Enbridge Energy, Limited Partnership

Line 6B Integrity Verification and Remedial Work Plan

Prepared for

Pipeline and Hazardous Materials Safety Administration

(PHMSA)

September 26, 2010

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Line 6B Integrity Verification and Remedial Work Plan

1. INTRODUCTION

On July 26, 2010, a pipeline leak was discovered on Enbridge Energy, Limited Partnership's ("Enbridge") 6B pipeline, approximately one mile downstream of Marshall Station near MP 608 in Calhoun County, Michigan (the "Marshall incident"). In response to the Marshall incident the Pipeline and Hazardous Materials Safety Administration ("PHMSA") issued a Corrective Action Order on July 28, 2010. Subsequently on September 22, 2010 PHMSA issued an Amendment to that Corrective Action Order stipulating additional requirements relative to Line 6B's integrity analysis and remediation.

In accordance with and in response to the original and amended Corrective Action Orders[1], Enbridge has prepared this Integrity Verification and Remedial Work Plan ("IVP") for the U.S. portion of Enbridge's mainline 6B pipeline system ("Line 6B"). Specifically, this IVP addresses all those items for response identified in Items 5A through J of the CAO, including:

- Reference to integration of the results of the metallurgical analysis being performed by the National Transportation Safety Board ("NTSB"); **(CAO Item 5.A)**
- A review of Line 6B's failure history over the past 20 years (**CAO Item 5.B**);
- An evaluation of potential threats to the integrity of Line 6B together with testing and integrity verification measures, as well as a schedule for same (**CAO Items 5.C, 5.E and 5.F);**
- Project plans and schedules for repairs of all remaining anomalies identified in the CAO, as well as a description of how those anomalies will be evaluated (including the inspection and repair criteria (**CAO Items 5.D, 5.F, 5.G and 5.H**);
- A plan and schedule for specific in-line inspections ("ILI") of Line 6B (**CAO Items 5.F and 5.I**); and
- A plan and schedule for the complete replacement of the pipe in the entire St. Clair River crossing to be completed (subject to permitting and other factors) within one year of restart (**CAO Items 5.F and 5.J**).

A Table of Concordance for the CAO and this IVP has been included at the end of this document for PHMSA's ease of reference.

[1] *Hereafter the July 28th Corrective Action Order and the September 22, Amendment to the Corrective Action Order are referred to collectively as the CAO.*

1.1 NTSB and Enbridge Investigations Currently Underway

At the present time Enbridge has not drawn any conclusions respecting the cause of the Marshall incident. Metallurgical and other laboratory work is ongoing under the NTSB's direction. Enbridge, as a participant in that agency's investigation, has been cooperating with the NTSB and the other parties to the investigation to assess the cause of the incident and will take future steps as warranted to enhance the safety of the pipeline based on that assessment. Some of the activities being undertaken by Enbridge concurrently with this IVP are: in-line inspections, strategic pipeline excavations, and engineering analysis. As details from the metallurgical and other assessments become available from the NTSB, Enbridge will modify activities as appropriate and integrate those results into this IVP as required by item 5.A of the CAO.

This IVP includes information derived from Enbridge's investigations underway both prior to the July 26, 2010 incident as well as activities taken subsequent thereto. In accordance with the CAO's Item 6, the IVP will also be supplemented with additional post-restart data and investigative findings. Many of the activities in this IVP have been underway well prior to the preparation of this document and progress on specific items is detailed herein.

2. INTEGRITY VERIFICATION ACTIVITIES CONDUCTED TO DATE

Enbridge has conducted a formal, active integrity management program on Line 6B throughout its history. The existing level of integrity information on Line 6B is extensive and provides a foundation for integrity planning. To supplement the historic integrity information gathered from Line 6B integrity programs, immediately upon occurrence of the Marshall incident, Enbridge undertook a series of analyses and investigations in response thereto. These analyses included a detailed review of all existing data and processes, including those associated with feature assessments and repairs, integrity planning, vendor reports, and failure history. Significant measures were taken to ensure that the restart of Enbridge's Line 6B will be executed and completed in a safe and operationally sound manner.

The actions outlined in sections 2.1 through 2.5 below have already been completed by Enbridge and previously reported to PHMSA:

2.1 Examination of the Pipeline at the Failure Location

In accordance with Item 2 of the CAO, Enbridge conducted a complete examination of the pipeline, including exposure of the pipeline extending 50 feet on either side of the failed section to examine for corrosion, coating conditions and other issues that can be identified through external physical inspection. In addition, the examination included verification of cathodic

protection for the area where the failure occurred. The review also involved correlating the observed conditions with previous ILI. No unusual conditions were identified and all areas were determined to be acceptable with no repairs required. The 50 foot examinations on the existing pipe upstream and downstream confirmed that the adjacent pipe did not require repair or replacement.

2.2 Repair of the Pipeline at the Failure Location

Upon completion of the above examination, a 51 foot section of new pipe was installed to replace the failed section. The pipe installed was manufactured by JFE Steel Corporation and met API 5L, Grade X-70, 0.375-inch wall thickness specifications. The details of Enbridge's examination and repair processes were submitted to PHMSA for review and approval on August 31, 2010.

2.3 Integrity Validation Pressure Test

On August 30, 2010, Enbridge successfully completed an integrity validation pressure test along 13-miles of Line 6B, under the oversight of PHMSA as per item 2 of the requirements in PHMSA's letter to Enbridge dated August 10, 2010 (the "August 10 Letter"). The approved Hydrostatic Test Plan covered the portion of Line 6B from MP 607 to MP 620. In accordance with the Hydrostatic Test Plan Enbridge injected water into the tested pipe section and applied sufficient pressure to reach a minimum 450 psig test level. Testing consisted of a continuous 8-hour hold at the specified test pressure.

The integrity validation pressure test was successful and the pressure remained constant at 455 psi throughout the test period. Following completion of the pressure test, PHMSA did not direct further repairs or remediation to the tested section of Line 6B. The interim operating discharge pressure proposed by Enbridge for all of the segments will be lower than the 450 psig target pressure test level. The results of Enbridge's pressure test were submitted to PHMSA on August 31.

2.4 Additional Investigative Excavations and Specifically Requested Anomaly Information

Pursuant to the CAO and other PHMSA guidance, Enbridge was required to determine, investigate and remediate as necessary, at least four additional anomalies on Line 6B subject to similar operating parameters as the anomaly associated with the Marshall incident.

Six sites were selected based on the information available at that time, including the ILI results from the most recent ILIs which occurred in 2005, 2007 and 2009. The sites were selected with the intent of advancing the investigative process and further affirming the safe operability of the entire pipeline at the proposed interim reduced operating pressure approved by PHMSA in the restart plan. The excavation and examination of the pipe at the six additional investigative sites were consistent with the conditions typically observed and expected from existing integrity

programs. Enbridge has already provided PHMSA with a detailed analysis of specific findings resulting from the investigative excavations and a description of the repairs.

In addition to the sites selected based on similar operating parameters to the section of pipe that failed, Enbridge has undertaken nineteen additional investigative excavations at sites selected by Enbridge immediately following the incident. The investigative excavations are progressing and results from those sites will be provided to PHMSA. Inspection and repair criteria to be used in evaluation of anomalies that are excavated are discussed below in section 3.1 as per Item 5.D of the CAO.

2.5 Integrity Assessment for the Entire Line 6B

In response to Item 5.C of the CAO and related PHMSA requests, Enbridge prepared and submitted to PHMSA on August 31, 2010 a Line 6B Integrity Summary Assessment Report that analyzed all known and potential features on Line 6B. Section 4 of that Report provided an Operational Reliability Assessment with technical detail that demonstrates the capability for safe start-up and continued operation of the pipeline at lower-than-normal operating pressures relative to known existing features on Line 6B. The Report summarized the following potential integrity issues relative to Line 6B, given its design and operating history: (1) Stress Corrosion Cracking, (2) Long Seam Fatigue Cracking, (3) External Corrosion, (4) Internal Corrosion, (5) Dents, and (6) Girth Weld Cracking. The assessment provided detailed information about Line 6B's susceptibility to those conditions, ability to detect those conditions, growth rates for any existing features, and specifics on Enbridge's integrity management plan with respect to those conditions on Line 6B. The Report concluded that the pipeline is reliable and ready for restart and operation at reduced pressure. As required by Item 5.E of the CAO, section 3.6 of this IVP provides additional detail regarding the continuing long-term periodic integrity assessment testing and integrity verification measures to be employed by Enbridge on Line 6B.

2.6 Consideration of Failure History of Line 6B

The failure history of the pipeline is a key component of the reliability assessment and is discussed further in the next section as per Item 5.B of the CAO. Line 6B has experienced only two pipe failures over the past 20 years; the Marshall Incident and a small leak that occurred in 1995. Section 3 of this IVP describes plans to confirm that the remainder of the pipeline is not susceptible to more failures.

Details of the two leaks are set forth below:

2.6.1 Marshall

On July 26, 2010 Enbridge discovered that a rupture had occurred on Line 6B resulting in the release of what has been initially estimated to be approximately 19,500 barrels of crude oil. The failure occurred at Mile Post 608, approximately one mile south of the town

of Marshall, Michigan. The section of Line 6B that included the failure segment was removed and a new section welded in place. The NTSB took custody of the section of pipe removed and is currently investigating the cause of the failure, as noted above.

Figure 1 – Failed Pipe Section

Prior to the excavation of the failed pipe section, a close interval cathodic protection survey was completed. The level of cathodic protection was found to meet the requirements.

