

Record

Geometric ILI Summary Document

Line 5 ENO-EMA April 2018 BH Geopig

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1.0 Purpose

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

- ILI QA/QC results and remarks
- Summary of preliminary results, as well as learnings from previous excavation program
- Summary of preliminary field results and trending (if available)
- Back to back ILI inspection comparison
- Summary of priority notification features
- Summary of pressure restrictions associated with geometric features reported by the Inspection
- Summary of geometric features meeting “Code Criteria” as per Table 3 of PI-43
- Summary of geometric features meeting “Investigative Criteria” as per Table 4 of PI-43
- Summary of geometric features identified through threat integration
- List of geometric feature selected for detail feature review
- Risk mitigation assessment data.

It is important to consider that this document is a working file that tracks learnings and/or status of the deformation 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.

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 as part of the Fitness for Service (Offs) process defined further in Integrated Management System IMS-09.

3.0 Basic Inspection Remarks

Please indicate in this section important information regarding the inspection; contents of this section include but are not limited to:

- This is the sixth geometry inspection on the East Straits
- The last two geometric inspections were in 2017 and 2016; as per the PIPES ACT, the Straits will have annual corrosion and geometry inspections starting in 2016

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Table 1 Inspection Parameters

ILI inspection Parameter	Absolute units (in)	Alternative
Sizing accuracy	± 0.1	± 0.5 % OD
Orientation accuracy	NG	NG
Reporting Threshold	± 0.1	± 0.5 % OD
Minimum deformation detection threshold	NG	0.5 % OD
Circumferential sensor/arm spacing	1.26	50 sensors

- This inspection is considered to be a high resolution inspection level 2 (please note high resolution inspection level 1 is a circumferential spacing less than 25.4 mm (1 in), level 2 greater than or equal to 25.4 mm (1 in) and less than 50.8 mm (2 in), and level 3 greater than or equal to 76.2 mm (3 in))[1]

[1] Please note that the resolution levels defined is this document does not correspond to any industrial standard classification and have been defined for Enbridge internal use only.

4.0 Inspection Report Review (PI-47) and Remarks

Complete the review of the ILI report as per guidelines of PI-47

1. Was this a degraded inspection? ☒ No ☐ Yes

If yes, summarize what caused the inspection to be degraded and identify additional actions taken to ensure a successful program.

2 Inspection Summary

2.1 Operational Details

Baker Hughes Pipeline Inspections has mobilized equipment and a qualified crew to perform in-line inspections of the following system:

BHI Job Number	J2008-355
Pipeline Operator	Enbridge Energy, Limited Partnership
Segment Name	Line 5 North Straits EAST - Mackinaw
Launch Site	Ignace, Michigan
Receive Site	Mackinaw City, Michigan
Pipeline Nominal Diameter	20"
Product	Oil
Section Length	4.13mi
Date of GEOPIG™ Inspection	April 7, 2018
Duration of GEOPIG™ Inspection	51 minutes
Field Project Manager	Dale Simpson

Table 1. Operational Details

After passing all of the Baker Hughes pre-run inspection procedures, the GEOPIG™ was launched at 13:53 EDT on April 7, 2018. The tool entered the receive trap at 14:44 EDT on April 7, 2018. The GEOPIG™ tool was received relatively clean with no apparent damages.

Field analysis indicated that a complete set of caliper data was collected for the run. All other systems, including Inertial, odometer, pressure and temperature sensors functioned normally for the entire run.

Based on the vendor's inspection summary shown above, a complete set of caliper data was collected for the run.

2. Are there features meeting immediate reporting requirements not previously reported?

☒ No
☐ Yes

If yes, confirm that these features were identified and appropriate mitigation was initiated.

3. Is reported feature density what was expected?

☒ Yes
☐ No

If no, summarize additional actions, if required, taken to ensure a successful program

4. Do reported features align with known existing features?

☒ Yes
☐ No

If no, summarize additional actions, if required, taken to ensure a successful program

5. Based on Report Review, is the inspection acceptable for

☒ Yes

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further analysis? ☐ No

If no, summarize additional actions taken to ensure a successful program.

