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BARR

Technical Memorandum

To: Alex Smith, Enbridge Energy
From: Ryan Erickson and Tristan Beaster
Subject: Superior Terminal Field Booster Pump 25 Release
Date: October 3, 2014
WDNR SERTS Spill ID: 20140818NO16-1
Barr Project: 49161292

This memorandum summarizes the actions conducted by Barr Engineering (Barr) at the request of Enbridge Energy (Enbridge) in response to a crude oil release at Field Booster Pump 25 (FB25) at the Enbridge Superior Terminal in Superior, Wisconsin (Figure 1).

Background

On August 18, 2013 at 6:15AM, Enbridge personnel observed crude oil contamination in a drainage ditch and on the ground surface near the center of the Enbridge Superior Terminal. The contamination was traced back to FB25 (Photo 1; Figure 2). The FB25 booster pump was not in its booster can (Photo 2) at the time of the release due to pump maintenance activities. The release occurred when a greater than two inch rain event the night of August 17 caused the booster can to overfill with rainwater and release to the ground surface the approximately 2.5 barrels of crude oil that had been left in the can. The rainwater and crude oil spilled onto the ground surface and flowed into and down the terminal stormwater ditches and into a stormwater pond (Photos 3 and 4).

Enbridge immediately reported the release to the National Response Center on August 18, 2014 and it was assigned case number 1092634 (Attachment A). The release was also reported to the Wisconsin Department of Natural Resources (WDNR) and it was assigned Substance Release Notification Report (SERTS) Spill ID: 20140818NO16-1.

Response Activities

Enbridge personnel immediately responded to the release. Response efforts included the following: placement of oil absorbent pads and booms on the ground surface in stormwater ditches and in terminal water bodies to recover free-product and limit contaminant migration (Photos 3, 4, 5, and 6; Figure 2); mobilizing multiple vacuum trucks to recover free product and water with a hydrocarbon sheen (Photos 4 and 5); placement of river boom in terminal water bodies and the Nemadji River to isolate the contamination and prevent potential downstream migration (Photos 5 and 7); deploying a boat on the Nemadji River to place the river boom and monitor river conditions; and, excavation of crude oil

contaminated soil with hydrovacuum (hydrovac) truck, mechanical equipment and hand tools (Photos 3, 9 and 11).

Recovered crude oil was injected into the pipeline system. Recovered contaminated water was containerized in three tanker trailers and stored onsite until off-site disposal could be coordinated. Contaminated soil was stockpiled in the terminal soil management area (SMA) building (Photo 13; Figure 2) until offsite disposal could be coordinated. Used oil absorbent boom, absorbent pads, and other investigation-derived waste (IDW) was containerized in garbage bags and stored in a roll-off container at the SMA (Photo 14) until offsite disposal could be coordinated.

Environmental Assessment

Enbridge contacted Barr and requested assistance with the following environmental release response and assessment services:

- assess the environmental site conditions through field observation and screening
- development of a response specific *Sampling and Analysis Plan* (SAP) (Attachment B)
- development of a response specific *Waste Management Plan* (WMP) (Attachment B)
- collect soil and water analytical samples
- assist with the off-site disposal coordination of contaminated soil, waste, and water
- site clean-up activity oversight and documentation, resource tracking, and daily reporting

Barr was onsite the morning of August 18, 2014 to assist with initial response activity. For environmental assessment organizational and reporting purposes, the site was divided into five operational units (OU1 through OU5) (Figure 2).

Field Methods

Field methods and procedures conducted during the FB25 response followed those described in the project specific *Sampling and Analysis Plan* (SAP) (Attachment B), the project specific *Waste Management Plan* (WMP) (Attachment B), the Superior Terminal WDNR pollutant discharge elimination system (WPDES) permit (Permit No. WI-0044393-05-0; Attachment B), and the pending Enbridge Superior Terminal /WDNR Negotiated Agreement for Facility-Wide *Site Investigation and Response Action Plan* (SIRAP) (2014), unless otherwise noted.

Barr was onsite between August 18 and August 22, 2014 to assist with the response activities. Barr also returned to the site as needed on later dates to document the environmental conditions encountered during the site restoration activity. During the early response actions, contaminated soil was identified visually by the dark crude oil staining on the ground surface and contaminated water was identified by

the presence of product and/or a rainbow sheen on the water surface. As the clean-up activity continued, Barr field screened soil from the remedial excavation extents for the presence of volatile organics using an 11.7 eV photoionization detector (PID) to guide the excavation activity and document site conditions (Attachment C). Other evidence of crude oil contamination, such as odor, discoloration, and sheen were also recorded on field screening sheets. In accordance with the Facility-wide SI/RAP, soil impacts were considered present if a headspace greater than 10 parts per million (ppm) was identified.

Barr collected two analytical soil samples (*140820FB25-SO-1*, *140820FB25-SO-2*) from the final OU1 remedial scrape near the release source (Figure 3) to document post-response action soil conditions. The samples were submitted to ALS Environmental Laboratory in Holland, Michigan for analysis of petroleum volatile organic compounds (PVOC) plus naphthalene. Analytical results from each sample were input into the WDNR Web Calculator to compare analyte detections to groundwater residual contaminant levels (RCL) and industrial direct contact RCL's and determine whether the soil passes the Cumulative Hazard Index criteria.

Barr also collected up to five daily surface water samples (Photo 8) from water bodies downstream of the release, including from the Nemadji River, between August 18 and August 22 to document surface water conditions (Photo 8). The samples were collected from six locations (SW-1 through SW-6) in OU4 and OU5. In accordance with the WPDES permit for this facility (Attachment B), water samples were collected for laboratory analysis of polycyclic aromatic hydrocarbons (PAH), benzene, ethylene, toluene, xylene (BETX), oil and grease (O&G), biological oxygen demand (BOD) and total suspended solids (TSS). Samples were submitted to ALS Laboratory and/or ERA laboratories for analysis. Surface water samples collected on August 18, 2014 were also analyzed for diesel range organics (DRO). Barr measured pH and dissolved oxygen (DO) at each sampling point using a YSI 556 multiprobe meter (Attachment C). Surface water sample analyte detections and surface water monitoring results were compared to WPDES permit effluent limitations (*WPDES* Table 2.2.1) and WDNR *NR105.08 Surface Water Quality Criteria and Secondary Values for Toxic Substances* Human Threshold Criteria for Non-Public Water Supply Cold Water Communities (*NR105.08* Table 8). These regulatory documents are provided in Attachment B and the regulatory criteria values are referenced in Table 1 and Attachment C.

Results

In this section of the memo, the following items are addressed for each operational unit:

- environmental conditions encountered after the FB25 release
- the remedial response and restoration activities
- the final site conditions, including applicable field screening and analytical sampling results

The site operational units and response features are shown on Figure 2. The field conditions observed during the initial field assessment and the analytical sampling locations are shown on Figure 3. Site investigation field sampling and screening logs and surface water quality field monitoring pH and DO measurement results are provided in Attachment C. Excavation soil sample and surface water sample laboratory reports are provided in Attachment D.

OU1 (Photos 1, 2, 9, 10)

Crude oil impacted soil and water with free-product were observed in the OU1 area. Product was recovered with vacuum trucks and oil absorbent pads and boom. Impacted soil was removed with hydrovac trucks and mechanical equipment. Impacted stormwater culverts in the northwest corner of OU1 were removed and replaced. The OU-1 remedial excavation was completed on August 20, 2014 and had approximate dimensions of 190 feet long by 60 feet wide by 0.5 feet deep.

Barr collected 61 field screening soil samples from the final OU1 remedial excavation extents. All of the field screening samples had a headspace below 10 ppm except *OU1-G15*, which was located immediately adjacent to the field booster structure and had a headspace detection of 30 ppm. Approximately 0.1 cubic yards of impacted soil was excavated from this location with hand tools following the field screening activity. At the WDNR's request, two PVOC plus naphthalene analytical soil samples were collected from the bottom of the OU1 remedial excavation (*140820FB25-SO-1*, *140820FB25-SO-2*). Analyte detections in the OU1 excavation samples were below laboratory reporting limits, below WDNR groundwater RCL's and industrial direct contact RCL's, and passed the Cumulative Hazard Index criteria.

The area was backfilled with clean aggregate material and the culverts were replaced on August 22, 2014.

OU2 (Photos 3, 4, 11, 12)

Crude oil impacted soil and water with free-product were observed in the OU2 ditch and Pond 1. Free-product was recovered with vacuum trucks and oil absorbent pads and boom. Water with a hydrocarbon sheen was recovered with a vacuum truck. Impacted soil was removed from the OU2 ditch with mechanical equipment and hydrovac trucks. The Pond 1 banks were washed with a high pressure sprayer.

Following the excavation activities, Barr collected 32 field screening samples along the length of the OU2 ditch between August 20th and August 27th, 2014. The final extent of the OU2 remedial excavation was approximately 700 feet long by 15 feet wide by 1 foot deep. No residual crude oil impacted soil was identified through field screening of the final excavation extents. The remedial ditch excavation was backfilled with clean rock.

Barr collected 10 field screening samples around the perimeter of Pond 1 on September 10, 2014. No residual crude oil impacted soil was identified around the perimeter of the pond and no sheen was observed on the water surface.

OU3

OU3 consists of a narrow drainage ravine between Pond 1 and Pond 2. Oil absorbent boom was placed across the bottom of the northwest end of the ravine in case crude oil contaminated water was released from Pond 1. Barr periodically monitored OU3 conditions at both ends of the ravine and no evidence of crude oil contamination (staining, sheen, free-product) was observed. No soil or water was removed from OU3 and no field screening or analytical samples were collected from OU3 as part of the environmental assessment.

OU4 (Photo 5)

A hydrocarbon sheen was observed on the surface of Pond 2 in OU4 on August 18th and 19th, 2014. River booms were placed in OU2 to prevent contaminant migration. Enbridge rinsed the ditch banks with a high pressure washer and recovered hydrocarbon impacted water with a vacuum truck and oil absorbent booms and pads. A hydrocarbon sheen was not observed on the water surface after August 19, 2014.

Barr monitored surface water conditions with a YSI and collected surface water samples from the Pond 2 SW-6 sampling point daily from August 19, 2014 to August 22, 2014 (*140819-FB25-SW-6, 140820-FB25-SW-6, 140821-FB25-SW-6, 140822-FB25-SW-6*). The SW-6 surface water pH and DO readings were within WPDES limits, except on August 19 when the pH was measured at 5.97 (the acceptable pH range in the permit is between 6 and 9) and on August 20 when the DO was measured at 5.95 mg/L. The DO limit in the permit is 7. All analyte concentrations were below laboratory detection limits.

OU5 (Photos 6, 7, 8)

No evidence of hydrocarbon impacts was observed in OU5. Enbridge deployed oil absorbent boom across the drainage in several locations between Pond 2 and the Nemadji River as a preventative measure. River boom was also placed across the Nemadji River to prevent potential contaminant migration.

Barr monitored surface water conditions with a YSI and collected surface water samples from sampling points SW-1 through SW-5 from August 18, 2014 through August 22, 2014. The exact sampling locations varied based on observed conditions and accessibility. Surface water pH and DO readings were within WPDES limits with the following exceptions: SW-1 (8/20/2014 DO = 6.87); SW-2 (8/19/2014 DO = 5.28; 8/20/2014 DO = 6.45); and, SW-5 (8/19/2014 DO = 6.98). The DO limit in the permit is 7.

No analyte concentrations were detected in the Nemadji River. All detected analyte concentrations were below WPDES effluent limits and *WDNR NR105.08* Human Threshold Criteria for Non-Public Water Supply Cold Water Communities (Table 1). No analyte concentrations were detected in the surface water samples collected after August 19, 2014.

Table 1: Surface Water Sample Analyte Detections

Sample ID	Sample Date	BETX Total	Benzene	Ethylbenzene	Toluene	Xylenes	Oil and Grease	DRO
WPDES Permit Effluent Limits		*750 ug/L*	*50 ug/L*	*NA*	*NA*	*NA*	*15 mg/L*	*NA*
NR105.08 Human Threshold Criteria[1]		*NA*	*260 ug/L*	*931 ug/L*	*5,201 ug/L*	*NA*	*NA*	*NA*
140818 FB25-SW-3	8/18/2014	22.2 ug/L	11.8 ug/L	1.3 ug/L	3.4 ug/L	5.7 ug/L	ND	0.12 mg/L
140818 FB25-SW-4	8/18/2014	10.6 ug/L	1.3 ug/L	1.2 ug/L	2.9 ug/L	5.2 ug/L	ND	0.13 mg/L
140818 FB25-SW-5	8/18/2014	9.3 ug/L	1.2 ug/L	1.1 ug/L	2.5 ug/L	4.6 ug/L	ND	0.14 mg/L
140819 FB25-SW-5	8/19/2014	ND	ND	ND	ND	ND	5.3 mg/L	NS

BOLD = Regulatory criteria exceedance; NA = Not applicable; ND = Non-detect; NS = Not Sampled.
[1] = NR105.08 Human Threshold Criteria for Non-Public Water Supply Cold Water Communities

Waste Management Coordination

Waste management actions conducted by Barr followed the response-specific *Waste Management Plan* (WMP) (Attachment B). Specific waste management actions are summarized below for each generated waste stream.

An estimated 25 gallons of crude oil was recovered with vacuum trucks during the response actions and from the contaminated water tanker trailers. The product was injected into the Enbridge pipeline system. The remaining product was recovered with oil absorbent boom and pads and with the excavated contaminated soil.

Remedial response activities generated approximately 550 cubic yards of contaminated soil (Photo 13) and 10 cubic yards of contaminated waste materials (absorbent boom and pads) (Photo 14). Barr collected waste characterization samples from the contaminated soil stockpile (*140818-FB25-Stockpile-1, 140818-FB25-Stockpile-2*) and from the waste materials (*140820-FB25-IDW-1*). The samples were sent to the ALS Laboratory in Holland, Michigan. The soil samples were analyzed for DRO, Oil and Grease, and BETX. The waste material sample was analyzed for toxicity characteristic leaching procedure (TCLP) benzene. Upon receipt of the analytical results, the laboratory report was submitted to the Shamrock Landfill in Cloquet, Minnesota as part of the waste profile application. The waste profile was accepted (profile #CL14-0042) and a total of 392.13 tons of contaminated soil and IDW were hauled to the landfill in August and September of 2014 (Attachment E).

Two waste characterization contaminated water samples (*140819-FB25-WW-1, 140819-FB25-WW-2*) were collected from the tankers onsite. The samples were sent to ALS Laboratory in Holland, Michigan for analysis of BTEX and DRO. The results were submitted with a contaminated water disposal request to the Western Lake Superior Sanitary District (WLSSD) wastewater treatment plant in Duluth, Minnesota. The

disposal request was accepted on August 25, 2014 (Attachment E) and a total of 22,000 gallons of contaminated wastewater was hauled to WLSSD in August and September of 2014.

Conclusions and Recommendations

Visible product from this release was recovered using vac trucks and booms. Impacted soil in the FB25 release area with a headspace greater than 10 ppm has been removed. Analyte concentrations in the soil samples collected from the base of the excavation closest to the release site (OU1) were below laboratory detection limits. Final remedial excavation extents have been backfilled with clean gravel or rock.

Surface water with a visible sheen in Pond 1 and Pond 2 and the OU2 ditch was pumped into tanker trucks and captured using booms and pads. A rainbow sheen is no longer observed on the water surface in these areas. Water quality monitoring did not identify any significant DO or pH exceedances that can be attributed to the release. Analyte concentrations that were detected in water downstream of the release were below the WPDES effluent limits and *NR105.08* Human Threshold Criteria. All analyte concentrations were below laboratory detection limits three days after the release. No analyte concentrations were detected in the Nemadji River. The FB25 release does not appear to have impacted public waters.

Crude oil impacted soil, water, and waste materials generated during the FB25 release response and remedial actions have been properly disposed of at approved waste disposal facilities.

Based on the results from the environmental assessment, it appears that the FB25 release response activities sufficiently addressed the associated contaminated soil and water at the Superior Terminal. No further action is recommended.

Attachments:

Site Photos	1 through 14
Figure 1	Site Location Map - Field Booster 25 Response
Figure 2	Site Layout Map - Field Booster 25 Response
Figure 3	Environmental Site Assessment and Response Map - Field Booster 25 Response
Attachment A	Enbridge Incident Alert
Attachment B	Field Activity Plans and Reference Documents
Attachment C	Field Activity Documentation
Attachment D	Laboratory Reports for Excavation Soil Samples and Surface Water Samples
Attachment E	Waste Disposal Documentation

Site Photos:

Photo 1

Photo 2

Photo 1: FB25 release area. Photo taken facing south on August 18, 2014.
Photo 2: FB25 booster can. Crude oil is visible on the outside of the pump casing. Photo taken facing southwest on August 18, 2014.

Photo 3

Photo 4

Photo 3: OU2 ditch with crude oil staining on ditch banks and vegetation. Oil absorbent boom and remedial excavation activity are shown. Photo taken facing southeast on August 18, 2014.
Photo 4: Pond 1 response. Oil absorbent boom and pads and a vacuum truck are shown. Photo taken facing west on August 18, 2014.

Photo 5

Photo 6

Photo 5: Response activity in the OU4 Pond 2. River boom (yellow) and oil absorbent boom (white) were deployed to prevent sheen migration. A vacuum truck was used to recover water with a sheen. Photo taken facing northeast on August 18, 2014.
Photo 6: The OU5 terminal drainage below Pond 2. Photo taken facing southwest on August 18, 2014.

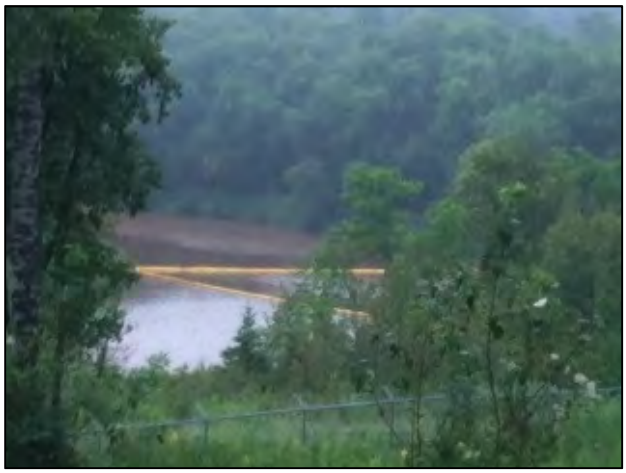


Photo 7

Photo 8

Photo 7: River boom (yellow) deployed on the Nemadji River around the outlet for Terminal drainage. Photo take facing southwest on August 18, 2014.
Photo 8: SW-5 surface water sample collection in OU5 on August 20, 2014.

Photo 9

Photo 10

Photo 9: OU1 remedial excavation scrape. Photo taken facing south on August 20, 2014.
Photo 10: Restored OU1 release area. Photo taken facing southeast on August 22, 2014.

Photo 11

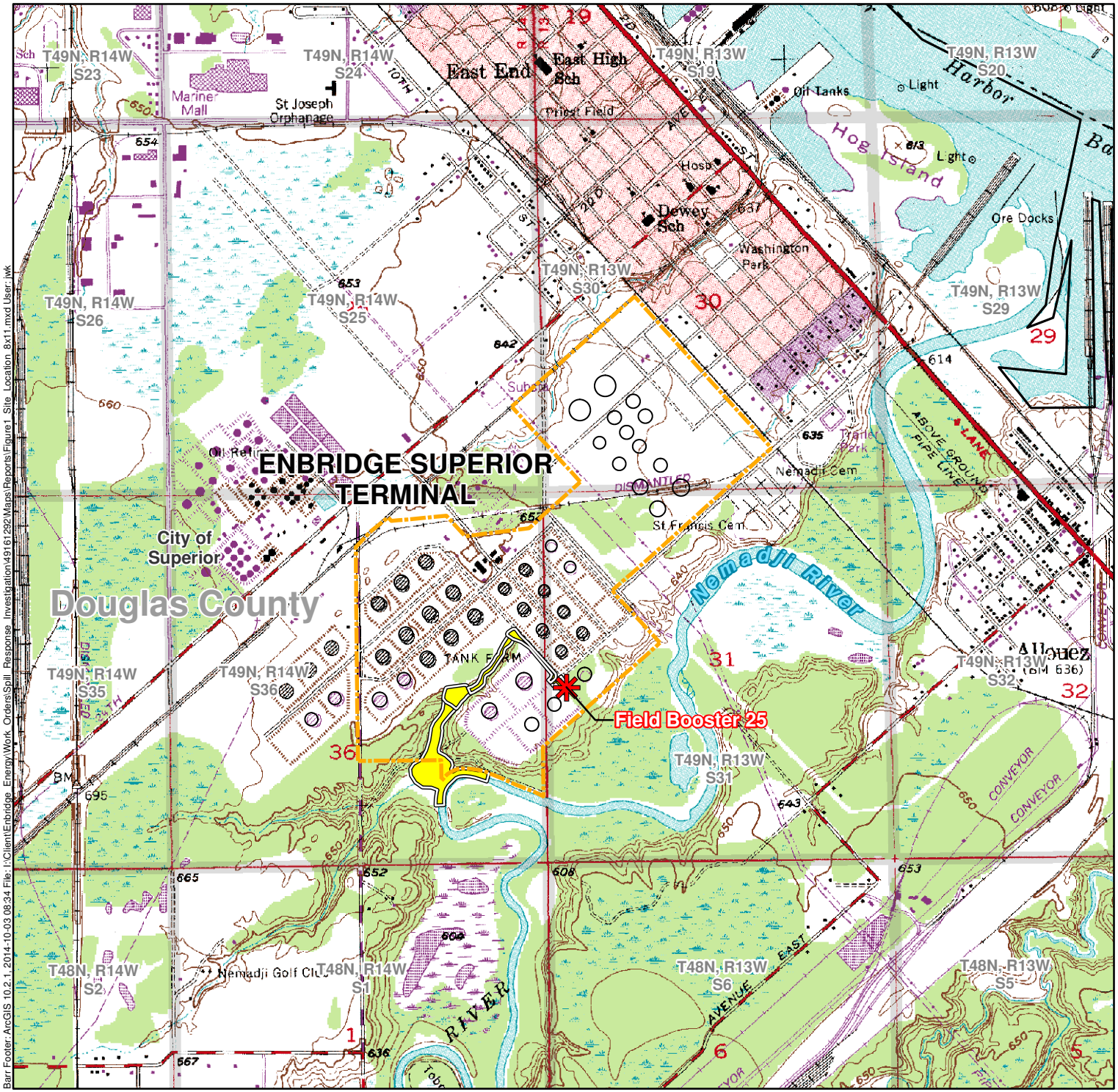
Photo 12

Photo 11: OU2 ditch remedial excavation scrape. Photo taken facing southeast on August 27, 2014.
Photo 12: Restored OU2 ditch with rock backfill. Photo taken facing southeast on August 27, 2014.

Photo 13

Photo 14

Photo 13: FB25 contaminated soil stockpile in the Terminal soil management area. Photo taken on August 19, 2014.
Photo 14: FB25 contaminated waste material in roll-off container located in the Terminal soil management area. Photo taken on August 20, 2014.



Release Location

Operational Units

Terminal Property Boundary

0 2,000 4,000

Feet

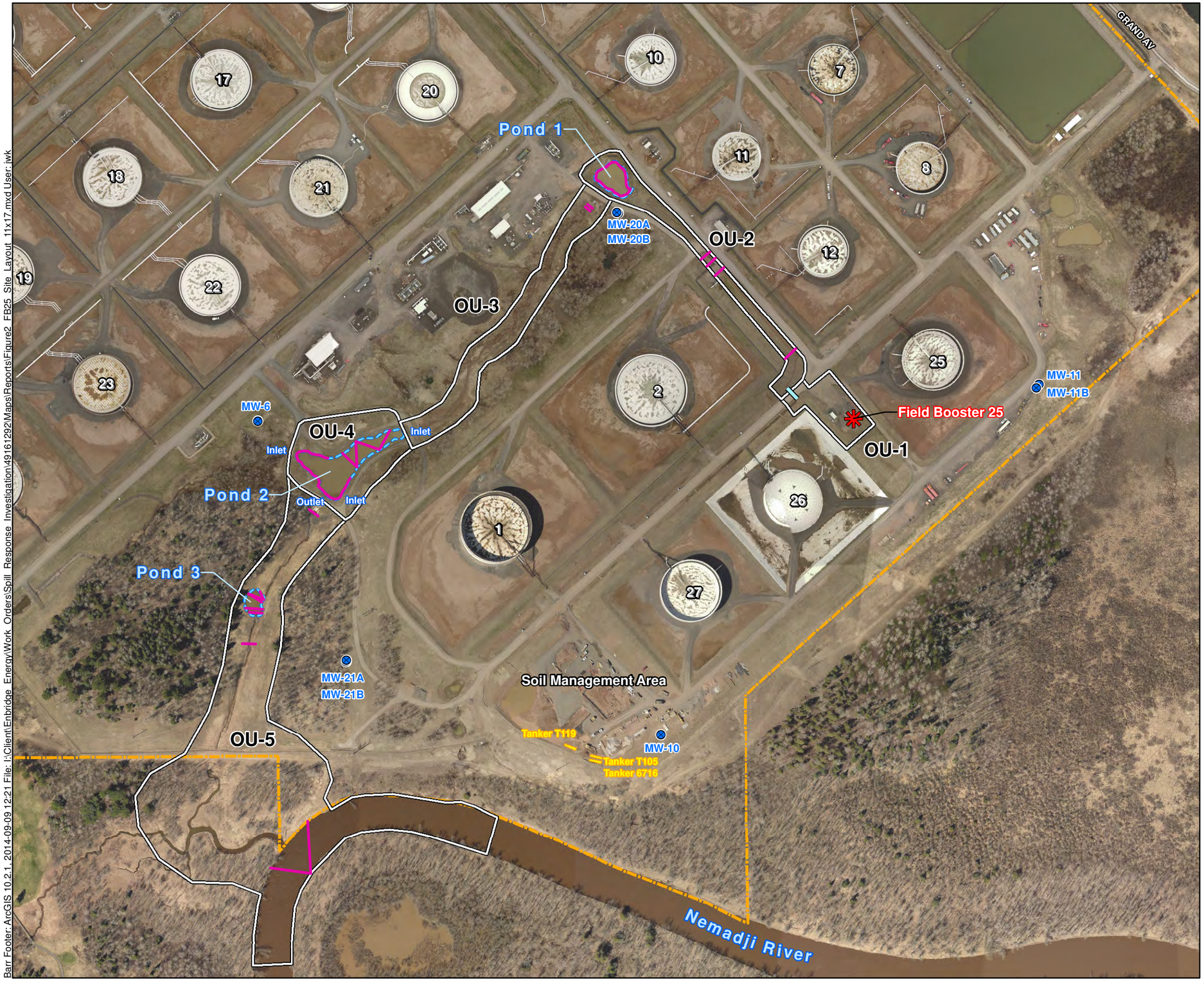
1 Inch = 2,000 Feet

Figure 1

SITE LOCATION MAP
FIELD BOOSTER 25 RESPONSE
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Barr Footer: ArcGIS 10.2.1, 2014-10-03 08:34 File: I:\Client\Enbridge_Energy\Work_Orders\Spill_Response_Investigation\49161292\Maps\Reports\Figure1_Site_Location_8x11.mxd User: jwk



Release Location

Monitoring Wells

Operational Units

Tanker Trailers

Ponds

Culvert

Booms

Terminal Property Boundary

0 300 600

Feet

1 Inch = 300 Feet

Douglas County Imagery Circa May, 2013

Figure 2

SITE LAYOUT MAP
FIELD BOOSTER 25 RESPONSE
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Release Location

Soil Sample Locations

Surface Water Sample Locations

Monitoring Wells

Release Extent

Product Observed

Sheen Observed

Operational Units

Ponds

Terminal Property Boundary

0 300 600

Feet

1 Inch = 300 Feet

Douglas County Imagery Circa May, 2013

Figure 3

ENVIRONMENTAL SITE ASSESSMENT & RESPONSE MAP FIELD BOOSTER 25 RESPONSE SUPERIOR TERMINAL

Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Attachment A

Enbridge Incident Alert

Ryan E. Erickson

From: Alex Smith <alex.smith@enbridge.com>
Sent: Monday, August 18, 2014 11:02 AM
To: Ryan E. Erickson
Subject: Fw: INCIDENT ALERT - [5045]

Alex Smith
Enbridge Energy
715-817-8322

From: Theresa Picton
Sent: Monday, August 18, 2014 11:00 AM Central Standard Time
To: Ryan Stahler; Ben Bouska; Jeremy Herd; Neil Cooney; Rose McEneaney; Kyle Oraskovich; Hailey McBurney; Kristen Higgins; Glen Whelan; Paula Howard; Chris Mampre; Steve Letko; Jackie Guthrie; Kori Patrick; Charmain Calancia; Marcella Harder; Marc Orchard; Kristyn Springall; Chris Beaudin; Douglas Rosenberg; Laura Anato; Richa Sahib; Thai Javate; Jerico Perez; Refaul Ferdous; Bill Timbers; Caroline Seguin; Amy Baxter; Guy Jarvis; Andrew Harrington; Danny Schall; Lane Robbins; Aja Obin; Matt Yarmuch; David Weir; Lily Li; Dan Ferguson; Jessica Farrell; Ronnie Maglalang; retben.jay.johnson@enbridge.com <retben.jay.johnson@enbridge.com>; Theresa Picton; IT Web Support; Bradley Salo; Steven Dahnke; Kelly Kowalczak; Stacy Soine; Cynthia Clark; Shaun Kavajecz; kaci.lundgren@enbridge.com <kaci.lundgren@enbridge.com>; Michael Pudleiner; Paula Brostowitz; Emily Moe; Ashley Evans; Nick Compton; Brian Mills; Jim Ramnes; Kim Campbell; Donna Tribe; Craig Sluser; Gee Hagan; Shireen Chaudhary; Tamara Wild; Steve Murray; Lindsay Reynolds; Bonnie Andriachuk; Matthew Thompson; Vince Macintyre; Jessica Skoreyko; Scott Ironside; Don Engen; Chris Martens; Damir Grmek; Monique Berg; Randall Kemp; Adam Pecush; Ingrid Pederson; Mark McTavish; Amy Higgins; Leigh Gendron; Anna Warawa; Doug Lawrence; Saheed Akonko; Steven Bott; Shaun Dawe; Larry Heise; Sean Keane; Len LeBlanc; Jackie Lewyk; Jason Pavone; Trevor Place; Garry Sommer; Martha Vega-Smith; Tom Zimmerman; Iouri Ponomarev; Jenny Mi; Luis Torres; Adam Maki; Prema Meiappan; Ryan Dale; Aaron Sutton; Barbara Broderick; Cheng Xing; Collin Taylor; Geoff Vignal; Jen Maynard; Brian Scott; Junfang Lu; Oscar Khazam; Peter Song; Tom Richardson; Tommy Harn; Yvan Hubert; Laura Kennett; Millan Sen; Len Krissa; Ryan Sporns; Gordon Fredine; Cecilia Barrios; Arlene Willick; Juan Mejia; Stephen Wood; Rain Zhu; Wanmin Song; Paola Scholte Mendoza; Francisco Aranguren; Gurwinder Nagra; Johana Gomez; Brian Ellestad; Wade Keller; Duane Evans; Kirk Strachan; Lorna Harron; Rob MacKenzie; Mark Maxwell; Doug Cook; Bersi Alvarado; Cristin Mieila; Mohamed Chebaro; Greg Sasaki; Jennifer Morse; Peter Dobson; Suzanne Ward; Phil Perron; Laura Seto; Randy Penney; Wei Liu; Jaqueline Pina; Bill Boorse; Michael Huot; Emils Muehlenbachs; Sandra Gaudet; Andrew Nielsen; Jun Zhang; Karmun Cheng; Kimberly Pierce; Amanda Kulhawy; Ana Kapach; Andrea Daniel; Art Meyer; Casey Lavigne; Catherine Rieck; Chijioke Ukiwe; Darrell Fluet; James Martin; Jeff Liang; Jeremy Ward; Jesus Amundarain; Jonny Tran; Justin Han; Kaitlyn Korol; Laz Itama; Marc Rouleau; Mariangel Rivolta; Mary Banack; Mustafa Al-Nuaimi; Richard Himschoot; Rupal Jajal; Scott Bachand; Simona Voicila; Syed Haider; Yanping Li; Sal Paonessa; Lawrence Jordan; seema.taylor@enbridge.com <seema.taylor@enbridge.com>; Lisa Anderson; Wilma Pelech; Kevin Underhill; Scott Brummet; Rachael Shetka; Paul Meneghini; Scott Lounsbury; Jeannette Gasser; Joseph Peterson; Joe McGaver; Les Miskolzie; Sara Ploetz; Eric Williams; Jennifer Russell; Shane Yokom; Harold Stark; Jason Arsenault; Karl Beaster; Greg Milne; Neil Reid; Ken Kozyra; Julie O'Brien; Femke Pennings; James Snider; Alina Heydt; Cheryl Urie; Amanda Mitchell; Richard Oleschuk; Paul Turner; Tony Shoberg; Bryan Sederberg; Rhonda O'Leary; Niki Harriman; Amanda MacKay; Kari Hamilton; Daniel Cameron; John Bohrmann; Robert Doherty; David Bareham; Tricia Asbell; James Anklam; Stacy Frerich; Gary St Onge; Heather MacLeod; Michael Eigner; Adam Vehe; Alex Smith; Andrew Orthober; Ashleigh Whitton; Bobby Hahn; Carl Carlson; Curtis Wakulchyk; Dale Gross; Dan Born; Doug Bowes; Erin Sanford; Keely Pearson; Kelli Nelson; Kendra Stasyk; Lacey Cribb; Laura Wynychuk; Martin Peek; Mary Conrad; Mike Sutherland; Mike Zimmel; Paul Lehman
Subject: INCIDENT ALERT - [5045]

Enbridge Energy, Limited Partnership

Release Information:

A. Location

Superior
Wisconsin
USA

B. Time of Incident

8/18/2014 06:15 CDT

C. Leak Details

Line: N/A
Station: PR
Mile Post: N/A
Gathering System: N/A
Lateral: N/A
Lateral Description: N/A
Volume: 2.50 BBLs (0.4 m3)
Commodity Type: Crude Oil
Crude Type: N/A

D. Description of Incident

While completing rounds at the Superior Terminal on August 18th at approximately 6:15 CST, the gaugers discovered oil sheen in the ditch near field booster (FB) 25 and 26. The gaugers immediately notified their supervisor and in turn notified Area Management and Superior PLM. Boom was deployed in the ditch where oil was first identified as well as two containment ponds. A boat was launched into the Nemadji River to assess if oil had reached the Nemadji River. Although oil has not reached the Nemadji River, boom has been installed as a precautionary measure. It is believed that the source of the oil has been identified as the FB25 booster can. The booster pump has been out for rebuild since June 25, 2014, and it is believed that the oil source was from residual oil that was in the can. PLM and Superior Terminal Operations personnel are currently cleaning up oil sheen on the containment ponds. External Notification to the NRC has been completed #1092634. This incident will require a 30 day PHMSA 7000 Report.

