



<p>Information Exchange Meeting (CVA 1718-031)</p> <p>Company Name: Enbridge Pipelines (NW) Inc.</p>		<p>Date: 8 June 2017</p> <p>Time: 8:30 AM – 1:00 PM</p> <p>Location: Genesis Meeting Room, NFS Nunasi Financial Services Office</p> <p>Suite 201, 5109 48th St, Yellowknife NT X1A 1N5</p>		
<p>Purpose of Meeting: 2017 Annual Operation and Maintenance Review</p>				
<p>Chairperson: Gladys Onovwiona</p>				
<p>Attendees:</p> <p>National Energy Board (NEB): Tyler Caines, Katherine Roblin, Bahaa Mekalled (on the phone)</p> <p>Enbridge : Gladys Onovwiona, Sarah McKenzie, Erin Sanford, Nader Yoosef-Ghods, Ann Marie Tout, John Richmond, Lyndon Lamborn, Rob MacKenzie, Duncan Purvis</p> <p>Mackenzie Valley Land and Water Board (MVLWB): Angela Love</p> <p>NRCan: Sharon Smith (on the phone)</p> <p>Government of North West Territories (GNWT): Karen Polakoff, Laurie McGregor</p> <p>Amec Foster Wheeler: Blake Brodland, Karen Hincks</p>				
<p>A G E N D A</p>				
Item	Description	Who	Time (minutes)	Expected Outcome
1	Introduction and Welcome	Chair	15	Opening, introductions, housekeeping including

				emergency evacuation procedures
2	Safety moment	Chair	10	Safety awareness: Potholes
3	Environmental Management	Erin Sanford	45	
4	Pipeline Condition	Nader Yoosef-Ghods and Lyndon Lamborn	35	
5	Right-of-Way Condition	Nader Yoosef-Ghods and Karen Hincks	90	
5	Open discussion & Wrap-up	Chair / All	90	Group discussion / roundtable, review of action items

Minutes – see Enbridge presentation slide deck for full presented information; minutes below summarize highlights and additional questions or discussion

Environmental Management:

- Environmental training modules continue to be delivered to employees on a web-based platform. Environmental unit added to contractor orientation in 2015 was also included in 2016, and will remain a part of the contractor orientation package (updated annually).
- Formal environmental reviews are performed every 5 years (none in 2016).
- [Slides reference annual environmental facility assessment performed in 2015 but do not include 2016 data; report shows annual assessments performed in May and Sept 2016, with no major issues identified or new actions required.]
- Community wildlife monitoring has been discontinued.

Groundwater Monitoring Program:

- Ongoing groundwater monitoring taking place annually at 5 sites along the line, per standards laid out in Enbridge’s Groundwater Monitoring Program Standard ENV-01.
 - o Mackenzie Station – groundwater monitoring not performed at because located on bedrock, which inhibits drilling monitoring wells.
 - o Norman Wells and Zama Stations – BTEX and F1-F4 below detection limits/guidelines
 - o Wrigley Station
 - MW08-01 dry and MW08-02 could not be located in 2016 (as in 2015), but were not decommissioned as contemplated in 2015 report; Enbridge will keep trying to monitor them
 - Four new monitoring wells were added in the fall of 2015 (see “Underground sump tanks” for more information)
 - PHC F2-F4 detected in MW15-03 [one of new wells near sump tank]; PHC F3

detected in MW10-01 [lowest groundwater elevation on site]; below guidelines where available

- Injection Facility KP 839
 - MW08-120 benzene now less than guideline and ethylbenzene below detection limit (improvement since 2015); F3 detected in 2 offsite downgradient wells (MW07-111 and MW08-121), no guideline available
 - report shows 2015 groundwater elevations and flow direction, in error; presentation slide 18 correctly shows 2016 data; Enbridge representatives said they will amend the report, and noted that 2016 was a much wetter year than 2015
- Remote Maintenance Base KP 160:
 - F2 in BH-17C exceeds guidelines, but BTEX and PHCs in BH-17C improved since 2015 [report shows BTEX and PHC F1 detected in BH-20B but below guidelines]
 - PAHs exceeded guidelines in BH-17C similar to previous years [report also shows PAH exceedance in BH-4]
- Enbridge indicated that they apply the Federal Interim Groundwater Quality Guidelines for freshwater aquatic life, and Alberta Tier 1 Groundwater Remediation Guidelines
 - Injection Facility KP 839 and Zama Station: Natural area, fine-grained soil
 - Norman Wells and Wrigley Stations: Industrial land use, coarse-grained soil
- NEB noted detections of / increases in analysed constituent concentrations in groundwater from wells at boundaries of monitoring arrays (eg: Wrigley MW10-01, MW15-03; IJ KP 839 MW07-111, MW08-121; KP 160 BH-4, BH-20B); while contaminant concentrations in core areas were generally decreasing and concentrations in outlying wells were still less than referenced guidelines (except KP 160 BH-4), Enbridge should watch for trends in these areas and include in future report narrative as appropriate
- NEB and GNWT suggested considering for future reports:
 - Provision of summary tables of laboratory analyses for key wells, tabulated against referenced criteria guidelines
 - Indication of degree of increase or decrease of parameters