5.0 Priority Notification for Imperative Condition

Were there any features reported meeting imperative condition? ☐ Yes ☒ No

If yes, provide feature metrics and dig selection similar to Section 6.1

Were there any features not reported as imperative condition that meet the imperative condition criteria? ☐ Yes ☒ No

If yes, provide feature metrics and dig selection similar to Section 6.1

6.0 Summary of Feature Selection

6.1 SUMMARY OF FEATURES MEETING CODE CRITERIA (PI-43)

Table 2 summarizes all features meeting the code criteria as defined by PI-43.

Table 2 Features meeting code criteria

Category	Sub-Category d = depth D = Diameter	Number of Features Reported	Number of Features Issued for Excavation
Topside Dent Features	d > 6%	0	0
	D < 12", d > 0.250" D ≥ 12", 6% ≥ d ≥ 3%	1	1
	D < 12", d = 0.250" D ≥ 12", 3% > d ≥ 2%	0	0
	Associated with metal loss, cracking, or stress concentrator	0	0
Bottom Side Dent Features	Bottom of pipe dent, d > 6%	0	0
	Associated with metal loss, cracking, or stress concentrator	0	0
Dents Affecting Pipe Curvature at a Weld	D < 12", d > 0.250" D ≥ 12", d ≥ 2% Associated with girth weld	0	0
	D < 12", d > 0.250" D ≥ 12", d ≥ 2% Associated with long seam weld	0	0
Totals		1	1

Assessment for the one 3.9%OD topside dent reported has already been inspected by ROV and divers and a dent was confirmed with two minor gouges in it (no cracking). The gouges were hand filed and removed at <10% wt. Additionally, one mill surface irregularity not associated with the dent and two linear features and one scrape not associated with the dent were filed down and removed; there are no longer any surface indications present. This plain dent will be repaired with a composite wrap repair and recoated.

6.2 SUMMARY OF FEATURES MEETING INVESTIGATIVE CRITERIA (PI-43)

Table 3 summarizes all features meeting the investigative criteria as defined by PI-43.

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Table 3 Features meeting investigative criteria (PI-43)

Category	Sub-Category/Comments	Number of Features Reported	Number of Features Issued for Excavation
Other Features of Interest	Top of pipe geometric anomalies in close proximity (within 10' axial and 60° radial positions)	0	0
	Bottom of pipe dents or geometric anomalies in Close Proximity (within 5' axial and 60° radial positions)	0	0
	Multiple Apex Dent	0	0
	Other dent/geometry features of interest including buckles, wrinkles and ovalities (Ovalities excavation selection based on Minimum Allowable ID as per OMM Book 3 05-03-03)	0	0
Interacting Features Identified Through Threat Integration Processes	Dent with possible stress concentrator	0	0
Totals		0	0

6.3 TOTAL DIG SELECTION SUMMARY

Table 4 Total number of digs selected based on Code Criteria and Investigative Criteria

Criteria	Number of Features Reported	Number of Features Issued for Excavation
Code	1	1
Investigative	0	0
Totals	1	1

7.0 Features Identified Through Data Integration (PI-32)

Please include in Table 5 all features that have been identified as potential associated with secondary feature. Also, indicate which features require detail feature review. It is important to note that all features identified as requiring detail feature review should be included in the detail feature review document.

Table 5 List of Features Identified as Potentially Associated with Metal Loss Indications Through Data Integration (PI-32)

No features interacting based on the latest threat integration.