E. Impacts

Unintentional explosion or fire: None
Death or Injuries: No
Estimated costs exceed $50,000: Yes
Water Body (river/stream/wetland/reservoir): None
Contaminated Soil: Yes
Wildlife: None
Vegetation: None

F. Links

To open the Leak Record, please click on the link below:
http://lrs.enbridge.com/LRS/LeakDashboard.aspx?LeakID=5045

Attachment B

Field Activity Plans and Reference Documents

- FB25 Sampling and Analysis Plan
- FB25 Waste Management Plan
- Superior Terminal WPDES Permit
- WDNR NR105.08 Surface Water Quality Criteria and Secondary Values for Toxic Substances

Field Booster FB25 Release
Superior Terminal Facility
Superior, Wisconsin

Sampling and Analysis Plan

August 20, 2014

Final: August 20, 2014

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APPENDICES

Appendix A - Standard Operating Procedures

This Sampling and Analysis Plan (SAP) describes the sampling/analysis and quality assurance programs to which Enbridge Energy, Limited Partnership (Company) will adhere to during implementation of stabilization and mitigation activities associated with the Field Booster FB25 Release on August 18, 2014. It is to be implemented in conjunction with response plans discussed in other sections of this work plan. Changes to the plan are anticipated to reflect the changing conditions during the response and the information gained as the work progresses.

1.0 Background, Spill Release Area Description, and Location

On August 18, 2014 oil was discovered near a booster pump at the Company's Superior Terminal Facility (facility) located at 2800 East 21st Street, Superior, Wisconsin in Douglas County. The facility property includes portions of Sections 30 and 31, Township 49 North and Range 13 West and Section 36, Township 49 North and Range 14 West. The Company's pipeline Spill Release Area (RA) is located near field booster pump 25 (referred to as "FB25") between storage Tanks 25 and 26, extends approximately 1,300 feet northwest along an earthen ditch into a retention pond near Tank 10, and approximately 1,200 feet southwest along a gully to a second containment pond near Tank 1 (Figure 1). The Company estimates the initial volume of crude oil releases was approximately 2.5 barrels.

Response measures (e.g., oil absorbent booms and pads) were deployed in the ditch downstream of FB25 to control the flow of oil and sheen into the containment ponds. Oil was observed in the ditch and pond 1. A sheen was observed in the ditch between pond 1 and pond 2 and on the surface of pond to during the first 12 hours of the response. There was no sheen observed in the unnamed Tributary downstream from Pond 2 indicating there was no release to the Nemadji River.

1.1 Spill Release Area Description and Location

The primary areas impacted by this release have been divided into five Operational Units (OU) for clean-up operations and sampling (Figure 2):

- OU1 – the area adjacent to the field booster pump 25 source area which is primarily oil-saturated soil below ground surface,
- OU2 - the area where stormwater transported oil product along the earthen road ditch leading to Pond 1 northwest of OU1,
- OU3 – the area where surface water transported oil sheen southwest along a gully leading southwest from OU2, and
- OU4- the area around Pond 2 where oil sheen was observed.
- OU5- the area between Pond 2 and the Nemadji River.

1.2 Area Physical Features

The topography of the RA and the general area around the RA is relatively flat. The National Resource Conservation Service (NRCS) has mapped the majority of the surficial soils in the vicinity of the facility as clay. There are several wetland areas associated with the facility and the surrounding vicinity (Figure 3). The most dominant wetland types are identified as Scrub/Shrub and Forested Wetlands.

The Nemadji River is present on the south and southeast side of the property in a broad incised valley (Figure 1). The adjacent Nemadji River valley is topographically 35 to 50 feet lower than the average elevation of the site. On the west side of the facility, a small tributary stream and ephemeral gullies are present that discharge to the Nemadji River. The majority of the surface water flow in the vicinity of the site is toward these gullies and the river. The Nemadji River discharges to Superior Bay of the St Louis River within the Superior Harbor approximately one-half mile to the northeast. The St. Louis River discharges to Lake Superior. The surface water flow of the Nemadji River correlates with the dominant regional groundwater flow direction which is also northeast in this portion of the watershed.

1.3 Adaptive Management

Throughout this plan there are various forward-looking statements or content, as well as, associated text that may indicate specific details may need to be worked out with relevant agencies as work progresses.

1.4 General Scope of SAP

The SAP will address the objectives of the stabilization and mitigation activities to address this release. This includes performing soil, water, waste, and product sampling within impacted areas. Results of the sampling program will be used to guide oil recovery and containment activities as they relate to remediation of OU1 through OU5. Sampling beyond Pond 2 in OU 4 and OU5 is also being performed to evaluate potential impacts from the release.

This SAP is intended to encompass the work to be conducted during the release response. Supplements to the SAP will be developed as necessary based on additional known information and for future phases of work.

2.0 Current Conditions

The Company, as of the date of this plan, has mobilized to OUs 1-5, as well as the Nemadji River, the following resources in the support of sample collection, analysis, data validation, and reporting:

- Surface water collection and data reporting professionals, and
- Waste inventory and characterization professionals.

To date, the Company has collected the following types of discrete samples in the appropriate sample containers:

- Surface water, and
- Waste characterization.

To date, the following key response actions have been completed:

- Security: Access to the RA is restricted by a 24-hour security detail that has isolated the area from vehicular traffic. Two retention ponds are located within the restricted access areas.

- Shallow Soil Excavation: Shallow soil in the RA impacted by the overland flow of crude oil is being excavated and staged for off-site disposal. The objective associated with shallow soil excavation is to prevent further migration of oil to surface water. RA excavation activities involve the use of mechanical backhoes and hydrovac excavators to remove impacted soil. The material is directly loaded into trucks and transported to the nearby on-site soil management area (SMA) pending waste characterization prior to disposal.

- Isolate Field Booster: Field Booster 25 has been pumped and secured. It will remain out of service until response actions are completed and the booster is repaired. Oil drainage recovery is on-going as needed.

- Surface Water Sampling: Five surface water sampling locations were established on the first day of the release and a sixth was added on the second day. These include sampling locations within the retention ponds, downstream of the retention ponds in the unnamed tributary, and locations within the Nemadji River. This sampling program is expected to evolve based on results from the latest sample results.

- Oil and Water Containment and Recovery: Oil containment and recovery operations using vacuum trucks in the source area, ditch and ponds have been recovering crude oil.

- Initial Receptor Survey: An initial receptor survey was implemented and will be updated during post-response activities to effectively identify other potential migration pathways and potential receptors within the Source Area. The receptor survey is conducted to identify the presence and location of

surface waters, surface water intakes, groundwater wells, and subsurface structures which could be impacted by the crude oil release.

3.0 Project Organization

The SAP describes the duties and responsibilities of the Company and its contractors. This section provides information on project organization for the project. The project organization and the responsibilities of key personnel are defined in subsequent sections. Figure 4 presents the program lines of authority and the project organization.

3.1 Federal On-Scene Coordinator

The FOSC is a representative of U.S. EPA and directs all response efforts and coordinates all other efforts at the scene of this release. Due to the nature of this release a FOSC is not required.

3.2 Company Environmental Unit Leader

The Company Environmental Unit Leader (EUL) is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The EUL will comprise a rotation of project managers who will provide continuous management activities. The EUL will report to the U.S. EPA FOSC and/or other state and local agencies. All communication and reporting will be conducted through the EUL. The EUL's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The EUL will:

- Oversee project objectives and develop a detailed work schedule,
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task,
- Acquire and apply technical and corporate resources as needed to ensure performance within schedule constraints,
- Orient all field leaders and support staff concerning the project's special considerations,
- Monitor and direct the field leaders,
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product,
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness,
- Review and analyze overall task performance with respect to planned requirements and authorizations,
- Approve all reports (deliverables) before their submission to FOSC,
- Ultimately be responsible for the preparation and quality of interim and final reports,

- Represent the project team at meetings and public hearing, and
- Submit monthly progress reports.

The EUL for the FB25 Release Project is Mr. Shane Yokom (or designee) of Enbridge.

3.3 Sampling and Analysis Manager

The Sampling and Analysis Manager (SAM) is responsible for establishing project scope and objectives and for communicating to the project team. The SAM is also responsible for identifying internal, regulatory, and procedural requirements pertinent to the work that may differ from accepted industry standards of work. The SAM is responsible for assuring that projects are properly staffed and is ultimately responsible for the technical direction and quality of the work. The SAM is responsible for establishing appropriate budgets and schedules, making available appropriate forms or equivalent of training, and monitoring the performance of the staff. The SAM may talk with regulatory agencies regarding methodologies and requirements. The SAM is also responsible for monitoring the implementation of the quality assurance program.

Specific responsibilities include:

- Assure the provision of necessary resources including personnel, facilities, and equipment,
- Review and approve standard operating procedures and other project documents,
- Monitor offsite area and onsite area laboratories for proper turnaround times,
- Support the efforts of the Field Manager, Quality Assurance Officers (QAO), and Data Manager(s) in all matters concerning the quality of work products,
- Assure effective response to corrective action requirements identified by any member of the project team of staff,
- Plan the activities of and ensure proper equipment, personnel, and subcontractor resources are allocated,
- Provide a liaison between the client, field, laboratory staff, and any other subcontractors,
- Effectively carry out the QA Program and this SAP, and
- Assure completion of corrective actions, as needed.

The SAM for the FB25 Release Response Project is Hans Wronka of Barr Engineering Company (BARR).

3.4 Quality Assurance Officer (QAO)

The Quality Assurance Offer (QAO) is responsible for implementation of the Quality Assurance Project Plan (QAPP) in both field and laboratory operations. The QAO reports to the EUL and has the authority to take any actions necessary to ensure the reliability and validity of work and deliverables according to the QAPP. The QAO is responsible for developing and implementing procedures to appropriately document all project activities, to provide specific means of measuring conformance to specifications, to manage the corrective actions program, and to provide periodic reports to management. Specific responsibilities include:

- Develop, document, and carry out QA activities to ensure that appropriate Quality Control (QC) measures are being carried out and documented,
- Ensure all records related to quality assurance are documented and maintained securely and retrievably,
- Conduct periodic performance audits and/or surveillances to measure conformance to specifications,
- Prepare periodic quality reports and QA sections of final reports,
- Ensure corrective actions are carried out and documented in a way that precludes future occurrences,
- Review and approve SOPs, training records, and purchasing actions, and
- Acquire and maintain required certifications and manage performance evaluation tests.

The QAO for the FB25 Release Response Project is Andrea Nord of BARR.

3.5 Field Manager

The Field Manager (or managers if shift assignments are made) is responsible for implementing the SAP. The Field Manager's responsibilities include:

- Overseeing field equipment calibration, sample collection teams, field documentation, submission of samples to laboratories, and preparation of a summary report,
- Leading and coordinating the day-to-day activities of the various sample teams under their supervision,
- Implementing QC for technical data provided by the field staff including field measurement data,
- Complying with the schedule and adhering to management-developed study requirements, and

- Identifying problems at the field team level, resolving difficulties in consultation with the SAQAM, implementing and documenting corrective action procedures, and provision of communication between team and upper management.

The Field Manager for the FB25 Release Response Project is Ryan Erickson of BARR.

3.6 Sample/Technical Manager

The Sample/Technical Manager will be responsible for all sample collection and processing to the project organization in accordance with the QAPP. These tasks include:

- Develop the laboratory SOW,
- Procure laboratory services,
- Communicate daily with the laboratory,
- Process samples for laboratory submittal,
- Address any chain-of-custody discrepancies or laboratory QA/QC anomalies, and
- Logistically support Operations in the collection of samples.

The Sample/Technical Manager for the FB25 Release Response Project is James Taraldsen of Barr.

3.7 Data Manager

The Data Manager is responsible for all data reporting, quality checking and reporting to the project organization in accordance with the QAPP. These tasks include:

- Receiving analytical data; checking for completeness, and making sure that appropriate QA checks have been performed,
- Performing summary validation on all samples not assigned for full validation,
- Entering and maintenance of sample location data,
- Saving data to a secure server, and
- Maintaining appropriate security measures to ensure data integrity.

The Data Manager for the FB25 Release Response Project is Kelly Caddy of BARR.

3.8 Third Party Data Validator

The scope of this release does not warrant a Third Party Data Validator.

4.0 Overview of Sampling Activities

Sampling activities will be used to guide oil recovery and containment activities as they relate to remediation of OUs 1-5. The data obtained from sampling, along with any significant field observations from the collection points (e.g., sheen, odor, etc) will be summarized and provided daily to Operations. Data and observations will be evaluated regularly during the operational period to determine if the level of effort is appropriate. Discussions with the state and federal regulatory agencies, as appropriate, will be conducted as needed to increase or decrease the scope, including sample location, sample frequency and analyte list.

4.1 Data Quality Objectives

The goals of the response actions are to conduct removal of oil discharge to mitigate or prevent a substantial threat of a discharge of oil. The primary objectives of the Sampling and Analysis Plan are (1) to evaluate and identify visible oil and/or sheen that is either currently affecting navigable waterways and/or poses a threat to the release of a visible sheen or sheen discharge to navigable waterways and (2) to provide protection of public health and the environment by conducting initial sampling and analysis of groundwater and community and private drinking wells, air, soil, and surface waters that could be impacted by the crude oil release. The Data Quality Objectives (DQOs) for the SAP include qualitative descriptions to document that the endpoints of response actions in OUs 1-5 have been achieved.

Data Quality Objectives presented below were developed in accordance with EPA's 7-step process described in "Guidance for the Data Quality Objectives Process EPA/QA/G-4".

STEP 1: State the Problem
On August 18, 2014, a release of crude oil from the Company's Superior Terminal Field Booster FB25 (referred to as "FB25") was discovered. The release flowed over the ground surface and into a ditch drain that discharged to an unnamed drainage ditch and a storm water retention pond. Impacts to soil and surface water need to be characterized.
STEP 2: Identify the goal of the Investigation
The primary goal of the investigation is to characterize soil and surface water impacts to and confirm cleanup of soil and surface water at the site.
STEP 3: Identify information inputs
The investigation will include collection of surface water and soil. Soil will be screened with a PID and a limited number of samples will be analyzed for PVOC + Naphthalene and DRO. These parameters correspond to the indicator contaminants for crude oil as specified by the WDNR in the

pending memorandum of understanding (MOU) between the Company and the WDNR for the Superior Terminal Facility. TPH may be analyzed to help guide soil removal efforts in the field.
STEP 4: Define the boundaries of the Investigation
The physical boundaries of the investigation are defined in Section1.3.2 and as shown on Figure 2.
STEP 5: Develop the analytical approach
Surface water samples will be analyzed for the parameters identified in the WPDES permit for the facility by the analytical methods and laboratories listed in Section 1.2.7. Soil samples will be analyzed for PVOC + Naphthalene and DRO by the analytical methods and laboratories listed in Section1.2.7.
STEP 6: Specify performance or acceptance criteria
Measured concentrations of applicable COCs in soil will be compared to the WDNR groundwater residual contaminant levels (RCL) and industrial direct contact RCLs for PVOC and naphthalene compounds in accordance with NR 720. The surface water results will be compared to the surface water quality standards established in the WPDES permit for the facility.
STEP 7: Develop the plan for obtaining data
Soil and surface water samples will be collected according to the procedures contained in the SAP.

4.2 Sampling Activities – Operational Unit 1

This objective will be met by meeting the target endpoints for Operational Unit 1 as described below.

The endpoint for the response action in Operational Unit 1 is the removal of oil-saturated soil capable of causing oil migration to a navigable waterway. Excavation of oil-saturated soil is underway. Qualitative soil sampling activities will take place in Operational Unit 1 to document that this endpoint is achieved. These activities include visual observations of oil-saturated soil and use of the petroleum sheen test. The petroleum sheen test consists of mixing a small aliquot of soil with deionized water in a glass sample container and noting if any sheen is present. Soil with sheen is considered oil- saturated.

Initially, visual observations will be used to guide soil excavation. Soil screening samples will be collected at perimeter of the excavation area and up to four soil samples will be collected from the base of the excavation. The proposed sample locations are shown in Figure 5. Soil screening and sample collection will be in accordance with our SOPs (**Appendix A**).

Soil samples will be analyzed for PVOC + Naphthalene and DRO. Laboratory analytical results will initially be compared to WDNR industrial direct contact standards and groundwater RCLs.

4.3 Sampling Activities – Operational Units 2, 3, 4 and 5

Initially, visual observations will be used to guide soil excavation. Soil screening samples will be collected at the base of the scrap area with a target separation distances between samples of approximately 25 feet and a maximum separate distance not to exceed 50 feet. Soil scraping will continue until PID readings are below 10 ppm. Confirmation soil samples will not be collected. The proposed soil screening sample locations are shown in Figure 5. Screening samples will be collected in accordance with our SOPs (**Appendix A**).

Based on the documented extent of the oil release, soil impacts are no expected beyond Pond 1. Therefore soil removal and verification screening will not be completed within Operational Units 3, 4 and 5. These areas will continue to be visually inspected for sheen throughout the active response phase.

Additional surface water sampling at locations in Operational Unit 4 and 5 area are also included in this section and are used to document the effectiveness of response actions used to keep oil or oily sheen from migrating past the control flume in the retention pond.

A description of sampling activities used to document the endpoint of the response actions is provided below.

4.3.1 Removal of Residual Crude Oil and Sheen – Earthen Ditch/Retention Pond

The endpoints for the response actions in Operational Unit 2 include the removal of residual crude oil and sheen on surface water in the earthen ditch and retention pond and removal of oil-saturated soil and vegetation. Response actions in Operational Unit 2 include deployment of containment and absorbent booms in the earthen ditch and retention pond, scraping oil-saturated soil and sediment along the bank of the ditch and pond, removal of oil-saturated vegetation, establishment of a control point at the existing concrete weir controlling outfall from the retention pond.

Qualitative determinations of oil content of samples will be made with respect LNAPL/DNAPL characteristics. Oil and/or rainbow sheens observed floating on surface water bodies will be classified as LNAPL. Non-floating oils will be classified as DNAPLs. Containment and absorbent booms will remain in place until it has been determined that oil in the earthen ditch no longer affects or poses a threat to navigable waters or the adjoining shoreline. Sediments will be disturbed at regular intervals (e.g., 50') through the earthen ditch and banks of the retention pond using a rod, stick, or similar implement to evaluate if visible oil and/or a rainbow sheen is present after completion of oil removal activities.

The containment and absorbent booms and control weir are designed to isolate the earthen ditch and retention pond and unnamed tributary leading from the pond from impacting downstream navigable

waterways, which includes wetlands and the Nemadji River. Surface water sampling has taken place at five (5) surface water sampling locations to confirm that navigable waterways have not been impacted by the release (**Figure 2**). These sampling locations have been logged by GPS to aid in replicability of the sampling locations. The surface water sampling locations have been established hydrogeologically downgradient of Operational Unit 4.

Visual observations were made at each surface water sampling location and noted in a log dedicated to this project. Surface water samples were collected and submitted for laboratory analysis as indicated in **Table 1**. Surface water sampling was conducted in accordance with our SOP (**Appendix A**).

Surface water samples were initially collected the first day approximately 9 hours after discovery of the release. Analytical results will be used to document that surface water downstream of Pond 2 has not been impacted by the release.

The analytical results will be compared to standards and/or requirements outlined in the Superior Terminal WPDES permit. Should conditions change downstream of the retention pond, sampling at an alternate frequency will be evaluated.

4.3.2 Removal of Oil Impacts within Sewer Lines and Sanitary Lines

There were no documented impacts to storm or sanitary sewer lines.

4.3.3 Removal of Oil-Saturated Soil, Sediment, and Vegetation

Removal of oil-saturated soil, vegetation, and/or sediment along the banks of the drainage ditch and along the shore of the retention pond has begun. Initially, visual observations will be used to guide soil and sediment removal. Excavation will take place until oil-saturated materials are no longer visually observed along the banks of the ditch or retention pond. At this point, soil samples will be collected and analyzed using the petroleum sheen test and a PID at 25-50 foot intervals along the banks of the ditch and retention pond. If the results from the qualitative soil sampling indicate that oil-saturated soil is present, excavation will continue horizontally and/or vertically, as needed, until subsequent qualitative soil sample results indicate that oil-saturated soil has been removed. Figure 5 shows proposed sample locations within each operational unit.

Sediment sampling is not currently planned as part of this response.

Visual observations will be used to guide removal of oil-saturated vegetation. Vegetation with oil visible on the surface will be cut down and removed. To the extent possible, remediation will be performed to minimize damage to plants, particular in sensitive vegetation areas.

4.4 Groundwater Sampling/Monitoring Approach

Due to the nature of the release, rapid response and native clay soil at the facility, groundwater impacts have not been identified as a concern. Therefore, new and/or existing groundwater wells will not be sampled as part of this release response.

4.4.1 Location and Frequency of Sample Collection for Private Wells

Groundwater contamination is not expected as a result of this release. The locations of area water supply wells are provided on Figure 5; however, these wells will not be sampled as part of this release response.

4.4.2 Monitoring Well Installation

Groundwater wells will not be installed as part of this release response.

4.4.3 Groundwater Sample Analyses

Groundwater samples will not be collected as part of this release response. If the WDNR requires groundwater sample collection in the future, samples will be collected and submitted for laboratory analysis as indicated in **Table 2.**

4.5 Soil Vapor Monitoring

Due to the nature of the release, rapid response and native clay soil at the facility, vapor migration has not been identified as a concern.

4.6 Waste Characterization Sampling

4.6.1 Overview and Rationale

Response activities related to this release generate multiple waste streams requiring appropriate characterization proper disposal determination. Examples of anticipated waste generated from the response activities may include, but are not limited to:

- Crude oil,
- Impacted soil, water, sediments,
- Dam materials from the ditch and unnamed tributary,
- Vegetation,

- Used sorbent materials,
- Oil contaminated timber mats,
- Used disposable personal protection equipment (PPE),
- Biological material associated with wildlife rescue operations, and

4.6.2 Location and Frequency

Waste and other materials are being generated at various locations. All waste is being managed in the on-site soil management area (SMA) as shown on Figure 2. Soil, water and other waste material will be sampled for disposal characterization. Samples will be collected in accordance with the Waste Treatment, Transportation, and Disposal Plan on an as-needed basis as activities and accumulated quantities dictate.

4.6.3 Waste Characterization Analysis

Analytical samples will be transported to a NELAC certified fixed-base laboratory and analyzed by matrix as indicated in **Table 3** to guide disposal of waste generated during Response Actions.

4.7 Product Sampling

Product sampling will not be conducted as part of this release response.

5.0 Sample Management

Samples will be managed in accordance with the requirements set forth in the referenced analytical method (Table 1-3) and/or laboratory SOPs (Appendix A).

Field samples will be contained and preserved in accordance with appropriate U.S. EPA specifications. Sampling containers and preservatives will be provided by the laboratory. Samples will be placed in individual pre-cleaned containers for shipment to the laboratory. Samples will be collected and stored in accordance with U.S. EPA specifications, laboratory SOPs, and analytical methods currently under development for this project.

Sample container orders, when shipped by the laboratory, will include a packing list that details the number and type of bottles shipped, the bottle lot numbers, chemical preservatives, and the packer's signature. The Chain of Custody (COC) Records will be completed by field sampling personnel and returned to the laboratory with the samples.

Samples will be stored according to the applicable storage criteria from the time of collection until the time of analysis by the laboratory. Field personnel will keep samples cold by placing ice in the coolers in which samples will be stored until delivery to the analytical laboratory personnel. After receipt of the samples, it is the laboratory's responsibility to store the samples according to the applicable preservation conditions until preparation and analysis has been initiated.

Samples have a finite holding time (the time between sample collection, sample digestion, and sample analysis) to limit the potential for degradation of the analytes. The holding times for required analyses are measured from the verified time of sample collection. When possible, samples will be shipped by overnight carrier or hand delivered by same-day courier to minimize the time between collection and laboratory receipt.

Samples will be preserved per the appropriate U.S. EPA or other State of Wisconsin approved method, immediately placed in a cooler following sample collection, and maintained at 4 degrees C. Shipping or transporting of samples to the laboratory will be done within a timeframe such that recommended holding times are met. Split sampling will be offered to the U.S. EPA.

5.1 Sample Packaging

Samples collected during site activities will be placed in a cooler containing ice and maintained until the end of the shift or transfer to a sample custodian. Following cessation of activities at the end of a shift or transfer to the custodian, the samples will be packaged with others (following labeling and completion of the chain of custody) for hand delivery or shipment via courier (e.g., Federal Express) to the designated laboratory. Samples will be kept on ice during shipment.

Sufficient packing material (i.e., bubble wrap or other material) will be used to prevent breakage during delivery to the laboratory. For samples that are shipped, ice will be placed in sealable polyethylene bags to minimize potential leakage. In addition, samples and the bags of ice may be placed in a large plastic bag which will minimize loss of water from the cooler if container breakage during transport or shipment to the laboratory occurs. Temperature blanks may be used in some coolers to verify temperature upon receipt at the laboratory. Vermiculite or other absorbent material may be placed around samples in the cooler to absorb water if container breakage occurs.

5.2 Sample Labeling

Sample jars and vials will be clearly labeled with, at a minimum, the following information:

- Unique sample identification,
- Sample Type (discrete or composite area),

- Sampler name or initials,
- Date sample collected,
- Time sample collected, and
- Analysis to be performed.

The unique sample designation will include a matrix prefix followed by a numerical designation. The following matrix prefixes will be used: “SO”, “SE”, “SW”, “WW”, “PW”, and “GW” which designate soil, sediment, surface water, waste water, potable water (if collected), and groundwater (if collected), respectively. For example, a surface water sample collected from location SW-1 would be named SW-1. As appropriate, a suffix may be added to indicate the QA sample type (e.g., a duplicate could be “D” or “DUP”). Date, time, and initials of the sampler will be recorded on the chain of custody form but will not be included in the sample identification.

5.3 Chain of Custody Procedures

A primary consideration for environmental data is the ability to demonstrate that samples have been obtained from specific locations and have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody while samples are in the laboratory’s possession will be documented by maintaining a COC that records each sample and the individuals responsible for sample collection, shipment, and receipt at the project laboratory. Samples that are collected will be accompanied by a COC Record. The following information will be recorded to complete the COC Record:

- Project name and number,
- Name of sampler,
- Sample identifier/name, location, date and time collected, and sample type,
- Analyses requested,
- Special instructions and/or sample hazards, if applicable,
- Signature of sampler in the designated blocks, including date, time, and company, and
- Sample condition (including temperature) upon receipt as reported by the analytical laboratory.

Copies of COC Records will be maintained under customary business practices and on-Spill Release Area by the Environmental Sampling Manager. Duplicates of all COC Records will be retained by the as part of the Project File.

5.4 Sample Location Photographs

If multiple samples are scheduled to be collected from a single location on a given day, a photograph will be taken of that sample location for each sample collected. If a situation arises where multiple samples are to be collected at a location where collection of one sample was scheduled, a photograph will be taken at that sample location for each sample collected after the first. For locations where only one sample will be collected per day, no photographs are planned.

Sample location photographs will include the sample designation, date, and time showing the immediate surrounding area and any distinctive feature that can be found in the future.

6.0 Analytical Approach

Water and sediment samples, as well as confirmatory soil samples (if collected) will be submitted to a full-service, qualified, subcontracted commercial laboratory for the analyses listed in the Tables Section of the SAP. During the initial response period, sample turn-around times (TATs) be will expedited as necessary to assist in making quantitative driven decisions. After a review of the data, it may be agreed upon by UC that expedited TATs may be scaled back to a standard TAT. Lab contacts and shipping information are as follows:

ALS Environmental
3352 128th Avenue
Holland, MI 49424
DIRECT PHONE 616-738-7346
OFFICE PHONE 616-399-6070 Ext. 525
MOBILE 616-218-5574
FAX 616-399-6185 http://www.alsglobal.com

ERA Laboratory
4730 Oneota Street
Duluth, MN 55807
Phone: 218-727-6380
http://www.eralabs.com

This list of laboratories may need to be augmented based on lab limitations.

7.0 Quality Assurance

Sampling will be carried out in conjunction with a defined quality assurance (QA) program. The goal of the field QA program is to document that samples are collected without introducing a bias (i.e., the effects of accidental cross- or systematic contamination are eliminated) and refers to the sampling, analysis, and data validation procedures for generating valid and defensible data. To provide QA for the proposed sampling, the following sampling, analysis, and data validation procedures will be performed:

7.1 Initial Field Evaluation

7.1.1 Surface Water

Surface water sample containers collected for VOC analysis will be evaluated for "acceptability" in the field prior to submittal to the laboratory. Volatile organic analysis (VOA) vials containing air bubbles will be judged unacceptable. Containers containing air bubbles will be re-opened and an additional aliquot of representative sample carefully decanted into the container to remove any air bubbles in the sample without losing any of the preservative.

7.1.2 Sediment

Sediment samples will be retrieved aboard the boat or from the shoreline and evaluated for "acceptability". For example, a sediment sample will be considered "acceptable" if it meets all of the following characteristics for "representativeness":

- Sediment surface is not against the top of the sampler (i.e., not over-filled),
- Sediment surface is relatively flat indicating minimal sediment disturbance,
- Overlying water is present indicating minimal leakage,
- Overlying water has minimal turbidity indicating minimal sample disturbance, and
- Desired penetration is achieved.

7.1.3 Groundwater

Groundwater sample containers collected for VOC analysis will be evaluated for "acceptability" in the field prior to submittal to the laboratory. VOA vials containing air bubbles will be judged unacceptable. Containers containing air bubbles will be re-opened and an additional aliquot of representative sample carefully decanted into the container to remove any air bubbles in the sample

without losing any of the preservative. Groundwater will be purged in accordance with SOP (Appendix A) prior to sample collection to achieve representativeness.

7.1.4 Soil

Soil samples collected for VOC analysis will be evaluated for “acceptability” in the field prior to submittal to the laboratory. Ten milliliters of methanol will be combined with 10 grams of soil in the appropriate soil sample container when using EPA Method 5035.

7.2 Field Duplicate

Field duplicate samples are used to check for sampling and analytical error, reproducibility, and homogeneity. For approximately every twenty samples of each sampling media collected in the field, one field duplicate will be collected and submitted for laboratory analyses to verify the reproducibility of the sampling methods. Field duplicates will be prepared by separately submitting an aliquot from the same sample location to the laboratory for analysis consistent with the proscribed analyses. For sediment samples, the duplicate will be obtained by collecting a sample from an area adjacent to the routine sample or by collecting a separate aliquot of sediment from within the same core (i.e., co- located sample), whichever is more appropriate for the type of sample/sampling technique (i.e., surface or subsurface sediment sample). At least one field duplicate will be collected each day that samples are collected.

7.3 Equipment Rinsate

If required, collection and analysis of equipment rinsate blanks are performed to assess the efficiency of field equipment decontamination procedures in preventing cross-contamination between samples. Each day of sampling, one equipment rinsate sample will be collected off of a portion of non-dedicated equipment and submitted for laboratory analysis. The rinsate sample will be collected by decanting deionized water over the post-decontaminated non-disposable sampling equipment (e.g., ponar sampling device, stainless steel bowls and spoons used for sample collection) into laboratory-supplied sample containers. The deionized water comprising the rinsate blank will make contact with each piece of decontaminated sampling equipment used in the collection of the sample.