The pipeline was also examined for 50 feet on either side of the failed section for corrosion, coating conditions, and other issues that can be identified through external physical inspections. The review also involved correlating the observed conditions with previous ILI inspection data. No unusual conditions were identified and all areas were determined to be acceptable with no repairs required.

2.6.2 MP 671.90

At MP 671.90 on June 26, 1995, during the investigative excavation of an external corrosion indication from in-line inspection results, Enbridge discovered crude oil between the

pipeline coating and the pipeline with an estimated release volume of 0.03 gallons. The cause of the leak was determined to be external corrosion. This release did not meet PHMSA's volume-out criteria for reportable releases at the time. This was the only other leak on Line 6B since January 1, 1990.

In accordance with the requirements of the CAO's Item 5.B, additional details on this release are included in the attached Line 6B Release Summary Report, together with its attachments.

2.7 Safe Start-up

Completion of a root cause analysis accident investigation underway by the NTSB will provide further relevant information and this IVP will be amended, as necessary, based upon the results of that analysis. Until that information is provided, this IVP takes a generalized and comprehensive approach to the possible contributing causes of the Marshall incident as well as other potential concerns based on known conditions, and sets forth a program of inspection and remediation actions for the entire Line 6B.

2.7.1 Interim Reduced Operating Pressures

As per PHMSA's stated directives to Enbridge in Item 2 of the CAO, Line 6B operating pressures at restart will be at reduced levels. The lower operating pressures in effect upon restart provide a significant margin of operational safety. The Specified Minimum Yield Strength (SMYS) for Line 6B is 866 psig. The original hydrostatic pressure test for the line at installation established a Maximum Allowable Operating Pressure (MOP) of 624 psig in accordance with 49 CFR Part 195. As discussed in earlier filings, Enbridge had previously self-imposed pressure reductions below the MOP at points along the pipeline while plans were under consideration to remediate, repair and/or replace certain segments between Stockbridge Station and Marysville, Michigan near the St. Clair River.

Upon Line 6B's restart, the operating pressures will be *further* reduced to be below the test pressure of the hydrostatic pressure test conducted along 13-miles of Line 6B on August 30, 2010. Subject to the terms of the restart plan, the reduced pressures will be 20% below the operating pressure at each station at the time of the Marshall incident. A pressure reduction in operating pipelines is a well-validated risk reduction mitigation measure used by industry and accepted by U.S. regulatory agencies and international research and technical organizations. The significantly lower discharge pressures proposed for Line 6B on an interim basis are less than 50% of the Specified Minimum Yield Strength ("SMYS") of the entire Line 6B. This provides a significant safety margin pending future metallurgical results of the incident investigation by the NTSB and additional future

remediation and repair programs that will be conducted by Enbridge under the oversight of PHMSA.

2.7.2 Restart Plan

On September 21, 2010, Enbridge submitted the revised restart plan for Line 6B. PHMSA approved the restart plan on September 22. The restart plan outlines the measures to be undertaken by Enbridge, including preparatory notifications, supplementary field monitoring and supplementary Control Center activities in advance of and in connection with Line 6B restart. The document also outlines all activities associated with Control Center operations and supplemental activities in response to the CAO including system modifications, personnel training, SCADA/PLC alarms & shutdown protection, procedures for column separation, material balance system enhancements, as well as pre-start checklists for assuring all authorization and communications have been taken. Throughout the pre-start and restart activities, the Control Center procedures will be monitored and observed by a third party verification consultant, Stantec Consulting Ltd, which was chosen by PHMSA from among four international engineering firms with expertise in pipeline design, control and operations.

2.7.3 Continual Safety Confirmation

Given that the cause of the failure is still under investigation by the NTSB, in response to Item 5.C of the CAO Enbridge has analyzed potential growth mechanisms reflective of all potential issues to ensure that Line 6B will remain safe following restart. Growth rate calculations were conducted to assess the hypothetical assumption that there could have been an undetected, "just surviving" feature in the pipeline that was very close to failure at the operating pressures prior to the Marshal incident. The intent of this assessment is to confirm the safety margin provided by the proposed interim reduced operating pressures, which are set to a level that is 80% of the pressures prior to the Marshall incident.

The detailed technical calculations for the assessment were provided to PHMSA on September 7, 2010 in response to the PHMSA letter of September 3, 2010 regarding Enbridge's restart plan. The calculations describe the remaining life of hypothetical near-critical features, if they were to exist on the pipeline. The report calculated the life of the hypothetical features with inputs that would drive the features to fail in the least amount of time in order to come up with a conservatively biased minimum time to failure for the hypothetical flaws.

The data was calculated for each station section and utilized the actual pipeline operating discharge pressures at each station prior to failure. The approach was to assume a hypothetical feature that would fail at the last station pressure achieved and then grow it through modeling calculations to a feature that would hypothetically fail at the new

operating pressures and based on the worst recorded cycling. The report explained the various coefficients and the range of conservatism applied within selection of those coefficients.

2.8 Summary of Reliability Assessment

The Enbridge integrity management program is designed to locate and remediate any integrity feature that does not meet internally specified and/or regulated safety levels. Prior to the Marshall incident, Enbridge had experienced one minor leak on the mainline pipe over the past twenty years. While Enbridge has amassed a great deal of information regarding the integrity condition of Line 6B, Enbridge recognizes that the magnitude of a system failure such as the Marshall incident, albeit rare, is indicative of the need for extensive further validation, as detailed in this IVP.

The integrity verification activities taken to date -- including the validation hydrotest, investigative excavations, integrity assessment with consideration to failure history, a comprehensive restart plan, and the calculation of hypothetical feature growth rates -- demonstrate that the line remains fit-for-service at the proposed interim reduced operating pressures. In the following sections of this IVP, Enbridge sets forth detailed plans and schedules for further integrity management measures as well as additional remediation and repair, and further integrity assessment testing and evaluation of Line 6B, in accordance with the requirements of CAO Items 5.C through 5.J.

3. PLANNED INTEGRITY VERIFICATION AND REMEDIAL WORK PLANS

The methods and schedule for further integrity verification of Line 6B are outlined in this section, in accordance with the requirements of CAO Items 5.C through 5.I.

3.1 Post Incident Investigative Excavations

Enbridge provides the following response to Items 5.C and 5.D of the CAO: As described in Section 2.4 above, Enbridge has already reviewed ILI data from the most recent in-line inspections occurring in 2005, 2007 and 2009, and selected locations for investigative excavations. The results of the post incident investigative digs completed thus far are consistent with the conditions typically observed and expected from existing integrity programs. Enbridge selected further sites based on the historical in-line inspection data and the list of those sites has been provided within the Submission to PHMSA of September 7, 2010. The list of those sites is also provided in Appendix 1 and includes a schedule for the completion of the further investigative excavations.

The selection of the sites provided in Appendix 1 and the September 7, 2010 submission focused on features from each of the individual ILI runs coincidental to features at the Marshall site.

Other factors employed in identifying the excavation locations included: feature growth rates, calculated failure pressure, proximity to pump stations and environmental conditions. Beyond those excavations, Enbridge will continue to select sites from the currently available ILI data sets and continue to integrate these results into the overall engineering integrity analysis of Line 6B and calibration review.

Further, on September 7, Enbridge also provided to PHMSA a list of investigative excavations to conduct analysis of narrow corrosion along the pipe's long seam. This specific feature has normally been managed as a component of the regularly planned corrosion program; however supplemental activities will be conducted alongside investigations associated with the incident in order to combine work crews and collate observations from all possible sources on Line 6B.

The post-incident investigative excavations are ongoing and the schedule for their completion was provided to PHMSA on September 7 and is also provided in Appendix 1. The majority of these investigative excavations are planned for completion by October 31, 2010. The information from these sites will provide further calibration information regarding the susceptibility of the pipe line to failure resulting from those features as well as provide additional calibration regarding the detectability of those features with the internal inspection assessment program.

At each of the identified sites, the field evaluation of the excavated features will involve measurement of the feature in comparison to predicted ILI results. Magnetic particle inspection (MPI) will also be conducted to examine for cracking and ultrasonic and/or pit depth measurements will be taken of metal loss. Additional to the features under study, all exposed girth welds and longitudinal seams will be examined, as is done in the normal course of Enbridge maintenance activities when pipe is exposed. If cracking features are confirmed through MPI or are further anticipated from the ILI prediction, additional non-destructive testing for cracking assessment will be conducted with ultrasonic technology. At selected sites, information gathering will include soil and corrosion sampling to assess for environmental contributors including microbial occurrence, topographical observations, and coating condition.

The measurement of the features will feed into a fitness-for-purpose calculations using CorLas for cracking and RStreng for metal loss. The measurements and repair decisions will be defined by third party non-destructive testing technicians and field activities will be supervised by Enbridge personnel. In some cases, grinding will be conducted to assist in the feature evaluation. In those instances where investigative grinding exceeds 40%, the ground out area will be sleeved even if it does not exceed the requirements of the fitness-for-purpose calculations. The detailed specifications for these activities are described within the Enbridge Operations & Maintenance Procedures Manuals, and comply with 49 CFR Part 195, including relevant technical codes and standards.

3.2 Plans to Repair Remaining Identified Anomalies (180 Day Features)

Enbridge provides the following response to Items 5.G and 5.H of the CAO: Enbridge provided a list of the remaining identified anomalies and the schedule for repair to PHMSA on September 16, 2010. That list and accompanying work plan, along with the detailed execution schedule, are also provided in Appendix 2 to this IVP. The listed anomalies are the balance of all remaining unexcavated features previously identified to PHMSA on July 15, 2010 as part of the Long Term Pressure Reduction Notification ("Notification") submitted by Enbridge. All of the features identified by the Notification have been safely maintained, since the date of discovery by ILI, using self-imposed pressure restrictions to assure a minimum 1.39 safety factor. The proposed Line 6B interim reduced operating pressures as part of Line 6B start-up will provide additional safety margin.