Feature ID	GW Number	Actions and Remarks	Detail Feature Required (Y/N)
NA			

8.0 Graphical Representation of the Integrity Status of the Line

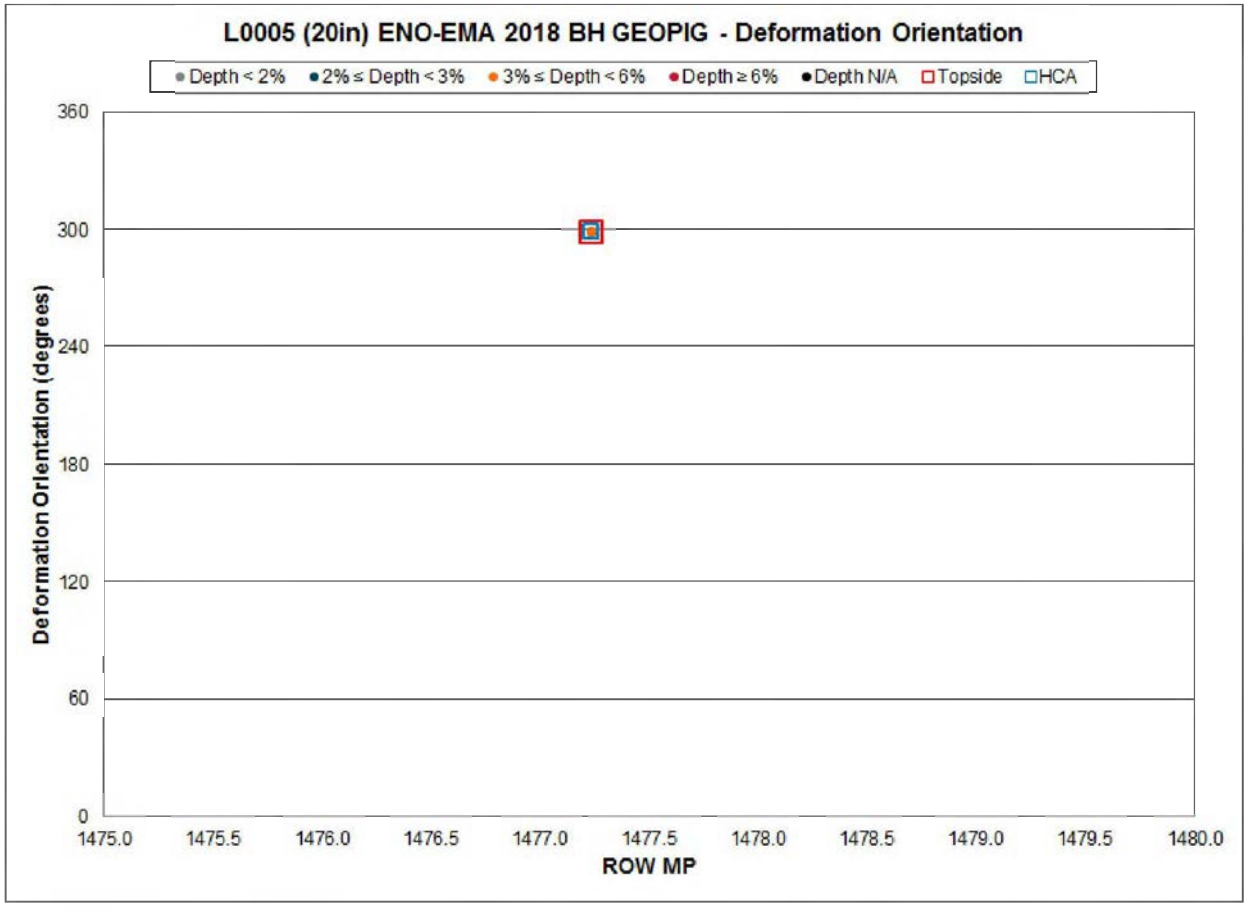


Figure 1 Orientation of all reported features on the pipeline system based on the 2018 Geopig program.