Contaminated Sites Management Program:

- Sites include Norman Wells Sump Tank Release (closure report submitted to NEB in Feb 2015), KP 160 Remote Maintenance Base and KP 839 Injection Facility, as noted above, and KP 387 site (closure report submitted to NEB Aug 2014)
- KP380.4 Release site
 - remediation completed in 2011; groundwater monitoring wells decommissioned in 2015; fifth and final year of reclamation program completed in 2016
 - weeds covered ~1% of site in 2016 (down from 10% in 2015), were removed by hand
 - results indicate revegetation treatments met the reclamation objectives of returning the site to pre-release conditions; closure report anticipated in 2017

Stormwater Monitoring Program:

- conducted spring and fall for containment ponds and tank farms at Mackenzie and Wrigley stations (except where insufficient water); analysed for pH, chloride, TSS, BTEX and PHC F1-F4
- all parameters were within acceptable limits

Underground sump tanks

- Underground sump tanks at Line 21 facilities are single-walled; routine integrity testing is performed via gas tracer tests
- Sump tank containment test performed at Wrigley Station in 2015 was inconclusive; as there

were only 2 weeks was left until ferry shut down for the winter, Enbridge drilled wells to monitor sump tank rather than redo the containment test and wait another year to monitor if necessary (rationale for 4 new groundwater monitoring wells)

- It was identified during the annual 2014 meeting that all Line 21 underground sump tanks would be replaced¹; this was to be completed by 2017 but has been delayed
- Enbridge to provide update regarding sump tank replacement dates

Operations and Maintenance Activities:

- There are 3 Remote Maintenance Bases: KP160 (small camp), and KP447 and KP731 (just equipment, no current fuel tanks or accommodation)
- Brushing is performed on rotation over the length of the RoW, except for slopes or watercourse crossings; mechanical, no pesticide use
- RoW “opened” means company went in and accessed that portion of the RoW

1617-053 (Pipeline Integrity):

- KP 23.7
 - o Added to the annual reconnaissance program in 2016. This site was previously documented as part of the overarching geohazards program for Line 21.
 - o No strain data available No geotechnical instruments at this site
 - o FoS estimated to be above 1.5
- KP 103
 - o Vertical strain at 1.66% (1989 to 2016) a with an increase of 0.02% from 2015 to 2016
 - o Deep seated slope failure movement not expected due to frozen ground below 6m but not ruled out
 - o Additional instrumentation installed in 2016
 - o Further study may be considered to estimate the risk to the pipeline due to this landslide movement
 - o Ill run has recorded a strain anomaly near the lower slope, in the same general area as the off ROW tension cracks.
 - o FoS for localized portion near the creek is expected to be in the range of 1.0 to 1.1 for some periods during the year and the entire slope estimated to be 1.3
- KP 133.6/133.7
 - o Slope Stability Factor of Safety (FOS) is 1.0 to 1.3
 - o Real time slope movement measurement devices are being considered
- KP 158
 - o FOS is 1.3 for the slide retrogressing to the pipeline
 - o Noted tension crack within 1 m of ROW had a 2 m dropdown, a change from the previous surface crack

¹ Enbridge response to action items related to 2014 Line 21 Annual Information Exchange Meeting (Activity # 1415-031 and #1415-133), Item # 2 – “The Underground Storage Tank integrity testing program for facilities on Line 21: All underground sump tanks on Line 21 system will be replaced, and monitored via regularly scheduled inner-wall integrity checks as per Enbridge’s Book 6 Operations and Maintenance Manuals, 04-05-12 – Prevention Maintenance Tasks- Operations_Double Walled Sump Tanks.”