7.4 Trip Blanks

Trip blanks will be prepared by the lab and included in each cooler containing water samples to be analyzed for VOCs. The trip blanks will be used to assess the potential for contamination of the containers during handling and transit.

7.5 Field Split Samples

Field split samples refer to samples collected by the regulatory agency or its designee from the same sampling location and independently submitted to a different laboratory for analysis. Field split samples may be requested at the discretion of representatives of the regulatory agency or UC.

7.6 Laboratory QA

Laboratory quality control procedures will be conducted in a manner consistent with relevant State and Federal regulatory guidance. Internal laboratory quality control checks will include method blanks, matrix spikes (and matrix spike duplicates), surrogate samples, and laboratory control standards (LCSs).

7.7 Matrix Spike/Matrix Spike Duplicate Sample

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples refer to field samples spiked with the analytes of interest prior to being analyzed at the laboratory to gauge the quality of analysis. Approximately one sample in twenty will be analyzed as MS/MSD samples. The MS/MSD sample will consist of triple the regular sample volume.

7.8 Data Validation

Validation of the data generated by the laboratory performing the analyses will include at a minimum, sample holding times, accuracy, precision, contamination of field generated or laboratory method blanks, and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating laboratory and field duplicate samples.

Data are reviewed for compliance with accuracy limits for surrogate recovery, laboratory control samples, matrix spikes, matrix spike duplicate recoveries. Laboratory method blank and field blank results will be reviewed for evidence of contamination and potential impacts on project data quality results.

8.0 Sampling Equipment Decontamination Procedures

Decontamination procedures refer to the steps undertaken to minimize the potential for offsite area contamination and cross-contamination between individual sampling locations. Prior to collecting any sample described in this SAP the following decontamination procedures will be undertaken: non-disposable sampling equipment such as stainless steel bowls and spoons which come into contact with sampling media will be decontaminated using a bristled brush and a solution comprised of a laboratory grade, non-phosphate detergent (e.g., Alconox or Liquinox) and deionized water. The sampling

equipment to be decontaminated will be placed in the first bucket containing the detergent solution and thoroughly washed using a bristled brush. The items will then be transferred to the second 5-gallon bucket containing deionized water for rinsing. Following the initial rinsing, the item will be held over the third 5-gallon bucket while deionized water is carefully decanted over each item. Decontaminated items will be wrapped in clean aluminum foil for transit to the next sampling location.

All decontamination will be conducted according to our SOPs (**Appendix A**).

9.0 Waste Disposal and Investigative Derived Waste

Excess media (i.e., soil, sediment, or water) recovered and not submitted as part of the discrete sample will be handled, characterized, and disposed of as an Investigation Derived Waste (IDW) in accordance with the Waste Treatment, Transportation, and Disposal Plan. This includes waste generated during the above referenced decontamination procedures.

10.0 Data Management

Data obtained as part of this response will be managed as follows:

10.1 Sampling and Analytical Data

Sampling data will be recorded in field log books or on paper forms referenced in the log book. Analytical laboratory data sheets will be provided from the laboratory as a Portable Document File (PDF) and an Electronic Data Deliverable (EDD).

10.2 Data Flow

Sampling data, including but not limited to, hand-written field notes, photographs, and real-time monitoring parameters will be entered daily following the sampling event into an off-site data warehouse, managed by the Company's contractor. The Data Manager will receive EDDs from the analytical laboratory and save them to a database on a secure server. The type of EDDs and database used are yet to be determined.

10.3 Data Backup

Daily backups are performed on-site to a removable storage drive using off-the-shelf commercial backup hardware and software. Every evening an off-site dump is performed to the Company's Contractor's corporate file server over the network. Every night, this fileserver is backed up to tape and stored off site.

11.0 Records Management

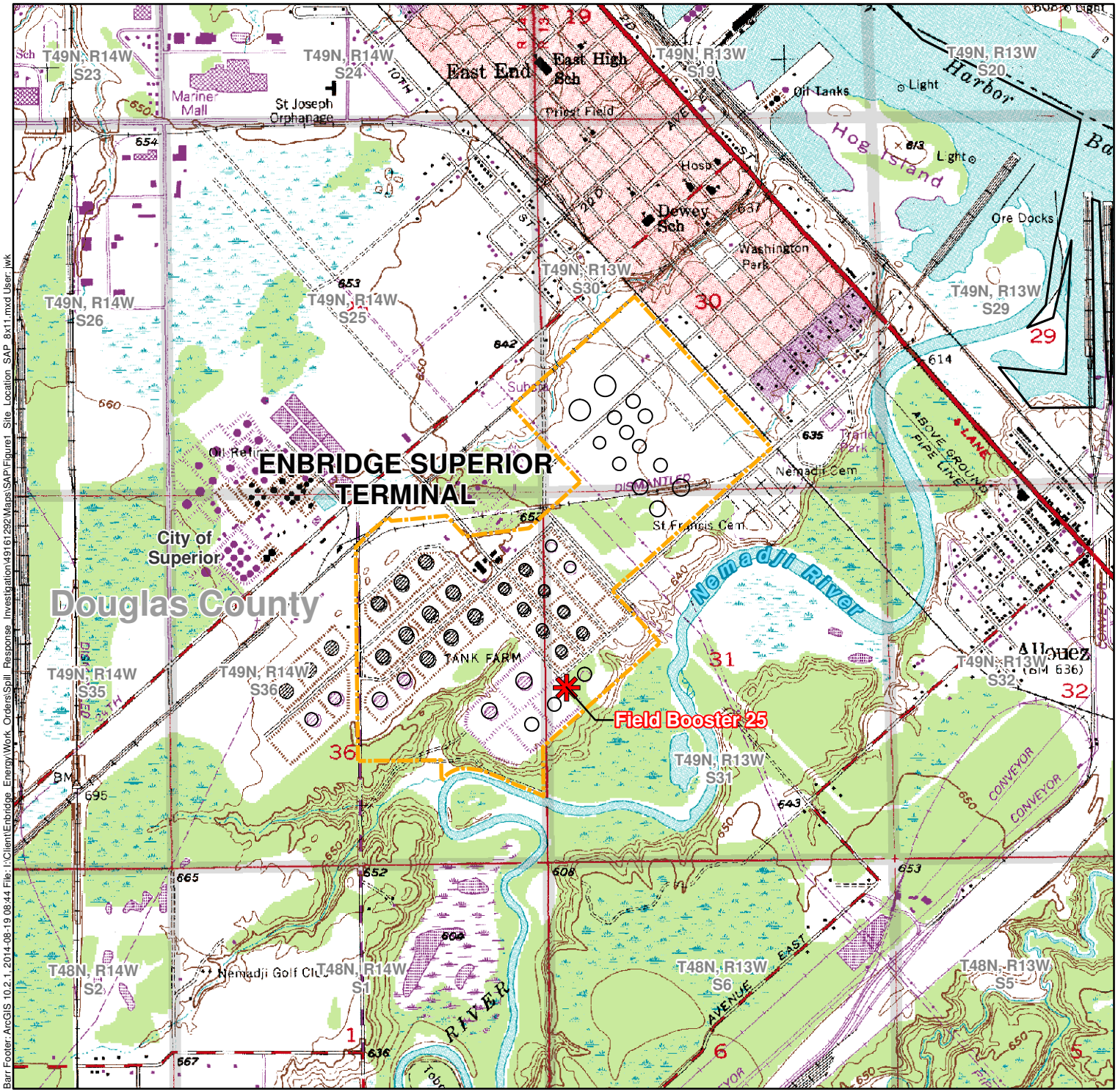
Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence needed for later reviews and analyses, will be legible, identifiable, retrievable and protected against damage, deterioration, or loss on a centralized electronic database. Handwritten records will be written in indelible ink. Records will likely include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms, sample location maps, equipment maintenance and calibration forms, chain-of custody forms, maps and drawings, transportation and disposal documents, reports issued as a result of the work, procedures used, correspondences, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so it remains legible and will be initialed by the responsible individual, along with the date of change, and the correction will be written adjacent to the error.

All project files and records will be stored on site until the final report has been approved by U.S. EPA. Project files will be moved to an off-site storage location and retained for a period of seven years.

Project information can be obtained through a written request to the EUL. The requested information should be available within seven working days.

Upon request by U.S. EPA, the Company will deliver any project records to U.S. EPA. The Company may assert that certain documents, records and other information are privileged under the attorney- client privilege or any other privilege recognized by federal law. If the Company asserts such a privilege it will provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by the Company.

Figures



Release Location

Terminal Property Boundary

0 2,000 4,000

Feet

1 Inch = 2,000 Feet

Figure 1

FIELD BOOSTER 25
SITE LOCATION
SAMPLING & ANALYSIS PLAN
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Release Location

Release Extent

Product Observed

Sheen Observed

Ponds

Monitoring Wells

Surface Water Sample Locations

Operational Units

Terminal Property Boundary

DRAFT

N

0 300 600

Feet

1 Inch = 300 Feet

Douglas County Imagery Circa May, 2013

Figure 2

FIELD BOOSTER 25
OPERATIONAL UNIT AND
SURFACE WATER SAMPLE LOCATION MAP
SAMPLING & ANALYSIS PLAN
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Barr Footer: ArcGIS 10.2.1, 2014-08-19 09:46 File: I:\Client\Enbridge_Energy\Work_Orders\Spill_Response_Investigation\49161292\Maps\SAP\Figure2_FB25_OU_SurfaceWaterSamples_SAP_11x17.mxd User: iwk

Release Location

Release Extent

Ponds

Terminal Property Boundary

Wisconsin Wetland Inventory

Emergent/wet meadow

Filled/drained wetland

Forested

Open Water

Scrub/Shrub

DRAFT

N

0 800 1,600

Feet

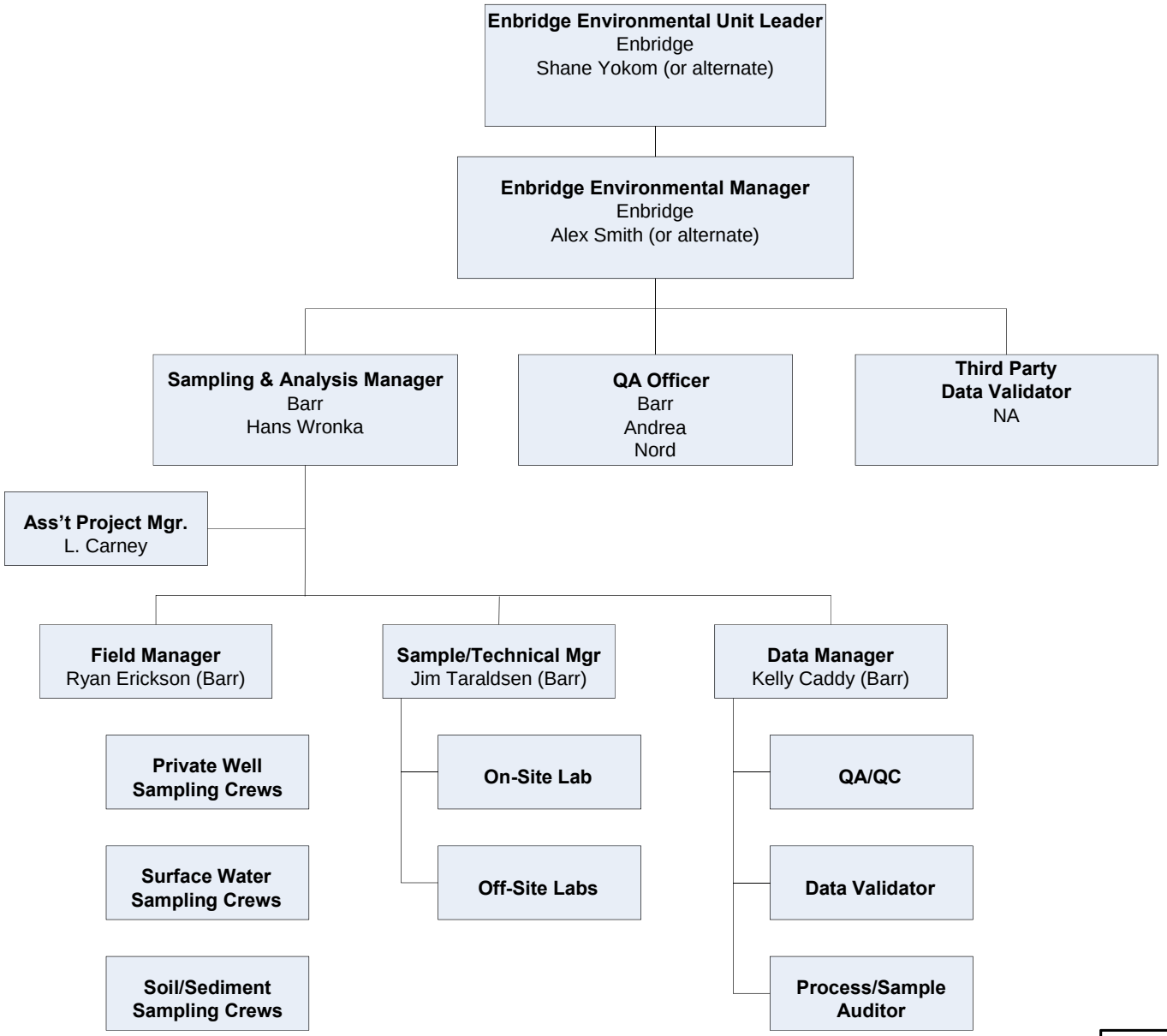
1 Inch = 800 Feet

Douglas County Imagery Circa May, 2013

Figure 2

FIELD BOOSTER 25
WISCONSIN WETLAND INVENTORY (WWI)
SAMPLING & ANALYSIS PLAN
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE



ENBRIDGE

ENBRIDGE FB25 RELEASE RESPONSE
QUALITY ASSURANCE PROJECT PLAN
ORGANIZATION CHART
ENBRIDGE – Superior Terminal FB25
Superior, WI
Date Aug 18, 2014

Figure 4

Release Location

Release Extent

Monitoring Wells

Area Water Supply Wells

Terminal Property Boundary

DRAFT

0 1,320 2,640

Feet

1 Inch = 1,320 Feet

Douglas County Imagery Circa May, 2013

Figure 5

FIELD BOOSTER 25
GROUNDWATER MONITORING AND WATER SUPPLY WELLS SAMPLING & ANALYSIS PLAN
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Barr Footer: ArcGIS 10.2.1, 2014-08-19 12:28 File: I:\Client\Enbridge_Energy\Work_Orders\Spill_Response_Investigation\49161292\Maps\SAP\Figure5_FB25_Monitoring_Wells_SAP_11x17.mxd User: jwk

Barr Footer: ArcGIS 10.2.1, 2014-08-19 16:24 File: I:\Client\Enbridge Energy\Work Orders\Spill Response Investigation\49161292\Maps\SAP\Figure6_FB25_Proposed_Site_Investigation_Samples_SAP_11x17.mxd User: jwk

- Proposed Soil Screening Locations (25-ft to 50-ft Spacing)
- Proposed Soil Sample Locations
- Release Location

Release Extent

- Product Observed
- Sheen Observed
- Ponds
- Monitoring Wells
- Operational Units
- Terminal Property Boundary

DRAFT

0 200 400

Feet

1 Inch = 200 Feet

Douglas County Imagery Circa May, 2013

Figure 6

FIELD BOOSTER 25
PROPOSED SITE INVESTIGATION
SAMPLE LOCATIONS
SAMPLING & ANALYSIS PLAN
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Tables

Table 1 - Surface water parameters, methods, and container types

Parameter	Method	Container Number, Size, and Type	Sample Preservatives
Benzene, Ethylbenzene, Toluene, Xylene (BETX)	EPA 8260B	3 x 40 ml VOA vials	Hydrochloric acid (HCl) to pH < 2; $4^{o}C$
Polynuclear aromatic hydrocarbons (PAHs), if collected	EPA 8270C (SVOCs)	1 x 1 L Amber glass	$4^{o}C$
Biological Oxygen Demand (BOD)	Hach 10360 / SM 5210 B-97	1 x 1 L Plastic	$4^{o}C$
Oil and Grease	EPA 1664A	1 x 1 L Glass	H_2SO_4 to pH,2: ice
Total Suspended Solids (TSS)	USGS I-3765-85	1 x 1 L Plastic	$4^{o}C$
Dissolved Oxygen	In Field	NA	NA
pH	In Field	NA	NA

Table 2 - Groundwater parameters, methods, and container types

Parameter	Method	Container Number, Size, and Type	Sample Preservatives
Petroleum Volatile organic compounds (PVOC) + Naphthalene	EPA 8260B	3 x 40 ml VOA vials	Hydrochloric acid (HCl) to pH < 2; $4^{o}C$
Diesel range organics (DRO) Compounds	WI Mod Method	1 x 1 L Amber glass	HCl to pH < 2; ice

Table 3 - Waste characterization parameters, methods, and container types

Parameter	Method	Container Number, Size, and Type		Sample Preservatives
Benzene, Ethylbenzene, Toluene, Xylene (BETX)	EPA 8260B	Liquid	3 x 40 ml VOA vials	Hydrochloric acid (HCl) to pH < 2; ice
		Solid	1 x 40 ml vial	MEOH; Ice
Diesel Range Organic (DRO) Compounds	EPA 8015B	Liquid	2 x 1 L Amber glass	HCl to pH < 2; ice
		Solid	1 x 4 oz wide- mouth glass	ice
Toxicity Characteristic Leaching Procedure (TCLP) Benzene	EPA 8260B	Liquid	1 x 1 L Glass Bottle	ice
		Solid	1 x 4 oz wide- mouth glass	ice
Oil and Grease / TPH (silica gel)	EPA 1664A EPA 9071B	Liquid	1 x 1 L Glass Bottle	H_2SO_4 to pH,2: ice
		Solid	1 x 8 oz wide-mouth glass	ice

Appendix A

Appendix A

Index of Standard Operating Procedures

Enbridge Superior Terminal FB25 Release Response
Superior, Wisconsin

Contents:

SOP Name
Collection of Surface Water Samples
Decontamination of Field Sampling Equipment
Documentation on a Chain-of-Custody Form
Domestic Transport of Samples to Laboratories within the USA - States and Territories
Field Screening Soil Samples
Investigative Derived Waste
Soil Sample Collection Tools Decontamination – Level I
Soil Sample Collection

STANDARD OPERATING PROCEDURE

Collection of Surface Water Samples

Revision 5

April 29, 2011

Approved By:

Print	QA Manager(s)	Signature	Date
Andrea Nord			4-29-11

Print	Field Technician(s)	Signature	Date
Kim Johannessen			4-29-11

Barr Engineering Company
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Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Annual Review of the SOP has been performed and the SOP still reflects current practice.

Initials:	KSJ	Date:	2/21/2012
Initials:	KSJ	Date:	6/28/2013
Initials:		Date:	
Initials:		Date:	
Initials:		Date:	

Standard Operating Procedures for the Collection of Surface Water Samples

Purpose

The purpose of this procedure is to describe the collection of water samples for volatiles, semivolatiles, metals, inorganics, bacteria, and dioxin from surface water.

Applicability

This procedure applies to the collection of surface water samples by the sampling technician(s).

Definitions

Headspace. Air space between the container top and water sample level.

Holding Time. Time interval between sample collection and sample analysis.

Sample Preservation. The stability of analytes depends upon the proper preservation technique and preservation acceptance criteria as defined by EPA Title 40 of the Code of Federal Regulations and corresponding method criteria.

Leachate The liquid product produced when water percolates through any permeable material.

Equipment

Sampler media
Pre-cleaned-certified Sampling Containers
Coolers
Ziploc® Baggy
Ice
Water-proof ink pen or pencil
Nitrile Gloves
Water Quality Meter
Sample label
Chain of Custody Form
Lead acetate test paper
Acetic acid buffer solution (pH of 4)

References

Procedures for Ground Water Monitoring, Minnesota Pollution Control Agency Guidelines, September 2006.

EPA: Title 40 of the Code of Federal Regulations.

Discussion

- Surface water stations may include seep locations, lake sampling, influent and or effluent stream or river locations.

- Samples collected from a surface water location; water quality may vary from shore to shore. The sample should be integrated from top to bottom in the middle of the location.

- Samples collected in shallow water (less than 3 feet deep) should be collected at mid-depth, holding the container under the surface until filled. The mouth of the container should face the flow. Samples can also be collected by the use of a peristaltic pump, with

tubing attached to a telescoping pole for larger water bodies. The use of a pole allows access to the mid channel location without disturbing the bottom sediments. Refer to the SOP for peristaltic pump operation.

- When sampling extremely shallow water such as leachate seeps, care should be taken not to disturb the bottom sediments.

- When sampling shallow streams, collection should begin at the furthest downstream point and move upstream so that any disturbances caused by sampling will not affect the quality of the water sampled. When sampling deeper waters, such as rivers, collection should begin first at the upstream point, next to the downstream point, and finally to the sampling point closest to the apparent source of discharge, minimizing contaminants adhering to the sample apparatus.

- All unpreserved sample containers will be rinsed three times with sample water prior to collection as a precautionary measure to be sure containers are uncontaminated.

- Caution will be exercised in filling preserved containers to prevent loss of the preservative.

Responsibilities

The environmental technician(s) is responsible for the proper collection of surface water samples; sample identification; quality control procedures; sample filtering and documentation.

Procedure

1. Obtain sampling media-Approximately one week before the sampling event, the sample containers should be ordered from the laboratory.

   Note: Container volume, type, and preservative are important considerations in sample collection. Container volume must be adequate to meet laboratory requirements for quality control, split samples, or repeat examinations. The container type or construction varies with the analysis required. The analytical laboratory will preserve the container before shipment. Preservation and shelf life vary; contact the laboratory to determine if an on-hand container is still useful.

2. Put on sampling gloves to protect the sample and skin.

   Note: New sampling gloves should be used for each location.

3. Prepare sampling containers by filling out the label with the following information:
   - Project number
   - Location identification
   - Individual collecting the samples
   - Date and time of collection
   - Sample analysis (if required by the lab)

4. Remove cap from the first sample container. Make sure to collect low-level mercury and volatile samples prior to all other analytical method samples. Collect metals samples prior to cyanide samples.

5. Fill sampling container (do not overfill).

   To ensure sample integrity, collect volatile samples first, then proceed to the least volatile method required for the site.

   A. Volatiles and WI Gasoline Range Organics (WIGRO) – Samples to be analyzed for volatile organics will be collected in two or three 40-ml vials with Teflon®-lined septum caps. Use caution because concentrated acid may be present. Do not rinse glass vials. Hold bottle in one hand, the cap right side up in the other. Allow a slow stream of water to run into the 40-ml vial. The vial should be held at an angle while filling to prevent water from falling directly to the bottom of the container and becoming overly disturbed. While holding the vial vertically, add the water sample until a small meniscus forms on the top of the sample container. Avoid air bubbles and overfilling the vial. Cap tightly, invert the bottle, and tap gently. If any air bubbles appear in the vial, discard and collect sample in a new vial. These samples will be cooled to approximately 4°C. After collecting the required number of vials, insert them in a zip-lock plastic bag and place in a cooler with ice.

      If prescribed by site-specific situations a duplicate volatile sample may be collected and field checked with a pH indicator strip to assess the pH of the sample. If the pH is greater than 2, the laboratory will be instructed to reduce the holding time of that day's samples to the 7-day holding period used for unpreserved samples.

   B. Semivolatiles (includes: Pesticides, PCB, Herbicides, BNAs, Dioxin and Furans)– Samples to be analyzed for semivolatile organics will be collected in a 1-liter amber glass jar with a Teflon-lined septum cap for each fraction. Fill container slowly with a minimum headspace and cap tightly. Do not rinse glass containers. Place container directly in a cooler with ice. These samples will be cooled to approximately 4°C.

   C. WI Diesel Range Organics (WIDRO) – Samples to be analyzed for WIDRO are to be collected in a 1-liter amber glass jar with a Teflon-lined septum cap and preserved with 1:1 HCl to a pH or less than 2. Fill container slowly with a minimum of headspace and cap tightly. Do not rinse glass containers. Place container directly into a cooler with ice. These samples will be cooled to approximately 4°C.

   D. Other Organics – Containers may contain acid(s), use caution when handling. Fill containers completely minimizing headspace and avoiding spillage. Place container directly in a cooler with ice.

   E. Metals

      1. Total Metals – Samples to be analyzed for metals will be collected in a 500-mL or 1-liter polyethylene jar with a polyethylene-lined closure. These samples will be preserved in by the lab with a 1:1 (50%) solution of Nitric Acid to reduce the pH of the sample to less than 2.

2. Filtered Metals – Select the appropriate Corning filter size, either 250-ml or 500-ml volume (for further details regarding water sample filtration, see Standard Operating Procedures for Filtering Groundwater Samples). Pour filtered sample into metals sample container, minimizing headspace and avoiding spillage. Use caution handling metals containers because of nitric acid. Place directly in a cooler with ice.

F. Oil and Grease by hexane extraction – Samples to be analyzed for Oil and Grease will be collected in a 1-liter glass jar with a Teflon-lined septum cap preserved to a pH or less than 2 with either 1:1 hydrochloric acid or 1:1 sulfuric acid. These samples will be cooled to approximately 4°C.

G. Cyanide – Samples to be analyzed for cyanide will be collected in a 1-liter polyethylene container with a polyethylene cap and preserved with sodium hydroxide to pH greater than 12 and cooled to approximately 4°C. If elevated levels of sulfur components (i.e. sulfate, sulfide, sulfite, thiosulfate, thiocyanate, and aldehydes) are suspected, test water with a lead acetate test paper (previously moistened with 1-2 drops of acetic acid buffer solutions (pH of 4) to determine the presence of sulfur. If elevated concentrations of sulfur components are detected, contact the project's quality assurance manager, expedite sample shipment to the analytical laboratory on the same day of collection and coordinate rush analyses per the EPA guidelines.

H. Collecting General Chemistry Samples – Samples to be analyzed for sulfate, chloride, carbonate, and bicarbonate will be collected in laboratory supplied containers (plastic or glass per the guidelines included in the analytical method(s)). These samples will be cooled to approximately 4°C.

I. Bacteria – Plastic bottles or glass containers preserved with 10 mg of sodium thiosulfate are used for bacterial sample preservation. Care should be taken not to contaminate the container before collecting the sample. Fill the container within 1 inch of the top. This allows the laboratory to shake and mix the contents before analysis. Place directly in a cooler with ice and cool to approximately 4°C. **Note**: 6 hour technical holding time for analysis.

Collecting Quality Control Samples

The effectiveness of the sample handling techniques is monitored by collecting both preserved and unpreserved field blank samples. For additional information, consult the Barr Engineering Co. SOP for the Collection of Quality Control Samples.

Field (or Masked) duplicate samples will be collected to measure relative sampling (and laboratory) precision. The ratio of quality control samples are generally 1 field blank/field duplicate per twenty samples, however, specific project requirements may be determined by the QAPP/SAP for the project. These samples are collected at the same time using the same procedures, equipment, and types of containers as the required samples. They are also preserved in the same manner and are either co-located or split and submitted for the same analyses as the native sample(s).

Trip blank samples are only applicable when sampling/analyzing for volatile organics. Their purpose is to determine if contamination has occurred as a result of improper sample

container cleaning, contaminated blank source water, sample contamination during storage and transport due to exposure to volatile organics, or other environmental conditions during sampling and analysis. The water will be free of contaminants. The trip blanks are prepared, sealed and labeled appropriately at the lab, and transported to the field in the same containers as the sample vials. These blanks are not opened in the field. They are transferred to the coolers designated for volatile sample storage and transport and accompany the samples to the analytical laboratory.

Field blank samples contain analyte-free water exposed to environmental conditions at the sampling site by transfer from one vessel to another or through contact with the sampling equipment (bailer, pump, tubing, hoses, stainless-steel bowls, trowels, etc.). If sampling equipment is rinsed, it may also be referred to as an Equipment or Rinsate Blank. It measures field and laboratory sources of contamination. The field blanks will be handled in the same manner as the sample group for which they are intended (i.e., blanks will be stored and transported with the sample group).

The volume of the sample obtained should be sufficient to perform all required analyses with an additional amount collected to satisfy the needs for quality control, split samples, or repeat examinations. The QA Staff should be consulted for any specific volume requirements.

The elapsed time between sample collection and initiation of each laboratory analysis will fall within a prescribed time frame. Holding times for samples required by this project are prescribed by EPA: Title 40 of the Code of Federal Regulations.

Water and Soil Sample Storage

The samples will be bubble wrapped or bagged immediately after collection, stored in a sample cooler, packed on double bagged wet ice and accompanied with the proper chain of custody documentation. Samples will be kept cold (approximately 4°C) until receipt at the laboratory, where they are to be stored in a refrigerated area. Custody seals may be present, but at minimum, the coolers must be taped shut with three straps of fiberglass tape. All samples will be kept secured to prevent tampering. If sample coolers are left in a vehicle or field office for temporary storage, the area will be locked and secured. The coolers must be delivered to the laboratory via hand or overnight delivery courier in accordance with all Federal, State and Local shipping regulations.

Note: Samples may have to be stored indoors in winter to prevent freezing.

After collection, all samples should be handled as few times as possible. Samplers should use extreme care to ensure that samples are not contaminated. If samples are placed in a cooler, samplers should ensure that melted ice cannot cause sample containers to become submerged, as this may result in cross-contamination. Plastic bags, such as Ziplock® bags, should be used when small sample containers (e.g., VOC vials) are placed in coolers to prevent cross-contamination.

Some compounds can be detected in the parts per billion and/or parts per trillion range. Extreme care will be taken to prevent cross-contamination of these samples. A clean pair of new, disposable gloves will be worn for each sample location. Sample containers for source samples or samples suspected of containing high concentrations of contaminants are placed in separate plastic bags and coolers immediately after collecting, preserving and tagging.

Sample collection activities will proceed progressively from the least contaminated area to the most contaminated area (when known).

Disposal

All waste generated by this process will be disposed of in accordance with Federal, State and Local regulations. When feasible, implement procedures to minimize environmental pollution.

Documentation

The technician(s) will document the type and number of samples collected during each field event. All sample information will be documented in the field notebook, field log data sheet and chain-of-custody record.

Attachments

Attachment 1: Chain of Custody Form
Attachment 2: Sample Label
Attachment 3: Custody Seal – if applicable
Attachment 4: Field Sampling Report
Attachment 5: Field Log Data Sheet

Attachment 1
Chain of Custody Form

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number:

Project Name:

Sample Origination State __ __ (use two letter postal state abbreviation)

COC Number:

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mn)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil: VOCs (1:1 MeOH) #1	GRO, BTEX (1:1 MeOH) #1	DRO (1:1 unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers
1.																								
2.																								
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

COC _____ of _____

Project Manager: _____

Project QC Contact: _____

Sampled by: _____

Laboratory: _____

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____ Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09/01/09

Attachment 2
Example - Sample label

Client _____

Project Number _____

Date: _____ Time _____

Preservative: _____

Sampled By: _____

Sample Location: _____

_____

Attachment 3
Custody Seal – if applicable

Custody Seal

Date_____ Project_____

Signature _____Container#_____ of_____

Attachment 4
Field Sampling Report

BARR

FIELD SAMPLING REPORT

Date:

Project:

Contact:

Barr Engineering Company
4700 W. 77th Street
Minneapolis, MN 55435-4803

Field Sampling

Field Report

Attachments:

-
-
-
-
-
-
-

Laboratory Analysis Status

<Name inserts here>
Environmental Technician

Document1

BARR

Attachment 5
Field Log Data Sheet

Client:		**Monitoring Point:**						
Location:		**Date:**						
Project #:		**Sample time:**						
GENERAL DATA		**STABILIZATION TEST**						
Barr lock:		Time/ Volume	Temp. ºC	Cond. @ 25	PH	ORP mV	D.O.	Turbidity Appearance
Casing diameter:								
Total well depth:*		NA						
Static well level:*								
Water depth:*								
Well volume: (gal)								
Purge method:								
Sample method:								
Start time:		Odor:						
Stop time:		Purge Appearance:						
Duration: (minutes)		Sample Appearance:						
Rate, gpm:		Comments:						
Volume purged:								
Duplicate collected:								
Sample collection by:								
Others present:		Well condition:						
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment Other: sump								
VOC Semi-volatile General Nutrient Cyanide DRO Sulfide								
Oil, grease Bacteria Total Metal Filtered Metal Methane Filter								
Others:								

* Measurements are referenced from the top of riser pipe, unless otherwise indicated.

STANDARD OPERATING PROCEDURE

Decontamination of Field Sampling Equipment

Revision 4

June 16, 2014

Approved By:

Print	QA Manager(s)	Signature	Date
Dana Pasi			6/16/14

Print	Field Technician(s)	Signature	Date
KEVIN McGILP			6/16/14

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com

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Review of the SOP has been performed
and the SOP still reflects current practice.

