Jerry DeWitt
Senior Cathodic Protection Specialist
Enbridge Pipelines ((US) INC.
Chicago Region
1500 W. Main Street
Griffith, IN 46319
Tel 219 922 7023
Fax 219 922 3122

ENBRIDGE™

TO: Jay Johnson

SUBJECT: Marshal Area Close Interval Survey

At the request of the National Transportation Safety Board I was asked to collect close interval survey data in the vicinity of the defect area on mainline 6-B.

A close interval survey consists of recording structure to soil voltage potentials over the top of the pipeline, at 10 foot intervals, and with the rectifiers providing cathodic protection current cycling on and off so the IR drops in the circuit can be eliminated.

Structure to soil voltage is collected by placing a copper/copper sulfate reference electrode in the ground directly over the top of the pipeline, connecting the reference electrode to a high impedance volt meter that is connected to the structure. The measured voltage represents the average structure potential that equates to (4xD = L) D is depth to the top of structure and L is the length of the structure. By taking potential readings at intervals not exceeding 20 feet, it is possible to determine if the structure receiving adequate cathodic protection current and meets or exceeds the minimum levels of cathodic protection mandated in CFR 49 Part 195 which refers to NACE SPO196- latest revision.

Cathodic protection is achieved if one the following criteria are achieved:

- -850 millivolts with current applied
- -850 millivolts instant off
- 100 millivolt shift

At all locations tested on mainline 6-B acceptable levels of cathodic were found.

Jerry DeWiTT

NACE CERTIFICATION:

CP SPECIALIST 3593
COATING INSPECTOT LEVEL 3, 3885
INTERNAL CORROSION TECHKNOLOGIST 3593

NATIONAL PIPELINE SERVICES, LLC

July 31, 2010

Mr. Jerry DeWitt
Enbridge Energy

RE: Cathodic Protection Results – Marshall Leak Site

Dear Mr. DeWitt,

National Pipeline Services, LLC (NPS) obtained cathodic protection structure-to-soil potentials at the Marshall, MI leak site on July 31, 2010 between 6:30 and 7:00 pm. These readings were obtained by Keith Boswell and Cliff Metcalf with National Pipeline Services. These reading were obtained prior to the pipeline being exposed for inspection.

The following Enbridge Energy rectifiers were interrupted with synchronized GPS interrupters on an 8 second cycle ON and 3 second cycle OFF. Readings were obtained on approximately 10 foot intervals, starting at the temporary valve at Station 7553+24. Survey direction was down stream towards the leak site and beyond approximately 100 feet. Attached is a graph of the potentials obtained during this test.

ID	Location	Volts	Amperes
585	Fulton	10.6	4.9
599	Leroy Station	29.2	5.8
607	Marshall Station	21.7	8.4
620	Albion Station	31.4	6.1

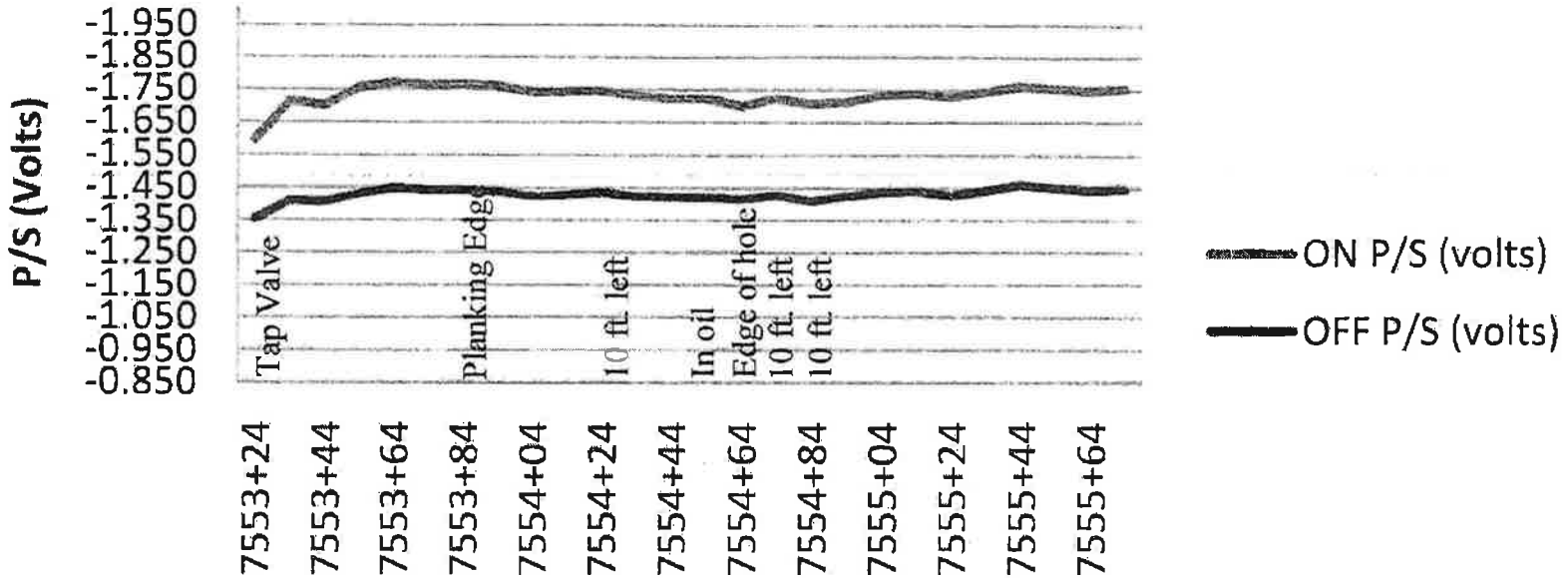
Cathodic protection levels appear adequate with minimal deviation along the length of pipeline surveyed.