As required by Item 5.G and 5.H of the CAO, all of the remaining identified anomalies (180-day condition features) will be excavated and repaired as necessary within 180 days of restart, beginning with the anomalies identified in Table 6, of the Notification. As noted in Appendix 2, site reconnaissance and permitting to complete investigative excavations is currently underway. Enbridge will alert PHMSA of any permitting or site-specific issues which may affect completion timing of any of the repairs. A pressure restriction will remain in effect until full repairs are completed.

In response to Item 5.D of this CAO, Enbridge notes that the same procedures as described above in Section 3.1 will be utilized at these excavations. Any features with a rupture pressure ratio RPR = 1.0 or less (fitness-for-purpose is equivalent to 100%SMYS) will be repaired with a sleeve. Any metal loss feature with a depth >80% will also be repaired with a sleeve. In those instances where grinding for investigative purposes exceeds 40% depth, a sleeve will also be installed. Upon completion of the work at each site, the pipe will be recoated and backfilled.

As noted in the Notification, Enbridge was in the process of determining the feasibility and permitting timeline of a plan to mitigate the features listed in the Notification through replacement of certain segments between Stockbridge and Marysville, Michigan. As communicated in meetings with PHMSA Central Region earlier in 2010, the permitting time frame for a major segment replacement program would not allow the replacements to be completed within a 180-day time frame. However, concurrent with the schedule and plans detailed herein for meeting the 180-day requirement imposed by the CAO, Enbridge is now diligently consulting all affected agencies and re-evaluating the feasibility of a smaller-scale replacement of one or more segments to determine whether such replacement could be completed within the 180-day CAO mandate.

Should such a smaller scale replacement program be feasible within the 180-day mandate, Enbridge will amend the feature repair schedule in this IVP and communicate a revised plan to PHMSA.

3.3 Planned Line 6B In-line Inspections (ILI)

Enbridge provides the following response to Items 5.C and 5.I of the CAO: Line 6B will be evaluated through the use of additional in-line inspections and follow-up investigative excavations, according to the schedule shown in Appendix 3. As required by Item 5.I(i) of the CAO the schedule reflects that the ILI runs will initiate within 14 days of restart. The following types of ILI tools will be utilized:

1. Circumferential magnetic flux leakage (a.k.a transverse field) ILI capable of identifying metal loss features; and

2. High resolution ultrasonic ILI technology capable of detecting cracks on Line 6B.

Item 5.I.ii of the CAO requires that the tool vendor's initial report on anomalies meeting 49 C.F.R Part 195 immediate repair criteria be provided to PHMSA within 30 days of completion of the in-line inspections. Enbridge's tool vendors have indicated that their reports can be made available 30 days after receipt and downloading of tool data at their analysis facilities. Similarly, Enbridge will provide the tool vendor's final report on all anomalies to PHMSA within 90 days after receipt and downloading of tool data at their analysis facilities.

Investigative excavations will be conducted post receipt of the ILI data. The same procedures as described above in section 3.1 will be utilized at these excavations. Any immediate repairs as defined by Item 5.I.iii of the CAO will be made within 14 days of discovery. As per Item 5.I.iv of the CAO, all other anomalies in HCA's requiring repair will be repaired by Enbridge in accordance with 49 C.F.R Part 195 not later than 180 days of Enbridge's discovery thereof. Regarding features identified from the results provided by the crack investigation ILI's, Enbridge will investigate, within 14 days upon receipt of vendor information, any features reported as greater than a depth of 0.120-inch. For all other features, calibration investigative excavations will be conducted upon receipt of the data. Investigative excavations for calibration activity are planned to occur within thirty days of receipt of either the preliminary or final vendor report. Upon completion of the calibration, all features will be investigated based on the specifications of 49 C.F.R Part 195. Enbridge may elect to perform additional investigative excavations to further progress the analysis of the pipeline at sites that do not meet the requirements listed above.

Further, as per Item 5.I.v of the CAO, Enbridge will integrate the new ILI results into results of prior tool runs to reprioritize the focus and schedule of the integrity verification and remedial work plan for Line 6B as necessary. This process will also include overlay of coincident data from metal loss and crack detection inspection results received by Enbridge moving-forward.

3.4 St Clair River Dent Remediation

As required by Item 5.J of the CAO, Appendix 4 sets out Enbridge's plan and a schedule for the complete replacement of the pipe in the entire St. Clair River crossing within one year of restart, subject to caveats noted in the Appendix and summarized below. The plan and schedule will also be provided to the National Energy Board of Canada in accordance with the CAO's requirements. Appendix 4 provides an overview of the HDD design and plan completed to date. If the HDD is successful, the plan will comply with the CAO's mandate to complete this replacement within one year, assuming that permits are timely issued by relevant agencies.

All reasonable assessments, planning and execution measures will be undertaken to increase the likelihood of a successful HDD crossing within the schedule presented. However, Appendix 4 notes that the timeline is dependent on key agencies agreeing that the activity is a "maintenance activity" allowed under existing permits; that other environmental permits do not delay the project; and that the HDD at the existing route is successful. As a precaution, Enbridge will pursue the appropriate level of assessment and pre-planning for an alternative crossing method in the event of an unsuccessful HDD, including an open-cut of the river or other alternative options, most of which could not be accomplished or permitted in a one-year timeframe.

3.5 Schedule of ILI and Investigative Dig Work Plan

The schedule in Appendix 5 summarizes all of the planned integrity validation and remedial work activities and as described above, and is responsive to Item 5.F of the CAO.

3.6 Long Term Periodic Testing and Integrity Verification

Enbridge will conduct continuing long-term periodic testing and verification measures in accordance with CAO Item 5.E to ensure the ongoing safe operation of the entire Line 6B. The long-term program will consider results of the analyses, inspections, and corrective measures conducted during all integrity programs.

3.6.1 Recalculate Feature Growth Rates

As shown in Appendix 5, substantive integrity condition information will be gathered prior to year-end 2010. The information will be integrated alongside historical integrity information and any results made available from the NTSB forensic analysis, as required by Item 5.A of the CAO. The collation of this information will provide the basis for a detailed re-evaluation of the growth rate and "just surviving flaw" calculations described in section 2.7.3, above. The results of this reanalysis will provide further direction regarding any additional integrity actions that Enbridge will conduct to continually reaffirm the safe and reliable operations of Line 6B. The results of this reanalysis will be provided to PHMSA.

3.6.2 Future Plans

Further to CAO Item 5.E, current plans for continual integrity evaluation of Line 6B include further inspection using high resolution ILI. The plan incorporates inspections in 2011 utilizing both ultrasonic and magnetic flux leakage metal loss tools. An additional crack inspection is planned for 2013.

Upon integration of all data gathered, Enbridge will examine the benefit and practicality of alternate remediation methods such as pipe replacement.

4. ENBRIDGE RESPONSE TO OTHER CAO REQUIREMENTS

In addition to its responses to CAO Items 5.A – 5.I above, Enbridge provides the following brief comments on ancillary matters raised therein:

4.1 Reporting to PHMSA

As per CAO Item 8, Enbridge will submit quarterly reports to the Regional Director that include all available data and results of the testing and evaluations conducted on Line 6B. The reports will describe the progress of the repairs or other remedial actions being undertaken. The first quarterly report will be provided by November 30, 2010.

Additional to the requirement of the CAO, Enbridge will provide to PHMSA regular status reports that will describe Control Center operations updates, pressure cycling analysis, investigative dig status, and ILI run status. The first such report will be provided three weeks following start-up, and reports will be submitted every two weeks thereafter pending further discussions with PHMSA.

4.2 Tracking Costs

In response to CAO Item 9, Enbridge will undertake cost tracking and will maintain records associated with the implementation of the activities required by the Corrective Action Order. Reports submitted by Enbridge will provide to-date costs associated with: 1) preparation and revision of procedures, studies, and analyses relative to Line 6B as a result of this CAO; 2) physical changes to Line 6B infrastructure, including repairs, replacements and other modifications to Line 6B; and costs of environmental remediation related to this CAO, if applicable.

4.3 Engineering Analysis for Restoring to Normal Operations

At a future date, Enbridge will submit to the PHMSA Regional Director a request for removal or modification of the CAO imposed interim reduced operating pressures. The request will be justified by a reliable engineering analysis and will consider all known integrity features and operating parameters of the pipeline.

TABLE OF CONCORDANCE

CAO Reference:	CAO Requirement:	Addressed in Integrity Verification and Remedial Work Plan Sections:
5.A.	Results of NTSB Metallurgical Analysis	1.1 3.6.1
5.B	Line 6B Failure History over past 20 years	2.6
5.C	Evaluate Integrity Threatening Conditions	2.5, 2.7.3, 3.1, 3.3, Appendix 3
5.D	Inspection and Repair Criteria	2.4, 3.1, 3.2, Appendix 1
5.E	Long Term Periodic Testing and Integrity Verification Measures	3.1, 3.6, Appendix 5
5.F	Completion Schedules for CAO Items 5.A – 5.E *(where applicable)*	3.5, Appendix 1 Appendix 2 Appendix 3 Appendix 4 Appendix 5
5.G	Project Plans and Schedules for Repair of Remaining Anomalies Identified for Action from 2007 and 2009 In-Line-Inspections	3.2, Appendix 2
5.H	Project Plans and Schedules for Repair of Remaining Anomalies Identified for Action in the July 15, 2010 Long Term Pressure Reduction Notification	3.2 Appendix 2
5.I	Schedule for In-Line Inspections	3.3, 3.5 Appendix 3 Appendix 5
5.J	Project Plan and Schedule for replacement of pipe in entire St. Clair River Crossing	3.4 Appendix 4

Enbridge Energy, Limited Partnership

Line 6B Release Summary Report

In Response to Item 5B of the Corrective Action Order

Prepared for

Pipeline and Hazardous Materials Safety Administration

(PHMSA)

September 26, 2010

Line 6B Release Summary Report

1. INTRODUCTION

In accordance with and in response to the original and amended Corrective Action Order ("CAO")[1], Enbridge has prepared this Line 6B Release Summary Report for the U.S. portion of Enbridge's mainline 6B pipeline system ("Line 6B"). Specifically, this Line 6B Release Summary Report addresses the item for response identified in Item 5B of the CAO.

