Enbridge Energy, Limited Partnership
Integrity Management Program - Line 5 Straits of Mackinac
2017 Coating Inspection at Support Anchor Locations
Status Update Nov. 13, 2017

As the 2017 safe working season on the water is coming to an end, the following report provides an update of the completion status and findings related to the 2017 coating investigation project being conducted at all of the support anchors along the Line 5 dual pipelines across the Straits of Mackinac. The work has been completed without incident to worker or public safety, crews will soon begin demobilizing for the season, and plans will be developed for continuing the work in 2018.

The core integrity management program encompasses a range of continual inspections, diagnostics and analytics involving a variety of in-line inspection devices, underwater scans, geotechnical evaluations, and monitoring of all operating conditions. As part of the core program in 2017, the dual pipelines were also hydro-tested to the same test level as when the line was originally constructed. The results of any of these comprehensive examinations and safety confirmations from the core program have been previously shared with the State and can be resubmitted if desired in addition to this report.

Coating Inspection

Crews were mobilized in August 2017 to inspect the pipeline coating on Line 5 using work barges, divers, support teams, and remotely operated cameras (ROV) which provided live feed/recording to technicians on-board the barges. The scope of the project is to examine the condition of the coating at all 128 previously installed pipeline support anchor locations. In 2017, all of these locations have been inspected by the ROV. Subsequently, a total of 48 of the locations have been examined by divers to gather further data in addition to the ROV inspections. The late season weather will limit the diver inspections to perhaps only a few more locations.

Of the support anchor sites investigated by the divers, bare metal was discovered at 3 locations (E-10, E-13, W-3 as listed in Table 1). The total cumulative area of bare metal at these locations was 0.831 ft^2. It was confirmed that corrosion had not occurred at any of these locations.

In addition, at various of the anchor inspection locations as shown in Table 1, calcareous deposits were observed. Calcareous deposits are known in our industry and other industries to be a typical byproduct of the cathodic protection of steel surfaces in marine environments. The deposits are a demonstration that the cathodic protection current is effectively protecting the steel and as it builds up, serves as an additional protective layer on the steel. It is not typical practice to remove calcareous deposits but, as shown on Table 1, some were removed to confirm the condition of the pipe beneath them and gather samples to study the deposit chemistry. At all locations where the deposit was removed, bare pipe was revealed and it was confirmed that no corrosion had occurred. Calcareous deposits are not considered fully equivalent to a coating system but the risk of corrosion is still effectively managed between the deposits, the cathodic protection system and regular in-line-inspections. As confirmed by cathodic

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protection readings, the cathodic protection system is working to continually protect the pipe and our plan is to catalogue all calcareous deposits and develop a plan to manage them over the winter. Once again, corrosion has not occurred at any of the locations.

Any bare spots found or intentionally created through removal of the deposits have been or will be recoated. All but 0.330 ft^2 of bare area at anchor locations is anticipated to be recoated prior to winter weather in 2017, the time at which work crews will no longer be able to safely access the work site. As previously communicated to the State regarding the Biota Study, which is an examination of the aquatic biota (mussels), the coating has also been investigated at all biota investigation sites. From the biota investigation sites, there were 8 sites in total where either a small area of bare pipe was found or where the pipe was made bare because of intentional removal of calcareous deposit. Of these 8, all but one is expected to be repaired prior to demobilization this season. The one remaining location will require a State permit in order to allow the removal of lake bed soil from around the bottom of the pipe prior to recoating. The area of this bare spot is 1.64 ft^2 and will be protected with cathodic protection and recoated in 2018 once the permit is granted.

The next key step involves the collation and organizing of all data gathered from the ROV and diver inspections. The data will be assessed by both in-house and by third party scientists. The information gathered in this investigation will be incorporated alongside other information gathered from the other core integrity program activities. The evaluation will examine the observations regarding any bare spots and calcareous deposits and assess their relationship to operating conditions, existence of mussels, historic maintenance activities, or other factors that are identified. Beyond this summary update, further reporting will be provided to the State.

Prior to remobilization in 2018, a high resolution in-line inspection (ILI) tool will be launched into both of the dual pipelines in order to measure for corrosion. The inspection device will provide a millimeter by millimeter full scan of the pipes and will do so for both the external and internal surfaces. The report will be provided to the State.

Summary

Coating inspections have been conducted at all 128 support anchor installations. At all locations, the ROV inspection has been completed. Diver inspection has been completed at 48 of 128 support anchor locations. All bare area, either as-found or intentionally created as part of the support anchor investigation as well as the Biota Study, has been recoated except for a cumulative total area that is less than 2ft^2 which will be recoated when the work resumes in 2018. Of this remaining area, approximately 83% relates to the one biota investigation location where a permit will be required in order to dig the soil at the base of the pipe to apply the coating. No corrosion has occurred at any of the examined locations.

ENBDNR0003379

This report provides a summary status update of the work conducted in 2017. An interim Final Report will be submitted within 30 days of completion of the 2017 site work. The Report will detail the following:

a. Progress of the Work Plan, including percentage of completion.

b. Summary of the remainder of the Work Plan to be conducted in 2018.

c. Summary of projected or anticipated deviations from the Work Plan as a result of findings from 2017.

d. Timeline for re-starting operations in 2018.

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Table 1 – Diver Inspection Results at Support Anchor Installations

Anchor Label	Area of Bare Steel As-Found (ft^2)	Area of Bare Steel Created by Calcareous Deposit Removal (ft^2)	Area Of Calcareous Deposit Remaining (ft^2)
E-1	-	***0.0245***	-
E-2	-	***0.043***	-
E-3	-	-	0.042
E-4	-	-	0.06
E-5	-	***0.01***	-
E-6	-	-	0.076
E-7	-	***0.0511***	-
E-8	-	-	0.39
E-9	-	-	0.44
E-10	***0.63***	***0.106***	-
E-11	-	-	0.143
E-12	-	-	1.07
E-13	***0.172***	-	3.5753
E-14	-	-	-
E-15	-	-	0.0006
E-16	-	-	0.054
E-17	-	-	0.01
E-18	-	-	0.634
E-19	-	-	0.634
E-20	-	-	0.06
E-21	-	-	0.074
E-23	-	-	0.394
E-24	-	-	0.0004
E-25	-	-	-
E-26	-	-	-
E-27	-	-	0.7
E-28	-	-	-
E-29	-	-	0.0614
E-30	-	-	0.027
E-67	-	-	1.02
W-1	-	-	-
W-2	-	-	0.1904
W-3	***0.029***	-	0.21
W-4	-	-	-
W-5	-	-	0.0408
W-6	-	-	0.0004
W-7	-	-	0.0024
W-8	-	-	0.025
W-9	-	-	0.403
W-10	-	-	1.2373
W-11	-	-	2.644
W-12	-	-	0.1732
W-13	-	-	0.035
W-57	-	-	0.204
W-58	-	-	0.0908
W-59	-	-	0.358
W-60	-	-	0.217
W-61	-	-	0.2562

* Coating repairs will be completed at all bare metal locations identified in ***italics*** (E-1, E-2, E-5, E-7, E-10, E-13 and W-3).

Repairs at E-10 will be completed in 2017, weather permitting.

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