Initials:	_____	Date:	_____
Initials:	_____	Date:	_____
Initials:	_____	Date:	_____
Initials:	_____	Date:	_____
Initials:	_____	Date:	_____

Decontamination of Monitoring Well Sampling Equipment

Purpose

The purpose of this procedure is to define the process used for decontaminating all sampling-related equipment including pumps, meters, and materials coming into contact with actual sampling equipment or with sampling personnel. Bailers, protective gear, and filtration devices will be discarded after one use. Stainless steel bailers are used once and returned to an independent laboratory for decontamination.

Applicability

This procedure is applicable to all personnel who are collecting samples and/or decontaminating sampling and field equipment

Equipment

Alconox™
Scrub brush made of inert materials
Distilled or Deionized rinse water
Bucket
Field Log Data Sheets
Field Log Cover Sheets
Field Log Data Reports

Responsibilities

The equipment technician is responsible for ensuring all field equipment has been thoroughly decontaminated and prepared for use out in the field. The field technician(s) are responsible for decontamination in the field at each individual sampling point. The field technician(s) are responsible for ensuring adherence to any IDW project-specific requirements as set forth in the QAPP or SAP are met.

Procedure

Decontamination of monitoring well equipment will be performed by the field technician(s) before sampling and after working at each sampling point. All equipment will be handled in a manner that minimizes cross-contamination between points. After cleaning, the equipment will be visibly inspected to detect any residues or other substances that may exist after normal cleaning. If inspection reveals that decontamination was insufficient, the decontamination procedures will be repeated.

Equipment will be decontaminated in the following manner:

1. Equipment that does **not** contact sample water or the inside of the well:

    a. Rinse with clean control water.

    b. Inspect for remaining particles or surface film and repeat cleaning and rinse procedures if necessary.

2. Equipment that contacts sample water or the inside of the well:

a. Clean (inside and outside where possible) with an Alconox™/clean-water solution applied with a scrub brush made of inert materials.

b. Rinse with clean control water, containerized with other IDW if required by the SAP or QAPP.

c. Inspect for remaining particles or surface film and repeat cleaning and rinse procedures if necessary.

d. Shake off remaining water and allow to air dry.

The internal surfaces of pumps and tubing that cannot be adequately cleaned by the above methods alone will also be cleaned by circulating decontamination fluids through them. The fluids will be circulated through this equipment in the order shown above. Special care will be exercised to ensure that the "rinse" fluids will be circulated in sufficient quantities to completely flush out contaminants and detergents.

When transporting or storing equipment after cleaning, the equipment will be protected in a manner that minimizes the potential for contamination.

Disposal

All waste generated by this process will be disposed of in accordance with Federal, State and Local regulations. Where reasonably feasible, technological changes have been implemented to minimize the potential for environmental pollution.

Documentation

The field technician(s) will document the field equipment decontamination procedures on Field Log Data Sheets, Field Log Cover Sheets, and Field Log Data Reports or a project dedicated Field Log book.

Attachments

Attachment 1: Field Sampling Report
Attachment 2: Field Log Cover Sheet
Attachment 3: Field Log Data Sheet

Attachment 1
Field Sampling Report

BARR

FIELD SAMPLING REPORT

Date:

Project:

Contact:

Barr Engineering Company
4700 W. 77th Street
Minneapolis, MN 55435-4803

Field Sampling

Field Report

Attachments:

-
-
-
-
-
-
-

Laboratory Analysis Status

<Name inserts here>
Environmental Technician

Document1

Attachment 2
Field Log Cover Sheet

BARR

FIELD LOG COVER SHEET
WATER SAMPLING

Client: **Project No.:**

Technician: **Sampling Period:**

Date	Temperature	Wind Speed	Wind Direction	Cloud Cover

Summary of Field Activities

Document1

Attachment 3
Field Log Data Sheet

BARR

Barr Engineering Company
Field Log Data Sheet

Client:	**Monitoring Point:**
Location:	**Date:**
Project #:	**Sample Time:**

GENERAL DATA		STABILIZATION TEST						
Barr lock:		Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Casing diameter:								
Total well depth:*								
Static water level:*								
Water depth:*								
Well volume: (gal)								
Purge method:								
Sample method:								
Start time:		Odor:						
Stop time:		Purge Appearance:						
Duration: (minutes)		Sample Appearance:						
Rate, gpm:		Comments:						
Volume, purged:								
Duplicate collected?								
Sample collection by:		CO2- Mn2- Fe(T)- Fe2-						

Others present:

WELL INSPECTION (answer for each category, state if lock replaced, detail any repairs needed on back of form)

CASING & CAP: COLLAR: LOCK: OTHER:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- general- nutrient- cyanide- DRO- Sulfide-

oil,grease- bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated.

S:\DM\Templates\FieldLogDataSheet.doc

STANDARD OPERATING PROCEDURE

Documentation on a Chain-of-Custody Form

Revision 3

March 23, 2010

Approved By:	Andrea Nord	Cindy Nord	03/23/10
	Print QA Manager(s)	Signature	Date

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
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Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Annual Review of the SOP has been performed and the SOP still reflects current practice.

Initials:	AAN	Date:	04/08/11
Initials:	DLB	Date:	02/27/12
Initials:	DLB	Date:	04/04/13
Initials:		Date:	
Initials:		Date:	

Standard Operating Procedures for Documentation on a Chain-of-Custody Form

Purpose

The purpose of this procedure is to describe how to properly document information on a Chain-of-Custody (COC) form.

Applicability

These procedures apply to anyone, any time a COC is required.

Definitions

Chain-of-Custody A legally binding document that identifies sample identification, analyses required, and shows traceable possession of samples from the time they are obtained until they are introduced as evidence in legal proceedings.

Equipment

Chain of Custody form
Indelible ink pen

References

Groundwater sampling guidelines and groundwater and surface water sampling procedures by Barr Engineering Company.

Responsibilities

The field technician(s) is responsible for accurate and complete documentation on the COC.

Procedure

The COC is the most important sampling document; it must be filled out accurately and completely every time.

Completing a Chain-of-Custody

1. The COC should be completed prior to leaving the sampling location.

2. Complete one COC or more as needed for each cooler of samples.

3. The COC must contain the following information:

    a. Project number
    b. Project name
    c. Two digit identification for the state or province the samples originated from/sampled in
    d. Unique Chain-of-Custody number
    e. Sample location
    f. Sample start depth (if applicable)
    g. Sample stop depth (if applicable)
    h. Depth unit of measurement (meter, feet, inches, etc)
    i. Date and time of sample collection

j. Sample matrix
k. Container type and number
l. Whether the sample is a grab, composite, or blank sample
m. Project manager
n. Project Quality Control (QC) contact
o. Initials of sample/field technician(s)
p. Laboratory name
q. Analyses required
r. Signature of sampler(s)
s. Signature of transferee
t. Date and time of transfer
u. Method of transport and any shipping numbers
v. Presence or absence of ice
w. Method of transport (UPS, FedEx, local courier, Sampler, etc.)
x. Air Bill number (if applicable)
y. If sample preservation check conducted in the field indicates:
    1. additional preservation is required for inorganic samples. Note this on the COC or perform a pH adjustment and note the volume, concentration and preservative type on the COC; or
    2. that a VOC sample is not properly preserved, note this on the COC, and request a 7- day TAT due to the analytical method holding time being 7 days from collection.

4. The COC should always accompany the cooler of samples associated with the COC.

    a. Distribution of the COC pages:

        Pages one and two go to the laboratory, page three goes to the laboratory coordinator, and the fourth page is the field copy.

Documentation

The Chain-of-Custody form is the documented proof of possession of samples collected. This is documented by field personnel collecting the samples and the laboratory receiving the samples.

Attachments

Attachment 1: Chain of Custody Form

Attachment 1
Chain of Custody Form

BARR

Chain of Custody

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC ______ of ______

Project Number:

Project Name:

Sample Origination State _ _ (use two letter postal state abbreviation)

COC Number:

Project Manager: ______________

Project QC Contact: ______________

Sampled by: ______________

Laboratory: ______________

						Matrix			Type			Number of Containers/Preservative: Water										Soil									
Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Water	Soil		Grab	Comp.	QC	VOCs (HCl) *#1*	SVOCs (unpreserved) *#2*	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) *#3*	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) *#4*				VOCs (tared MeOH) *#1*	GRO, BTEX (tared MeOH) *#1*	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) *#2*	% Solids (plastic vial, unpres.)			Total Number Of Containers	
1.																															
2.																															
3.																															
4.																															
5.																															
6.																															
7.																															
8.																															
9.																															
10.																															

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: ______				Air Bill Number:		

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

STANDARD OPERATING PROCEDURE

Domestic Transport of Samples to Laboratories within the United States of America - States and Territories

Revision 1

May 16, 2014

Approved By: Andrea Nord | [signature] | 05/16/2014

Print | QA Manager(s) | Signature | Date

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Annual Review of the SOP has been performed and the SOP still reflects current practice.

Initials: _____ Date: _____

Initials: _____ Date: _____

Initials: _____ Date: _____

Initials: _____ Date: _____

Initials: _____ Date: _____

Standard Operating Procedures for the Domestic Transport of Samples to Laboratories within The United States of America – States and Territories

Purpose

To describe the procedures necessary for personal delivery or shipment of samples from locations within the United States of America and its territories to analytical laboratories located within the United States of America and its territories.

Applicability

This procedure applies to the transportation of ground and surface water, soil, wipe, sediment, paint chip, debris, and air samples to the appropriate laboratory.

Definitions

Environmental Samples. Samples not regulated by the U.S. Department of Transportation.

Hazardous Material. Regulations for packing, marking, labeling, and shipping of hazardous materials are governed by the U.S. DOT.

Equipment

Rigid Cooler
Environmental Samples
Ziploc® baggies
Bubble-wrap/bubble bags (inner packaging material)
Absorbent padding
Heavy plastic bags to contain samples and absorbent padding
Zip ties
Garbage bag for containing ice and preventing leakage of melted ice water
Ice
Packing tape
Chain of Custody Record
Shipping papers – if shipping via delivery service
Secondary shipping label
Dangerous Goods in Excepted Quantities Label with the number "3" added indicating the hazard class. This label must be used for all coolers containing methanol preservative.
Directional arrow labels may be used to insure samples remain upright.

References

Quality Assurance Manual: Groundwater and Surface Water Sampling Procedures, Barr Engineering Co.; Procedures for Ground Water Monitoring: MPCA Guidelines, January 1995.

Discussion

Maintaining proper sample temperatures (4±2°C or ambient air temperature in accordance with the analytical method requirements) and delivering samples to the laboratory within 24 to 48 hours from collection are primary concerns.

Responsibilities

The field technician(s) shall ensure the security, temperature, and packaging of environmental samples during transport and shipment.

Procedure

Packaging of water, soil and sediment samples (requiring chilled preservation per the analytical method of analysis)

1. Packaging Samples:

Place samples in a rigid cooler, pack glass containers in bubble wrap or other cushioning material to avoid breakage. (Note: Bubble-wrap is the preferred packing material.) Caps on all sample containers must be reinforced with adhesive tape.

Place samples and cushioning material in strong plastic bag with enough absorption padding to absorb all of the liquid in the packaging. Be sure to zip tie this bag shut.

Add enough ice to maintain a constant temperature at 4±2°C until the samples arrive at the laboratory. Package ice in double-lined bags to ensure sample labels will not be compromised, and the cooler(s) will not leak melt water.

Before sealing cooler, fill out the chain-of-custody form completely and include required copies with the samples (see Standard Operating Procedure for Documentation on a Chain-of-Custody).

Adhere two to three strips of packaging tape on the cooler from top to bottom, and adhere an additional strip of tape covering the gap between the lid and sides of cooler to seal the cooler to avoid leakage. Custody Seals must be adhered on the cooler if project quality assurance plan or sampling and analysis plan require them. The custody seal must be adhered to the crack of the lid and the side of the cooler to ensure the cooler lid has not been tampered with in transit. Be sure to attach the courier shipping label to the top of the cooler.

2. Labeling

A secondary label with the same information should also be attached with packaging tape to the cooler in event that the original label is damaged or destroyed during sample shipment.

When shipping samples preserved with methanol, the cooler must have a Dangerous Goods in Excepted Quantities label (see attachment 4) placed on the outside of the cooler. Be sure to add the number “3” to each label in permanent marker to indicate the hazard class being shipped.

Each cooler shall not exceed 500 mL of Methanol (16 vials, 30 mL of methanol per vial) and each vial shall not have more than 30 mL of methanol to meet the requirements of a dangerous good in excepted quantities. Acid/base preserved samples vials are often 40 mL or larger and do not qualify for excepted quantities.

Directional arrow labels should also be attached to the cooler to insure the cooler remains upright during shipping. Directional arrow labels should be attached to the outside of the cooler to keep the cooler in an upright position during sample shipment.

Packaging of wipe, paint chip, debris, and air samples (requiring ambient air temperature per the analytical method of analysis)

1. Packaging Samples: Place the samples in a cooler or cardboard box in a manner that will avoid breakage.

Adhere two to three strips of packaging tape from top to bottom on the cooler or box. Fill out the chain-of-custody completely and include required copies with the samples (see Standard Operating Procedure for chain-of-custody record).

Custody Seals must be adhered over the lid if project quality assurance plan or sampling and analysis plan require them. The custody seal must be adhered to the crack of the lid and the side of the cooler or over the flaps of the box to ensure the container remained shut and has not been tampered with in transit.

Personal Delivery. The samples are delivered to the laboratory by the field technician(s). The chain-of-custody record is signed and dated by the laboratory representative.

Local Courier. The same procedures are followed as above; i.e., the chain-of-custody record is signed and dated and the top copy is sent with the samples. The cooler or box is then secured with packaging tape and a courier form is filled out for the designated laboratory. The cooler or box is then left in the services area for pickup.

Overnight Courier. Follow the procedures above, replacing the courier form with the overnight courier (examples Federal Express, United Parcel Service, Speedy Delivery) form. Date, project number, type of delivery desired, weight, and number of coolers or boxes should be included.

Account for all samples before shipping and compare to the chain of custody (see Standard Operating Procedure for chain-of-custody record).

Shipping Considerations

Ship samples during times when the laboratory will be able to accept and quickly analyze them. Whenever possible, select mode of transport/delivery to ensure delivery to the laboratory will occur with ample EPA recommended holding time remaining for the specified analytical methods required for the samples. Avoid sending samples during holidays and weekends. All Federal, State and Local shipping regulations must be met.

Sample Storage

For samples requiring ice as a preservative, the samples will be bubble wrapped, bagged immediately after collection, stored in a sample cooler, packed on double bagged wet ice and accompanied with the proper chain-of-custody documentation. The samples will be kept cold (approximately 4°C) until receipt at the laboratory, where they are to be stored in a refrigerated area.

For samples that are stored at ambient air temperature, the samples (wipe, paint chip, debris, and air samples) will be placed in a baggie or shipping carton (i.e. cardboard box) and accompanied with the proper chain-of-custody documentation.

For all samples, custody seals may be present, but at minimum, the coolers must be taped shut with two to three straps of packing tape. All samples will be kept secured to prevent tampering. If sample coolers are left in a vehicle or field office for temporary storage, the area will be locked and secured. The coolers must be delivered to the laboratory via hand or over-night delivery courier in accordance with all Federal, State and Local shipping regulations.

Note: Samples may have to be stored indoors in winter to prevent freezing.

Documentation

The field technician is responsible for proper documentation and distribution of the chain-of-custody, overnight courier forms. They also must ensure sample analysis are copied and included in site files and reports.

Attachments

Attachment 1: Chain of Custody Form
Attachment 2: Custody Seal – if applicable
Attachment 3: Example - Courier Shipping Document
Attachment 4: Dangerous Goods in Excepted Quantities Label

Attachment 1
Chain of Custody Form

BARR

Chain of Custody

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number:

Project Name:

Sample Origination State _ _ (use two letter postal state abbreviation)

COC Number:

COC _______ of _______

Project Manager: __________________

Project QC Contact: __________________

Sampled by: __________________

Laboratory: __________________

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water:	Water:	Water:	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil:	Soil:	Total Number Of Containers
1.																														
2.																														
3.																														
4.																														
5.																														
6.																														
7.																														
8.																														
9.																														
10.																														

(Column group heading: Number of Containers/Preservative — Water / Soil)

Common Parameter/Container - Preservation Key

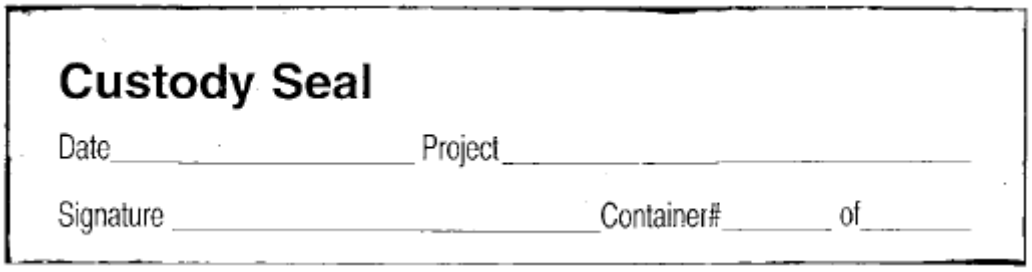
#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: ________				Air Bill Number:		

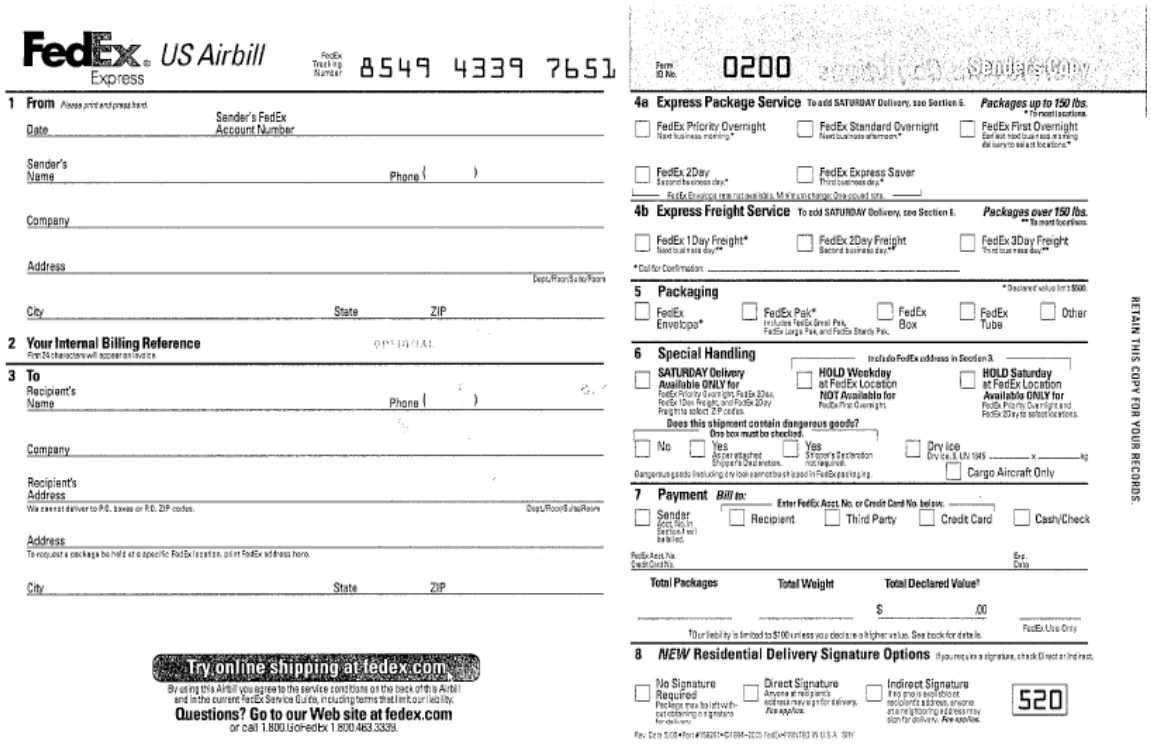
Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

HRL CUSTODY FORMS/Chain Of Custody Form 2009 RLG Rev. 09/01/09

Attachment 2
Example Custody Seal – if applicable



Attachment 3
Example - Courier Shipping Document



FedEx Express US Airbill

FedEx Tracking Number 8549 4339 7651

Form ID No. 0200

1 From Please print and press hard.
Date
Sender's FedEx Account Number
Sender's Name
Phone ( )
Company
Address
Dept/Floor/Suite/Room
City State ZIP

2 Your Internal Billing Reference
First 24 characters will appear on invoice.

3 To
Recipient's Name
Phone ( )
Company
Recipient's Address
We cannot deliver to P.O. boxes or P.O. ZIP codes.
Dept/Floor/Suite/Room
Address
To request a package be held at a specific FedEx location, print FedEx address here.
City State ZIP

4a Express Package Service To add SATURDAY Delivery, see Section 5. Packages up to 150 lbs. * To most locations.
FedEx Priority Overnight — Next business morning.*
FedEx Standard Overnight — Next business afternoon.*
FedEx First Overnight — Earliest next business morning delivery to select locations.*
FedEx 2Day — Second business day.*
FedEx Express Saver — Third business day.*
FedEx Envelope rate not available. Minimum charge: One pound rate.

4b Express Freight Service To add SATURDAY Delivery, see Section 5. Packages over 150 lbs. ** To most locations.
FedEx 1Day Freight* — Next business day.**
FedEx 2Day Freight — Second business day.**
FedEx 3Day Freight — Third business day.**
* Call for Confirmation:

5 Packaging * Declared value limit $500.
FedEx Envelope*
FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
FedEx Box
FedEx Tube
Other

6 Special Handling Include FedEx address in Section 3.
SATURDAY Delivery — Available ONLY for FedEx Priority Overnight, FedEx 2Day, FedEx 1Day Freight, and FedEx 2Day Freight to select ZIP codes.
HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight
HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.
Does this shipment contain dangerous goods? One box must be checked.
No
Yes — As per attached Shipper's Declaration
Yes — Shipper's Declaration not required.
Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
Dangerous goods (including dry ice) cannot be shipped in FedEx packaging.
Cargo Aircraft Only

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.
Sender — Acct. No. in Section 1 will be billed.
Recipient
Third Party
Credit Card
Cash/Check
FedEx Acct. No. / Credit Card No.
Exp. Date
Total Packages
Total Weight
Total Declared Value† $ .00
†Our liability is limited to $100 unless you declare a higher value. See back for details.
FedEx Use Only

8 NEW Residential Delivery Signature Options If you require a signature, check Direct or Indirect.
No Signature Required — Package may be left without obtaining a signature for delivery.
Direct Signature — Anyone at recipient's address may sign for delivery. Fee applies.
Indirect Signature — If no one is available at recipient's address, anyone at a neighboring address may sign for delivery. Fee applies.
520

Rev. Date 5/05 • Part #158201 • ©1994–2005 FedEx • PRINTED IN U.S.A. SRY

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Questions? Go to our Web site at fedex.com
or call 1.800.GO-FedEx 1.800.463.3339.

RETAIN THIS COPY FOR YOUR RECORDS.

Attachment 4:
Dangerous Goods in Excepted Quantities Label

STANDARD OPERATING PROCEDURE

Field Screening Soil Samples

Revision 6

June 16, 2014

Approved By:

Dana Pasi		6/16/14
Print QA Manager(s)	Signature	Date
KEVIN McGILP		6/16/14
Print Field Technician(s)	Signature	Date

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Review of the SOP has been performed
and the SOP still reflects current practice.

Initials:		Date:	
Initials:		Date:	
Initials:		Date:	
Initials:		Date:	
Initials:		Date:	

Standard Operating Procedure for Field Screening Soil Samples

Purpose

To describe the procedure for properly screening soil or sediment samples in the field.

Applicability

This procedure applies to all field technicians responsible for field screening soil or sediment samples.

Definitions

PPE Personal protective equipment
PID Photoionization Detector
FID Flame Ionization Detector

Equipment

PPE (gloves, safety glasses)
Project Health and Safety Plan
Quart-sized-self-sealing Polyethylene bag
Photoionization detector (PID)
Flame ionization detector (FID)
Thermometer
Indelible ink pen or pencil
Stainless-steel spoon
Squirt bottle with tap water
Logbook
Alconox®
Brush

Responsibilities

The environmental technician(s) is responsible for the proper sample identification; field screening procedures; field equipment and calibration; quality control procedures and documentation.

Equipment Calibration

The PID or FID shall be calibrated or checked against a known concentration of a calibration gas standard prior to collection of field measurements. Calibration of the PID or FID shall follow the recommended procedures as described in the manufacturer's operation manual and as outlined below.

Regular calibration checks (bump tests) are expected to be performed by the field technician a minimum of once per day of use in the field. It is recommended that bump tests be conducted around mid-day and at the end of the day. More frequent bump testing may be

completed if warranted by field conditions. The bump testing results should be recorded in the field log book or field log data sheets.

If problems occur during calibration, during bump tests, or if the unit will not stay calibrated, then the field technician should contact the equipment technician and project manager for assistance.

Procedure

The field screening techniques for soils are as follows: (1) visual examination; (2) odor; (3) headspace organic vapor screening; and (4) oil sheen. The results of these four screening procedures may be used to screen soil samples for possible contamination.

- **Visual Examination.** A visual examination of the soil sample will include noting any discoloration of the soil or visible oiliness or tar.

- **Odor.** The field technician will note odor only if noticed incidentally while handling the soil sample. Field technicians will not unduly expose themselves to sample odors. Odor will be described as trace, light, moderate, or strong, and appropriate description of the type of odor, if evident.

- **Headspace Organic Vapor Screening.** The polyethylene bag headspace method recommended by the Minnesota Pollution Control Agency will be used in the field to screen soils suspected to contain volatile organic compounds. The screening method is intended to be used in conjunction with other "real time" observations.

  The following equipment is required to conduct headspace organic vapor screening: photoionization or flame ionization detector (PID or FID), self-sealing quart-sized polyethylene bag, a log book or record sheet, and the appropriate personal protective equipment necessary for collection and handling of soil samples as described in the Project Health and Safety Plan (PHASP). The PID or FID shall be calibrated daily or more frequently if suspect data is obtained.

  The following procedure will be used for checking the calibration of the FID:

  FID calibration check is typically conducted using a two point calibration process with methane gas. Calibrate the instrument by analyzing the calibration gas at 100 ppm and 1,000 ppm. If instrument values exceed ± 5% from true value, then the FID needs to be recalibrated.

  Reference the Standard Operating procedure for the TVA1000B (FID) for further information.

  The following procedure will be used for checking the calibration of the PID:

  PID calibration check is conducted typically using isobutylene calibration gas at a concentration of 100 ppm. Analyze a sample of the calibration gas; evaluate result, if result exceeds ± 5% from true value, then the PID needs to be recalibrated.

Reference the Standard Operating procedure for the specific PID model for further information.

The following procedure will be used for conducting headspace organic vapor screening:

1. Soil samples collected from a split-barrel sampler or a direct-push (i.e., Geoprobe) sample liner will be collected immediately after opening the barrel or liner. If the sample is collected from an excavation wall, soil pile, or backhoe bucket, it will be collected from a freshly exposed surface.

2. Half-fill the bag with the sample to be analyzed using a stainless-steel spoon or a gloved hand and immediately seal it.

3. Agitate the bag for 15 seconds. Manually break up any soil clumps within the bag.

4. Allow headspace development for approximately 10 minutes. The sample should be kept in a shaded area out of direct sunlight. Ambient temperatures during headspace development should be recorded. When ambient temperatures are below 50°F, headspace development should be conducted inside a heated vehicle or building.

5. After completing the headspace development, agitate the bag for an additional 15 seconds.

6. Quickly puncture the bag with the sampling probe of the PID or FID at a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particles.

7. Record the highest PID or FID meter response as the headspace concentration. The maximum response will likely occur between 0 to 5 seconds.

8. When using a FID, it may be necessary to correct for methane. In this case, take a reading first with carbon filter, then without. This will require two duplicate bag samples. The second reading less the first is the headspace adjusted for methane. Adjusted readings less than zero are considered zero. Methane correction is not necessary if a PID is used.

- **Oil Sheen Test.** The oil sheen or hydrocarbon test is a method used to immediately determine the approximate magnitude of coal tar or petroleum contamination in soil by observation of the sample in the field. The test is useful in soils which do not have a high binding capacity with petroleum compounds or polyaromatic hydrocarbons (PAHs) (i.e., the petroleum compounds or PAHs are free on the surface of the soil particles and can be released by a stream of water).

  The equipment required to conduct the oil sheen test includes: a stainless-steel spoon, a squirt bottle filled with tap water, a log book or field log data sheet, and the appropriate personal protective equipment necessary for collection and handling of soil samples as described in the Project Health and Safety Plan. Decontamination of the spoon between test events will consist of scrubbing the surface of the spoon with a solution of Alconox™ in water using a brush and then rinsing the spoon with water.

The procedure for conducting the oil sheen test consists of obtaining approximately 50 grams (about 30 cc) of representative soil with the spoon and then directing a stream of water onto the soil in the spoon with the squirt bottle until the soil is saturated and water begins to collect around the soil. The amount of oil sheen present on the water is determined by observation and the results of the test are reported as a magnitude of oil sheen observed: none, trace, light, moderate, heavy or rainbow. The test results, sample location, and observations of the sample's appearance and odor are recorded in the log book or field log data sheet.

The specific soil types at the area of investigation should be accounted for when performing the oil sheen test. The best results are obtained in silts, sands, and/or gravels with low organic content. The results obtained from clay soils may appear deceptively low. Typical descriptions of each test result are given below.

Oil Sheen Test Result	Description
None	No sheen detected.
Trace	Possible or faint oil sheen observed (may not continue to generate sheen as additional water is added).
Light	Obvious sheen that may not cover entire water surface
Moderate	Definite oil sheen that covers entire surface, but "rainbow colors" not distinguishable.
Heavy	Definite oil film or product that does not display rainbow colors.
Rainbow	Definite oil sheen, film or product that displays rainbow colors.

Interferences

Interferences on the test can be caused by any contaminant that can cause an oil sheen on water. The samples will be carefully observed for characteristic appearance or odors which may indicate a possible contaminant other than coal tar or petroleum substances. Sunlight and low temperatures may interfere with headspace development. Water and soil particles may interfere with PID and FID measurements.

Documentation

The field technician(s) will document the soil sampling and field screening activities and measurement in a project dedicated field logbook or on field log data sheets.

Attachments

Attachment 1: Field Sampling Report
Attachment 2: Field Log Data Sheet

Attachment 1
Field Sampling Report

BARR

FIELD SAMPLING REPORT

Date:

Project:

Contact:

Barr Engineering Company
4700 W. 77th Street
Minneapolis, MN 55435-4803

Field Sampling

Field Report

Attachments:

-
-
-
-
-
-
-

Laboratory Analysis Status

<Name inserts here>
Environmental Technician

Document1

Attachment 2
Field Log Data Sheet

Barr Engineering Company
Field Log Data Sheet
Soil Samples

Client:									Number of Containers/ Analysis																				
Location:																													
Project #:																													
Project Name:																													
Sample Identification	Collection		Matrix			Type			2 oz. Pres.	2 oz. Unpres.	4 oz. Unpres.	8 oz. Unpres.	Moisture-plastic vial etc.	Other:	SVOC	PAH	VOC	WIGRO	WIDRO	PCB	RCRA Metals	Moisture	Other:	Other:					
	Date	Time	Soil	Sludge		Grab	Comp.	QC																					
1.																													
2.																													
3.																													
4.																													
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STANDARD OPERATING PROCEDURE

Sampling and Disposal of Investigative Derived Waste

Revision 3

June 16, 2014

Approved By:

Dana Pasi	Dana Pasi	06/16/14
Print QA Manager(s)	Signature	Date
KEVIN McGILP		06/16/14
Print Field Technician(s)	Signature	Date

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Review of the SOP has been performed
and the SOP still reflects current practice.

Initials: _____	Date: _____
Initials: _____	Date: _____
Initials: _____	Date: _____
Initials: _____	Date: _____
Initials: _____	Date: _____

Standard Operating Procedures for Sampling Investigative Derived Waste

Purpose

The purpose of this SOP is to define the procedures for the sampling and disposal of investigative derived waste (IDW) generated during field investigation activities.

Applicability

This SOP is applicable to sampling any containerized materials containing pollutants including: drill cuttings, drilling fluids, cleaning liquids, DNAPL, waste water, soil and rock samples, protective clothing and equipment, or any other items or materials which are exposed to, or may contain pollutants that must characterized for off-site disposal.

Definitions

Investigative Derived Waste - Materials containing pollutants derived during investigation activities including drill cuttings, drilling fluids, cleaning liquids, waste water, DNAPL, soil and rock samples, protective clothing and equipment, or any other items or materials which are exposed to, or may contain pollutants.

References

Project Quality Assurance Manual: Groundwater and Surface Water Sampling Procedures, Barr Engineering Co.; American Water Works Association: Pocket Guide to Water Sampling; Environmental Sampling, A Summary, the Radian Corporation.