2. OVERVIEW OF RELEASE HISTORY ON LINE 6B

Line 6B has experienced one mainline pipeline release between January 1st, 1990 and July 25, 2010.

2.1 Release Details

At MP 671.90 on June 26, 1995, during the excavation of an external corrosion indication from in-line inspection results, oil was observed between the pipeline coating and pipe with an estimated release volume of 0.03 gallons. The Preliminary Incident Report is included as Attachment 1. The pipeline was repaired with a steel full encirclement welded sleeve filled with epoxy. The repair report numbered BC95042 is included as Attachment 2.

2.2 Inspection History

Line 6B was inspected in 1979 and 1988 for corrosion with the best inspection technology available at the time. This technology is now considered to be low resolution MFL with reduced identification and sizing capabilities compared to current high resolution tools. In 1994, a British Gas high resolution MFL tool was used to inspect Line 6B. An inspection report was received in April 1995 that identified a 90% deep external corrosion feature.

2.3 Release Cause

Once excavated, Enbridge records note the direct cause of the release was external corrosion with dimensions of 2" longitudinal by 1" circumferential.

2.4 Release Assessment

The limited characterization capabilities of the low resolution tool used in 1988 is considered to be the main contributing factor to the late identification of the corrosion pit and ultimately the small release of oil. Since 1994, Enbridge has used high resolution magnetic and ultrasonic corrosion in-line inspection tools to capture a detailed understanding of the corrosion condition of Line 6B. Also, a relatively short re-inspection interval of two to three years has been established for Line 6B that allows for greater understanding of corrosion growth rates thereby reducing the likelihood of deep corrosion features from developing prior to mitigation.

[1] *Hereafter the July 28, 2010 Corrective Action Order and the September 22, 2010 Notice of Proposed Amendment to the Corrective Action Order are referred to collectively as the CAO.*

S

Mainline MN

Attachment 1

To: Rick C Sandahl/LPL, Kevin L Beatty/LPL, Mark A Kinblom/LPL, Nori L Ferris/LPL, Jim G Crawford/LPL, Doug A Klein/LPL, Mike J Miller/LPL

cc:

From: Shaun G Kavajecz/LPL

Date: 06/29/95 05:35:48 PM EDT

Subject: Preliminary Incident Report

Due to the nature of this incident, in that it did not require external reporting, distribution of the report includes the above listed potentially affected parties, rather than the distribution listed within the report.

PRELIMINARY INCIDENT REPORT

Date: 06/29/95 08:47:07 AM

Name of Person Completing Report: Shaun G Kavajecz

To:

President & C.O.O
Vice President, Operations
Vice President, Technology
Oil Movements, IPL
Manager, Environment
General Counsel, Law Department
Manager, Tax & Insurance
Team Leader, Operations Services
Insurance Analyst
Safety, Training & Compliance Coordinators
Safety, Training & Compliance Clerk

REPORT INFORMATION

Reason Incident is reportable (Place an X in the Box of ALL that apply)

A failure in the pipeline system which results in:

- ☐ Reportability to a state agency OR
- ☐ Loss of 50 or more barrels of liquid OR
- ☐ Escape of more than 5 barrels NGL to atmosphere OR
- ☐ Unintentional explosion or fire OR
- ☐ Death of any person OR
- ☐ Hospitalization of any person OR
- ☐ Estimated property damage exceeding $50000 (Including repair & cleanup) OR
- ☐ Pollution of a water body (river/stream/wetland/reservoir) OR
- ☒ Any other event that the District Manager deems significant for other reasons

A. Date of Incident: 06/26/95
Time of Incident (MST): 10:55 AM

B. Location: Milepost 671.9. Approximately 6 miles upstream of Howell station
Line No: 6B S BP(6/30/95) O.K. 6B

C. Type of Material Released: Crude Oil
Barrels Out: Trace amount accumulated underneath the tape coating
Barrels Recovered: Same

D. Description of Incident: Incident was reportable as it was a release on the system

which resulted in a line shutdown. No external reporting is required.

While performing Line 6B dig program on a corrosion indication at MP 671.9, Marshall PLM noticed a smell of oil and the Control Center was immediately notified by Pipeline Foreman, (Mick Collier) and the line was shutdown and isolated. Upon removal of tapecoat, a pinhole leak and approximately 1/2 cup of oil mixed in water which had accumulated underneath the tape, was discovered. The oil was absorbed with rags, and repairs initiated..

E. Apparent Cause of Incident: External Corrosion. An area of external corrosion approximately 2" long X 1-1/2 " circumferential had developed at the 6:00 o'clock position on the pipe, 20 ft 6" downstream of the circumferential weld. The longitudinal seam on this joint was 1" left of the 12:00 o'clock position.

F. **How was Incident Discovered?:**

1. First LPL Employee notified of Incident: Marshall Crew (Les Erickson)
2. Date and Time notification was received: 10:53 AM
3. LPL Employee who confirmed the leak: Same
4. Date and Time leak was confirmed:
5. Date and Time line was shutdown or isolated: 06/26/95 10:55 AM MST

G. **Safety & Environmental concerns in the area:**

1. Brief description of affected area: No oil was released into the environment
2. Proximity to the public: N/A
3. Proximity to bodies of water: N/A
4. Were there any fatalities or injuries?: No
5. Weather conditions at the site: N/A

H. **Briefly describe containment and recovery efforts:** Wiped off with rags

I. **Describe initial remedial activities: (Stockpiling, burning, etc.):** N/A

J. **Description of leak repair in detail:** A 14" Plidco was bolted in place for temporary repair and completed at 15:45 MST, June 26, 1995. Line 6B was restarted at 15:55 MST. The rest of the joint is being excavated to examine for any further anomolies. A permanent repair is scheduled for July 7, 1995. Tentatively plans are to remove the Plidco and install a leaking defect sleeve.

K. **Government agencies notified:**

1. State: None
2. National Response Center: None
3. Other: None

L. **Describe Media Coverage:** None

5

Two Database - Complete Listing

LEAK DESCRIPTION

Date of Leak : 06/26/95 Time: 10:55 MST
Line Number: 6
Location: Upstream Howell sta.
Milepost: 671.90
City: Manistique County: Schoolcraft State: MI
Tract:
Landowner:

Part of System Involved: Line Pipe
Item Involved : Pipe
Cause:
Number of People Injured: 0
Number of People Killed : 0
Was there an Explosion ? No
Was there a Fire ? No
Leak enter Watercourse ? No

Estimated Damage: 0
Barrels Out: 0
Barrels Recovered: 0
Depth of soil cover: 0 ft.

Government Agencies: None

Was it DOT Reportable? NO
Was Drug Testing Performed? No
Temporary Repair: 14" Plidco bolted in place Date: 06/26/95
Permanent Repair: Install a leaking defect sleeve Date: 07/07/95
Line Shutdown: 10:55 06/26/95 Pressure at Shutdown:
Returned to Service: 15:55 06/26/95
Pipe Analysis Performed? No

Pipe Information

Size: 0 In.
Wall Thickness: 0.0000
Date Installed: / /
Yield Strength: 0
Manufacturer:

Seam Type:
Spec. Manufacturer:
Coating:
Maximum Operating Press.: 0 psi

Hydrotest Data

Date: / / Test Press.: 0 psi Test Medium: Test Duration: 0 hrs

Internal Inspection:

Date: / / Type of Tool: Anomolies:

Disposition of Lost Commodity: Absorbed w/rags
Land Restoration Method:
Comments: Upon removal of tapecoat, a pinhole leak was evident, in which 1/2 cup oil mixed with water had accumulated underneath the tape, oil was absorbed with rags and repairs started.

FB 631189

CONFIDENTIAL

PLM REPORT NUMBER _____

Lakehead Pipe Line Company, Limited Partnership
PLM Activity Report

PERMANENT REPAIR REPORT

INTERPROVINCIAL PIPE LINE INC.
INTERPROVINCIAL PIPE LINE (NW) LTD
LAKEHEAD PIPE LINE COMPANY, L.P.

