

Crack ILI Program Summary Document

Line 05 ENO-EMA 2019 NDT UCc

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1.0 Purpose

This document serves as a checklist and summary of Crack ILI assessment results, with provisions for commentary.

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 (FfS) process defined further in Integrated Management System. Information found elsewhere within PI documentation is not to be duplicated herein.

3.0 Basic Inspection Remarks

This inspection is the fourth circumferential crack inspection for this section of pipeline. The most recent prior inspection was conducted in April 2018 with the NDT UCc.

The minimum detection threshold for this is inspection is:

- 30 mm long by 2 mm deep at weld
- 30 mm long by 1 mm deep in base metal

Tool depth tolerances are:

- ± 1 mm depth at 80% confidence at weld
- ± 1 mm depth at 80% confidence in base metal

Is this a Lakehead regulated line segment?

☒ Yes

☐ No

4.0 Priority Notification for Imperative Condition

Were there any features reported meeting imperative condition?

☐ Yes

☒ No

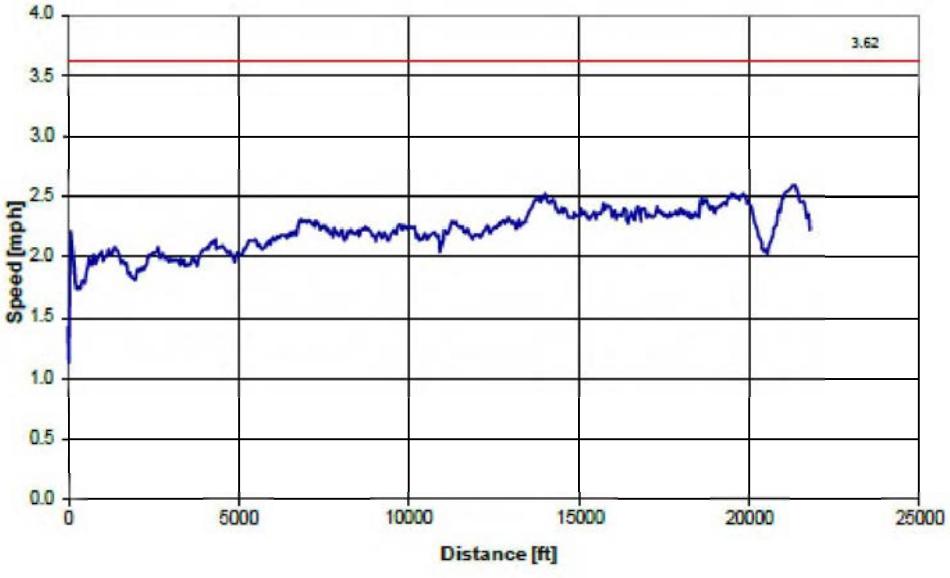
5.0 Inspection Report Review (PI-36) and Remarks

Complete steps in PI-36, adding explanatory notes below for any data quality issues, corrective actions (if applicable), and why inspection results meet expectations.	☒ Complete

Inspection details:

Robot type & inspection technology	Evo 1.0 UCc
Run ID	ENBNM19U0
Insertion of the robot	06 Mar 2019, 08:35
Launch of the robot	06 Mar 2019, 09:15
Arrival of the robot	06 Mar 2019, 11:21
Retrieval of the robot	06 Mar 2019, 12:45
Speed of the robot[1]	Min. 1.13 mph Avg. 2.21 mph Max. 2.59 mph
Condition of the robot	No obvious malfunctions
Amount of debris	None

Speed Profile:



Data was recorded by all channels, covering the entire circumference and length of the inspected distance.

Based on the statistics and results of the data quality assessment it can be concluded that the quality of the recorded data is good, complete and has consistent amplitudes over the total inspection distance.

The stated performance specifications can be achieved over the entire pipeline length and circumference.

The inspection run is classified as successful.

1 crack-like anomaly was entered into the 2019 listing and into the 2018 listing.

Crack-like anomaly with ID 5926 Run ID / Inspection year	Depth (mil)
ENBNA14U0	35
ENBNA17U0	24
ENBNA18U0	43
ENBNA19U0	51

1 crack-like anomaly was entered into the 2018 listing but not into the 2019 listing.