Ground Water Sampling Guidelines, MPCA

EPA: Title 40 of the Code of Federal Regulations Barr Engineering Co. SOP for Soil Compositing

Barr Engineering Co. SOP for Soil Sample Collection

Barr Engineering Co. SOP for Collection of Each Type of Groundwater Samples from

Monitoring Wells, Residential Wells and Residential Systems

Barr Engineering Co. SOP for Dense Non-aqueous Phase Liquid Sample Collection

Responsibilities

The Barr Project Manager is responsible for determining whether any solid or liquid-phase product needs to be containerized, and characterized for off-site disposal. The field technician is responsible for the proper sample collection and management techniques, documentation, and sample transport to the laboratory. The role of the Health and Safety Officer is to oversee all aspects of job safety.

Procedure

- Representative samples will be collected and/or composited following the Barr standard sampling procedures including: SOP for Soil Compositing.
- SOP for Soil Sample Collection.

- SOP Collection of Each Type of Groundwater Samples from Monitoring Wells, Residential Wells and Residential Systems.
- SOP for Dense Non-aqueous Phase Liquid Sample Collection.

All sampling equipment will follow applicable decontaminations procedures. All samples will be collected and handled using appropriate sampling containers, also storage, transport, and shipping documentation procedures. IDW will also be managed in accordance with applicable regulatory and contractual requirements.

Sample Storage

The samples will be bubble wrapped or bagged immediately after collection, stored in a sample cooler, packed on double bagged ice and accompanied with the proper chain of custody documentation. Samples will be kept cold (approximately 4°C) until receipt at the laboratory, where they are to be stored in a refrigerated area. Custody seals may be present, but at minimum, the coolers must be taped shut with three straps of tape. All samples will be kept secured to prevent tampering. If sample coolers are left in a vehicle or field office for temporary storage, the area will be locked and secured. The coolers must be delivered to the laboratory via hand or shipped via delivery courier in accordance with all applicable Federal, State and Local shipping regulations.

Note: Samples may have to be stored indoors in winter to prevent freezing.

Disposal

All waste generated will be disposed of in accordance with Federal, State and Local regulations.

Documentation

The technician(s) will document the IDW sampling events in a dedicated project field logbook or on field log data sheets, field log cover sheet, and field sampling report as applicable. The technicians will also document the type and number of bottles on both the field log data sheet and chain-of-custody record. The analysis for each bottle and the laboratory used will be documented on the chain-of-custody record.

Attachments

Attachment 1: Chain of Custody Form
Attachment 2: Sample Label
Attachment 3: Custody Seal – if applicable
Attachment 4: Field Sampling Report
Attachment 5: Field Log Cover Sheet
Attachment 6: Field Log Data Sheet

Attachment 1
Chain of Custody Form

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number:

Project Name:

Sample Origination State ___ ___ (use two letter postal state abbreviation)

COC Number:

Number of Containers/Preservative

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Soil: VOCs (1ard MeOH) #1	Soil: GRO, BTEX (1ard MeOH) #1	Soil: DRO (1ard unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Total Number Of Containers
1.																								
2.																								
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

COC _____ of _____

Project Manager: _____

Project QC Contact: _____

Sampled by: _____

Laboratory: _____

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____ Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

HRLG:STDFORMS\Chain Of Custody Form 2008 HLG Rev. 08/01/08

Attachment 2
Example - Sample label

Client _____

Project Number _____

Date: _____ Time _____

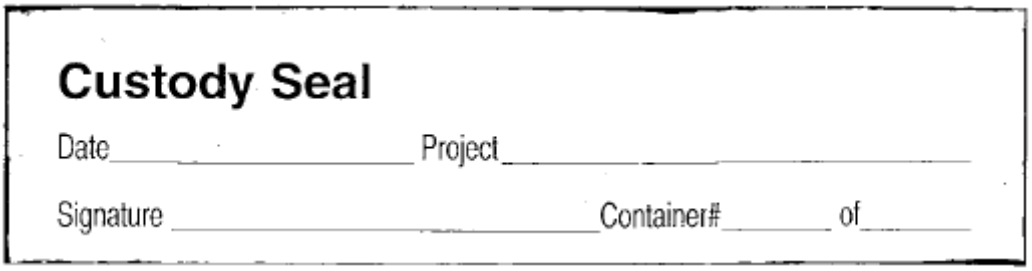
Preservative: _____

Sampled By: _____

Sample Location: _____

_____

Attachment 3
Example Custody Seal – if applicable



Attachment 4
Field Sampling Report

BARR

FIELD SAMPLING REPORT

Date:

Project:

Contact:

Barr Engineering Company
4700 W. 77th Street
Minneapolis, MN 55435-4803

Field Sampling

Field Report

Attachments:

-
-
-
-
-
-
-

Laboratory Analysis Status

<Name inserts here>
Environmental Technician

Attachment 5
Field Log Cover Sheet

BARR

FIELD LOG COVER SHEET
WATER SAMPLING

Client: **Project No.:**

Technician: **Sampling Period:**

Date	Temperature	Wind Speed	Wind Direction	Cloud Cover

Summary of Field Activities

Document1

BARR

Barr Engineering Company
Field Log Data Sheet

Client:				**Monitoring Point:**				
Location:				**Date:**				
Project #:				**Sample Time:**				
GENERAL DATA		**STABILIZATION TEST**						
Barr lock:		Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Casing diameter:								
Total well depth:*								
Static water level:*								
Water depth:*								
Well volume: (gal)								
Purge method:								
Sample method:								
Start time:		Odor:						
Stop time:		Purge Appearance:						
Duration: (minutes)		Sample Appearance:						
Rate, gpm:		Comments:						
Volume, purged:								
Duplicate collected?								
Sample collection by:		CO2- Mn2- Fe(T)- Fe2-						
Others present:								
WELL INSPECTION (answer for each category, state if lock replaced, detail any repairs needed on back of form)								
CASING & CAP: COLLAR: LOCK: OTHER:								
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:								
VOC- semi-volatile- general- nutrient- cyanide- DRO- Sulfide-								
oil,grease- bacteria- total metal- filtered metal- methane- filter-								
Others:								

*Measurements are referenced from top of riser pipe, unless otherwise indicated.

S:\DM\Templates\FieldLogDataSheet.doc

Attachment 6B
Field Log Data Sheet

Barr Engineering Company
Field Data Log Sheet
Soil Samples

Client:
Location:
Project #:
Project Name:

Sample Identification	Collection		Matrix			Type			Number of Containers/ Analysis																
	Date	Time	Soil	Sludge		Grab	Comp.	QC	2 oz. Pres.	2 oz. Unpres.	4 oz. Unpres.	8 oz. Unpres.	Moisture-plastic vial etc.	Other:	SVOC	PAH	VOC	WIGRO	WIDRO	PCB	RCRA Metals	Moisture	Other:	Other:
1.																								
2.																								
3.																								
4.																								
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20.																								

STANDARD OPERATING PROCEDURE

Soil Sample Collection

Revision 5

June 16, 2014

Approved By:

Dana Pasi		06/16/14
Print QA Manager(s)	Signature	Date
KEVIN McGILP		06/16/14
Print Field Technician(s)	Signature	Date

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Review of the SOP has been performed
and the SOP still reflects current practice.

Initials:		Date:	
Initials:		Date:	
Initials:		Date:	
Initials:		Date:	
Initials:		Date:	

Standard Operating Procedure for Soil Sample Collection

Purpose

To describe the collection of soil samples for volatiles, semivolatiles, metals, inorganics, bacteria, and dioxin analysis in soil.

Applicability

This procedure applies to the collection of soil samples by the sampling technician(s). It identifies each container type (volume, construction, preservative) required for each category of analyses, their corresponding holding times and collection procedures from a variety of sources.

Definitions

Holding Time. Period of time between sample collection and when the sample is analyzed.

Sample Preservation. The stability of analytes depends upon how well the samples are preserved.

Equipment

Sampler media
Pre-cleaned-certified Sampling Containers
Stainless Steel Spoons
Balance
Coolers
Ziploc® Baggy
Ice
Water-proof ink pen or pencil
Gloves
Alconox®
Chain of Custody Form
Sample Label
Custody Seal – if applicable
Field Sampling Report
Field Log Cover Sheet
Field Log Data Sheet

Responsibilities

The Field Operations/QA Officer or the environmental technician(s) will order the sample containers prior to the sampling event. The environmental technician(s) is responsible for the proper collection of soil samples, sample identification, quality control procedures, and documentation.

Procedure

Examples of samplers include split-barrel, split-barrel with brass liners, Geoprobe® sleeves, piston samplers, backhoe, or shovels may be used to retrieve soil from sampling locations. Depending upon the analyses to be conducted on the soil sample, the soil sample will either be sealed within the liner or sleeve or the soil sample will be transferred to a certified-laboratory-supplied container. The equipment required to transfer soil from the sampler to the sample container includes: stainless steel spoons, or scoops and the appropriate personal protective equipment necessary for collection and handling of soil. Volatile samples will be collected from representative areas of soil that were least disturbed first, then the remaining soil will be mixed and collected for the remaining analyses.

All soil sampling equipment will be carefully cleaned before and during soil sampling. All sampling tools including split-barrels, stainless steel spoons and scoops will be cleaned before use and between samples in the following manner: (1) clean with tap water and a phosphate–free detergent such as Alconox®, using a brush if necessary to remove particulate matter and films; (2) rinse three times with tap water; and (3) rinse three times with deionized water. To prevent sample cross-contamination, the sampler will discard the outer pair of sample gloves and put on a new pair between each sample event.

Collecting Volatile Organic Samples

Soil samples will be collected for analysis by either a drilling apparatus equipped with a split-barrel, core barrel sampler or by hand excavation. Volatile samples should be collected first. The soil selected for collection should be the most undisturbed sample possible.

It is important to note that there are different jar sizes and sampling media available for collecting a soil sample for volatile organic compounds (VOCs). The table below describes the sample volumes and preservation techniques for the most common sampling media.

Summary of Typical Sampling Media and Soil Volumes Used for Volatile Organic Compound Determination

VOC Sample Media	Preservative	Volume of Preservative (mL)	Volume of Sample (g)
2 oz. glass jar with PTFE-lined lid	MeOH, cool 4 °	10	10
	MeOH, cool 4 °	25	25
4 oz. glass jar with PTFE-lined lid	MeOH, cool 4 °	10	10
	MeOH, cool 4 °	25	25
Encore® Sampler			
5 gram device	Freeze or extrude into chemical preservative	Maintain a 1:1 ratio of soil to preservative if chemical preservation is used.	5
25 gram device	Freeze or extrude into chemical preservative	Maintain a 1:1 ratio of soil to preservative if chemical preservation is used.	25
Terracore® Kit			
1 MeOH and 2 water preserved glass vial	MeOH, cool 4 °	5	5
	Water Submersion, cool 4 °	5	5
1 MeOH and 2 sodium bisulfite preserved glass vials	MeOH, cool 4 °	5	5
	Sodium Bisulfite, cool 4 °	5	5

The following procedure applies to soil samples retrieved with a drilling apparatus equipped with a split-barrel sampler or core barrel with liners (skip to the next section if Encore® sampler or other coring device is used):

1. Open the split-barrel sampler.

2. Open a representative liner containing soil.

3. Using a stainless-steel spoon, weigh the desired aliquot (25 g. or 10 g.) of a representative soil sample on a field balance. Once a weight/volume estimate has been established, discard the soil and collect untouched soil, from the same source for step 4.

4. Using a stainless-steel spoon, place soil in a laboratory-provided-pre-weighed sample container containing methanol (avoid splashing the methanol).

5. Wipe the container lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

6. Cool the sample to approximately 4±2°C immediately after collection.

The following procedure applies to the collection of hand-excavated soil samples:

1. Dig to the desired sampling interval, exposing fresh soil surface to sample.

2. Collect a large sample on a shovel or in a bucket auger and bring it to the surface or collect the sample directly from the fresh soil surface.

3. Using a stainless-steel spoon, weigh the desired aliquot (25 g. or 10 g.) of a representative soil sample on a field balance. Once a weight/volume estimate has been established, discard the soil and collect untouched soil, from the same sample source for step 4.

4. Using a stainless-steel spoon, place the desired aliquot (25 g. or 10 g.) of soil in a pre-weighed-laboratory-provided sample container containing methanol (avoid splashing the methanol).

5. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

6. Cool the sample to 4±2°C immediately after collection

Collecting Volatile Organic Samples with the Encore® Sampler or other soil coring device

The following procedure applies to the collection of VOC samples of soil with the Encore® sampler device:

1. Hold the Encore® coring body and push plunger down until small o-ring rests against tabs to ensure the plunger moves freely.

2. Depress locking lever on T-Handle. Place coring body plunger end first into the open end of the T- Handle, aligning the slots on the coring body with the locking pins in the T-Handle. Twist coring body clockwise to lock pins in slots. Check to insure sampler is locked in place.

3. Turn T-handle with T-up and coring body down. This positions the plunger bottom flush with bottom of coring body. Using T-Handle, push sampler into soil until coring body is completely full. When full the small o-ring will be centered in the T-Handle viewing hole. Remove excess soil from the coring body exterior.

4. Cap the coring body while it is still on the T-Handle. Push and twist cap over bottom until grooves on locking arms seat over ridge on coring body. Remove from T-Handle, lock plunger by rotating extended plunger rod fully counterclockwise until wings rest firmly against tabs, and attach label.

5. Cool the sample to 4±2°C immediately after collection.

Collecting Semivolatile Organic, Wet Chemistry and Metals Samples– except WI DRO

Soil samples will be collected for analysis by either a drilling rig equipped with a Geoprobe® sleeve, split-barrel, core barrel sampler or by hand excavation.

Please review the SOP for Direct Push Soil and Groundwater Sample Collection when Geoprobe® sleeves are used.

The following procedure applies to soil samples retrieved with a drilling rig equipped with a split-barrel sampler or core barrel with brass liners:

1. Open the split-barrel sampler.

2. Select a representative brass liner filled completely with soil.

3. Wrap the ends of the brass liners with heavy-duty aluminum foil, taking care to not piece the foil. Tape the foil to the brass liner with duct tape to ensure a seal. Cover the ends of the liner with plastic caps or duct tape to fully protect the foil.

4. Cool the sample to 4±2°C immediately after collection.

The following procedure applies to the collection of hand-excavated soil samples or core barrel samples:

1. Dig to the desired sampling interval, exposing fresh soil surface to sample.

2. Collect a large sample on a shovel or in a bucket auger and bring it to the surface or collect the sample directly from the fresh soil surface.

3. Using a stainless-steel spoon homogenize the soil; pack the soil into the sample jars, leaving no headspace.

4. Wipe the container lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

5. Cool the sample to 4±2°C immediately after collection.

WI Diesel Range Organic (WIDRO) Samples

Soil samples will be collected for analysis by either a drilling apparatus equipped with a split-barrel, core barrel sampler or by hand excavation. Volatile samples should be collected first. The soil selected for collection should be the most undisturbed sample possible.

The following procedure applies to soil samples retrieved with a drilling apparatus equipped with a split-barrel sampler or core barrel with liners:

1. Open the split-barrel sampler.

2. Open a representative liner containing soil.

3. Using a stainless-steel spoon, weigh 25 to 35 grams of a representative soil sample on a field balance. For best data quality results, do not use less than 25 grams in a sample. Once a weight/volume estimate has been established, discard the soil and collect untouched soil, from the same source for step 4.

4. Using a stainless-steel spoon, place 25 to 35 grams of soil in a laboratory-provided-pre-weighed sample container. For best data quality results, do not use less than 25 grams in a sample.

5. Wipe the container lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

6. Cool the sample to 4±2°C immediately after collection.

The following procedure applies to the collection of hand-excavated soil samples:

1. Dig to the desired sampling interval, exposing fresh soil surface to sample.

2. Collect a large sample on a shovel or in a bucket auger and bring it to the surface or collect the sample directly from the fresh soil surface.

3. Using a stainless-steel spoon, weigh 25 to 35 grams of a representative soil sample on a field balance. For best data quality results, do not use less than 25 grams in a sample. Once a weight/volume estimate has been established, discard the soil and collect untouched soil, from the same sample source for step 4.

4. Using a stainless-steel spoon, place 25 to 35 grams of soil in a pre-weighed-laboratory-provided sample container. For best data quality results, do not use less than 25 grams in a sample.

5. Wipe the container lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

6. Cool the sample to 4±2°C immediately after collection

Collecting Soil Quality Control Samples

Trip blanks are only used when sampling for volatile organics. Their purpose is to determine if contamination has occurred as a result of improper sample container cleaning, sample contamination during storage and transport due to exposure to volatile organics, or other environmental conditions during sampling or analysis. Trip blank samples are prepared prior to the sampling events by the laboratory providing the sample containers. The certified-pre-weighed methanol (MeOH) containers will be free of contaminants. The trip blank samples are prepared by the lab, sealed, labeled appropriately by the lab, and transported to the field in the same containers as the sample containers. These blanks are not opened in the field. They are transferred to the cooler designated for volatile sample storage and transport and accompany the samples to the analytical laboratory.

Field (or Masked) duplicate samples will be collected to measure relative sampling precision. Five percent of all samples collected are collected in duplicate. These samples are collected at the same time using the same procedures, equipment, and types of containers as the required samples. They are also preserved in the same manner and are either co-located or split and submitted for the same analyses as the required samples.

Some general considerations will be taken into account when planning and conducting sampling operations. The sampler will take into consideration the required sample volume, sample holding times, sample handling, and special precautions for trace contaminant sampling.

The volume of the sample obtained should be sufficient to perform all required analyses with an additional amount collected to satisfy the needs for quality control, split samples, or repeat examinations. The QA Officer should be consulted for any specific volume requirements.

The elapsed time between sample collection and initiation of each laboratory analysis will fall within a prescribed time frame. Holding times for samples required by this project are prescribed by EPA: Title 40 of the Code of Federal Regulations.

After collection, all samples should be handled as few times as possible. Samplers should use extreme care to ensure that samples are not contaminated. If samples are placed in a cooler, samplers should ensure that melted ice cannot cause sample containers to become submerged, as this may result in cross-contamination. Plastic bags, such as Ziploc® bags, should be used when small sample containers are placed in coolers to prevent cross-contamination.

Some compounds can be detected in the parts per billion and/or parts per trillion range. Extreme care will be taken to prevent cross-contamination of these samples. A clean pair of new, disposable gloves will be worn for each sample location. Sample containers for source samples or samples suspected of containing high concentrations of contaminants are placed in separate plastic bags and coolers immediately after collecting, preserving and tagging. Sample collection activities will proceed progressively from the least contaminated area to the most contaminated area (when known).

Sample Storage

Immediately after samples are collected, they will be placed in a cooler containing bagged ice. Samples will be kept cold (approximately 4±2°C) until receipt at the laboratory, where they are to be stored in a refrigerated area. Custody seals may be present, but at minimum, the coolers must be taped shut with three straps of tape. All samples will be kept secured to prevent tampering. If sample coolers are left in a vehicle or field office for temporary storage, the area will be locked and secured. The coolers must be delivered to the laboratory via hand or overnight delivery courier in accordance with all Federal, State and Local shipping regulations.

Note: Samples may have to be stored indoors in winter to prevent freezing.

Disposal

All waste generated by this process will be disposed of in accordance with Federal, State and Local regulations. Where reasonably feasible, technological changes have been implemented to minimize the potential for environmental pollution.

Documentation

The technician(s) will document the soil sampling events in a project dedicated field logbook or on field log data sheets. They will also document the type and number of bottles the field log data sheets and chain-of-custody record. The analysis for each bottle and the laboratory used will be documented on the chain-of-custody record. The sampling request form will document which sampling containers are used for which soil samples.

Attachments

Attachment 1: Chain of Custody Form
Attachment 2: Sample Label
Attachment 3: Custody Seal – if applicable
Attachment 4: Field Log Data Sheet

Attachment 1
Chain of Custody Form

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number:

Project Name:

Sample Origination State __ __ (use two letter postal state abbreviation)

COC Number:

Number of Containers/Preservative

COC _____ of _____

Project Manager: _____

Project QC Contact: _____

Sampled by: _____

Laboratory: _____

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water:	Water:	Water:	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil:	Soil:	Soil:	Total Number Of Containers
1.																													
2.																													
3.																													
4.																													
5.																													
6.																													
7.																													
8.																													
9.																													
10.																													

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time

Samples Shipped VIA: ☐Air Freight ☐Federal Express ☐Sampler ☐Other: _____ Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

HRL GUSTOF CHMS\Chain Of Custody Form 2009 RLG Rev. 09/01/09

Attachment 2
Example - Sample label

Client _____

Project Number _____

Date: _____ Time _____

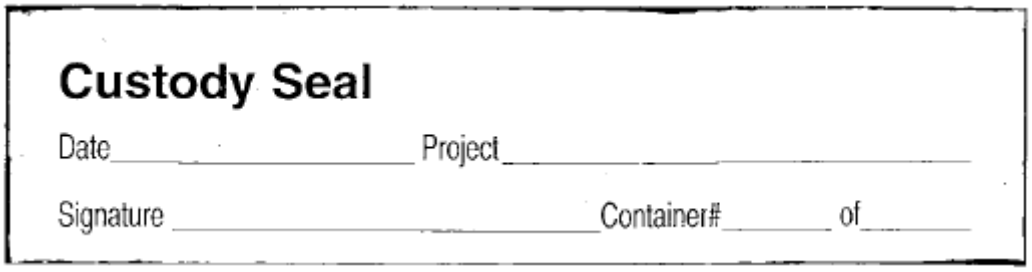
Preservative: _____

Sampled By: _____

Sample Location: _____

_____

Attachment 3
Custody Seal



Attachment 4
Field Log Data Sheet

Barr Engineering Company
Field Log Data Sheet
Soil Samples

Client:									Number of Containers/ Analysis																			
Location:																												
Project #:																												
Project Name:																												
Sample Identification	Collection		Matrix			Type			2 oz. Pres.	2 oz. Unpres.	4 oz. Unpres.	8 oz. Unpres.	Moisture-plastic vial etc.	Other:	SVOC	PAH	VOC	WIGRO	WIDRO	PCB	RCRA Metals	Moisture	Other:	Other:				
	Date	Time	Soil	Sludge		Grab	Comp.	QC																				
1.																												
2.																												
3.																												
4.																												
5.																												
6.																												
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19.																												
20.																												

STANDARD OPERATING PROCEDURE

Soil Sample Collection Tools Decontamination – Level I

Revision 3

March 23, 2010

Approved By:

Andrea Nord		3/23/10
Print QA Manager(s)	Signature	Date
KEVIN McGILP		3/23/10
Print Field Technician(s)	Signature	Date

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601 • www.barr.com

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO • Bismarck, ND • Calgary, AB, Canada

Annual Review of the SOP has been performed and the SOP still reflects current practice.

Initials:	JWJ	Date:	4-10-11
Initials:	PWS	Date:	2/23/12
Initials:	JWJ	Date:	2/21/13
Initials:		Date:	
Initials:		Date:	

Standard Operating Procedures for the Soil Sample Collection Tools Decontamination – Level I

Purpose

The purpose of this SOP is to describe the proper techniques for equipment decontamination to meet level I protocol.

Applicability

This SOP applies to any field technician who is collecting environmental samples or is otherwise tasked with decontaminating field equipment for level I decontamination protocol.

Equipment

Tap water
Alconox®
Brush
Deionized water or distilled water
Bucket
Gloves

Responsibilities

The environmental technician(s) and/or Equipment technician is responsible for the proper equipment decontamination; quality control procedures and documentation.

Discussion

A variety of samplers (split-barrel, split-barrel with brass liners, piston sampler, backhoe, hand-auger, or shovel) may be used to retrieve soil from sampling locations. The soil sample will either be sealed within the sampler (e.g., collecting volatile samples) or the soil sample will be transferred to laboratory-supplied containers depending on the analysis to be conducted on the soil sample. The equipment required to transfer the soil from the sampler to the laboratory-supplied sample containers includes: stainless-steel spoons or scoops and the appropriate personal protective equipment necessary for collection and handling of soil samples as described in the Project Health and Safety Plan.

Decontamination Procedures

All soil sampling equipment will be carefully cleaned before and during soil or sediment sampling. All sampling tools including split-barrels, stainless-steel spoons and scoops will be cleaned before use and between samples in the following manner:

1. Clean in a tap water and Alconox® solution, using a brush if necessary to remove particulate matter and films.

2. Rinse three times with tap water.

3. Rinse three times with deionized or distilled water.

4. Inspect equipment and repeat procedure if any residual soil or visible contaminants are present.

Disposal

All waste generated by this process will be disposed of in accordance with Federal, State and Local regulations. Where reasonably feasible, technological changes have been implemented to minimize the potential for environmental pollution.

Documentation

The environmental and/or equipment technician is responsible for the proper decontamination of the equipment and the proper documentation in the Field Sampling Report and/or Field Log book.

Attachments

Attachment 1: Field Sampling Report

Attachment 1
Field Sampling Report

BARR

FIELD SAMPLING REPORT

Date:

Project:

Contact:

Barr Engineering Company
4700 W. 77th Street
Minneapolis, MN 55435-4803

Field Sampling

Field Report

Attachments:

-
-
-
-
-
-
-

Laboratory Analysis Status

_____
<Name inserts here>
Environmental Technician

Document1

Superior Terminal Response
Superior, WI

FB25 Release Response
Waste Treatment, Transportation and Disposal Plan

August 19, 2014

Enbridge Energy, Limited Partnership

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FIGURES

Figure 1 Field Booster 25 Site Location- Superior Terminal

Figure 2 Hazardous Waste Route Map - Superior Terminal to WLSSD

Figure 3 Hazardous Waste Route Map - Superior Terminal to Shamrock Landfill

APPENDIX

Appendix A MSDS for Crude Oil

1.0 Introduction

On Monday, August 18, 2014, the release of an unspecified volume of crude oil occurred at Enbridge's Field Booster 25 (FB25) at the Superior Terminal. The release was identified when oil sheen was noticed on water in a drainage ditch near the release. The oil reached a ditch that flowed north to a containment pond, west through a ditch to another containment pond. An oil sheen was observed on the surface of the two ponds. The second pond drains southwest through a ditch/creek to the Nemadji River. There was no sheen observed on this ditch/creek or on the Nemadji River. The cause of the release is currently under investigation. Enbridge crews along with emergency response personnel were dispatched to the Site to contain the release and to minimize environmental impacts.

The purpose of the Waste Treatment and Transportation Plan (WTTP) is to describe procedures for complying with Federal, State and County waste laws and regulations, to prevent and minimize risk to human health and environment associated with managing petroleum contaminated media, and to provide a beneficial reuse of the material where feasible.

1.1 Type and Quantity of Waste

The released petroleum product is unrefined crude oil. The Material Safety Data Sheet (MSDS) for the product is attached in **Appendix A**. The release impacted soil, water and vegetation. At this time, final quantities of each impacted media have not been determined.

1.2 Oil Reclamation

Recovered crude oil will be transported by truck. The quality of the oil will be evaluated. If the oil quality is acceptable, the recovered product will be shipped by pipeline to a refinery for processing from the Superior Terminal. If the oil quality is not acceptable, other options for oil processing and recycling will be evaluated. Recovered crude oil managed as a product for recovery requires no waste profiling.

2.0 Waste Management

Impacted media requiring treatment and disposal will likely include soil and industrial waste generated as a result of recovery efforts. Enbridge will contract with a number of waste disposal companies for this response with the capabilities to treat, transport, and dispose of many types of impacted media. Following is a summary of potential waste management practices for each impacted media currently expected to be generated at the site.

2.1 Soil Treatment and Disposal

Enbridge has identified several options for the treatment and disposal of impacted soil from the site. Other disposal facilities and treatment technologies may be utilized as identified by Enbridge. Impacted soil will be generated from source-area excavation and adjacent area cleanup activities. Impacted soil will be analyzed in accordance with the Soil Clean-Up Confirmation Plan. All samples of oil impacted soils to date have been found to be nonhazardous.

Impacted soil removed from the source area and adjacent areas will be solidified as necessary prior to transportation. The impacted soil will be directly sent to disposal. Any free fluids not contained through the mixing and solidification process will be absorbed with solidification materials. If this method proves to not be effective, other suitable sorbent materials and/or BMPs will be utilized as necessary to solidify soils and manage free fluids. Visual inspection will be performed on the stockpiled materials to ensure that wastes placed into trucks or roll-off boxes passes the paint filter test.

Though not expected, if soil requires solidification for disposal or transportation, one or more of the following materials will be mixed with the soil:

- Fly ash,
- Wood chips,
- Native soils, or
- Other similar materials.

Soil that is determined to be hazardous will be stabilized as necessary, based on the results of analytical sampling and will be segregated from non-hazardous waste soils. Disposal options available for impacted soil include: landfilling or bioremediation of non-hazardous soils and landfilling or incineration for hazardous soils.

Enbridge is currently investigating potential waste vendors for the disposal of hazardous soils.

2.2 Industrial Waste

Industrial waste being generated at the site includes booms, sorbent pads, rags, tools, and personal protective equipment (PPE). Industrial waste will be placed into lined dumpsters in preparation for disposal. Several waste vendors are being identified for disposal of industrial waste. Options for disposal include landfilling or incineration.

Representative composite samples of industrial waste materials will be collected and analyzed in accordance with the project Sampling and Analysis Plan prior to transportation and disposal. Analytical results will be used to characterize clean-up materials for appropriate disposal as either hazardous or non-hazardous industrial waste. Analytical results of initial samples from dumpsters are pending.

2.3 Wastewater

Wastewater collected from the ditches, ponds, and river will be stored in tanker trucks or frac tanks. Recoverable product will be removed and reclaimed, as discussed in 1.2. The remaining water will be sampled and evaluated. Based on the analytical results, the water will be disposed of at a local POTW, or as hazardous waste through Chief Industrial Services, Winneconne, WI.

2.4 Transportation

Trucks hauling non-hazardous soil from the site will travel to Shamrock Landfill, located in Cloquet, Minnesota along the route depicted in **Figure 3**. Trucks hauling non-hazardous wastewater will travel to WLSSD, located in Duluth Minnesota along the route depicted in **Figure 2**. To prevent overloading of trucks, loading operations will be supervised by Enbridge representatives. In accordance with the Soil Clean-up Confirmation Plan, samples will be collected at a determined frequency to monitor the waste's characteristics.

Trucks used for the transportation of impacted soil will have a lined tailgate, and all loads will be covered. All loads will be placarded in accordance with U.S. Department of Transportation (U.S. DOT) requirements and all other applicable State requirements. All transporters will satisfy the U.S. DOT requirements for transporting hazardous materials under 49 CFR 172 by carrying a hazardous materials license.

Enbridge will manage the distribution of all transportation paperwork. A uniform hazardous waste manifest will be used for transportation of hazardous wastes. At this time, it is anticipated that bill of ladings will be used for the transportation of recovered crude oil. Copies of transportation and disposal forms will be distributed to the appropriate agencies within the required timeframes.