REPORT DATE 07/05/95
PLM REPORT NUMBER BC95042 REPORT TYPE Corrosion Tool Anomaly

LOCATION

REPORTING OFFICE	DATE DISCOVERED	DATE REPAIRED	REPORT DATE	SAFETY RELATED CONDITION REPORT REQUIRED?
Marshall PLM Buffalo	06/26/95	06/26/95	07/05/95	NO

PIPE LINE LOCATION - PUMP STATION OR MILEPOST	LINE NO.	LINE SIZE	SPECIAL COST NUMBER
MILEPOST NUMBER 671.~~90~~ 671.96	6B	30"	SCN-3497

SPECIFIC LOCATION - LOCATION FROM A KNOWN STATIONING ON A ROUTE SHEET	ROUTE SHEET NO.
10897+11	C-416

QUARTER	SECTION	TOWNSHIP	RANGE	TRACT NO.	MERIDIAN/COUNTY	PROVINCE/STATE
NW	17	T3N	R5E	M-786-2	Livingston	MI

PROPERTY OWNER'S NAME AND ADDRESS
Peter Baldwin 3296 Curdy Road Howell MI 48843

PROPERTY TENANT'S NAME AND ADDRESS

FULL DESCRIPTION OF PROPERTY DAMAGE AND ANY COMMUNICATIONS WITH OWNER OR TENANT (ATTACH SKETCH IF NECESSARY)
1 Excavation - 25' x 85'. Broke a few branches off a couple of White Pine Trees - Branchs 1" dia. Mr. Baldwin requested switch grass be planted over excavation for rabbits and birds which we did and repaired fence.

LEAK

BREAK OR LEAK CLASSIFICATION
External Corrosion

DESCRIBE SPECIFIC NATURE AND CAUSE OF BREAK OR LEAK
1 - external corrosion pit 2" long x 1-1/2" circ.
1/2 cup oil out.

OIL OUT OF LINE - BARRELS	OIL RECOVERED - BARRELS	NET LOSS - BARRELS	CRUDE TYPE	BATCH NUMBER
0 BARRELS	0 BARRELS	0 BARRELS		

DISPOSITION OF COST OIL
Rags and shirt.

NAME AND ADDRESS OF PERSON REPORTING LEAK	WAS A REPORT FEE PAID? AMOUNT
Les Erickson - Lakehead Pipe Line P.O. Box 8 Marshall, MI 49068	NO $

REPAIRS OR CHANGES TO MAINLINE

NATURE OF REPAIR & FITTINGS ADDED TO MAINLINE (ATTACH SKETCH-IDENTIFY UPSTREAM & PIPE ORIENTATION)
1/2" x 30" x 30" long split repair sleeving filet welded to pipe.

NATURE AND TYPE OF SOIL	GENERAL CONDITION OF LINE	TYPE OF EXISTING COATING
Clay - Wooded	See Corrosion Inspection Report	Polyken Tape
CONDITION OF TRENCH (DRY, WET, ETC.)	CATHODIC PROTECTION POTENTIAL	TYPE AND LENGTH OF REPAIR COATING
Wet	See Corrosion Inspection Report	Tapecoat 20 55 FT.

LPL PERSONNEL MUST ALSO COMPLETE A CORROSION INSPECTION REPORT

OTHER

WAS THERE ANY STOCK PIPE INSTALLED? (If YES, attach hydrotest records)	HYDROTEST NUMBER
NO	

REMARKS:

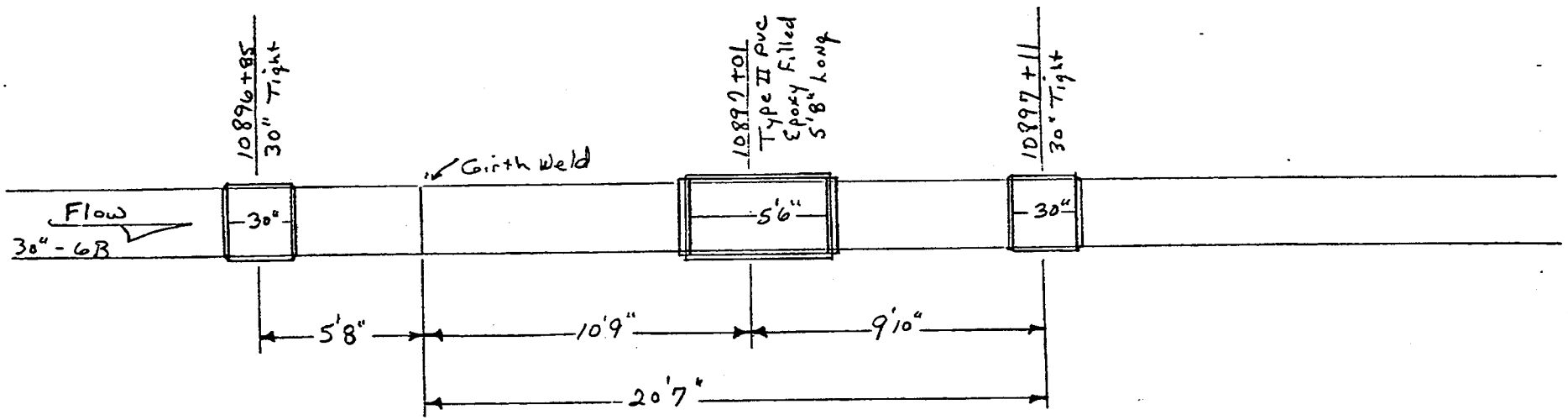
GOVERNMENT AGENCY NOTIFIED	INDIVIDUAL CONTACTED	DATE	TIME
		/ /	

REPORT COMPLETED BY AND SIGNATURE	DISTRICT MANAGER (SIGNATURE)	DIVISION MANAGER/G.M. OPERATIONS (SIGNATURE)
Mick Collier Michael Collier		

MP 671.9 7-6-95 7-6-95 Welded Fillets To pipe

CP 1.35 Hole CP -1.35 7-7-95 Welded oversleeve + MAC Paetide

AB Chainages
1093074.6
10896+85
10897+01
10897+11



Lakehead Pipe Line Company, Limited Partnership

CORROSION INSPECTION REPORT

PLM REPORT NUMBER BC95042 REPORT DATE 07/05/95

PART A - GENERAL INFORMATION CONCERNING EXCAVATION

LINE NUMBER AND SIZE	MILEPOST	TRACT NO.	STATIONING
6B - 30"	~~671.90~~ 671.96	M-786-2	10897+11
PURPOSE FOR EXCAVATION		**SOIL TYPE**	**TERRAIN TYPE**
Corrosion Tool Anomaly		Clay	Wooded

COMPLETE THIS LINE IF EXCAVATION IS FOR INSTRUMENT PIG INVESTIGATION

TYPE OF PIG	INDICATION NO.	WHEEL COUNT	REPORTED GRADE/DEPTH OR RPR
British Gas	23	1,093,074	90%
CORROSION TYPE	**MAX. DEPTH**	**ANOMALY SIZE**	
External	.244	2 x 1	

PART B - INSPECTION RESULTS

CONDITION OF OUTSIDE OF PIPE: Extensive Corrosion. Repair sleeve or pipe replacement required.

COMMENTS:

1 - external corrosion pit 2" long x 1-1/2" circ.
Weeper.

THE EXISTING COATING IS Polyken Tape

CONDITION OF COATING IS Unsatisfactory. Pipe was recoated.

COMMENTS:

Ultrasoniced at fillet weld locations.

NEW COATING IS Tapecoat 20 COATING LENGTH IN FEET IS: 55

PIPE TO SOIL POTENTIAL

-1.35

CONDITION OF INSIDE OF PIPE: Inside of pipe not exposed.

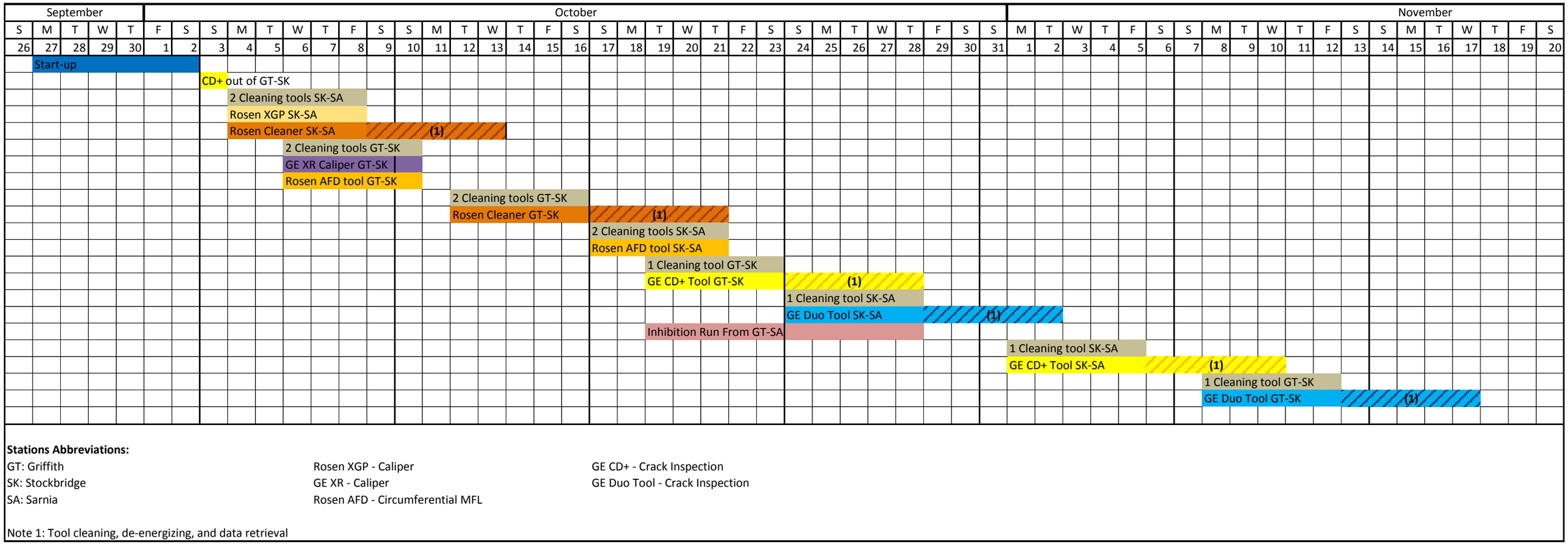
COMMENTS:

INSPECTED BY	DATE INSPECTED
Brian Whittaker	07/05/95

PART C - SIGNATURES

PIPE LINE FOREMAN Michael Collier

DISTRICT MANAGER L Hyde



Appendix 3 - LINE 6B - ILI PLAN

Stations Abbreviations:

GT: Griffith
SK: Stockbridge
SA: Sarnia

Rosen XGP - Caliper
GE XR - Caliper
Rosen AFD - Circumferential MFL

GE CD+ - Crack Inspection
GE Duo Tool - Crack Inspection

Note 1: Tool cleaning, de-energizing, and data retrieval

Appendix 4

ENBRIDGE ENERGY, LIMITED PARTNERSHIP

REMEDIATION PLAN

LINE 6B – ST. CLAIR RIVER CROSSING

September 26, 2010

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

Enbridge Energy, Limited Partnership ("Enbridge") operates the U.S. portion of the crude oil and liquid petroleum system spanning from the Canadian/North Dakota border near Neche, ND traversing states around the Great Lakes to Sarnia, Ontario. As part of its ongoing pipeline and integrity management system, Enbridge has periodically conducted internal inspections of the pipeline including underwater inspections of navigable waters crossings.