- Main headscarp has retrogressed towards the ROW by about 1 m between 2015 and 2016
- SAA readings remotely monitored daily and have alarm notifications if movement rate meets a set threshold
- Subsequent retrogression of the slope could lead to a FOS of 1.1 with time
- KP 181.9
 - FOS estimated at 1.3-1.4
 - Monitoring instruments are being considered for this slope
 - Thaw probing in 2016 was cancelled due to weather
- KP 194.6
 - FOS >1.5 to 1.6, however, a conservative assumption of a steeper slope of 17 degrees resulted in a FoS of 1.1 to 1.2
 - No deep movement detected
 - Cracks observed off the ROW in previous years
 - Vertical strain increased by 0.02% from 2015 to 2016, total of 0.45% (North Slope)
- KP 195
 - FOS <1 to 2.1 depending on conservative parameters showing water pressures at, or above ground surface are responsible for FoS below 1.5
 - No deep movement detected and no pipe strain increase
 - Cracks identified in previous years were observed off the ROW and within 3 m of ROW
 - No vertical strain increase between 2015 and 2016 with overall vertical strain of 0.12%
- KP 196.7
 - Added to the annual reconnaissance program in 2016. This site was previously documented as part of the overarching geohazards program for Line 21.
 - FOS estimated between 1.6 and 1.7. Conservative parameters including a steeper slope angle of 22 degrees and higher pore water pressures result in an estimated FOS between 0.8 and 1.3
- KP 299.5 and 300.2
 - Two pipe strain anomalies have been identified within 1 Km of each other, one located at KP 299.5 and the other at KP 300.2.
 - Kp 299.5 was identified in 2016 as most likely for wrinkle development
 - Pipe vertical strain accumulation at Site 6 Overland Area A from 1989 to 2016 was 1.41% with an increase of 0.05% between 2015 and 2016
 - Pipe vertical strain accumulation at Site 6 Overland Area B from 1989 to 2016 was 1.14% with an increase of 0.01% between 2015 and 2016
 - KP 300.2 pipe vertical strain accumulation from 1989 to 2016 was 1.12% with an increase of 0.01% between 2015 and 2016.
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- KP 303
 - Confirmation wrinkle remediated in 2017
 - Vertical strain increase of 0.04% between 2015 to 2016 with overall vertical strain of 1.69%
- KP 309.1
 - Two strain features at this site one with strain of 1.05% (1989 to 2016) with a decrease

of 0.05% from 2015 to 2016. The other feature has a strain of 1.04% (1989 to 2016) and a strain increase of 0.02% between 2015 to 2016

- KP 311
 - o Site of previous wrinkles
 - o Most recent wrinkles was removed in 2007 Low factor of safety 1.1 to 2.0 with relatively stable strain
 - o Overall strain is 0.17% (2007 to 2016) with a decrease of 0.01% from 2015 to 2016
- KP 318
 - o Site of previous wrinkle, cut out in 1999
 - o Overall vertical strain of 0.20% (1999 to 2016) and an increase of 0.01% from 2015 to 2016
 - o Confirmation that no mitigation will be done at this site in 2016 or the near future.
- KP 825
 - o There are no significant integrity issues to the pipeline from Geo and hydro perspective
 - o The pipeline section is exposed since 2013 and monitored regularly
 - o No update on the hazard assessment has been done for this site for 2016.
- Company did consider remediation of site KP 300.2 and KP 309 at the same time as KP 303 but through analysis determined that they did not expect the strains at both sites to increase to a critical limit within the next 5 years and therefore have not planned any remediation at those sites at this time.
- Current Board order expires in 2017 and company will be submitting application for renewal at that time.

Action items:

Enbridge will provide the following information as soon as practicable:

1. Amend report to include correct Groundwater Elevation at Injection Facility KP 839 (Figure 2.4.1.4)
2. Provide an update regarding sump tank replacement dates
3. Provide the pipe soil interaction analysis for KP 103 where strain is 1.66% and increasing.
4. Engineering assessment for pipe at KP 103 in accordance with CSAZ662-15 clause 10.1.1
5. Respond to Environmental Follow-up Questions noted below Action Items

Environmental Follow-up Questions:

1. Injection Facility KP 839:

- Slide 18 of 2017 Annual Meeting presentation says “Sump tank release remediation in 2007, impacts were left in-place due to infrastructure”
- “Enbridge Pipelines (NW) Inc. (“Enbridge”) Notification of Contamination: Kilometer Post 839, Alberta” letter dated 13 December 2013 (RDIMS 865478) says site status is “Post-Remediation Monitoring”
- Please describe and show on a site plan the location, extent and maximum concentrations of contaminants left in-situ on this site.

2. Stormwater Monitoring Program:

- Please provide responses to the following follow-up questions regarding records of 2015 stormwater sampling provided by Enbridge on 28 July 2016 as part of the Action Item Deliverables from the Line 21 Operations and Maintenance Review Meeting (Item 10)
 - a. Mackenzie Station retention pond: What was observed "film" on surface and base of pond? Was this observed again in 2016 and/or spring 2017?
 - b. Wrigley Station retention pond: What was "organic odour noted" in May 2015? How is water collecting under liner (observed in May 2015), and what was the condition of the liner in 2016 and spring 2017?
 - c. Stormwater retention ponds at both stations: clarify what is meant by "down-turned" discharge pipe with no valve?