Figures

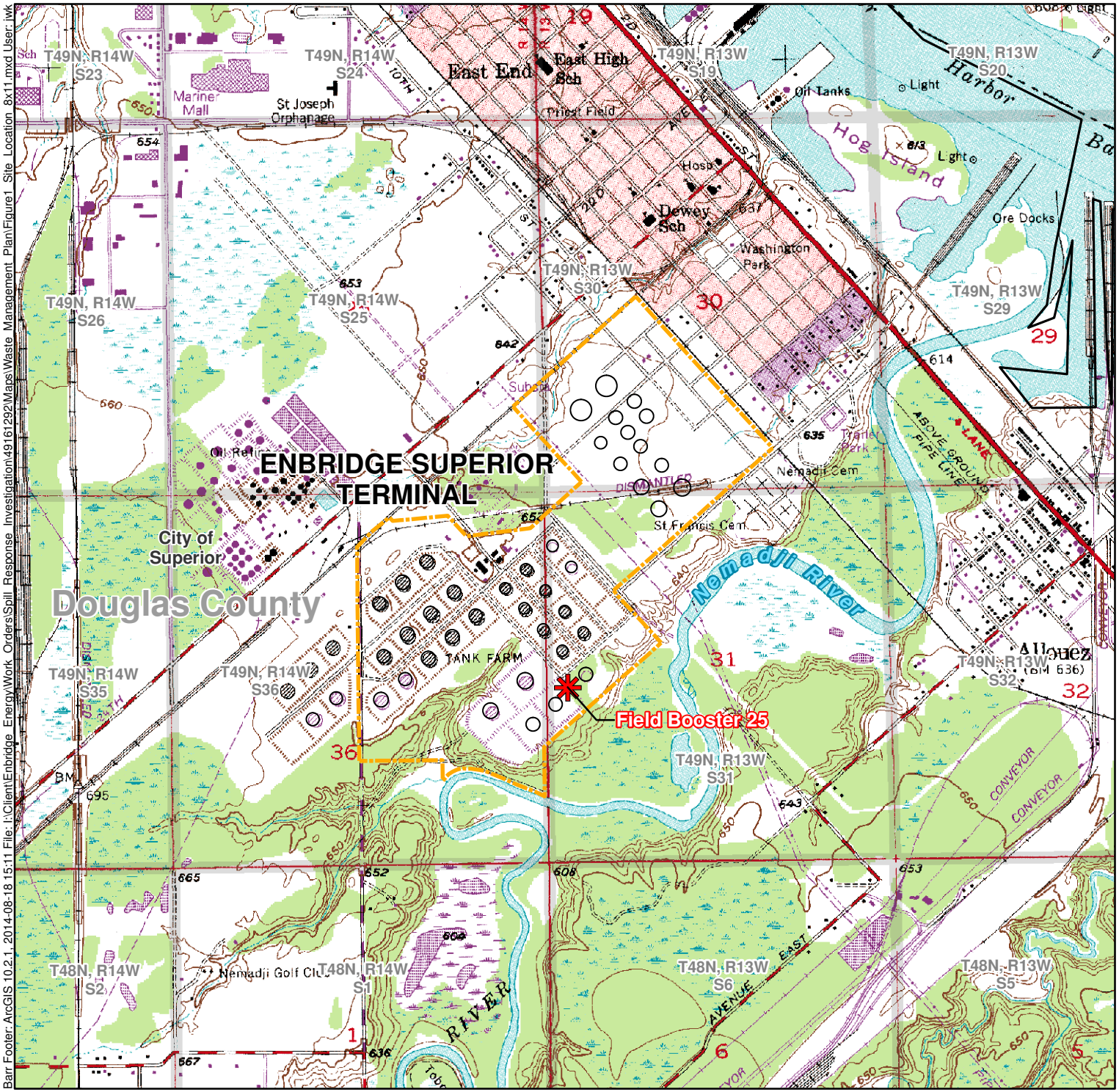


Figure 1

FIELD BOOSTER 25
SITE LOCATION
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

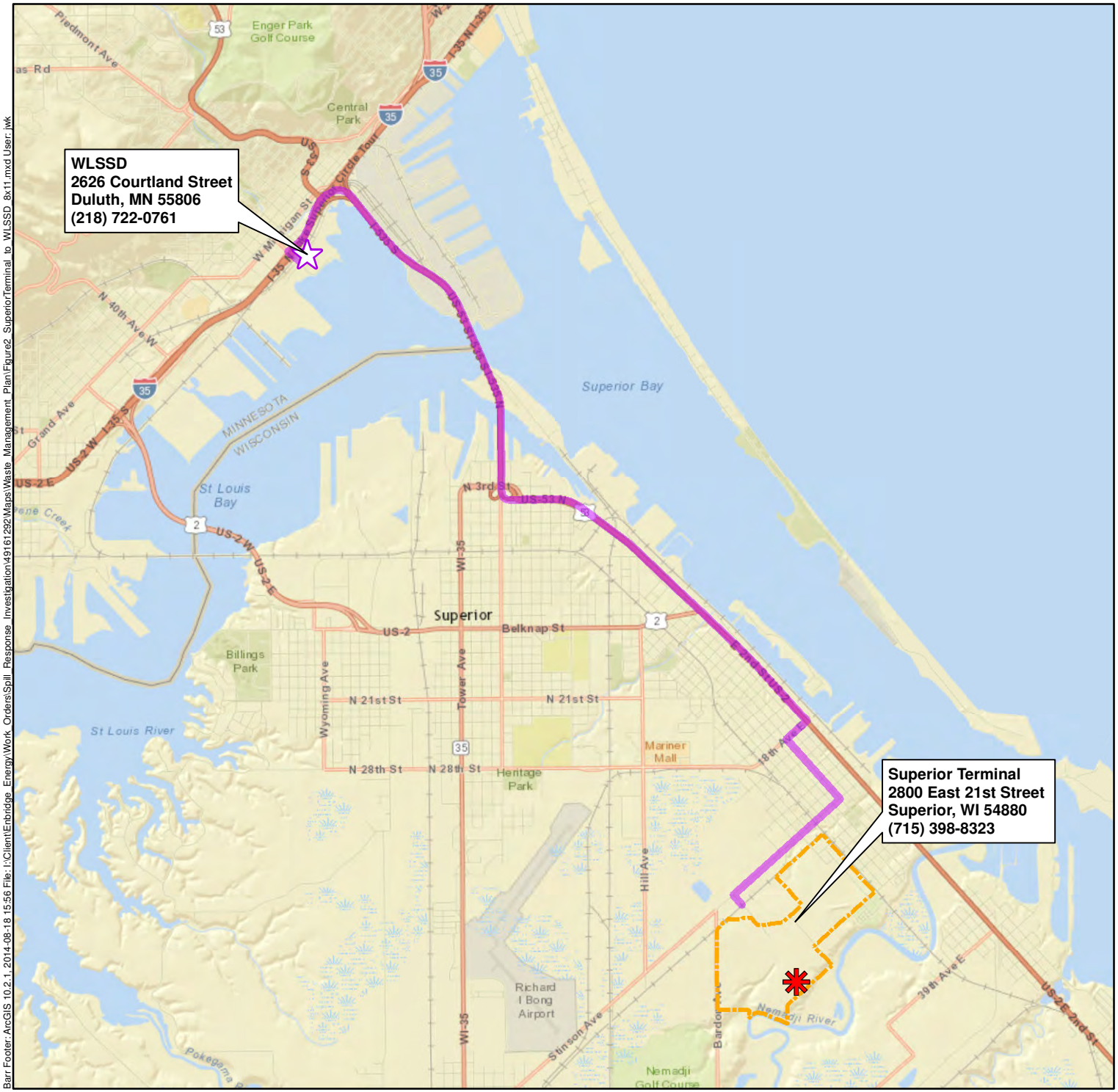
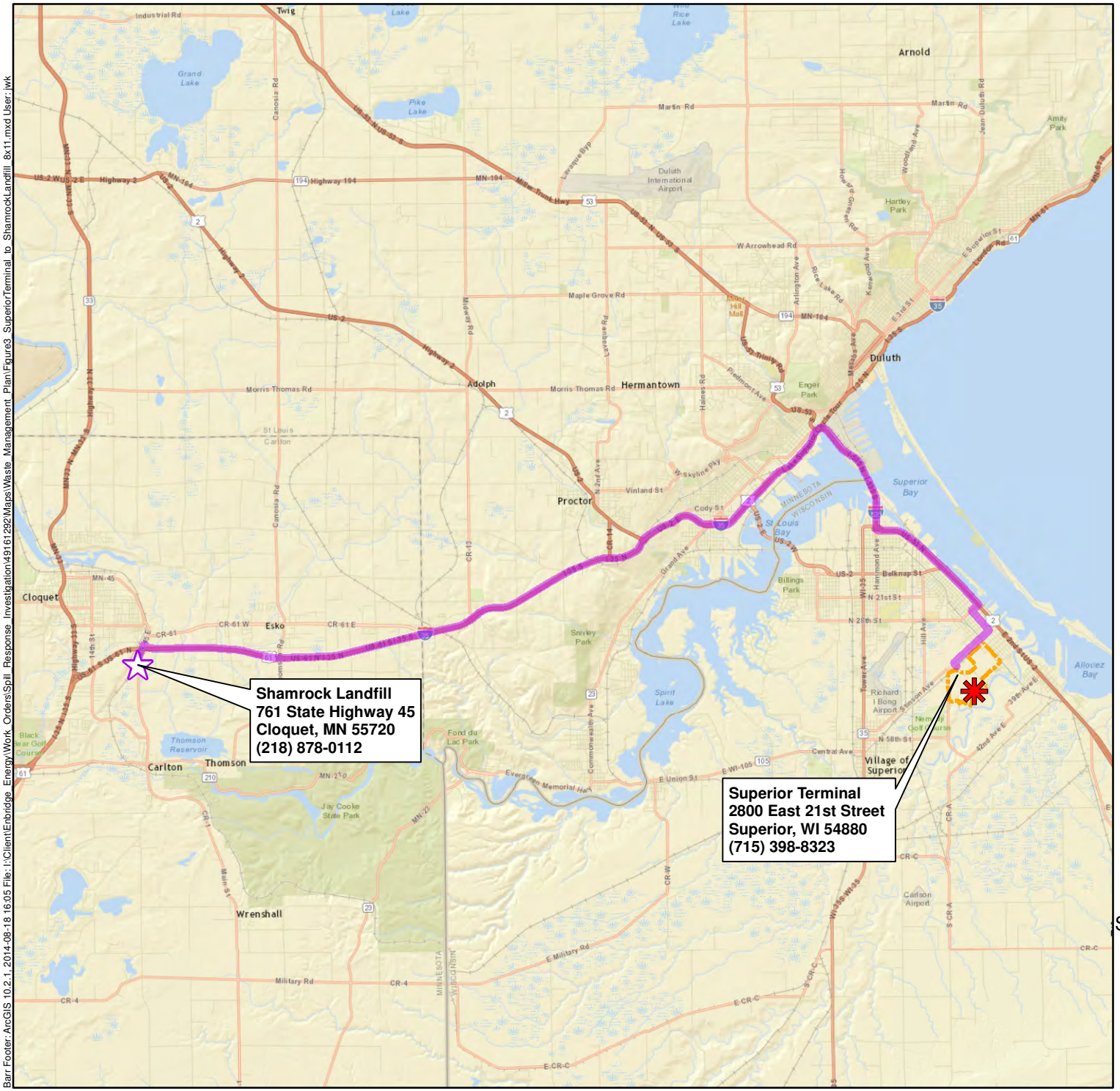


Figure 2

HAZARDOUS WASTE ROUTE MAP
Superior Terminal to WLSSD
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE



Release Location

Terminal Property Boundary

Shamrock Facility

Route from Superior Terminal to Shamrock Landfill (24.00 Miles)

N

0 3 6

Miles

1 Inch = 3 Miles

Figure 3

HAZARDOUS WASTE ROUTE MAP
Superior Terminal to Shamrock Landfill
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

ENBRIDGE ENERGY, LIMITED PARTNERSHIP

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at

2800 EAST 21ST STREET, SUPERIOR, WISCONSIN

to

THE NEMADJI RIVER AND GROUNDWATER WITHIN THE ST. LOUIS AND LOWER NEMADJI RIVERS WATERSHED IN THE LAKE SUPERIOR DRAINAGE BASIN IN DOUGLAS COUNTY

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Nancy Larson
Lake Superior Watershed Program Supervisor

_____
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - October 01, 2009 **EXPIRATION DATE - September 30, 2014**

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1 In-Plant Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
104	Samples shall be collected from various locations around the South Fire Pond to obtain representative results.

1.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

1.2.1 Sampling Point 104 - SOUTH FIRE POND

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
pH Field		su	Annual	Grab	
Oil & Grease (Hexane)		mg/L	Annual	Grab Comp	
Suspended Solids, Total		mg/L	Annual	Grab	
BETX, Total		µg/L	Annual	Grab	
Benzene		µg/L	Annual	Grab	

1.2.1.1 Monitoring of the South Fire Pond

Monitoring of the South Fire Pond shall be annual beginning January 1, 2010. The following are acceptable discharges to the Fire Pond: natural precipitation and stormwater; tank hydrostatic pressure test water; pipeline hydrostatic pressure test water; and prover calibration test water. Test water(s) shall be sampled by the facility in accordance with approved test water protocols prior to discharge to the Fire Pond. Test water with high contaminant levels may be directed through a mobile carbon-filtration treatment unit or a permitted wastewater treatment facility. All discharges to the pond shall meet the limitations of Outfall 001.

2 Surface Water Requirements

2.1 Sampling Point(s)

The discharge(s) shall be limited to the waste type(s) designated for the listed sampling point(s).

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	The permittee is authorized to discharge from the south fire pond Outfall 001. Representative samples shall be collected from the effluent sampling station that draws samples from the drainage ditch immediately downstream of the south fire pond before flowing into the ditch and to the wetland adjacent to the Nemadji River.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT AFTER FIRE POND

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Total Daily	
Suspended Solids, Total	Daily Max	30 mg/L	Weekly	Grab	
pH Field	Daily Max	9.0 su	Weekly	Grab	
pH Field	Daily Min	6.0 su	Weekly	Grab	
Dissolved Oxygen	Daily Min	5.0 mg/L	Weekly	Grab	The limit is in effect for the months of January, February, March, June, and July annually.
Dissolved Oxygen	Daily Min	7.0 mg/L	Weekly	Grab	The limit is in effect for the months of April, May, August, September, October, November and December annually.
Oil & Grease (Hexane)	Daily Max	15 mg/L	Weekly	Grab	
Oil & Grease (Hexane)	Weekly Avg	10 mg/L	Weekly	Grab	
BETX, Total	Daily Max	750 µg/L	Weekly	Grab	
Benzene	Monthly Avg	50 µg/L	Weekly	Grab	
PAHs	Monthly Avg	0.1 µg/L	Weekly	Grab	
BOD_5, Total		mg/L	Weekly	Grab	
Nitrogen, Ammonia (NH_3-N) Total		mg/L	Annual	Grab	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Acute WET		TU_a	Annual	Grab	One Acute WET test shall be conducted on the effluent during the first discharge event. Only one test is required during the term of this permit.

2.2.1.1 Authorized Discharges to the South Fire Pond

In addition to storm water, the permittee may direct the following to the south fire pond: hydrostatic test water from tanks and pipelines; and calibration test water from the prover.

2.2.1.2 Notification of Anticipated Discharge

Submittal of the discharge monitoring report (DMR) form is not required until a discharge occurs from the fire pond. The permittee shall contact the Department prior to any anticipated discharge to request a DMR form.

2.2.1.3 Notification of Tank Cleaning Procedure Changes

Any change to the current written procedure for cleaning storage tanks shall be submitted, in writing, to the Department for approval prior to initiation of the change. Automatic approval of the procedure changes shall be given, unless the Department comments within 60 days of receiving notification of the change.

2.2.1.4 Annual Reporting

Currently, residual product from tank cleaning is injected back into the Enbridge system. In the event that this disposal regime changes, the following reports shall be required:

1. **A report on Residual Product Disposal shall be submitted by January 31st, annually.** In the event that treated residual product is not injected back into the Enbridge system or is not discharged to surface waters under this permit, the permittee shall submit a written report to the Department along with a summary indicating the annual volume of residual product removed from the facility and how the facility is presently handling and disposing of residual product.
2. **A summary of each year's waste removal and disposal from the treatment system shall be submitted by January 31st, annually.** Residual product and solids removed from the treatment systems shall be disposed of at a site or operation licensed by the Department under chs. NR 500 to 522, Wis. Adm. Code (solid waste regulations), or chs.NR 600 to 685, Wis. Adm. Code (hazardous waste regulations). The following documentation shall be maintained on site regarding the removal and disposal of these wastes: (a) the amount removed, (b) date of removal, (c) person or company who hauled the waste, and (d) disposal site for the waste.

2.2.1.5 Analysis Methods

The following test methods shall be used unless and alternative, equivalent method is approved by a letter from the Department. EPA methods 602, 624, 8020, 8021, 8240, or 8260 shall be used for determination of aromatic volatile organics such as: benzene, ethylbenzene, toluene and total xylenes. EPA method 610 or 8310 (HPLC) or SW method 846 or 8270B shall be used for the determination of polynuclear aromatic hydrocarbons. EPA method 413.1 or 1664 (Standard Methods 17 edition, 2530 C) shall be used for determination of oil and grease. EPA Method 160.2 (Standard Methods 209 C) shall be used for determination of total suspended solids.

2.2.1.6 BETX

Demonstrate compliance with the BETX effluent limit by reporting the total sum of benzene, ethylbenzene, toluene and total xylenes concentrations of less than or equal to 750 ug/L.

2.2.1.7 Polynuclear Aromatic Hydrocarbons (PAH)

Compliance with the monthly average PAH limit of 0.1 ug/L may be demonstrated by using EPA method 610 or 8310 HPLC or SW method 846 or 8270B, reporting no detect of any of the following 11 PAH compounds, or by reporting a sum of the detected amounts of the following compounds of less than 0.1 ug/L: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene.

2.2.1.8 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Nemadji River

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.

WET Testing Frequency: One acute WET test is required during the permit term. It shall be conducted on the effluent from Outfall 001 during the first discharge event. If a discharge event during the permit term does not occur a WET test is not required. Refer to the WET Testing Compliance Schedule section 4.1 for additional reporting requirements.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Watershed Management, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The original Discharge Monitoring Report (DMR) form and one copy shall be sent to the contact and location provided on the DMR by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: If $LC_{50} \geq 100$, then $TU_a = 1.0$. If LC_{50} is < 100, then $TU_a = 100 \div LC_{50}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

3 Land Treatment Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to the waste type(s) designated for the listed sampling point(s).

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, Waste Description/Sample Contents and Treatment Description (as applicable)**
003	This outfall is limited to on-site pit/trench dewatering events.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 003 – PIT/TRENCH DEWATERING

Daily Log – Monitoring Requirements and Limitations

All discharge and monitoring activity shall be documented on log sheets. Originals of the log sheets shall be kept by the permittee as described under "Records Retention" in the Standard Requirements section. A copy of the log for the calendar year shall accompany the annual Discharge Monitoring Report submitted to the Department.

Parameters	Limit	Units	Sample Frequency	Sample Type
Flow Rate		gpd	Daily	Estimated
Start to End Time		Date, Hour	Daily	Log

3.2.1.1 Authorized Dewatering Discharges

All pit/trench discharges taking place on the terminal property shall be directed to upland locations within the property boundary. The upland locations shall be chosen for accessibility, distance from surface waters including wetlands, and surrounding vegetative cover. All discharged water will be contained on-site by constructed disposal best management practices (BMPs) so that no discharged water reaches surface waters. All constructed BMPs shall have sufficient capacity to contain all wastewater discharges and any precipitation resulting from a 10-year, 24-hour storm event which falls within or flows into the area of disposal or receiving area. The discharge of wastewater from the site shall not cause the erosion of soils in the receiving area. Approval must be obtained from the Lake Superior Basin Engineer prior to any pit/trench discharge event that can not meet the afore mentioned requirements.

3.2.1.2 Oil and Grease

All residual petroleum sheen will be removed from the water prior to discharge to groundwater. Any discharge of oil and grease above 15 mg/L or evident by an oil sheen or oil film on the surface of the water is prohibited.

4 Schedules of Compliance

4.1 WET Testing Compliance Schedule

One Acute WET test is required during the permit term during the first discharge event from Outfall 001. If a discharge does not occur, a WET test is not required.

Required Action	Date Due
WET Testing Status Report: An annual status report is required to be submitted by January 31, for the previous calendar year. This report shall identify any WET test taken during the past year. If no WET tests were conducted, this report shall identify the reason(s). Once a WET test has been conducted, annual status reports are no longer required.	01/31/2010
WET Testing Status Report: An annual status report is required to be submitted by January 31, for the previous calendar year. This report shall identify any WET test taken during the past year. If no WET tests were conducted, this report shall identify the reason(s). Once a WET test has been conducted, annual status reports are no longer required.	01/31/2011
WET Testing Status Report: An annual status report is required to be submitted by January 31, for the previous calendar year. This report shall identify any WET test taken during the past year. If no WET tests were conducted, this report shall identify the reason(s). Once a WET test has been conducted, annual status reports are no longer required.	01/31/2012
WET Testing Status Report: An annual status report is required to be submitted by January 31, for the previous calendar year. This report shall identify any WET test taken during the past year. If no WET tests were conducted, this report shall identify the reason(s). Once a WET test has been conducted, annual status reports are no longer required.	01/31/2013
WET Testing Status Report: An annual status report is required to be submitted by January 31, for the previous calendar year. This report shall identify any WET test taken during the past year. If no WET tests were conducted, this report shall identify the reason(s). Once a WET test has been conducted, annual status reports are no longer required.	01/31/2014

5 Standard Requirements

NR 205, Wisconsin Administrative Code (Conditions for Industrial Dischargers): The conditions in ss. NR 205.07(1) and NR 205.07(3), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(3).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. When submitting a paper Discharge Monitoring Report form, the original and one copy of the Wastewater Discharge Monitoring Report Form shall be submitted to the return address printed on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

All Wastewater Discharge Monitoring Reports submitted to the Department should be submitted using the electronic Discharge Monitoring Report system. Permittees who may be unable to submit Wastewater Discharge Monitoring Reports electronically may request approval to submit paper DMRs upon demonstration that electronic reporting is not feasible or practicable.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

An Electronic Discharge Monitoring Report Certification sheet shall be signed and submitted with each electronic Discharge Monitoring Report submittal. This certification sheet, which is not part of the electronic report form, shall be signed by a principal executive officer, a ranking elected official or other duly authorized representative and shall be mailed to the Department at the time of submittal of the electronic Discharge Monitoring Report. The certification sheet certifies that the electronic report form is true, accurate and complete. Paper reports shall be signed by a principal executive officer, a ranking elected official, or other duly authorized representative.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application, except for sludge management forms and records, which shall be kept for a period of at least 5 years.

5.1.6 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.2 System Operating Requirements

5.2.1 Noncompliance Notification

- The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance;
  - any noncompliance which may endanger health or the environment;
  - any violation of an effluent limitation resulting from an unanticipated bypass;
  - any violation of an effluent limitation resulting from an upset; and
  - any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit.

- A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the

Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

- The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at **1-800-943-0003**.

5.2.2 Unscheduled Bypassing

Any unscheduled bypass or overflow of wastewater at the treatment works or from the collection system is prohibited, and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats., unless:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- The permittee notified the Department as required in this Section.

Whenever there is an unscheduled bypass or overflow occurrence at the treatment works or from the collection system, the permittee shall notify the Department within 24 hours of initiation of the bypass or overflow occurrence by telephoning the wastewater staff in the regional office as soon as reasonably possible (FAX, email or voice mail, if staff are unavailable).

In addition, the permittee shall within 5 days of conclusion of the bypass or overflow occurrence report the following information to the Department in writing:

- Reason the bypass or overflow occurred, or explanation of other contributing circumstances that resulted in the overflow event. If the overflow or bypass is associated with wet weather, provide data on the amount and duration of the rainfall or snow melt for each separate event.
- Date the bypass or overflow occurred.
- Location where the bypass or overflow occurred.
- Duration of the bypass or overflow and estimated wastewater volume discharged.
- Steps taken or the proposed corrective action planned to prevent similar future occurrences.
- Any other information the permittee believes is relevant.

5.2.3 Scheduled Bypassing

Any construction or normal maintenance which results in a bypass of wastewater from a treatment system is prohibited unless authorized by the Department in writing. If the Department determines that there is significant

public interest in the proposed action, the Department may schedule a public hearing or notice a proposal to approve the bypass. Each request shall specify the following minimum information:

- proposed date of bypass;
- estimated duration of the bypass;
- estimated volume of the bypass;
- alternatives to bypassing; and
- measures to mitigate environmental harm caused by the bypass.

5.2.4 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2), Wis. Adm. Code. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.5 Spill Reporting

The permittee shall notify the Department in accordance with ch. NR 706 (formerly NR 158), Wis. Adm. Code, in the event that a spill or accidental release of any material or substance results in the discharge of pollutants to the waters of the state at a rate or concentration greater than the effluent limitations established in this permit, or the spill or accidental release of the material is unregulated in this permit, unless the spill or release of pollutants has been reported to the Department in accordance with s. NR 205.07 (1)(s), Wis. Adm. Code.

5.2.6 Planned Changes

In accordance with ss. 283.31(4)(b) and 283.59, Stats., the permittee shall report to the Department any facility expansion, production increase or process modifications which will result in new, different or increased discharges of pollutants. The report shall either be a new permit application, or if the new discharge will not violate the effluent limitations of this permit, a written notice of the new, different or increased discharge. The notice shall contain a description of the new activities, an estimate of the new, different or increased discharge of pollutants and a description of the effect of the new or increased discharge on existing waste treatment facilities. Following receipt of this report, the Department may modify this permit to specify and limit any pollutants not previously regulated in the permit.

5.2.7 Duty to Halt or Reduce Activity

Upon failure or impairment of treatment facility operation, the permittee shall, to the extent necessary to maintain compliance with its permit, curtail production or wastewater discharges or both until the treatment facility operations are restored or an alternative method of treatment is provided.

5.3 Surface Water Requirements

5.3.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall

be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.3.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average limits and mass limits:

Weekly/Monthly average concentration = the sum of all daily results for that week/month, divided by the number of results during that time period.

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

5.3.3 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.3.4 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.3.5 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Watershed Management, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
WET Testing Compliance Schedule -WET Testing Status Report	January 31, 2010	6
WET Testing Compliance Schedule -WET Testing Status Report	January 31, 2011	6
WET Testing Compliance Schedule -WET Testing Status Report	January 31, 2012	6
WET Testing Compliance Schedule -WET Testing Status Report	January 31, 2013	6
WET Testing Compliance Schedule -WET Testing Status Report	January 31, 2014	6
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	7

Report forms shall be submitted to the address printed on the report form. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Watershed Management, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
Northern Region - Spooner, 810 W. Maple Street, Spooner, WI 54801-1255

Chapter NR 105

SURFACE WATER QUALITY CRITERIA AND SECONDARY VALUES FOR TOXIC SUBSTANCES

NR 105.01 Purpose.
NR 105.02 Applicability.
NR 105.03 Definitions.
NR 105.04 Determination of adverse effects.
NR 105.05 Acute toxicity criteria and secondary acute values for aquatic life.
NR 105.06 Chronic toxicity criteria and secondary chronic values for fish and aquatic life.
NR 105.07 Wildlife criteria.
NR 105.08 Human threshold criteria.
NR 105.09 Human cancer criteria.
NR 105.10 Bioaccumulation factor.
NR 105.11 Final plant values.

NR 105.01 Purpose. The purpose of this chapter is to establish water quality criteria, and methods for developing criteria and secondary values for toxic substances to protect public health and welfare, the present and prospective use of all surface waters for public and private water supplies, and the propagation of fish and aquatic life and wildlife. This chapter also establishes how bioaccumulation factors used in deriving water quality criteria and secondary values for toxic and organoleptic substances shall be determined. Water quality criteria are a component of surface water quality standards. This chapter and chs. NR 102 to 104 constitute quality standards for the surface waters of Wisconsin.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.; am. Register, August, 1997, No. 500, eff. 9−1−97.

NR 105.02 Applicability. The provisions of this chapter are applicable to surface waters of Wisconsin as specified in chs. NR 102 to 104 and in this chapter.

(1) SITE SPECIFIC CRITERIA AND SECONDARY VALUES. A criterion contained within this chapter or a secondary value calculated pursuant to this chapter may be modified for a particular surface water segment or body. A criterion or secondary value may be modified if specific information is provided which shows that the data used to derive the criterion or secondary value do not apply and if additional information is provided to derive a site−specific criterion or secondary value. Site−specific criteria are intended to be applicable to a specific surface water segment. Criteria may be modified for site−specific considerations according to the USEPA "Water Quality Standards Handbook" Second Edition, revised 1994. Any criterion modified for site−specific conditions shall be promulgated in ch. NR 104 before it can be applied on a site−specific basis. Site−specific modifications of criteria and secondary values shall be consistent with the procedures described in 40 CFR Part 132, Appendix F, Procedure 1: Site−specific modifications to criteria and values. 40 CFR Part 132, Appendix F, Procedure 1 as stated on September 1, 1997 is incorporated by reference.

Note: Copies of 40 CFR Part 132 Appendix F, Proc. 1 are available for inspection in the offices of the department of natural resources, secretary of state and the legislative reference bureau, Madison, WI or may be purchased from the superintendent of documents, US government printing office, Washington, D.C. 20402.

(2) STATEWIDE CRITERIA. (a) The department may promulgate a less stringent criterion or remove a criterion from this chapter when the department determines that the previously promulgated criterion is more stringent than necessary, or unnecessary for the protection of humans, fish and other aquatic life or wildlife. The modification shall assure that the designated uses are protected and water quality standards continue to be attained.

(b) The department may promulgate a more stringent criterion in this chapter when the department determines that the previously promulgated criterion is inadequate for the protection of humans, fish and other aquatic life or wildlife.

(3) DETERMINATION OF SECONDARY VALUES FOR EFFLUENT LIMITATIONS. If a discharge contains a toxic substance, and if data to calculate a water quality criterion for that substance are not available, then, on a case−by−case basis, the department may calculate a secondary value as defined in this chapter and establish an effluent limitation for the toxic substance if the conditions contained in s. NR 106.05 (1) (b) are met.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. (1) and (2), cr. (3), Register, August, 1997, No. 500, eff. 9−1−97.

NR 105.03 Definitions. (1) "Acute toxicity" means the ability of a substance to cause mortality or an adverse effect in an organism which results from a single or short−term exposure to the substance.

(2) "Acute toxicity criterion" or "ATC" means the maximum daily concentration of a substance which ensures adequate protection of sensitive species of aquatic life from the acute toxicity of that substance and will adequately protect the designated fish and aquatic life use of the surface water if not exceeded more than once every 3 years. If the available data indicate that one or more life stages of a particular species are more sensitive to a substance than other life stages of the same species, the ATC shall represent the acute toxicity of the most sensitive life stage.

(3) "Adequate protection" means a level of protection which ensures survival of a sufficient number of healthy individuals in a population of aquatic species to provide for the continuation of an unreduced population of these species.

(4) "Adverse effect" means any effect resulting in a functional impairment or a pathological lesion, or both, which may affect the performance of the whole organism, or which contributes to a reduced ability to respond to an additional challenge. Adverse effects include toxicant−induced mutagenic, teratogenic, or carcinogenic effects or impaired, developmental, immunological or reproductive effects.

(5) "Baseline BAF" means for organic chemicals, a bioaccumulation factor normalized to 100% lipid that is based on the concentration of a freely dissolved chemical in the ambient water and takes into account the partitioning of the chemical within the organism. For inorganic chemicals, a bioaccumulation factor is based on the wet weight of the tissue.

(6) "Baseline BCF" means for organic chemicals, a bioconcentration factor normalized to 100% lipid that is based on the concentration of freely dissolved chemical in the ambient water and takes into account the partitioning of the chemical within the organism. For inorganic chemicals, a bioconcentration factor is based on the wet weight of the tissue.

(7) "Bioaccumulation" means the net accumulation of a substance by an organism as a result of uptake from all environmental sources.

(8) "Bioaccumulation factor" or "BAF" means the ratio (in L/kg) of a substance's concentration in the tissue of an aquatic organism to its concentration in the ambient water, in situations where both the organism and its food are exposed to the substance and where the ratio does not change substantially over time.

(9) "Bioaccumulative chemical of concern" or "BCC" means any substance that has the potential to cause adverse effects which, upon entering the surface waters, accumulates in aquatic organisms by a human health or wildlife bioaccumulation factor greater than 1000.

(10) "Bioconcentration" means the net accumulation of a substance by an aquatic organism as a result of uptake directly from the ambient water through its gill membranes or other external body surfaces.

(11) "Bioconcentration factor" or "BCF" means the ratio (in L/kg) of a substance's concentration in the tissue of an aquatic organism to its concentration in the ambient water, in situations where the organism is exposed through the water only and where the ratio does not change substantially over time.

(12) "Biota−sediment accumulation factor" or "BSAF" means the ratio (in kg of organic carbon/kg of lipid) of a substance's lipid−normalized concentration in the tissue of an aquatic organism to its organic carbon−normalized concentration in surface sediment, in situations where the ratio does not change substantially over time, both the organism and its food are exposed, and where the surface sediment is representative of the average surface sediment in the vicinity of the organism.

(13) "Carcinogen" means any substance listed in Table 9 or a substance for which the induction of benign or malignant neoplasms has been demonstrated in:

(a) Humans; or

(b) Two mammalian species; or

(c) One mammalian species, independently reproduced; or

(d) One mammalian species, to an unusual degree with respect to increased incidence, shortened latency period, variety of site, tumor type, or decreased age at onset; or

(e) One mammalian species, supported by reproducible positive results in at least 3 different types of short−term tests which are indicative of potential oncogenic activity.

(14) "Chronic toxicity" means the ability of a substance to cause an adverse effect in an organism which results from exposure to the substance for a time period representing that substantial portion of the natural life expectancy of that organism.

(15) "Chronic toxicity criterion" or "CTC" means the maximum 4−day concentration of a substance which ensures adequate protection of sensitive species of aquatic life from the chronic toxicity of that substance and will adequately protect the designated fish and aquatic use of the surface water if not exceeded more than once every 3 years.

(16) "Depuration" means the loss of a substance from an organism as a result of any active or passive process.

(17) "EC_{50}" means a concentration of a toxic substance which causes an adverse effect including mortality in 50% of the exposed organisms in a given time period.

(18) "Food−chain multiplier" or "FCM" means the ratio of a BAF to an appropriate BCF.

(19) "LC_{50}" means a concentration of a toxic substance which is lethal to 50% of the exposed organisms in a given time period.

(20) "LD_{50}" means a dose of a toxic substance which is lethal to 50% of the exposed organisms in a given time period.

(21) "Lipid−soluble substance" means a substance which is soluble in nonpolar organic solvents and which tends to accumulate in the fatty tissues of an organism exposed to the substance.

(22) "Lowest observable adverse effect level" or "LOAEL" means the lowest tested concentration that caused an adverse effect in comparison with a control when all higher test concentrations caused the same effect.

(23) "No observable adverse effect level" or "NOAEL" means the highest tested concentration that did not cause an adverse effect in comparison with a control when no lower test concentration caused an adverse effect.