On August 20, 2010, Enbridge submitted a report to the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration ("PHMSA") notifying the agency of a self-imposed Long Term Pressure Reduction across its Line 6B at the St. Clair River ("River"), which is the border between the United States and Canada at Marysville, Michigan and Sarnia, Ontario, respectively. The filing made official prior verbal presentations to PHMSA's Central Region regarding a dent at the River crossing (MP 751.33). The filing was made given that a normal investigative excavation and repair of a dent discovered under the River would not be able to be completed within the timeline required in 49 CFR Part 195.452 of such repairs in a High Consequence Area. In the August 20, 2010 filing, Enbridge provided engineering assessments and information concluding that while the probability of failure of this dent is very low, the location of the dent raised heightened concerns regarding the potential consequence of even a remote possibility of a leak. Therefore, Enbridge committed to undertaking either a repair of this anomaly or replacement of the pipeline segment across the River, subject to regulatory and environmental permitting. As required by the Amended Corrective Action Order (CAO) issued on September 22, 2010 in connection with the Marshall, MI incident, Enbridge hereby submits this plan to replace the segment under the St. Clair within one year of the restart of Line 6B.

Details of the engineering assessment are contained in the August 20, 2010 filing and are not repeated in this report. However, in summary, the engineering assessment reviewed previous internal inspection data; conducted another internal inspection using additional technological capabilities, included a third-party engineering assessment of fatigue-life of the dent and presented an internal engineering assessment. The assessments concluded the safety and integrity of the pipeline is considered secure. However, the dent does meet the repair criteria in 49 CFR Part 195.

Enbridge proposes to remediate the dent at MP 751.33 by replacement of approximately 3,600 feet of pipeline starting from the U.S. side of the River in Marysville, Michigan to the Canadian side of the river in Sarnia, Ontario. The replacement is proposed to be accomplished using a horizontal direction drill (HDD) of the river with 30-inch pipe immediately adjacent to the existing location of Line 6B. While the HDD Replacement Project plan has been prepared and the Project is targeted to be completed by 2nd Quarter 2011, the Project is subject to the following primary caveats:

- Confirmation from the Canadian National Energy Board (NEB), Michigan Public Service Commission (PSC) and U.S. Department of State, that the HDD replacement qualifies as a maintenance activity authorized under existing permits and will not require new permits from those agencies,
- Timely receipt of required environmental permits for the drilling and related work from other federal, state, provincial and local authorities in the United States and Canada;

- Completion of a detailed engineering and final construction design of the HDD that confirms scope of work is authorized under existing permits from Canadian NEB, U.S. Department of State and Michigan PSC; and
- Success in any horizontal directional drill is not guaranteed, but presents challenges and risks associated with the geological formations and obstacles under the river that could prevent a successful HDD plan along the existing route, thereby requiring more time-consuming alternative mitigative solution extending the timeline for addressing the dent.

Enbridge is currently completing further work to refine plans and perform appropriate permit preparatory work to ensure that plans for alternative mitigation of the dent may proceed in a timely manner should the HDD Replacement Project described here be unsuccessful. Specifically, as compared to the proposed HDD option, the planning, including navigable traffic planning, and environmental permitting timelines for alternative mitigation of the dent would be longer than one year.

2. LINE / FEATURE BACKGROUND INFORMATION

Enbridge's Line 6B is a 30-inch diameter pipeline that transports batched liquid hydrocarbons including light, medium and heavy crude oils. Line 6B was constructed in 1969 with a polyken tape coating, X52 grade and 0.250 inch nominal wall thickness. The pipe at the location of the crossing of the St. Clair River is 30-inch diameter, 0.500 inch wall thickness, API 5L Grade B (35 kpsi yield strength), and a protective three-inch thick concrete coating was applied to the pipeline prior to placement. As identified in Figure 1, Line 6B leaves Griffith, Indiana (MP 465.58) crossing the international boundary at the River and terminates in Sarnia, Ontario (MP 758.20) with a total length of 292.62 miles.

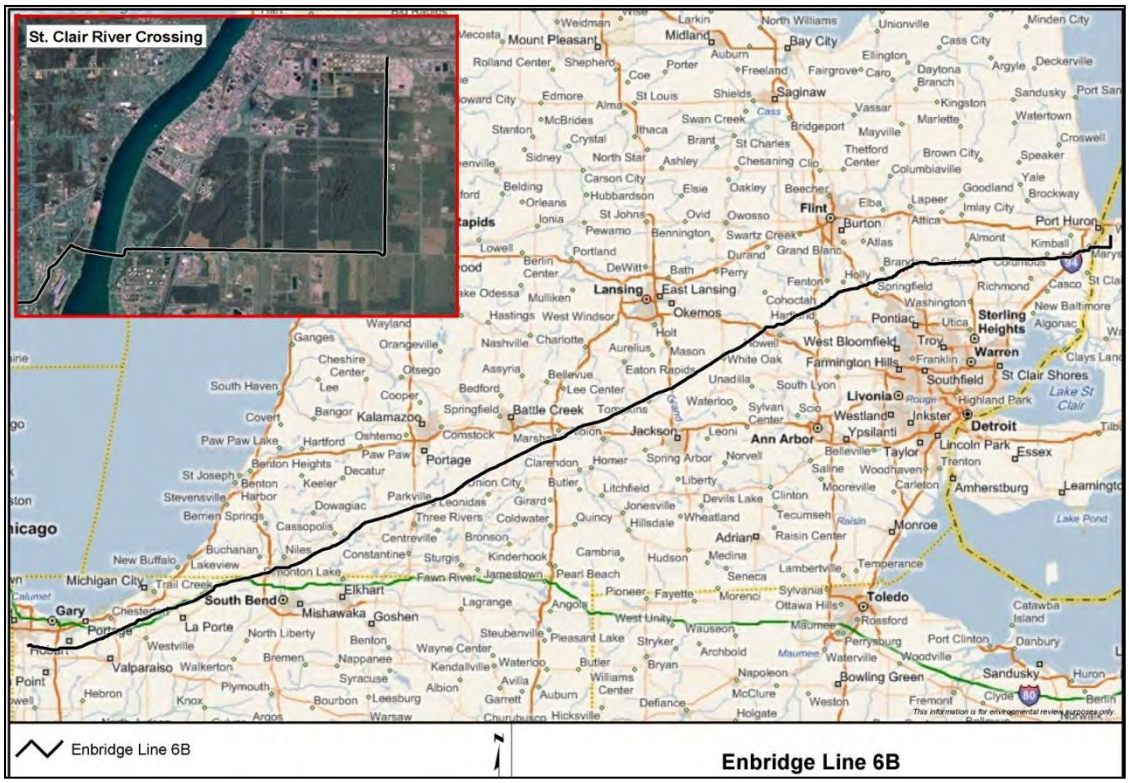


Figure 1 – Location of Line 6B

The dent location at MP 751.33 is approximately 15 feet under the river bed (depth of cover) and includes pre-designed protective layers of gravel, boulders, construction spill pile backfill and silt. The depth of water at the dent location is approximately 30 feet. An underwater inspection undertaken by a diver of the entire crossing was completed on December 21, 2007. This inspection concluded that there was no evidence of disturbance or shallow cover anywhere along the crossing location.