If you have any questions or comments, please call me at 989-928-9188.

Sincerely,
National Pipeline Services, LLC

Keith B. Boswell
Operations Manager – NACE CP Specialist #5407

Enbridge Energy
Line 6B - Marshall Leak Site Survey



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SUBJECT: Line 6-B Foreign pipeline interference
DATE: August 11, 2010

Today I contacted corrosion personnel from Wolverine Pipeline, Buckeye, and Panhandle Eastern and requested information on cathodic protection rectifier and bond locations.

Buckeye operates several cathodic protection systems at their terminal on 17 mile Road North of Division with anodes placed directly around the tank bottoms, with no direct connection to Enbridge there is little chance that any voltage gradient from their facility would affect out pipeline.

Panhandle Eastern temporally deactivated their cathodic protection system at 11 mile road, this resulted in a 24 millivolt drop measured at the test station near 17 Mile Road, this voltage drop is negligible and has minimal effect on line 6-B. Panhandle Eastern has returned their rectifier to service.

Wolverine remotely cycled their rectifiers located at 11 mile Road, 14 mile Road, Homer Road, and old Division Street. Enbridge has a bond with Wolverine at homer road. The voltage drop measured 532 millivolts at 17 mile road.

When we conduct testing to ensure the effectiveness of our cathodic protection systems we will interrupt the Wolverine rectifiers in sequence with our rectifiers. This will eliminate the error in measuring our pipe to soil potentials and provide a more accurate voltage measurement.

Jerry DeWitt

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ENBRIDGE™

SUBJECT: Line 6-B exposed coating inspection
DATE: August 10, 2010

As mandated by the Federal Code of Regulations (CFR 49 part 195) Coating inspections are required whenever a regulated pipeline is excavated. Operators are required to visually inspect the pipeline coating and identify any anomalous conditions.

Prior to the start of excavation activities National Pipeline Services (NPS) conducted a close interval cathodic protection survey in the defect area. This survey recorded pipe to soil on/off voltage potentials on approximately 500 feet of pipeline. The level of cathodic protection substantially exceeded the minimum criteria.

The pipeline was visually inspected only on the upper portion of the pipeline that was exposed from August 5th thru August 9th.

The pipeline coating appears to be a vinyl half lapped tape system, which is referenced in the pipeline alignment sheet as Polyken 960.

The coating in contact with oil was observed to be in generally poor condition exhibiting looseness, softening, and wrinkles. Coated surfaces not in contact with the oil residue were in fair to good condition with only slight evidence of wrinkling.

There were a few areas where the coating was damaged and the pipeline was exposed to the soil, calcareous deposits were observed and are believed to be a direct result of minerals transported to the structure surface with the passage of cathodic protection current. This is an additional indication that the cathodic protection system is functional.

There were no signs of corrosion observed during this inspection.

Jerry DeWiTT

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COATING INSPECTOT LEVEL 3, 3885
INTERNAL CORROSION TECHKNOLOGIST 3593

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FORM CF-106

INTERNAL / EXTERNAL PIPE INSPECTION FORM

COMPANY NAME	Enbridge Inc.	**DATE**	8/12/1010
PIPELINE SEGMENT NAME	Line 6-B from station 7552+46 to 7554+99		

	YES	NO
Is person conducting task qualified in accordance with the Enbridge Operator Qualification Program? If no, do not proceed with inspection.	X	☐

	YES	NO
Does the pipeline have cathodic protection?	X	☐

If so, what is the pipe/soil reading?	-1.645 millivolts

Is pipe bare or coated?		coated	
Type of coating?	Poleyken tape	Condition of Coating?	Fair to poor

Describe external condition of pipeline?

The pipe coating in most areas is in fair shape, with visible slight damage and wrinkles from station 7552+46 to 7553+95 from this point to 7994+55 the coating was removed and abrasive blasted or is coated with fusion bond epoxy, from 7554+55 to 7554+99 the Polyken tape coating is oil damaged and should be replaced.
The PLM crew is planning to remove all exposed tape coat and replacing it with SPC epoxy.

See attached photos below

If pipe was cut for any reason an internal inspection must be done.

Describe internal condition.	

PRINT NAME	JERRY DEWITT	NAME OF COMPANY (IF CONTRACTOR)	
SIGNATURE