(24) "Octanol/water partition coefficient" or "K_{OW}" means the ratio of the concentration of a substance in the octanol phase to its concentration in the aqueous phase in an equilibrated 2−phase octanol−water system. For log K_{OW}, the log of the octanol−water partition coefficient is a base 10 logarithm.

(25) "Secondary value" means a temporary value that represents the concentration of a substance which ensures adequate protection of sensitive species of aquatic life, wildlife or human health from the toxicity of that substance and will adequately protect the designated use of the surface water until database requirements are fulfilled to calculate a water quality criterion.

(26) "Steady state" means that an equilibrium condition in the body burden of a substance in an organism has been achieved and is assumed when the rate of depuration of a substance matches its rate of uptake.

(27) "Toxic substance" means a substance or mixture of substances which through sufficient exposure, or ingestion, inhalation or assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will cause death, disease, behavioral or immunological abnormalities, cancer, genetic mutations, or developmental or physiological malfunctions, including malfunctions in reproduction or physical deformations, in such organisms or their offspring.

(28) "Trophic level" means a functional classification of taxa within a community that is based on feeding relationships (e.g., aquatic plants comprise the first trophic level, herbivores comprise the second, small fish comprise the third, predatory fish the fourth, etc.).

(29) "Uptake" means the acquisition of a substance from the environment by an organism as a result of any active or passive process.

(30) "Water quality parameter" means one of the indicators available for describing the distinctive quality of water including, but not limited to, hardness, pH, or temperature.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; renum. (5) to (19) to be (11), (13) to (15), (17), (19) to (24), (26), (27) and (30), cr. (5) to (7), (9), (10), (12), (16), (18), (25), (28) and (29) and am. (8), (11) and (24), Register, August, 1997, No. 500, eff. 9−1−97.

NR 105.04 Determination of adverse effects. **(1)** Substances may not be present in surface waters at concentrations which adversely affect public health or welfare, present or prospective uses of surface waters for public or private water supplies, or the protection or propagation of fish or other aquatic life or wild or domestic animal life.

(2) A substance shall be deemed to have adverse effects on fish or other aquatic life if it exceeds any of the following more than once every 3 years:

(a) The acute toxicity criterion as specified in s. NR 105.05, or

(b) The chronic toxicity criterion as specified in s. NR 105.06.

(c) The acute and chronic toxicity criteria for ammonia nitrogen shall be determined on a case−by−case basis by the department for the appropriate aquatic life use category.

(3) A substance shall be deemed to have adverse effects on wildlife if it exceeds the wildlife criterion as specified in s. NR 105.07.

(4) A substance shall be deemed to have adverse effects on public health and welfare if it exceeds any of the following:

(a) The human threshold criterion as specified in s. NR 105.08; or

(b) The human cancer criterion as specified in s. NR 105.09; or

(c) The taste and odor criterion as specified in s. NR 102.14.

(5) A substance shall be deemed to have adverse effects or the reasonable potential to have adverse effects on aquatic life, wildlife or human health, if it exceeds a secondary value determined according to the procedures in ss. NR 105.05 to 105.08.

(6) The determination of the criteria or secondary values for substances as calculated under ss. NR 105.05 to 105.09 shall be based upon the available scientific data base. References to be used in obtaining scientific data may include, but are not limited to:

(a) "Water Quality Criteria 1972", EPA–R3–73–033, National Academy of Sciences, National Academy of Engineering, United States Government Printing Office, Washington, D.C., 1974.

(b) "Quality Criteria for Water", EPA–440/9–76–003, United States Environmental Protection Agency, Washington, D.C., 1976.

(c) October 1980 and January 1985 U.S. Environmental Protection Agency (EPA) ambient water quality criteria documents.

(d) "Public Health Related Groundwater Standards: Summary of Scientific Support Documentation for NR 140.10", Wisconsin Department of Health and Social Services, Division of Health, September 1985.

(e) "Public Health Related Groundwater Standards – 1986: Summary of Scientific Support Documentation for NR 140.10", Wisconsin Department of Health and Social Services, Division of Health, June 1986.

(f) Health advisories published on March 31, 1987 by EPA, Office of Drinking Water.

(g) Any other reports, documents or information published by EPA or any other federal agency.

(h) Any other reports, documents or information that the department, deems to be reliable.

(7) When reviewing any of the references in sub. (6) to determine the effect of a substance, the department:

(a) Shall use scientific studies on the toxicity of a substance to fish and other aquatic life and wild and domestic animals, indigenous to the state;

(b) May use scientific studies on the toxicity of a substance to fish or other aquatic life, plant, mammalian, avian, and reptilian species not indigenous to the state; and

(c) May consider biomonitoring information to determine the aquatic life toxicity of complex mixtures of toxic substances in addition to the chemical specific criteria specified in this chapter.

History: Cr. Register, February, 1989, No. 398, eff. 3–1–89; am. (3), renum. (5) and (6) to be (7) and am. (6) (intro.) and (7) (intro.), cr. (5), Register, August, 1997, No. 500, eff. 9–1–97.

NR 105.05 Acute toxicity criteria and secondary acute values for aquatic life. (1) MINIMUM DATABASE FOR ACUTE CRITERION DEVELOPMENT. (a) To derive an acute toxicity criterion for aquatic life, the minimum information required shall be the results of acceptable acute toxicity tests with one or more species of freshwater animal in at least 8 different families provided that of the 8 species:

1. At least one is a salmonid fish in the family Salmonidae in the class Osteichthyes,

2. At least one is a non–salmonid fish from another family in the class Osteichthyes, preferably a commercially or recreationally important warmwater species,

3. At least one is a planktonic crustacean (e.g., cladoceran, copepod),

4. At least one is a benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish),

5. At least one is an insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge),

6. At least one is a fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions.

7. At least one is an organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca), and

8. At least one is an organism from a family in any order of insect or any other phylum not already represented in subds. 1. to 7.

9. If all 8 of the families in subds. 1. to 8. are represented, an acute toxicity criterion may be developed for surface waters classified as cold water using information on all of those families. If an acute toxicity criterion is developed for surface waters classified as cold water, acute toxicity criteria may also be developed for any of the surface water classifications in s. NR 102.04 (3) (b) to (e) using the procedure in sub. (2) or (3) and data on families in subds. 1. to 8. which are representative of the aquatic life communities associated with those classifications. For each substance, in no case may the criterion for a lower quality fish and aquatic life subcategory as defined in s. NR 102.04 be less than the criterion for a higher quality fish and aquatic life subcategory.

10. For a substance, if all of the families in subds. 1. to 8. are not represented, an acute toxicity criterion may not be developed for that substance. Instead, any available data may be used to develop a secondary acute value (SAV) for that substance according to s. NR 105.02 (3) and sub.(4).

(b) The acceptability of acute toxicity test results shall be judged according to the guidelines in section IV of the United States environmental protection agency's 1985 "Guidelines for Deriving National Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" or 40 CFR Part 132, Appendix A. II, IV and V, as stated on September 1, 1997, is incorporated by reference.

Note: Copies of 40 CFR Part 132, Appendix A Sections II, IV and V are available for inspection in the offices of the department of natural resources, secretary of state and the legislative reference bureau, Madison, WI or may be purchased from the superintendent of documents, US government printing office, Washington, D.C. 20402.

(2) ACUTE TOXICITY CRITERIA FOR SUBSTANCES WITH TOXICITY UNRELATED TO WATER QUALITY PARAMETERS. If the acute toxicity of a substance has not been adequately shown to be related to a water quality parameter (i.e., hardness, pH, temperature, etc.), the acute toxicity criterion (ATC) is calculated using the procedures specified in this subsection.

(a) 1. For each species for which at least one acute value is available, the species mean acute value (SMAV) is calculated as the geometric mean of all acceptable acute toxicity tests using the guidelines in sub. (1) (b).

2. For each genus for which one or more SMAVs are available, the genus mean acute value (GMAV) is calculated as the geometric mean of the SMAVs available for the genus.

(b) The GMAVs are ordered from high to low.

(c) Ranks (R) are assigned to the GMAVs from 1 for the lowest to N for the highest. If 2 or more GMAVs are identical, successive ranks are arbitrarily assigned.

(d) The cumulative probability (P) is calculated for each GMAVs as P=R/(N + 1).

(e) The 4 GMAVs are selected which have P closest to 0.05. If there are less than 59 GMAVs, these will always be the lowest GMAVs.

(f) Using the selected GMAVs and Ps, the ATC is calculated using the following:

1. Let EV = sum of the 4 ln GMAVs,
   EW = sum of the 4 squares of the ln GMAVs,
   EP = sum of the 4 P values,
   EPR = sum of the 4 square roots of P, and
   JR = square root of 0.05.
2. $S = ((EW - (EV)^2/4)/(EP-(EPR)^2/4))^{0.5}$.
3. $L = (EV - S(EPR))/4$.
4. $A = (JR)(S) + L$.
5. Final Acute Value (FAV)= e^A.
6. ATC = FAV/2.

(g) If, for a commercially, recreationally or ecologically important species, the geometric mean of the acute values from flow−through tests in which the concentration of test material was measured is lower than the calculated ATC [FAV], then that geometric mean is used as the ATC [FAV] instead of the calculated one.

(h) Table 1 contains the acute toxicity criteria for fish and aquatic life subcategories listed in s. NR 102.04 (3) that are calculated using the procedures described in this subsection for substances meeting the database requirements indicated in sub. (1) (a).

(3) ACUTE TOXICITY CRITERIA FOR SUBSTANCES WITH TOXICITY RELATED TO WATER QUALITY PARAMETERS. If data are available on a substance to show that acute toxicity to 2 or more species is similarly related to a water quality parameter (i.e., hardness, pH, temperature, etc.), the acute toxicity criterion (ATC) is calculated using the procedures specified in this subsection.

(a) For each species for which acceptable acute toxicity tests using the guidelines in sub. (1) (b) are available at 2 or more different values of the water quality parameter, a least squares regression of the acute toxicity values on the corresponding values of the water quality parameter is performed to obtain the slope of the curve that best describes the relationship. Because the most commonly documented relationship is that between hardness and acute toxicity of metals and a log−log relationship fits these data, geometric means and natural logarithms of both toxicity and water quality are used in the rest of this subsection to illustrate this method. For relationships based on other water quality parameters, no transformation or a different transformation might fit the data better, and appropriate changes shall be made as necessary throughout this subsection.

(b) For each species, the geometric mean of the available acute values (W) is calculated and then each of those acute values is divided by the mean for that species. This normalizes the acute values so that the geometric mean of the normalized values for each species individually and for any combination of species is 1.0.

(c) For each species, the geometric mean of the available corresponding water quality parameter values (X) is calculated and then each of those water quality parameter values is divided by the mean for that species. This normalizes the water quality parameter values so that the geometric mean of the normalized values for each species individually and for any combination of species is 1.0.

(d) A least squares regression of all the normalized acute values on the corresponding normalized values of the water quality parameter is performed to obtain the pooled acute slope (V). If the coefficient of determination, or r value, calculated from that regression is found not to be significant based on a standard F−test at a 0.05 level, then the pooled acute slope shall be set equal to zero.

(e) For each species the logarithmic intercept (Y) is calculated using the equation: $Y = \ln W - V(\ln X)$.

(f) 1. For each species the species mean acute intercept (SMAI) is calculated as e^Y.

2. For each genus for which one or more SMAIs are available, the genus mean acute intercept (GMAI) is calculated as the geometric mean of the SMAIs available for the genus.

(g) The GMAIs are ordered from high to low.

(h) Ranks (R) are assigned to the GMAIs from 1 for the lowest to N for the highest. If 2 or more GMAIs are identical, successive ranks are arbitrarily assigned.

(i) The cumulative probability (P) is calculated for each GMAI as P=R/(N+1).

(j) The 4 GMAIs are selected which have P closest to 0.05. If there are less than 59 GMAIs, these will always be the lowest GMAIs.

(k) Using the selected GMAIs and Ps, the ATC is calculated using the following:

1. Let EV = sum of the 4 ln GMAIs,
   EW = sum of the 4 squares of the ln GMAIs,
   EP = sum of the 4 P values,
   EPR = sum of the 4 square roots of P, and
   JR = square root of 0.05.
2. $S = ((EW - (EV)^2/4) / (EP - (EPR)^2/4))^{0.5}$.
3. $L = (EV - S(EPR))/4$.
4. $A = (JR)(S) + L$.
5. Final Acute Intercept (FAI) = e^A.
6. Acute Criterion Intercept (ACI) = FAI/2.

(L) The acute toxicity equation (ATE) is written as:

$ATC = {}_e(V \ln(\text{water quality parameter}) + \ln ACI)$.

The ATE shall be applicable only over the range of water quality parameters equivalent to the mean plus or minus 2 standard deviations using the entire fresh water acute toxicity data base and the water quality parameter transformation employed in par. (a). If the value at a specific location is outside of that range, the endpoint of the range nearest to that value shall be used to determine the criterion. Additional information may be used to modify those ranges. The final acute value (FAV) equals 2 times the ATC (acute toxicity criterion) calculated using the formula in this paragraph.

(m) If, for a commercially, recreationally or ecologically important species, the SMAI is lower than the calculated ACI, then that SMAI is used as the ACI instead of the calculated one.

(n) Table 2 contains the acute toxicity criteria for the fish and aquatic life subcategories listed in s. NR 102.04 (3) that are calculated using the procedures described in this subsection for substances meeting the database requirements indicated in sub. (1) (a). Table 2A contains the water quality parameter ranges calculated in par. (L).

(4) SECONDARY ACUTE VALUES. If all 8 minimum data requirements for calculating acute toxicity criteria in sub. (1) (a) are not met, secondary acute values (SAVs) shall be determined using the procedure in this subsection.

(a) In order to calculate a SAV, the database shall contain, at a minimum, a genus mean acute value (GMAV) for one of the following 3 genera in the family Daphnidae − *Ceriodaphnia sp., Daphnia sp.*, or *Simocephalus sp.* To calculate a SAV, the lowest GMAV in the database is divided by the Secondary Acute Factor (SAF). The SAF is an adjustment factor corresponding to the number of satisfied minimum data requirements, listed in sub. (1) (a). SAFs are listed in Table 2B.

(b) Whenever appropriate, the effects of variable water quality parameters shall be considered when calculating a SAV, consistent with the procedures described in sub. (3).

(c) Whenever, for a commercially, recreationally or ecologically important species, the SMAV is lower than the calculated SAV, that SMAV shall be used as the SAV instead of the calculated SAV.

(5) ACUTE TOXICITY CRITERIA EXPRESSED IN THE DISSOLVED FORM. Acute water quality criteria may be expressed as a dissolved concentration. The conversion of an acute water quality criterion expressed as a total recoverable concentration, to an acute water quality criterion expressed as a dissolved concentration, the portion of the substance which will pass through a 0.45 um filter, shall be done using the equations in pars. (a) and (b). Substances which may have criteria expressed as a dissolved concentration are listed in par. (a) with corresponding conversion factors.

(a) The conversion of the water quality criterion expressed as total recoverable ($WQC_{Total\ R.}$) to the water quality criterion expressed as dissolved (WQC_D) shall be performed as follows:

$WQC_D = (CF)(WQC_{Total\ R.})$

Where: $WQC_{Total\ R.}$ = Criteria from NR 105, Table 1 or 2.
CF = Conversion factor for total recoverable to dissolved.

Conversion factors are as follows:

Arsenic	1.000
Cadmium	0.850
Chromium (III)	0.316
Chromium (VI)	0.982
Copper	0.960
Lead	0.875
Mercury	0.850
Nickel	0.998
Selenium	0.922
Silver	0.850
Zinc	0.978

(b) The translation of the WQC_D into the water quality criterion which accounts for site−specific conditions (WQC_{TRAN}) shall be performed as follows:

$WQC_{TRAN} = (Translator)(WQC_D)$

Where: Translator (unitless) = $((M_P)(TSS) + M_D)/M_D$

M_P = Particle−bound concentration of the pollutant (ug/g) in receiving water.

M_D = Dissolved concentration of the pollutant in receiving water (ug/L).

TSS = Total Suspended Solids (g/L) concentration in receiving water.

(c) The procedures in pars. (a) and (b) may also be used for the conversion of secondary values from total recoverable to dissolved.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. (1) (a) 1. to 5., (1) (b), (2) (a) to (f), (3) (a) and (f) to (L), r. and recr. (1) (a) 6., cr. (1) (a) 7. to 10., (4) and (5), Register, August, 1997, No. 500, eff. 9−1−97; CR 03−050: am. (3) (L) and (m) Register February 2004 No. 578, eff. 3−1−04.

NR 105.06 Chronic toxicity criteria and secondary chronic values for fish and aquatic life. (1) MINIMUM DATABASE FOR CHRONIC CRITERION DEVELOPMENT. (a) To derive a chronic toxicity criterion for aquatic life, the minimum information required shall be results of acceptable chronic toxicity tests with one or more species of freshwater animal in at least 8 different families provided that of the 8 species:

1. At least one is a salmonid fish, in the family Salmonidae in the class Osteichthyes,

2. At least one is a non−salmonid fish, from another family in the class Osteichthyes, preferably a commercially or recreationally important warmwater species,

3. At least one is a planktonic crustacean (e.g., cladoceran, copepod),

4. At least one is a benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish),

5. At least one is an insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge),

6. At least one is a fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions,

7. At least one is an organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca), and

8. At least one is an organism from a family in any order of insect or any other phylum not already represented in subds. 1. to 7.

9. If all 8 of the families in subds. 1. to 8. are represented, a chronic toxicity criterion may be developed for surface waters classified as cold water using information on all of those families. If a chronic toxicity criterion is developed for surface waters classified as cold water, chronic toxicity criteria may also be developed for any of the surface water classifications in s. NR 102.04 (3) (b) to (e) using the procedure in sub. (2) or (3) and data on families in subds. 1. to 8. which are representative of the aquatic life communities associated with those classifications. For each substance, in no case may the criterion for a lower quality fish and aquatic life subcategory as defined in s. NR 102.04 be less than the criterion for a higher quality fish and aquatic life subcategory.

10. For a substance, if all the families in subds. 1. to 8. are not represented, acute−chronic ratios as calculated in sub. (5) may be used to generate the chronic toxicity values necessary to calculate a chronic toxicity criterion.

11. For a substance, if all of the families in subds. 1. to 8. are not represented, a chronic toxicity criterion may not be developed for that substance except as provided in subd. 10. Instead, any available data may be used to develop a secondary acute value (SAV) for that substance according to sub. (4).

(b) The acceptability of chronic toxicity test results shall be judged according to the guidelines in section VI of the United States environmental protection agency's 1985 "Guidelines for Deriving National Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" or 40 CFR Part 132 Appendix A, sections VI and VII as stated on September 1, 1997, is incorporated by reference.

Note: Copies of 40 CFR Part 132, Appendix A, Sections VI and VII are available for inspection in the offices of the department of natural resources, secretary of state and the legislative reference bureau, Madison, WI or may be purchased from the superintendent of documents, US government printing office, Washington, D.C. 20402.

(2) CALCULATION OF A CHRONIC CONCENTRATION. A chronic concentration is obtained by calculating the geometric mean of the chronic lowest observable adverse effect level and the chronic no observable adverse effect level.

(3) CHRONIC TOXICITY CRITERIA FOR SUBSTANCES WITH TOXICITY UNRELATED TO WATER QUALITY PARAMETERS. If the chronic toxicity of a substance has not been adequately shown to be related to a water quality parameter, i.e., hardness, pH, temperature, etc., the chronic toxicity criterion (CTC) is calculated using the procedures specified in this subsection.

(a) 1. For each species for which at least one chronic value is available, the species mean chronic value (SMCV) is calculated as the geometric mean of all acceptable chronic toxicity tests using the guidelines in sub. (1) (b).

2. For each genus for which one or more SMCVs are available, the genus mean chronic value (GMCV) is calculated as the geometric mean of the SMCVs available for the genus.

(b) The GMCVs are ordered from high to low.

(c) Ranks (R) are assigned to the GMCVs from 1 for the lowest to N for the highest. If 2 or more GMCVs are identical, successive ranks are arbitrarily assigned.

(d) The cumulative probability (P) is calculated for each GMCVs as P=R/(N + 1).

(e) The 4 GMCVs are selected which have P closest to 0.05. If there are less than 59 GMCVs, these will always be the lowest GMCVs.

(f) Using the selected GMCVs and Ps, the final chronic value (FCV) is calculated using the following:

1. Let EV = sum of the 4 ln GMCVs,
EW = sum of the 4 squares of the ln GMCVs,
EP = sum of the 4 P values,
EPR = sum of the 4 square roots of P, and
JR = square root of 0.05.

2. $S = ((EW - (EV)^2/4)/(EP - (EPR)^2/4))^{0.5}$

3. $L = (EV - S(EPR))/4$.

4. $A = (JR)(S) + L$.

5. FCV = e^A.

(g) If, for a commercially, recreationally or ecologically important species, the geometric mean of the chronic values is lower than the calculated FCV then that geometric mean is used as the FCV instead of the calculated one.

(h) The chronic toxicity criterion (CTC) equals the lower of the FCV and the final plant value calculated using the procedure in s. NR 105.11.

(i) Table 3 contains the chronic toxicity criteria for the fish and aquatic life subcategories listed in s. NR 102.04 (3) that are calculated using the procedures described in this subsection for substances meeting the database requirements indicated in sub. (1).

(4) CHRONIC TOXICITY CRITERIA FOR SUBSTANCES WITH TOXICITY RELATED TO WATER QUALITY PARAMETERS. (a) If data are available on a substance to show that chronic toxicity to 2 or more species is similarly related to a water quality parameter (i.e., hardness, pH, temperature, etc.), the chronic toxicity criterion (CTC) is calculated using the procedures specified in this paragraph.

1. For each species for which acceptable chronic toxicity tests using the guidelines in sub. (1) (b) are available at 2 or more different values of the water quality parameter, a least squares regression of the chronic toxicity values on the corresponding values of the water quality parameter is performed to obtain the slope of the curve that best describes the relationship. Because the most commonly documented relationship is that between hardness and the chronic toxicity of metals and a log−log relationship fits these data, geometric means and natural logarithms of both toxicity and water quality are used in the rest of this subsection to illustrate this method. For relationships based on other water quality parameters, no transformation or a different transformation might fit the data better, and appropriate changes shall be made as necessary throughout this subsection.

2. For each species, the geometric mean of the available chronic values (W) is calculated and then each of the chronic values is divided by the mean for that species. This normalizes the chronic values so that the geometric mean of the normalized values for each species individually and for any combination of species is 1.0.

3. For each species, the geometric mean of the available corresponding water quality parameter values (X) is calculated and then each of the water quality parameter values is divided by the mean for that species. This normalizes the water quality parameter values so that the geometric mean of the normalized values for each species individually and for any combination of species is 1.0.

4. A least squares regression of all the normalized chronic values on the corresponding normalized values of the water quality parameter is performed to obtain the pooled chronic slope (V). If the coefficient of determination, or r value, calculated from that regression is found not to be significant based on a standard F−test at a 0.05 level, then the pooled chronic slope shall be set equal to zero.

5. For each species the logarithmic intercept (Y) is calculated using the equation: Y = ln W − V(ln X).

6. a. For each species the species mean chronic intercept (SMCI) is calculated as e^Y.

b. For each genus for which one or more SMCIs are available, the genus mean chronic intercept (GMCI) is calculated as the geometric mean of the SMCIs available for the genus.

7. The GMCIs are ordered from high to low.

8. Ranks (R) are assigned to the GMCIs from 1 for the lowest to N for the highest. If 2 or more GMCIs are identical, successive ranks are arbitrarily assigned.

9. The cumulative probability (P) is calculated for each GMCI as P=R/(N + 1).

10. The 4 GMCIs are selected which have P closest to 0.05. If there are less than 59 GMCIs, these will always be the lowest GMCIs.

11. Using the selected GMCIs and Ps, the final chronic value (FCV) is calculated using the following:

a. Let EV = sum of the 4 ln GMCIs,
EW = sum of the 4 squares of the ln GMCIs,
EP = sum of the 4 P values,
EPR = sum of the 4 square roots of P, and
JR = square root of 0.05.

b. $S = ((EW-(EV)^2/4)/(EP-(EPR)^2/4))^{0.5}$

c. L = (EV − S(EPR))/4.

d. A = (JR)(S) + L.

e. Final Chronic Intercept (FCI) = e^A.

12. The final chronic equation (FCE) is written as:
FCV = $_e$(V ln(water quality parameter) + ln FCI).

The FCE shall be applicable only over the range of water quality parameters equivalent to the mean ± 2 standard deviations using the entire freshwater chronic toxicity data base and the water quality parameter transformation employed in subd. 1. If the value at a specific location is outside of that range, the endpoint of the range nearest to that value shall be used to determine the criterion. Additional information may be used to modify those ranges.

13. If, for a commercially, recreationally or ecologically important species, the SMCI is lower than the calculated FCI, then that SMCI is used as the FCI instead of the calculated one.

(b) At a value of the water quality parameter, the chronic toxicity criterion (CTC) equals the lower of the FCV and the final plant value calculated using the procedure in s. NR 105.11.

(c) Table 4 contains the chronic toxicity criteria for the fish and aquatic life subcategories listed in s. NR 102.04 (3) that are calculated using the procedures described in this subsection for substances meeting the database requirements indicated in sub. (1). Table 4A contains the water quality parameter ranges calculated in par. (a) 1.

(5) ACUTE−CHRONIC RATIOS. (a) The acute−chronic ratio is used to estimate the chronic toxicity of a substance to fish or other aquatic species when the database of sub. (1) (a) is not satisfied.

(b) The acute−chronic ratio for a species equals the acute concentration from data considered under s. NR 105.05 (1) divided by the chronic concentration from data calculated under sub. (1), subject to the following conditions:

1. If the acute toxicity of a substance is related to any water quality parameter, the acute−chronic ratio shall be based on acute and chronic toxicity data obtained from organisms exposed to test water with similar, if not identical, values of those water quality parameters. Preference under this paragraph shall be given to data from acute and chronic tests done by the same author or reference in order to increase the likelihood of comparable test conditions.

2. If the acute and chronic toxicity data indicate that the acute−chronic ratio varies with changes in the values of the water quality parameters, the acute−chronic ratio used at specified values of the water quality parameters shall be based on the ratios at values closest to that specified.

3. If the acute toxicity of a substance is unrelated to water quality parameters, the acute−chronic ratio may be derived from any acute and chronic test on a species regardless of the similarity in values of those parameters. Preference under this paragraph shall be given to data from acute and chronic tests done by the same author or reference to increase the likelihood of comparable test conditions.

(c) A final chronic value shall be calculated for a substance under this subsection only if at least one acute−chronic ratio is available for at least one species of aquatic animal in at least 3 different families, provided that of the 3 species, one is a fish, one is an invertebrate, and the third is a relatively sensitive freshwater

species on an acute toxicity basis. The other 2 may be saltwater species.

(d) The geometric mean acute–chronic ratio is calculated for each species using the available acute–chronic ratios for that species. That mean ratio shall be called the species mean acute–chronic ratio (SMACR).

(e) For a given substance, if the SMACR appears to increase or decrease as the species or genus mean acute values (SMAVs or GMAVs) calculated for that substance using the procedure described in s. NR 105.05 increase, the final acute–chronic ratio (FACR) shall be equal to the geometric mean of the SMACRs for species with SMAVs closest to the final acute value.

(f) For a given substance, if no trend is apparent regarding changes in SMACRs and GMAVs, the FACR shall be equal to the geometric mean of all SMACRs available for that substance.

(g) For a given substance, the final chronic value (FCV) shall be equal to the final acute value (FAV) divided by the final acute–chronic ratio (FACR). The chronic toxicity criterion shall be equal to the lower of the FCV and the final plant value as calculated using the procedure in s. NR 105.11, if available.

(h) Chronic toxicity criteria for the fish and aquatic life subcategories listed in s. NR 102.04 (3) that are calculated using acute–chronic ratios are listed in Table 5 for substances with acute toxicity unrelated to water quality parameters and in Table 6 for substances with acute toxicity related to water quality parameters. Equations listed in Table 6 are applicable over the range of water quality parameters as contained in Table 4A. Table 2A should be used where no range is listed in Table 4A.

(6) SECONDARY CHRONIC VALUES. If all 8 minimum data requirements for calculating FCVs in sub. (1) (a) are not met for a substance, secondary chronic values (SCVs) shall be calculated for that substance using the procedure in this subsection.

(a) If any one of the combinations of information in subds. 1. to 3. is available, a SCV may be calculated. To calculate a SCV for a substance, the acute value from subds. 1. to 3. is divided by the applicable acute–chronic ratio in the same subdivision.

1. Calculate a FAV using the procedure in s. NR 105.05 (2) and divide it by a secondary acute–chronic ratio (SACR) using the procedure in sub. (7).

2. Calculate a SAV using the procedure in s. NR 105.05 (4) and divide it by a final acute–chronic ratio (FACR) using the procedure in sub. (5).

3. Calculate a SAV using the procedure in s. NR 105.05 (4) and divide it by a SACR using the procedure in sub. (7).

(b) If appropriate, the SCV shall be made a function of a water quality characteristic in a manner similar to that described in sub. (4) (a).

(c) If, for a commercially, recreationally or ecologically important species, the SMCV is lower than the calculated SCV, that SMCV shall be used as the SCV instead of the calculated SCV.

(d) If there is an FPV available using the procedure in s. NR 105.11 which is lower than the calculated SCV, that FPV shall be used as the SCV instead of the calculated SCV.

(7) SECONDARY ACUTE–CHRONIC RATIOS. (a) If a FACR cannot be calculated using the procedure in sub. (5) because SMACRs are not available for a fish, an invertebrate or an acutely sensitive freshwater species, a secondary acute–chronic ratio (SACR) may be calculated using the procedure in this subsection.

(b) The SACR shall be equal to the geometric mean of 3 acute–chronic ratios. Those ratios consist of the SMACRs available for the species in sub. (5) (c). When SMACRs are not available for the species in par. (a), the default acute–chronic ratio to be used is 18. Use of a SACR will result in the calculation of a secondary chronic value.

(8) CHRONIC TOXICITY CRITERIA EXPRESSED IN THE DISSOLVED FORM. Chronic water quality criteria may be expressed as a dissolved concentration. The conversion of a chronic water quality criterion expressed as a total recoverable concentration to a chronic water quality criterion expressed as a dissolved concentration, the portion of the substance which will pass through a 0.45 um filter, shall be done using the equations in pars. (a) and (b). Substances which may have criteria expressed as a dissolved concentration are listed in par. (a) with corresponding conversion factors.

(a) The conversion of the water quality criterion expressed as total recoverable ($WQC_{Total\ R.}$) to the water quality criterion expressed as dissolved (WQC_D) shall be performed as follows:

$$WQC_D = (CF)(WQC_{Total\ R.})$$

Where: $WQC_{Total\ R.}$ = Criteria from NR 105, Table 5 or 6.
CF = Conversion factor for total recoverable to dissolved.

Conversion factors are as follows:

Arsenic	1.000
Cadmium	0.850
Chromium (III)	0.860
Chromium (VI)	0.962
Copper	0.960
Lead	0.792
Mercury	0.85
Nickel	0.997
Selenium	0.922
Zinc	0.986

(b) The translation of the WQC_D into the water quality criterion which accounts for site–specific conditions (WQC_{TRAN}) shall be performed as follows:

$$WQC_{TRAN} = (Translator)(WQC_D)$$

Where: $Translator\ (unitless) = ((M_P)(TSS) + M_D)/M_D$

M_P = Particle–bound concentration of the pollutant (ug/g) in receiving water.

M_D = Dissolved concentration of the pollutant in receiving water (ug/L).

TSS = Total Suspended Solids (g/L) concentration in receiving water.

(c) The procedures in pars. (a) and (b) may also be used for the conversion of secondary values from total recoverable to dissolved.

Table 1
Acute Toxicity Criteria for Substances With Toxicity Unrelated to Water Quality
(in ug/L except where indicated)

Substance	Cold Water	Warm Water Sportfish, Warm Water Forage, and Limited Forage Fish	Limited Aquatic Life
Arsenic (+3)*	339.8	339.8	339.8
Chromium (+6)*	16.02	16.02	16.02
Mercury (+2)*	0.83	0.83	0.83
Cyanide, free	22.4	45.8	45.8
Chloride	757,000	757,000	757,000
Chlorine*	19.03	19.03	19.03
Gamma – BHC	0.96	0.96	0.96
Dieldrin	0.24	0.24	0.24
Endrin	0.086	0.086	0.12
Toxaphene	0.73	0.73	0.73
Chlorpyrifos	0.041	0.041	0.041
Parathion	0.057	0.057	0.057

Note: * – Criterion listed is applicable to the "total recoverable" form except for chlorine which is applicable to the "total residual" form.