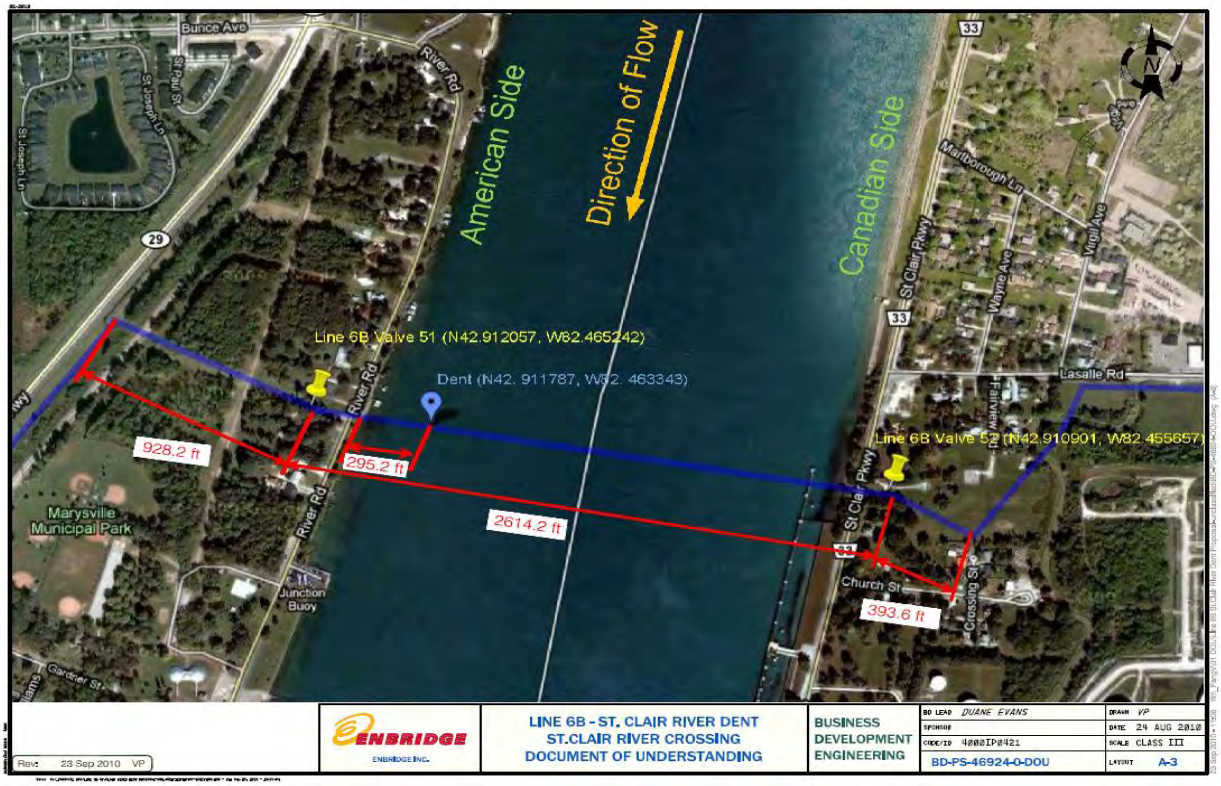


Figure 2 St. Clair River Crossing

3. HORIZONTAL DIRECTIONAL DRILL (HDD)

Enbridge has examined various alternatives for both technical feasibility and schedule requirements with respect to mitigation of the dent, including the requirement that it present a plan for replacement of the pipe within one year, as per the CAO. The preferred alternative is the replacement of the pipe across the River through a horizontal directional drill of the crossing along the same route as the existing line.

Other alternatives examined to varying levels of detail include, in-situ repair of the dent feature, a replacement of the pipe by an open-cut of the pipeline (as was done when the original Line 6B was installed); a pipe-in-pipe or "casing" (using existing Line 6B as casing for replacement smaller diameter pipe) and other alternatives that could require a new route for the crossing.

HDD is a common practice developed in the decades following initial construction of Line 6B for completing this type of river crossing. Other large diameter pipelines have been successfully constructed across the St. Clair River since the mid-1990's using the HDD technique, although the geology and success of an HDD is always site specific.

This replacement crossing for Line 6B will involve completing a parallel drill adjacent to the existing line and decommissioning[1] of the existing line once the replacement pipe is put in service. Enbridge will employ all safety measures required by the Canadian and U.S. federal pipeline safety rules in continuing to protect the decommissioned segment of Line 6B. The HDD will require the replacement of Line 6B block valves on either side of the river. The block valves will be replaced with new remotely operated gate valves on the newly installed segment on each side of the River. The estimated total width of the river from bank to bank at the crossing location is 2,200 feet, width from existing valve-to-valve is approximately 2,600 feet, and the length of pipe to be replaced during the HDD is approximately 3,600 feet, subject to final HDD design plans.

The replacement pipe will be 30-inch diameter, minimum 0.500" wall thickness, grade X52 or higher. The pipe will be externally coated with two layers. The first protective coating will be a fusion bond epoxy and a second layer of abrasion resistant overlay coating will be applied to protect the pipe while it is pulled through the crossing.

The replacement valves will be American National Standards Institute (ANSI) rated 600 pound tested Gate Valves remotely operated in the same fashion as the existing block valves.

[1] "Decommissioning" is defined in the Canadian NEB Onshore Pipeline Regulations as "to permanently cease operation such that the cessation does not result in the discontinuance of service". With regards to this project, our intent is to permanently remove the replaced pipe from service; however that will not result in a permanent discontinuance of service on Line 6B. The U.S. federal pipeline safety rules use different terminology as PHMSA does not regulate "service". Under PHMSA's rules, the replaced section of pipeline will be not be considered abandoned as defined by 49 CFR Part 195.59.

4. HDD ISSUES

The Enbridge replacement plan presented here will of necessity take into account the many considerations the St. Clair River crossing requires as part of the planning for HDD replacement, including consideration of the following:

- The River is an international border crossing between Canada and the United States;
- Permitting will be required for the drilling and related work from the U.S. Army Corps of Engineers, Michigan Department of Natural Resources and Environment, and Canadian agencies. It is not anticipated at this time that additional permits will be required from other agencies that authorized the original construction, maintenance and operation of the pipeline, namely, the United States Department of State, Michigan Public Service Commission and Canadian National Energy Board. Communication with these agencies has already been initiated, however, the agencies will be further consulted as design is finalized to ensure that they agree that the proposed HDD is deemed "maintenance" that is authorized under existing permits;
- Inherent in HDD technology is the possibility of "inadvertent return" of the bentonite drill fluid from the drill cavity;
- This portion of the River is a main shipping channel for the Great Lakes commerce;
- The flow rate of the River in this area is high, approximately 3 feet/second (1 meter/second);
- The River serves as drinking water source to various municipalities;
- Development on either side of the River is extensive with roadways parallel to the east and west River banks; and
- Potential impacts to the sediment in the River, which may be contaminated as a result of historical industrial activities over a period of many years with heavy metals that would require careful handling of dredge material.

Based on this assessment, Enbridge has identified the following key issues to be managed related to HDD Replacement Project, and has summarized the mitigation measures in the following table:

Table 1 Issues Summary

Issue	Mitigation
The final design results in the HDD not qualifying as "maintenance" under existing National Energy Board, U.S. Department of State and Michigan Public Service Commission permits authorizing the operation of the pipeline at its current location. Additional approvals for pipeline construction are required from one or more of these agencies.	Enbridge has had preliminary discussions with all the three regulatory agencies regarding this issue. Confirmation that the HDD qualifies as maintenance to an existing, approved pipeline (as opposed to construction of a new pipeline that will require new permitting) will depend on the final HDD Replacement Project plan.
Additional permits that are required from other Canadian, United States and Michigan regulators may be delayed due to extended environmental or other reviews, or not approved.	Enbridge is conducting pre-filing meetings with all appropriate regulators that will need to issue permits for the drilling and related work to ensure understanding of permit requirements, limited impact of HDD to environmental or public resources and confirm expected timelines for receipt of those permits required. The permitting agencies from which Enbridge will require additional approvals are included in the Regulatory section of this report.
Inadvertent return results in bentonite clay used as drill hole packing released into the river.	• Development of a Detailed HDD Project Execution Plan • Design drill path into bedrock subsurface layer • Proactively manage expectations/awareness in early consultation discussion with regulators, government Aboriginal groups, the public and the other stakeholders. • Developing a Sediment Control Plan for a possible inadvertent return in the river • Continuous monitoring of the river during HDD execution
Drilling of pilot or ream holes for HDD is unsuccessful due to geologic conditions or equipment	• Conduct planning, locate and assessment of other utilities, conduct geotechnical studies and use experienced drilling contractor. • Develop prudent back-up plans should attempts at an HDD be unsuccessful • HDD contractor will be required to have new, tested and backup equipment (e.g. new drill string, and back-up drill rig available)

5. HDD DEVELOPMENT EXECUTION PLAN

5.1. CONSTRUCTION

As noted above, the replacement crossing will be completed using a horizontal directional drilling technique. The drilling rig will be set up on the United States side of the River in Enbridge's existing right-of-way. Additional working space for equipment will be required to facilitate this drill and preliminary discussions with the adjacent landowner have commenced. On the Canadian side of the River, the drill will exit on existing Enbridge property and the new pipe will be strung, welded and tested above-ground. This layout area will require additional temporary work space and discussions with the landowner regarding access to that temporary working space have commenced. Once the HDD is completed, the new pipe will be pulled through the drilled crossing. The pulling rig will be situated on the U.S. side of the river and pipe will be pulled from Canadian Side to the U.S. Side of the River.

Figure 3 – Picture of drill section pull back

The replacement gate valves are remotely operated and will then be installed on the new section of pipeline on both sides of the river.

Once the replacement section is in place, the existing line will be prepared for tie-in by a nitrogen purge. The existing Line 6B will be cut and the tie-ins will be completed and the replacement crossing will be put into service. The section of pipe to be replaced will be properly de-commissioned according to Canadian National Energy Board Requirements and will remain properly protected but inactive.[2]

[2] See footnote 1

5.2. PROCUREMENT

All material and contractors required to complete the work have been notified and preliminary commitments have been made for their availability for this work according to the current schedule. Key materials and contractors include:

Table 2 Commodity Plan

Commodity	Status
Pipe	Available
Valves	Available in Enbridge stock
HDD Contractor	Primary and backup rig on standby
Pipeline Contractor	Available and on standby

5.3. REGULATORY

Enbridge has evaluated regulatory requirements for completion of the HDD across the St. Clair River. The current authorizations from the Canadian National Energy Board, U.S. Department of State for President Border Crossing Permit and the Certificate of Need from and current rules issued by the Michigan Public Service Commission allow for maintenance of the pipeline. Confirmation from these agencies that the HDD replacement qualifies as a "maintenance" activity is dependent upon the detailed engineering and final HDD design. Preliminary discussions have been held with each of these agencies, and they will be updated on a regular basis.