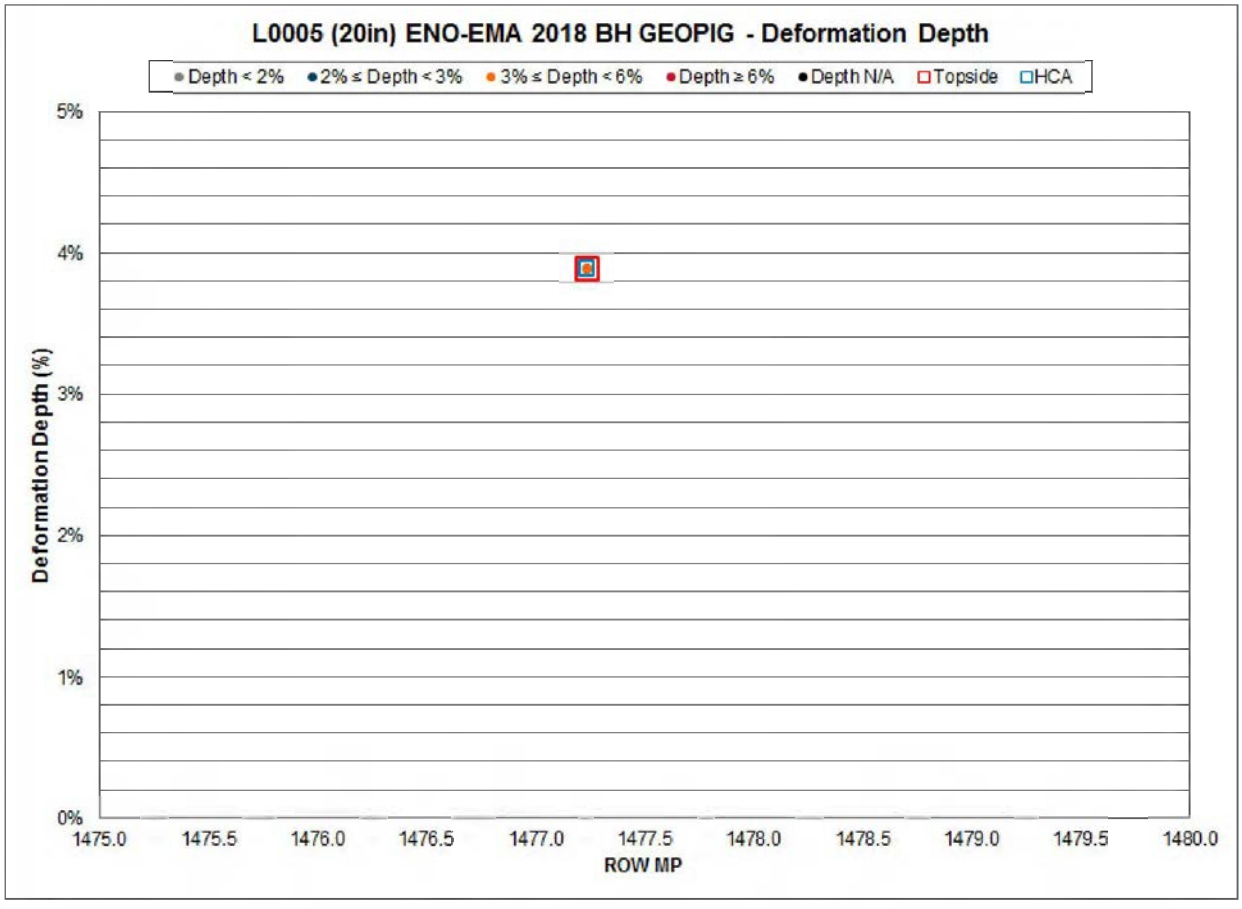


Figure 2 Depth of all reported features on the pipeline system based on the 2018 Geopig program.

