

Corrosion ILI Program Summary Document

Line 5 WNO-WMA BH GEMINIMFL 2017 Issue 2

Version #: 4.0

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1.0 Purpose

This document will provide a summary of all aspects associated with the corrosion management program. Contents of this summary may include but it is not limited to:

- Summary of priority notification features
- Summary of the results of Lakehead system integrity remediation process

It is important to consider that this document is a working file that tracks learnings and/or status of the corrosion program. Therefore, all changes to the selection process should be included in the corresponding sections and a clear summary of the learnings and resultant actions should be documented within this document.

All sections that are not applicable to the ILI program should be deleted.

2.0 Scope

This record applies to the ILI reports indicated on the front page of this document. This document will reference Pipeline Integrity (PI) procedures and work instructions as part of the Fitness for Service (FfS) process defined further in Integrated Management System IMS-09.

3.0 Basic Inspection Remarks

Table 1 Previous Inspections

Year Month	ILI Corrosion Tool	ILI Vendor
1998	ML	PII
2008	MFL3	GE
2013	MFL3	GE
2014	TWS	Oceaneering
2017	GEMINIMFL	BH

Hazard specific susceptibility ranking for the line is:

External corrosion	Low
Internal Corrosion	Low
Axial slotting corrosion	Low

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4.0 Priority Notification for Imperative Condition

Were there any features reported meeting imperative condition?

☐ Yes
☒ No

If Yes, summarize actions taken for the priority notification(s).

Were there any features not reported as imperative condition that meet the imperative condition criteria?

☐ Yes
☐ No

If Yes, summarize additional actions taken to ensure a successful program.

Were the imperative condition confirmed by NDE?

☐ Yes
☐ No

Summarizes the ILI and field findings

5.0 Inspection Report Review (PI-36) and Remarks

Prepared by: Devin Engel Date: 02/12/2018

Approved by: Kaitlyn Korol Date:2/14/2018

Complete review based on PI-36 Data Quality Review In-Line Inspection.

Step 1.0 Was the data degraded?

☐ Yes
☒ No

If Yes, explain the cause and affected region of the data degradation. And follow PI-36 to document additional actions taken to ensure a successful program.

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Pre-launch inspections of the GEMINI™ tool were performed at Enbridge's work shop in North Straits, Michigan. After passing all of the Baker Hughes pre-run inspection procedures at the North Straits Station, the tool was launched at 10:32 on April 11, 2017. The tool entered the receive trap and was removed at 11:18 on April 11, 2017 at the Mackinaw Station. The GEMINI™ tool was received relatively clean with no apparent damage.

Field analysis indicated that a complete set of MFL data was collected for the run. All other systems including the odometers and inertial system functioned normally for the entire run.

Step 2.0 Do features align with expectations?

☐ Yes

☒ No

Use Appendix A of PI-36 as guidance.

1) No Matched features

Table 2 No matched features cases in PI-36

2017 GEMINIMFL BH	2013 MFL3 GE	Description	# of features	Comments
-	>= 40 %	No Match	0	-
-	1.0 < RPR < 1.05	No Match	0	-

2) Preliminary Unity Plot

There were no metal loss features to trend.

3) Near miss and safety and resource (defined in WI-13) outliers of Preliminary Unity Plot

There were no metal loss features to trend.

4) Is Orientation plot as expected?

☒ Yes

☐ No

If No, explain how it is not as expected

5) Unexpected feature type? ☒ Yes

☐ No

Based on the runs' PI-Listings, there were 0 external and 24 internal features in the 2017 tool run, while there were 194 external and 100 internal features in the 2013 tool run. This can be attributed to the different ILI vendors in 2013 versus in 2017 and their reporting specifications.

6) Change in density (+/- 20%) of features >=40%? ☐ Yes

☒ No

There were no features of depth ≥ 40 % in the 2017 run, and only one in the 2013 run.

7) At least 60% of the features are >= 20% deeper or >= 20% shallower than previously reported?

☐ Yes

☒ No

There were no features, matched based on their depths by Feature Match, that were ≥ 20 % deeper and three features that were ≥ 20 % shallower than previously reported or 33 % of the total matches.

8) Is severity, density or unexpected feature type driving investigative dig program and expedite excavation deadlines?

☐ Yes

☒ No

End of PI-36

6.0 Consent Decree Excavation Criteria

Prepared by: Devin Engel Date: 02/12/2018

Approved by: Kaitlyn Korol Date: 2/14/2018

Table 3 Consent Decree Corrosion Feature Excavation Selection

Criteria	Unmitigated features are selected for excavation (Y/N/NA)
Any corrosion feature with a depth >80% of the wall thickness of the joint where the feature is located	NA
Any corrosion feature with a Predicted Burst Pressure < the established MOP	NA
Any corrosion feature with a Predicted Burst Pressure < 1.39 MOP	NA
Any corrosion feature with a depth>50% wall thickness but < 80% WT	NA
For Line 3 outside an HCA, any corrosion feature with a depth >65% wall thickness but <80% WT	NA
Any corrosion feature with a remaining life < 5 years (Not applicable to Line 3)	NA
Any corrosion feature with a remaining life < 2 times the planned re-inspection interval	NA

Explain if "N" is selected for any criterion

Table 4 Remaining Unmitigated Features (Updated on February 14, 2018)

Remaining Unmitigated Features	
The worst depth (%)	27
The lowest Safety Factor	N/A
The shortest remaining life (years)	N/A

If CMFL, continue to **8.0 Fitness-for-Service calculations CMFL ILI (WI-37) and Remarks**

If not CMFL, go to section **10.0 Consent Decree Threat Integration Excavation Selection**

Continue to Step 10.0

Step 10.0 Document all inputs and assumptions

See Corrosion Assessment Sheet

Continue to Step 11.0

Step 11.0 Generate Fitness-for-Service without tool tolerance

See Corrosion Assessment Sheet

Continue to Step 12.0

Step 12.0 Generate Fitness-for-Service with tool tolerance

See Corrosion Assessment Sheet

Continue to Step 13.0

Step 13.0 Determine features remaining lives

Perform fatigue crack growth calculations per *WI-13 Crack Growth Calculations*. See Corrosion Assessment Sheet

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End of WI-37

7.0 Consent Decree Threat Integration Excavation Selection

Prepared by: Kaitlyn Korol Date: 2/14/2018

Approved by: Yanping LI Date:2/14/2018

Table 5 Consent Decree Threat Integration Excavation Selection

Criteria	Unmitigated features are selected for excavation (Y/N/NA)
Any dent located in the top of the pipeline that has any indication of metal loss, cracking, or a stress riser	NA
Any dent located in bottom of the pipe that has any indication of metal loss, cracking, or stress riser	NA
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 is less than 1.25 MOP	NA
Any intersecting or interacting crack/corrosion feature with a remaining life < 5 years	NA
Any intersecting or interacting crack/corrosion feature with a remaining life < 2X planned re-inspection	NA

Explain if "N" is selected for any criterion

8.0 Summary of Consent Decree Excavation Selection

Table 6 Summary of Consent Decree Excavation Selection

Criteria	Number of Features Issued
No digs required or issued	0

9.0 Updates based on Statistical Analysis of field data

Prepared by: _____ Date:

Approved by: _____ Date:

Are additional digs required based on statistical analysis of field data

☐ Yes

☐ No

If Yes, update Table 4 (Remaining Unmitigated Features) and Table 6 (CMFL Remaining Unmitigated axial slotting and seam weld anomaly A/B Features (if applicable)