul style="list-style-type: none"> • Section 4.0 • Section 6.0 • Appendix F
69.a	In compliance with the requirement of CD ¶69.a to assess whether the mass of the biota are impacting the structural integrity of the Dual Pipelines, the <i>BIWP Report</i> and supporting appendix presents the results, findings and conclusions of the work undertaken to address this part of ¶69.a.	<i>BIWP Report</i> : <ul style="list-style-type: none"> • Section 5.0 • Section 6.0 • Appendix H
69.b	On June 13, 2017, the EPA approved the <i>BIWP Rev 2</i> .	EPA approval letter; June 13, 2017
69.c	In compliance with the requirement of CD ¶69.c to implement the approved work plan, the <i>BIWP Report</i> notes that crews were mobilized in August 2017 to commence the investigations per the approved <i>BIWP</i> .	<ul style="list-style-type: none"> • EPA approval letter; June 13, 2017 • <i>BIWP Report</i>: <ul style="list-style-type: none"> – Section 3.0 – Section 6.0 • ITP on-site observations
69.c	In compliance with the requirement of CD ¶69.c to submit a final report within 60 Days of completion of the investigations, the <i>BIWP Report</i> was submitted on March 29, 2018 (i.e. 29 Days after completion of the investigation on February 28, 2018).	<ul style="list-style-type: none"> • Transmittal Letter; Steptoe & Johnson; March 29, 2018 • <i>BIWP Report</i>: <ul style="list-style-type: none"> – Cover Page – Section 2.2.2

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

CD ¶	Item	References
69.c	<p>In compliance with the requirement of CD ¶69.c to submit a plan to address any impairments, Enbridge submitted a <i>Coating Repairs Work Plan</i> to the EPA for review and approval. Version 3.0 of that Plan was conditionally approved by the EPA.</p>	<ul style="list-style-type: none"> • <i>Coating Repairs Work Plan V3.0</i> • EPA approval Letters: <ul style="list-style-type: none"> – September 17, 2017 – September 20, 2017
69.c	<p>In compliance with the requirement of CD ¶69.c to provide the EPA with a report, on December 15, 2017, Enbridge submitted:</p> <ul style="list-style-type: none"> • A status report. • An appendix to the <i>BIWP Report</i> that provides a series of reports regarding the coating repairs performed at seven of the eight locations where bare metal or potential bare metal were identified as part of the Biota investigation. 	<ul style="list-style-type: none"> • <i>Enbridge Coating Repairs Work Plan – Interim Report 20171215</i> • <i>BIWP Report: Appendix G</i>

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Conformance with Enbridge's Biota Investigation Work Plan (Rev 2)

Table 9 lists the ITP's assessments regarding the completion of the biota investigation of the west and east segments of the Line 5 Dual Pipelines and the conformance of this work to the requirements of Enbridge's *BIWP Rev 2*.

Table 9: Conformance of the *BIWP Report* with applicable sections of the *BIWP (Rev 2)*

Section	Item	References
3.2	<p>Coating Inspections</p> <p>In conformance with this section of the <i>BIWP</i>, measurements of the thickness of the external coating were taken at 18 identified areas of interest and three additional areas.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: <ul style="list-style-type: none"> – Section 3 – Table 4 – Appendix D – Appendix G • ITP on-site observations
3.2.1	<p>Cathodic Protection Readings</p> <p>In conformance with this section of the <i>BIWP</i>, cathodic protection potential readings were taken at areas of identified bare metal or where the potential for bare metal existed.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: <ul style="list-style-type: none"> – Section 3.5 – Table 5 – Appendix E • ITP on-site observations
3.5.1	<p>Visual Biota Surveys</p> <p>In conformance with this section of the <i>BIWP</i>, visual surveys were completed at 16 biota sampling sites.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: section 3.2.2 • ITP on-site observations
3.5.2	<p>Biota Measurements</p> <p>In conformance with this section of the <i>BIWP</i>, the thickness of the biota was measured at select sites where the pipelines were suspended above the floor of the Straits of Mackinac.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: Appendix F • ITP on-site observations
3.5.3	<p>Biota Samples</p> <p>In conformance with this section of the <i>BIWP</i>, paired biota samples were collected and subsequently analyzed for the 16 designated biota sampling sites.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: Appendix F • ITP on-site observations
3.5.3.3	<p>Additional/Oppportunistic Sampling</p> <p>In conformance with this section of the <i>BIWP</i>, additional samples were collected when and where the opportunity presented itself.</p>	<ul style="list-style-type: none"> • <i>BIWP Report</i>: Appendix F • ITP on-site observations
4.1	<p>Biota Counts/Densities/Weight</p> <p>In conformance with this section of the <i>BIWP</i>, the collected biota samples were analyzed for their counts, densities, and weight.</p>	<i>BIWP Report</i> : Appendix F
4.2	<p>Presence / Absence Bacteria Testing</p> <p>In conformance with this section of the <i>BIWP</i>, one of each pair of the collected biota samples was tested using the prescribed field testing kits.</p>	<p><i>BIWP Report</i>:</p> <ul style="list-style-type: none"> • Section 4.0 • Appendix F