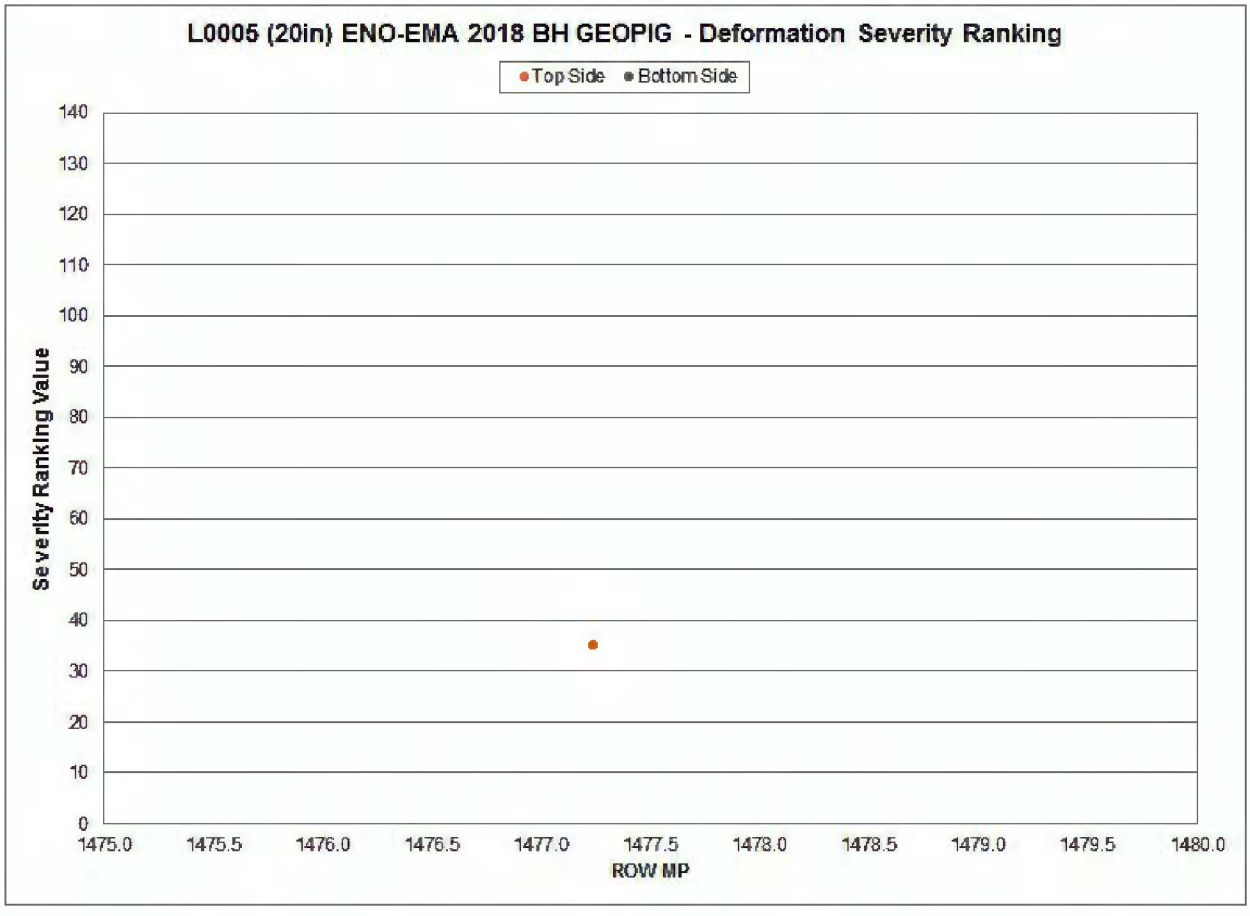


Figure 3 Severity ranking of all reported features on the pipeline system based on the 2018 Geopig program.

9.0 Field Trending

Based on field trending, no features were identified in field that were not previously identified on the Dig List.

Criteria	Date	Comments
Trending Completion Date	9/24/2018	Last NDE report approved on 9/20/2018
Trending ILI and Field Validation Date	5/1/2019	No actions required