Additional permits or authorizations will be required from Transport Canada, U.S. Army Corps of Engineers, Michigan Department of Natural Resources and Environment, Canadian Department of Fisheries and Ocean (DFO) and local jurisdictions. As final design and agency consultations progress, Enbridge may determine additional permits or authorizations are required.

As noted, should the HDD replacement not be successful, an open cut of the river or other alternative will need to be pursued. Most other alternatives require additional permits or the scope of the permits from the above agencies will be expanded. Enbridge will consult with agencies regarding a potential back-up plan and permitting requirements in the event of an unsuccessful HDD.

5.4. LAND

Under the current preliminary design, Enbridge will not require any additional permanent right-of-way as part of this Project, presuming the HDD crossing within the existing right-of-way is successful. Temporary work space will be required on the U.S. side to facilitate access to and erection of the HDD drilling rig. On the Canadian side, temporary work space will also be required for the drill exit location and the lay-out area for pipe fabrication and testing.

Discussions have started with all impacted landowners. Enbridge does not anticipate obstacles to access temporary work space.

6. SCHEDULE

6.1. PROPOSED HORIZONTAL DIRECTIONAL DRILL SCHEDULE

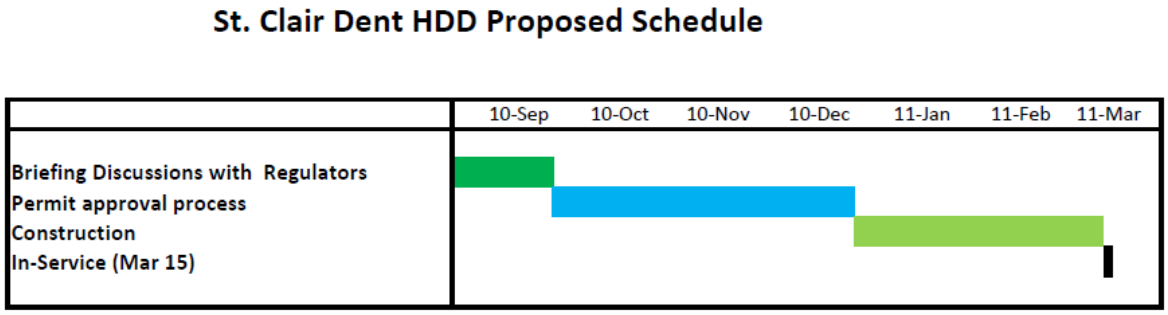


Figure 4 – Proposed HDD Schedule

6.2. SCHEDULE ASSUMPTIONS

Enbridge has recently completed a number of major construction projects in North America of large diameter liquid petroleum pipelines. Enbridge has the benefit of experience of managing large projects across multiple jurisdictions, including cross-border projects and numerous horizontal directional drills of rivers and other major crossings.

Enbridge has learned from experience that acquiring multi-jurisdictional permits and completing the necessary review process can often extend the schedule of projects of this nature.

Enbridge will work closely with all related agencies to acquire permits in a timely manner and avoid delays in constructing the HDD crossing. However, there is no guarantee that the above schedule, or a one-year time frame, can be met in light of required permitting requirements and the potential for currently unforeseen technical or engineering problems arising during the HDD process.

7. POST CONSTRUCTION PIPELINE MAINTENANCE

The pipe segment will be hydrostatically tested and upon installation of the replacement segment of Line 6B across the St. Clair River and an internal inspection caliper tool will be run to detect for any dents or buckles that could have been introduced during the HDD. The Maximum Operating Pressure for this segment of line will be established based on the hydrostatic test pressure or maximum allowable operating pressure for Line 6B, whichever is lower. Note that that the operating pressures across the St. Clair, also governed by the lower-than-normal pressures mandated for the rest of the U.S. portion of Line 6B in the CAO, will be significantly lower than the specified minimum yield strength of the proposed wall thickness and grade of pipeline planned

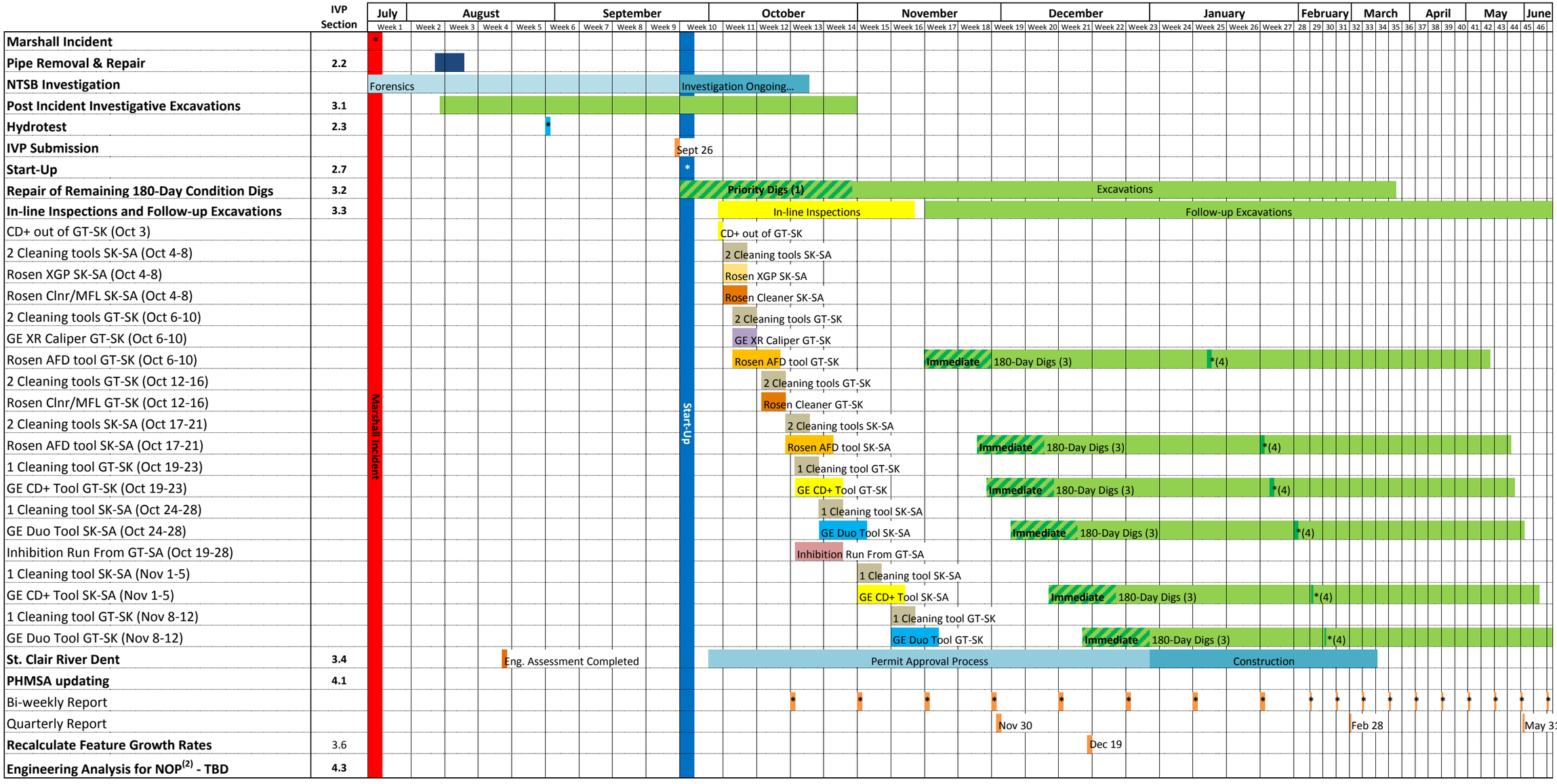
This integrity assessment testing will serve as the baseline testing for this segment in accordance with the Integrity Management Rules for Pipelines in High Consequence Areas as required in 49 CFR Part 195.452.

In addition, Enbridge will be conducting inspections, maintenance and integrity assessment testing in accordance with the existing Operating, Maintenance and Procedures Manual and the accompanying Integrity Verification and Remedial Plan (IVP) filed with PHMSA September 26, 2010. As Line 6B will undergo its next internal inspection according to the IVP prior to the completion of the St. Clair crossing, the next scheduled inline inspection for the St. Clair crossing will be within five years or as governed by Enbridge's IVP for Line 6B, whichever is earlier.

8. CONCLUSION

Enbridge has begun assembling an HDD Replacement Project development, support and execution team. The final Project plans, budgets and proposals will proceed through the necessary executive and Board of Director's review and approval process. All appropriate preplanning, agency consultation, material and contractor procurement and construction planning work has commenced in accordance with the schedule listed above. Should there be any material delays in this schedule or plan, Enbridge will notify PHMSA Central Region in writing and will continue to provide updates to the NEB. Also, Enbridge will provide advance notice to PHMSA Central Region, NEB and other agencies of the approximate timing that drilling and construction operations are expected to begin.

Appendix 5 - IVP Summary



Note 1: Priority Digs - As per CAO 5.G requiring priority of features noted on Table 6 of Jul 15, 2010 Long Term Pressure Notification for Line 6B
Note 2: NOP - Normal Operating Pressure
Note 3: 180-Day excavations shown are based on Preliminary Analysis
Note 4: Receipt of 90-day Final Report and start of 180-day final report excavations, not detailed on this chart