Crack-like anomaly with ID 19367 Run ID / Inspection year	Depth (mil)
ENBNA14U0	24
ENBNA17U0	79
ENBNA18U0	63
ENBNA19U0	20

In all data sets, this anomaly (ID 19367) shows a circumferential length < 30 mm and therefore has dimensions outside the UCc feature specification. The depth of the feature in the 2019 inspection was 20 mil, which is below the reporting thresholds (depth and length) and thus was not included in the final feature listing, but nevertheless shown in the table above for comparison purposes.

The inspection data and tool performance are trusted based on the fact that girth welds and features are consistently detected in each annual inspection and the grind features from the 2018 anchor strike NDE are identified.

6.0 ILI Fitness-for-Service Evaluation (PI-37 or WI-54) and Remarks

The Fitness for Service Evaluation checklist is as follows:

WI-32 Threat Integration is complete and other threats interacting with crack features are addressed in Detailed Feature Review	☒ Complete
For axial cracks, complete steps in WI-37 Axial Crack Fitness for Service Calculations. For circumferential cracks, complete steps in WI-54 Circumferential Crack Fitness for Service Calculations. See "Instructions" tab in the Crack ILI Assessment tool for detailed instructions specific to threat type (axial or circumferential).	☒ Complete
Ensure comments columns in the Crack ILI Assessment Sheet have appropriate entries for unique features of interest	☒ Complete
Any additional features meriting a detailed review have been assessed with narrative and any figures in this section	☒ Complete
For axial cracks, calculate final burst pressures for features, upload to OneSource	☐ Complete ☒ N/A
Consult Crack SME if special circumstances or deviations from standard analysis methods are employed	☐ Complete
Was an Engineering Assessment generated for this program?	☐ Yes ☒ No

No reported circumferential crack features are reported to be interacting with deformations or metal loss.

7.0 Mitigation Selection (PI-38) and PI Listing Approval

Select features for mitigation based on PI-38 and WI-38.

Complete steps in PI-38 Mitigation Selection and PI Listing Approval, including steps of WI-38 Mitigation Selection, Crack, In-Line Inspection	☒ Complete
Ensure comments columns in the Crack ILI Assessment Sheet have appropriate entries for features to be mitigated.	☒ Complete
Any additional features meriting a detailed review due to mitigation selection process have been assessed in the previous section.	☒ Complete
The Crack ILI Assessment tool has generated the before and after mitigation program Fitness for Purpose graphs and they have been checked for accuracy and completeness	☒ Complete
Pressure restrictions and safe excavation pressures have been determined and entered. If required, a pressure restriction study has been completed. Any pressure restrictions for circumferential cracks have substantiating notes in the ILI assessment tool or added below.	☒ Complete
The Crack ILI Assessment tool has created a Dig Selection Summary Table and has been checked for accuracy and completeness	☒ Complete
Priority Dig Total: N/A Phase 1 Dig Total: 0 Phase 2 Dig Total: N/A	
Consult Crack SME if special circumstances or deviations from standard analysis methods are employed. This will usually involve writing an Engineering Assessment per PI-150, with crack SME approval.	☐ Complete
WI-15 Below Grade Appurtenances steps are followed.	☒ Complete
A crack program summary stakeholder meeting (Crack SME, PI Planning Supervisor, Dig Program) has been held and any action items addressed. Invite crack SME to review this document.	☒ Complete

SME Approval Box: Reviewed and Approved?	☒ Yes
Date of Approval: 8/7/2019 Lyndon Lamborn	☐ No

8.0 Tool Bias, Re-Inspection Interval, Dig Deadline Revisions, Trending

Is the current crack re-inspection still appropriate? [Consider trending, tool bias adjustments, pressure cycling changes, EA results, regulatory change, hydrostatic test/JSF analysis, feature density, other per PI-41]	☒ Yes ☐ No

Date: 8/2/2019 **No tool bias required. Inspection interval is still valid.**

9.0 Conclusions

Only one circumferential crack was reported in the 2019 UCc inspection. Based on conservative assumptions the stress based safety factor (with TT) is > 2 , the tensile strain capacity (with TT) is 1.57, and the remaining life (conservatively assuming 0.25 mm/yr growth) is 72.8 years.

SME Approval Box: Tool Bias, Trending, Dig Deadline Extensions, Reviewed and Approved? Date: 8/7/2019 Lyndon Lamborn	☒ Yes ☐ No