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Section	Item	References
4.3	Coating Integrity Testing In conformance with this section of the <i>BIWP</i> , opportunistic dislodged coating samples were collected and analyzed to determine the penetration depth of various biota into the coating.	<i>BIWP Report</i> : Appendix F
4.4	Engineering Stress Analysis In conformance with this section of the <i>BIWP</i> , an engineering analysis was conducted to assess the sensitivity of the pipelines to stress and VIV as a result of the presence of biota.	<i>BIWP Report</i> : <ul style="list-style-type: none">• Section 5.0• Appendix H

On August 27, 2017, Enbridge submitted Addendum A to the *BIWP Rev 2*. This Addendum formalized revisions to Rev 2 of the *BIWP*, including clarifying the actual locations at which biota samples and measurements were to be taken, as well as addressing matters related to diver safety issues. These issues were discussed and agreed upon between Enbridge and the EPA prior to Enbridge issuing Addendum A. Based upon the ITP's field observations and information provided in the *BIWP Report*, the ITP finds that the biota investigation conformed with the provisions of Addendum A.

ITP's Assessment – Enbridge's BIWP Report

This document may contain information which Enbridge considers to be confidential business information or otherwise protected by statute.

Conformance with Enbridge's Coating Repairs Work Plan (Version 3.0)

On August 30, 2017, Enbridge submitted the *Coating Repairs Work Plan (CRWP)* to the EPA and ITP. On September 17, 2017, the EPA conditionally approved *CRWP v3*. On September 20, 2017, the EPA revised its approval, noting they were not approving Modified Method 2 and adding a requirement for Enbridge to provide a report describing the completion of the repairs.

Table 10 lists the ITP's assessments regarding the coating repairs that Enbridge completed during the 2017 and 2018 seasons.

Table 10: Conformance of the coating repairs with applicable sections of the *CRWP v3*

Item	References
<p>Coating Repair Scope of Work In conformance with the <i>CRWP</i>, as of December 15, 2017, coating repairs were completed at seven of the eight sites identified in the Scope of Work. Enbridge has verbally reported to the ITP that the coating repairs at the eighth site should be completed during the week of July 23, 2018. The ITP understands that Enbridge will provide a final report to EPA on coating repairs.</p>	<ul style="list-style-type: none"> • <i>Enbridge Line 5; Straits of Mackinac, MI; Status Update; Coating Repairs Work Plan; Summary of Activities Completed to Date</i> • <i>BIWP Report: Appendix G</i>
<p>Coating Repair and Coating Application Procedure In conformance with the <i>CRWP</i>:</p> <ul style="list-style-type: none"> • The coating repairs completed used the products supplied by Piping Repair Technologies Inc. • The sites where repairs were conducted were prepared in accordance with the manufacturer's instructions. • Method 1 (i.e. the method using a 360-degree wrap) was used to repair the coating at all seven sites. • The repairs were allowed to cure for seven days before removing the Stricture Bandage®. 	<ul style="list-style-type: none"> • <i>Enbridge Line 5; Straits of Mackinac, MI; Status Update; Coating Repairs Work Plan; Summary of Activities Completed to Date</i> • <i>BIWP Report: Appendix G</i>
<p>Diver Training and Certification In conformance with the requirements of the <i>CRWP</i>, all divers completing the coating repairs were trained and qualified. This training was supplemented by manufacturer training. The manufacturer issued certificates to the divers upon completion of the training.</p>	<p><i>Enbridge Line 5; Straits of Mackinac, MI; Status Update; Coating Repairs Work Plan; Summary of Activities Completed to Date</i></p>
<p>Deviations In conformance with the requirements of the <i>CRWP</i>, a deviation, relating to the width of the overlap of the Stricture Bandage® relative to the manufacturer's recommendation, was reviewed by the Enbridge Coating Specialist and the Manufacturer and was approved by the Project Manager.</p>	<p><i>Enbridge Line 5; Straits of Mackinac, MI; Status Update; Coating Repairs Work Plan; Summary of Activities Completed to Date</i></p>

On December 8, 2017, Enbridge submitted Addendum B to the *BIWP Rev 2*. EPA took no action on Addendum B; i.e., the EPA neither approved nor disapproved Addendum B.