Table 2
Acute Toxicity Criteria for Substances With Toxicity Related to Water Quality
(all in ug/L)

Water Quality Parameter: Hardness (in ppm as $CaCO_3$)					
$ATC = e^{(V \text{ in hardness}) + \ln ACI)}$			ATC at Various Hardness (ppm) Levels		
Substance	V	ln ACI	50	100	200
Total Recoverable Cadmium:					
Cold Water	1.147	−3.8104	1.97	4.36	9.65
Warm Water Sportfish, Warm Water Forage and Limited Forage Fish	1.147	−2.9493	4.65	10.31	22.83
Limited Aquatic Life	1.147	−1.9195	13.03	28.87	63.92
Total Recoverable Chromium (+3):					
All Surface Waters	0.819	3.7256	1022	1803	3181
Total Recoverable Copper:					
All Surface Waters	0.9436	−1.6036	8.07	15.51	29.84
Total Recoverable Lead:					
All Surface Waters	0.9662	0.2226	54.73	106.92	208.90
Total Recoverable Nickel:					
All Surface Waters	0.846	2.255	261	469	843
Total Recoverable Zinc:					
All Surface Waters	0.8745	0.7634	65.66	120.4	220.7
Water Quality Parameter: pH					
$ATC = e^{(V(pH) + \ln ACI)}$					
Substance	V	ln ACI	6.5	7.8	8.8
Pentachlorophenol:					
All Surface Waters	1.0054	−4.877	5.25	19.40	53.01

Table 2A
Water Quality Parameter Ranges for Substances With Acute Toxicity Related to Water Quality

Substance	Parameter	Applicable Range
Cadmium	Hardness (ppm)	6 – 457
Chromium (+3)	Hardness (ppm)	13 – 301
Copper	Hardness (ppm)	13 – 495
Lead	Hardness (ppm)	12 – 356
Nickel	Hardness (ppm)	13 – 268
Zinc	Hardness (ppm)	12 – 333
Pentachlorophenol	pH (s.u.)	6.6 – 8.8

Table 2B
Secondary Acute Factors

Number of minimum data requirements satisfied	Adjustment factor
1	21.9
2	13.0
3	8.0
4	7.0
5	6.1
6	5.2
7	4.3

Table 2C
Acute Toxicity Criteria for Ammonia With Toxicity Related to Water Quality(all in mg/L)

Cold Water (CW) Categories 1–5 are applicable only to ammonia criteria.[1]

Water Quality Parameter: pH

ATC (in mg/L) = $[A / (1 + 10^{(7.204 - pH)})] + [B /(1 + 10^{(pH - 7.204)})]$

Substance	**A**	**B**	**7.5**	**8.0**	**8.5**
Ammonia (as N) in mg/L:					
CW Category 1 & 4	0.275	39.0	13.28	5.62	2.14
CW Category 2 & 3	0.343	48.7	16.59	7.01	2.67
CW Category 5, Warm Water Sport Fish, Warm Water Forage, and Limited Forage Fish	0.411	58.4	19.89	8.41	3.20
Limited Aquatic Life	0.633	90.0	30.64	12.95	4.93

[1] For ammonia, along with data on all warm water fish species and invertebrates, the cold water criteria are calculated using data on all cold water fish species with the following exceptions:

CW Category 1 = Default category of cold water classification. This category includes all fish. [Note: CW Category 1 is always applicable in Lake Superior, Lake Michigan, and Green Bay north of 44° 32' 30" north latitude.]

CW Category 2 = Inland lakes with populations of cisco, lake trout, brook trout or brown trout, but no other trout or salmonid species. This category excludes data on genus *Onchorhynchus*.

CW Category 3 = Inland lakes with populations of cisco, but no trout or salmonid species. This category excludes data on genera *Onchorhynchus, Salmo*, and *Salvelinus*.

CW Category 4 = Inland trout waters with brook, brown, or rainbow trout, but no whitefish or cisco. This category excludes data on genus *Prosopium*.

CW Category 5 = Inland trout waters with brook and brown trout, but no whitefish, cisco, or other trout or salmonid species. This category excludes data on genera *Prosopium* and *Onchorhynchus*.

Table 3
Chronic Toxicity Criteria for Substances With Toxicity Unrelated to Water Quality(all in ug/L)

Substance	Cold Water	Warm Water Sportfish, Warm Water Forage and Limited Forage Fish	Limited Aquatic Life

(Reserved)

Note: This table is reserved for criteria that USEPA has indicated may be available in the near future.

Table 4
Chronic Toxicity Criteria for Substances With Toxicity Related to Water Quality (all in ug/L)

Water Quality Parameter: Hardness (in ppm as $CaCO_3$

$CTC = e^{(V \ln(hardness) + \ln CCI)}$

Substance	V	ln CCI	CTC at Various Hardness (ppm) Levels 50	100	175
Total Recoverable Cadmium:					
All Surface Waters	0.7852	−2.7150	1.43	2.46	3.82

Table 4A
Water Quality Parameter Ranges for Substances With Chronic Toxicity Related to Water Quality

Substance	Parameter	Applicable Range
Cadmium	Hardness (ppm)	18–175

Table 4B
Chronic Toxicity Criteria for Ammonia with Toxicity Related to Water Quality (all in mg/L)

Substance: Ammonia (as N)
Water Quality Parameters: Temperature in degrees Celsius, pH

30−Day CTC:

$CTC = E \times ((0.0676/(1 + 10^{(7.688 - pH)})) + (2.912/(1 + 10^{(pH - 7.688)}))) \times C$

4−Day CTC = 30−Day CTC X 2.5

Cold Water (all periods), Warm Water Sport Fish and Warm Water Forage Fish (periods with Early Life Stages Present):

C = minimum of (2.85) or $(1.45 \times 10^{(0.028 \times (25 - T))})$

T = Temperature in degrees Celsius

$E = 0.854$

Warm Water Sport Fish and Warm Water Forage Fish (periods with Early Life Stages Absent):

$C = (1.45 \times 10^{(0.028 \times (25 - T))})$

T = Maximum of (actual temperature in degrees Celsius) and (7)

$E = 0.854$

Limited Forage Fish (periods with Early Life Stages Present):

C = minimum of (3.09) or $(3.73 \times 10^{(0.028 \times (25 - T))})$

T = temperature in degrees Celsius

$E = 1$

Limited Forage Fish (periods with Early Life Stages Absent):

$C = (3.73 \times 10^{(0.028 \times (25 - T))})$

T = Maximum of (actual temperature in degrees Celsius) and (7)

$E = 1$

Limited Aquatic Life (all periods):

$C = (8.09 \times 10^{(0.028 \times (25 - T))})$

T = Maximum of (actual temperature in degrees Celsius) and (7)

$E = 1$

	30−day CTC in mg/L @ pH of:		
	7.5	8.0	8.5
Cold Water, Warm Water Sport Fish (Early Life Stages Present), and Warm Water Forage Fish (Early Life Stages Present):			
@ 25 degrees Celsius	2.22	1.24	0.55
@ 14.5 degrees Celsius or less	4.36	2.43	1.09
Warm Water Sport Fish (Early Life Stages Absent), and Warm Water Forage Fish (Early Life Stages Absent):			
@ 25 degrees Celsius	2.22	1.24	0.55
@ 7 degrees Celsius or less	7.09	3.95	1.77
Limited Forage Fish (Early Life Stages Present):			
@ 27 degrees Celsius or less	5.54	3.09	1.38
Limited Forage Fish (Early Life Stages Absent):			
@ 25 degrees Celsius	6.69	3.73	1.67
@ 7 degrees Celsius or less	21.34	11.90	5.33
Limited Aquatic Life:			
@ 25 degrees Celsius	14.50	8.09	3.62
@ 7 degrees Celsius or less	46.29	25.82	11.56

Note: The terms “early life stage present” and “early life stage absent” are defined in subch. III of ch. NR 106.

Table 5

Chronic Toxicity Criteria Using Acute–Chronic Ratios for Substances with Toxicity Unrelated to Water Quality (all in ug/L)

Substance	Cold Water	Warm Water Sportfish and Warm Water Forage	Limited Forage Fish and Limited Aquatic Life
Arsenic (+3)*	148	152.2	152.2
Chromium (+6)*	10.98	10.98	10.98
Mercury (+2)*	0.44	0.44	0.44
Cyanide, free	5.22	11.47	11.47
Chloride	395,000	395,000	395,000
Selenium	5.0	5.0	46.5
Chlorine*	7.28	7.28	7.28
Dieldrin	0.055	0.077	0.077
Endrin	0.036	0.050	0.050
Parathion	0.011	0.011	0.011

Note: *Criterion listed is applicable to the "total recoverable" form except for chlorine which is applicable to the "total residual" form.

Table 6

Chronic Toxicity Criteria Using Acute–Chronic Ratios for Substances With Toxicity Related to Water Quality (all in ug/L)

Water Quality Parameter: Hardness (in ppm as $CaCO_3$)					
$CTC=e^{(V \ln(hardness) + \ln CCI)}$			CTC at Various Hardness (ppm) Levels		
Substance	V	ln CCI	50	100	200
Total Recoverable Chromium (+3):					
Cold Water	0.819	0.6851	48.86	86.21	152.1
Warm Water Sportfish	0.819	1.112	74.88	132.1	233.1
All others	0.819	1.112	74.88	132.1	233.1
Total Recoverable Copper:					
All Surface Waters	0.8557	−1.6036	5.72	10.35	18.73
Total Recoverable Lead:					
All Surface Waters	0.9662	−1.1171	14.33	28.01	54.71
Total Recoverable Nickel:					
Cold Water, Warm Water Sportfish, Warm Water Forage, and Limited Forage Fish	0.846	0.059	29.0	52.2	93.8
Limited Aquatic Life	0.846	0.4004	40.8	73.4	132.0
Total Recoverable Zinc					
All Surface Waters	0.8745	0.7634	65.66	120.4	220.7
Water Quality Parameter: pH					
$CTC=e^{(V(pH) + \ln CCI)}$			CTC at Various pH (s.u.) Levels		
Substance	V	ln CCI	6.5	7.8	8.8
Pentachlorophenol:					
Cold Water	1.0054	−5.1468	4.43	14.81	40.48
All Other Surface Waters	1.0054	−4.9617	5.33	17.82	48.70

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. (5) (f) and Tables 2, 2a, 4, 4a and 6, Register, July, 1995, No. 475, eff. 8−1−95; am. (1) (a) 1., 2., 4., and 5., (1) (b), (3) (intro.), (a) to (g), (4) (a) 1., 7. to 13., (5) (c), renum. (1) (a) 6. to be (1) (a) 10., (3) (h) to be (3) (i) and am. (1) (a) 10, (4) (a) 6. to be (4) (a) 6. a., (4) (b) to be (4) (c), (5) (e) to (i) to be (5) (d) to (h) and am. (5) (e) to (g), cr. (3) (h), (4) (a) 6. b., (4) (b), (5) (b) 3., (6) to (8), r. and recr., Tables 1 to 2a, 3 to 6, r. (5) (d); am. Tables 1 and 5, Register, January, 2000, No. 529, eff. 2−1−00; CR 03−050: am. Tables 2 and 6, cr. Tables 2C and 4B Register February 2004 No. 578, eff. 3−1−04; CR 07−110: am Tables 2, 2A, 5 and 6 Register November 2008 No. 635, eff. 12−1−08; **CR 09−123: am. (5) (h), (8) (a), Tables 4B and 5 Register July 2010 No. 655, eff. 8−1−10.**

NR 105.07 Wildlife criteria. (1) The wildlife criterion is the concentration of a substance which if not exceeded protects Wisconsin's wildlife from adverse effects resulting from ingestion of surface waters of the state and from ingestion of aquatic organisms taken from surface waters of the state.

(a) For any substance not shown in Table 7, the wildlife criterion (WC) is the lower of the available mammalian or avian wildlife values (WVs) calculated pursuant to sub. (2). A wildlife criterion protective of Wisconsin's reptile fauna may be calculated pursuant to sub. (2) whenever data specific to reptiles are available.

(b) Table 7 contains the wildlife criteria calculated according to the procedures of this chapter.

Table 7
Wildlife Criteria

Substance	Criteria (in ng/L, except where indicated)
DDT & Metabolites	0.011
Mercury	1.3
Polychlorinated Biphenyls	0.12
2,3,7,8 – TCDD	0.003 (pg/L)

(2) (a) Mammalian and avian wildlife values shall be calculated as follows using information available from scientifically acceptable studies of animal species exposed repeatedly to the substance via oral routes including gavage:

$$WV = \frac{NOAEL \times Wt_A \times SSF}{W + \Sigma[F_{TLi} \times BAF_{TLi}]}$$

Where:

- WV = Wildlife value in milligrams per liter (mg/L).
- $NOAEL$ = No observed adverse effect level in milligrams of substance per kilogram of body weight per day (mg/kg–d) as derived from subchronic or chronic mammalian or avian studies or as specified in subs. (3) to (5).
- Wt = Average weight in kilograms (kg) of the representative species.
- W = Average daily volume of water in liters consumed per day (L/d) by the representative species or as specified in sub. (6).
- SSF = Species sensitivity factor, ranging between 0.01 and 1 to account for interspecies differences in sensitivity.
- F_{TLJ} = Average daily amount of food consumed from trophic level i by the representative species in kilograms per day (kg/d) or as specified in sub. (6).
- BAF_{TLJ} = Bioaccumulation factor for wildlife food in trophic level i with units of liter per kilogram (L/kg) as derived in s. NR 105.10. For consumption of piscivorous birds by other birds (e.g., herring gull by eagles), the BAF is derived by multiplying the trophic level 3 BAF for fish by a biomagnification factor to account for the biomagnification from fish to the consumed birds.

(b) The selection of the species sensitivity factor (SSF) shall be based on the available toxicological data base and available physicochemical and toxicokinetic properties of the substance and the amount and quality of available data.

(c) The bald eagle, kingfisher, herring gull, mink and otter are representative of avian and mammalian species to be protected by wildlife criteria. A NOAEL specific to each taxonomic class is used to calculate WVs for each of the 5 representative species. The avian WV is the geometric mean of the WVs calculated for the 3 representative avian species. The mammalian WV is the geometric mean of the WVs calculated for the 2 representative mammalian species.

(d) In those cases in which more than one NOAEL is available, the following shall apply:

1. If more than one NOAEL is available within a taxonomic class, based on the same endpoint of toxicity, the NOAEL from the most sensitive species shall be used.

2. If more than one NOAEL is available for a given species, based on the same enpoint of toxicity, the NOAEL for that species shall be calculated using the geometric mean of those NOAELs.

(e) Because wildlife consume fish from both trophic levels 3 and 4, baseline BAFs shall be available for both trophic levels 3 and 4 to calculate either a criterion or secondary value for a chemical. When appropriate, ingestion through consumption of invertebrates, plants, mammals and birds in the diet of wildlife species to be protected shall be included.

(3) In those cases in which a no observed adverse effect level (NOAEL) is available from studies of mammalian or avian species exposed repeatedly to the substance via oral routes including gavage, but is available in units other than mg/kg–d as specified in sub. (2), the following procedures shall be used to express the NOAEL prior to calculating the wildlife value:

(a) If the NOAEL is given in milligrams of toxicant per liter of water consumed (mg/L), the NOAEL shall be multiplied by the daily average volume of water consumed by the test animals in liters per day (L/d) and divided by the average weight of the test animals in kilograms (kg).

(b) If the NOAEL is given in milligrams of toxicant per kilogram of food consumed (mg/kg), the NOAEL shall be multiplied by the average amount of food in kilograms consumed daily by the test animals (kg/d) and divided by the average weight of the test animals in kilograms (kg).

(4) In those cases in which a NOAEL is unavailable and a lowest observed adverse effect level (LOAEL) is available from studies of animal species exposed repeatedly to the substance via oral routes including gavage, the LOAEL may be substituted with proper adjustment to estimate the NOAEL. An uncertainty factor of between one and 10 may be applied to the LOAEL, depending on the sensitivity of the adverse effect, to reduce the LOAEL into the range of a NOAEL. If the LOAEL is available in units other than mg/kg–d, the LOAEL shall be expressed in the same manner as that specified for the NOAEL in sub. (3).

(5) In instances where a NOAEL is based on subchronic data, an uncertainty factor may be applied to extrapolate from subchronic to chronic levels. The value of the uncertainty factor may not be less than 0.1 and may not exceed 1.0. This factor is to be used when assessing highly bioaccumulative substances where toxicokinetic considerations suggest that a bioassay of limited length underestimates chronic effects.

(6) If drinking or feeding rates are not available for representative species, drinking (W) and feeding rates (F_{TLi}) shall be calculated for representative mammalian or avian species by using the allometric equations given in pars. (a) and (b).

(a) For mammalian species the allometric equations are as follows:

1. $F_{TLi}=0.0687 \times (Wt)^{0.82}$

Where: F_{TLi} = Feeding rate of mammalian species in kilograms per day (kg/d).

Wt = Average weight in kilograms (kg) of the test animals.

2. $W=0.099 \times (Wt)^{0.90}$

Where: W = Drinking rate of mammalian species in liters per day (L/d).

Wt = Average weight in kilograms (kg) of the test animals.

(b) For avian species the allometric equations are as follows:

1. $F_{TLi} = 0.0582\ (Wt)^{0.65}$

Where: F_{TLi} = Feeding rate of avian species in kilograms per day (kg/d).

Wt = Average weight in kilograms (kg) of the test animals.

2. $W= 0.059 \times (Wt)^{0.67}$

Where: W = Drinking rate of avian species in liters per day (L/d).

Wt = Average weight in kilograms (kg) of the test animals.

Note: Criteria to protect domestic animals will be considered on an as needed basis using a model that accounts for domestic animal exposure through drinking water. Because domestic animals do not regularly consume aquatic organisms, the wildlife exposure model is not appropriate.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. table 7, Register, July, 1991, No. 427, eff. 8−1−91; am. (1), (2) (a), (b), (3) (intro.), (6) (intro.), r. and recr. (2) (c), (5), cr. (2) (d), (e), r. (6) (a), renum. (6) (b) and (c) to be (6) (a) and (b) and am., Register, August, 1997, No. 500, eff. 9−1−97.

NR 105.08 Human threshold criteria. (1) The human threshold criterion (HTC) is the maximum concentration of a substance established to protect humans from adverse effects resulting from contact with or ingestion of surface waters of the state and from ingestion of aquatic organisms taken from surface waters of the state. Human threshold criteria are derived for those toxic substances for which a threshold dosage or concentration can be estimated below which no adverse effect or response is likely to occur.

(2) For noncarcinogenic components of mixtures in effluents, interactions among substances may be additive, antagonistic or synergistic and may be accounted for by a model that is supported by credible scientific evidence. The risks are assumed to be additive when substances are members of the same structural class and cause potential adverse effects via the same mechanism of action, influencing the same kind of endpoint, and shall be accounted for by a model that is supported by credible scientific evidence.

(3) Human threshold criteria are listed in Table 8. Criteria for the same substance may be different depending on the surface water classification, due to the lipid value of representative fish, a component of the BAF, and whether or not the water may be a source of drinking water. Further application of these criteria to protect drinking water and downstream uses in the Great Lakes system shall be according to s. NR 106.06 (1)

(4) To derive human threshold criteria for substances not included in Table 8 the following methods shall be used:

(a) The human threshold criterion shall be calculated as follows:

$$HTC = \frac{ADE \times 70\ kg \times RSC}{W_H + (F_H \times BAF)}$$

Where: HTC = Human threshold criterion in milligrams per liter (mg/L).

ADE = Acceptable daily exposure in milligrams toxicant per kilogram body weight per day (mg/kg−d) as specified in sub. (5).

70 kg = Average weight of an adult male in kilograms (kg).

RSC = Relative source contribution factor used to account for routes of exposure other than consumption of contaminated water and aquatic organisms. In the absence of sufficient data on alternate sources of exposure, including but not limited to non−fish diet and inhalation, the relative source contribution factor shall be set equal to 0.8.

W_H = Average per capita daily water consumption of 2 liters per day (L/d) for surface waters classified as public water supplies or, for all other surface waters, 0.01 liters per day (L/d) for exposure through body contact or ingestion of small volumes of water during swimming or other recreational activities.

F_H = Average per capita daily consumption of sport−caught fish by Wisconsin anglers equal to 0.02 kilograms per day (kg/d).

BAF = Aquatic organism bioaccumulation factor with units of liter per kilogram (L/kg) as derived in s. NR 105.10.

Table 8
Human Threshold Criteria
(ug/L unless specified otherwise)

		Public Water Supply		Non−Public Water Supply		
	Substance	Warm Water Sport Fish Communities	Cold Water[4] Communities	Warm Water Forage, Limited Forage, and Warm Water Sport Fish Communities	Cold Water Communities	Limited Aquatic Life
1.	Acrolein	7.2	3.4	15	4.4	2,800
2.	Antimony	5.6	5.6	373	373	1,120
3.	Benzene[2]	5	5	610	260	4,000
4.	Bis(2−chloroisopropyl) ether	1,100	1,100	55,000	34,000	220,000
5.	Cadmium	4.4	4.4	370	370	880
6.	*Chlordane (ng/L)	2.4	0.70	2.4	0.70	310,000
7.	Chlorobenzene[2]	100	100	1,210	400	28,000
8.	Chromium, total[2]	100	100			
9.	Chromium (+3)	41,750	41,750	3,818,000	3,818,000	8,400,000
10.	Chromium (+6)	83.5	83.5	7,636	7,636	16,800
11.	Cyanide, Total[2]	138.6	138.6	9,300	9,300	28,000
12.	*4.4'−DDT (ng/L)	3.0	0.88	3.0	0.88	2800000
13.	1,2−Dichlorobenzene[2]	446	273	1,509	481	126,000
14.	1,3−Dichlorobenzene	1,400	710	3,300	1,000	500,000
15.	cis−1,2−Dichloroethene[2]	70	70	14,000	9,000	56,000
16.	trans−1,2−Dichloroethene[2]	100	100	24,000	13,000	110,000
17.	Dichloromethane[2] (methylene chloride)	5	5	95,000	72,000	328,000
18.	2,4−Dichlorophenol	74	58	580	180	17,000
19.	Dichloropropenes[3] (1,3−Dichloropropene)	8.3	8.2	420	260	1,700
20.	*Dieldrin (ng/L)	0.59	0.17	0.59	0.17	280,000
21.	2,4−Dimethylphenol	450	430	11,000	4,500	94,000
22.	Diethyl phthalate[2]	5,000	5,000	68,000	21,000	4,500,000
23.	Dimethyl phthalate (mg/L)	241	184	1,680	530	56,000
24.	4,6−Dinitro−o−cresol	100	96	1,800	640	22,000
25.	Dinitrophenols[3] (2,4−Dinitrophenol)	55	55	2,800	1,800	11,000
26.	2,4−Dinitrotoluene	0.51	0.48	13	5.3	110
27.	Endosulfan	87	41	181	54	33,600
28.	Ethylbenzene[2]	567	401	2,920	931	140,000
29.	Fluoranthene	890	610	4,300	1,300	220,000
30.	*Hexachlorobenzene	0.075	0.022	0.075	0.022	4,500
31.	Hexachlorocyclopentadiene	34.7	25.6	195	65.3	8,400
32.	Hexachloroethane	8.7	3.3	13	3.7	5,600
33.	*gamma−BHC (lindane)[2]	0.20	0.20	0.84	0.25	1,900
34.	Isophorone	5,500	5,300	180,000	80,000	1,100,000
35.	Lead	10	10	140	140	2,240
36.	*Mercury[5]	0.0015	0.0015	0.0015	0.0015	336
37.	Nickel[2]	100	100	43,000	43,000	110,000
38.	*Pentachlorobenzene	0.46	0.14	0.47	0.14	4,500
39.	Selenium[2]	50	50	2,600	2,600	28,000
40.	Silver	140	140	28,000	28,000	28,000
41.	*2,3,7,8−TCDD (pg/L)	0.11	0.032	0.11	0.032	7,300
42.	*1,2,4,5−Tetrachlorobenzene	0.54	0.17	0.58	0.17	1,700
44.	Toluene[2]	1,000	1,000	15,359	5,201	280,000
45.	1,1,1−Trichloroethane[2]	200	200	270,000	110,000	2,000,000
46.	2,4,5−Trichlorophenol	1,600	830	3,900	1,200	560,000

* Indicates substances that are BCCs.

[1] A human threshold criterion expressed in micrograms per liter (ug/L) can be converted to milligrams per liter (mg/L) by dividing the criterion by 1000.

[2] For this substance the human threshold criteria for public water supply receiving water classifications equal the maximum contaminant level pursuant to s. NR 105.08 (4) (b).

[3] The human threshold criteria for this chemical class are applicable to each isomer.

4 For BCCs, these criteria apply to all water of the Great Lakes system.

[5] The mercury criteria were calculated using 20 g/day fish consumption and the human non−cancer criteria derivation procedure in 40 CFR Part 132, Appendix C. For these criteria, 40 CFR Part 132, Appendix C as stated on September 1, 1997 is incorporated by reference.

(b) For surface waters classified as public water supplies, if the human threshold criterion for a toxic substance as calculated in par. (a) exceeds the maximum contaminant level (MCL) for that substance as specified in ch. NR 809 or the July 8, 1987 Federal Register (52 FR 25690), the MCL shall be used as the human threshold criterion.

(5) The acceptable daily exposure (ADE) referenced in sub. (4) represents the maximum amount of a substance which if ingested daily for a lifetime results in no adverse effects to humans. Paragraphs (a) to (c) list methods for determining the acceptable daily exposure.

(a) The department shall review available references for acceptable daily exposure or equivalent values, such as a reference dose (RfD) as used by the U.S. environmental protection agency, and for human or animal toxicological data from which an acceptable daily exposure can be derived. Suitable references for review include, but are not limited to, those presented in s. NR 105.04 (5).

(b) When human or animal toxicological data are available, the department may derive an acceptable daily exposure by using as guidance procedures presented by the U.S. environmental protection agency in "Water Quality Criteria Documents; Availability" (45 FR 79318, November 28, 1986). Additional guidance for deriving acceptable daily exposures from toxicological data are given in subds. 1. to 4. Alternate procedures may be used if supported by credible scientific evidence.

1. No observable adverse effect levels (NOAELs) and lowest observable adverse effect levels (LOAELs) from studies of humans or mammalian test species shall be divided by an uncertainty factor to derive an acceptable daily exposure. Uncertainty factors reflect uncertainties in predicting acceptable exposure levels for the general human population based upon experimental animal data or limited human data. Factors to be considered when selecting an uncertainty factor include, but are not limited to, interspecies and individual variations in response and susceptibility to a toxicant, and the quality and quantity of the available data. The following guidelines shall be considered when selecting an uncertainty factor:

a. Use an uncertainty factor of 10 when extrapolating from valid experimental results from studies on prolonged ingestion by humans. This 10−fold factor protects sensitive members of the human population.

b. Use an uncertainty factor of 100 when extrapolating from valid results of long−term feeding studies on experimental animals with results of studies of human ingestion not available or insufficient (e.g., acute exposure only). This represents an additional 10−fold uncertainty factor in extrapolating data from the average animal to the average human.

c. Use an uncertainty factor of 1000 when extrapolating from less than chronic results on experimental animals with no useful long−term or acute human data. This represents an additional 10−fold uncertainty factor in extrapolating from less than chronic to chronic exposures.

d. Use an additional uncertainty factor of between 1 and 10 depending on the severity of the adverse effect when deriving an acceptable daily exposure from a lowest observable adverse effect level (LOAEL). This uncertainty factor reduces the LOAEL into the range of a no observable adverse effect level (NOAEL).

e. Use an additional uncertainty factor of 10 when deriving an acceptable daily exposure for a substance which the U.S. environmental protection agency classifies as a "group C" carcinogen, but which is not defined as a carcinogen in s. NR 105.03 (13).

2. Results from studies of humans or mammalian test species used to derive acceptable daily exposures shall have units of milligrams of toxicant per kilogram of body weight per day (mg/kg−d). When converting study results to the required units, a water consumption of 2 liters per day (L/d) and a body weight of 70 kilograms (kg) is assumed for humans. The following examples and procedures illustrate the conversion of units:

a. Results from human studies which are expressed in milligrams of toxicant per liter of water consumed (mg/L) are converted to mg/kg−d by multiplying the results by 2 L/d and dividing by 70 kg.

b. Results from animal studies which are expressed in milligrams of toxicant per liter of water consumed (mg/L) are converted to mg/kg−d by multiplying the results by the daily average volume of water consumed by the test animals in liters per day (L/d) and dividing by the average weight of the test animals in kilograms (kg).

c. Results from animal studies which are expressed in milligrams of toxicant per kilogram of food consumed (mg/kg) are converted to mg/kg−d by multiplying the results by the average amount of food consumed daily by the test animals in kilograms per day (kg/d) and dividing by the average weight of the test animals in kilograms (kg).

d. If a study does not specify water or food consumption rates, or body weight of the test animals, standard values taken from appropriate references, such as the National Institute of Occupational Safety and Health, 1980, Registry of Toxic Effects of Chemical Substances, may be used to convert units.

e. Results from animal studies in which test animals were not exposed to the toxicant each day of the test period shall be multiplied by the ratio of days that the test animals were dosed to the total days of the test period. For the purposes of this adjustment, the test period is defined as the interval beginning with the administration of the first dose and ending with the administration of the last dose, inclusive.

3. When assessing the acceptability and quality of human or animal toxicological data from which an acceptable daily exposure can be derived, the department may use the following documents as guidance:

a. "Guidelines for Mutagenicity Risk Assessment", (51 FR 34006, September 24, 1986).

b. "Guidelines for the Health Risk Assessment of Chemical Mixtures", (51 FR 34014, September 24, 1986).

c. "Guidelines for the Health Assessment of Suspect Development Toxicants", (51 FR 34028, September 24, 1986).

d. "Guidelines for Exposure Assessment", (51 FR 34042, September 24, 1986).

e. Any other documents that the department deems reliable.

4. When the available human or animal toxicological data contains conflicting information, the department may consult with experts outside of the department for guidance in the selection of the appropriate data.

(c) Using sound scientific judgment, the department shall select an acceptable daily exposure as derived in pars. (a) and (b) for calculation of the human threshold criterion. When selecting an acceptable daily exposure, the department shall adhere to the following guidelines unless a more appropriate procedure is supported by credible scientific evidence:

1. Acceptable daily exposures based on human studies are given preference to those based on animal studies.

2. When deriving an acceptable daily exposure from animal studies preference is given to chronic studies involving oral routes of exposure, including gavage, over a significant portion of the animals' life span. If acceptable studies using oral exposure routes are not available, acceptable daily exposures derived from studies using alternate exposure routes, such as inhalation, may be used.

3. When 2 or more acceptable daily exposure values are available and have been derived from studies having equal preference as defined in subds. 1. and 2., the lowest acceptable daily exposure is generally selected. If the acceptable daily exposure values differ significantly, the department may consult with experts outside of the department for guidance in the selection of the more appropriate acceptable daily exposure.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; correction in (3) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1995, No. 477; renum.

(2) to (4) to be (3) to (5) and am., cr. (2), r. and recr. Table 8, am. (5) (intro.), 1. (intro.), d., e., 2 (intro.) and (c) and am., Register, August, 1997, No. 500, eff. 9−1−97; CR 03−050: am. Table 8 Register February 2004 No. 578, eff. 3−1−04; CR 07−110: am. Table 8 Register November 2008 No. 635, eff. 12−1−08; **CR 09−123: am Table 8 Register July 2010 No. 655, eff. 8−1−10.**

NR 105.09 Human cancer criteria. (1) The human cancer criterion (HCC) is the maximum concentration of a substance or mixture of substances established to protect humans from an unreasonable incremental risk of cancer resulting from contact with or ingestion of surface waters of the state and from ingestion of aquatic organisms taken from surface waters of the state. Human cancer criteria are derived for those toxic substances which are carcinogens as defined in s. NR 105.03 (13).

(2) For any single carcinogen or any mixture of carcinogens the incremental cancer risk from exposure to surface waters and aquatic organisms taken from surface waters may not exceed one in 100,000. The combined cancer risk of individual carcinogens in a mixture is assumed to be additive unless an alternate model is supported by credible scientific evidence.

(3) Human cancer criteria are listed in Table 9. Criteria for the same substance may be different depending on the surface water classification, due to the lipid value of representative fish, a component of the BAF, and whether or not the water may be a source of drinking water. Further application of these criteria to protect drinking water and downstream uses in the Great Lakes system shall be according to s. NR 106.06 (1).

Table 9
Human Cancer Criteria
(ug/L unless specified otherwise[1])

		Public Water Supply		Non−Public Water Supply		
	Substance	Warm Water Sport Fish Communities	Cold Water[4] Communities	Warm Water Forage, Limited Forage, and Warm Water Sport Fish Communities	Cold Water Communities	Limited Aquatic Life
1.	Acrylonitrile	0.57	0.45	4.6	1.5	130
2.	Arsenic[2]	0.2	0.2	13.3	13.3	40
3.	*alpha−BHC	0.012	0.0037	0.013	0.0039	11
4.	*gamma−BHC (lindane)	0.052	0.018	0.064	0.019	54
5.	*BHC, technical grade	0.038	0.013	0.047	0.014	39
6.	Benzene[2]	5	5	140	45	1300
7.	Benzidine (ng/L)	1.5	1.5	81	55	300
8.	Beryllium	0.054	0.054	0.33	0.33	16
9.	Bis(2−chloroethyl) ether	0.31	0.29	7.6	3.0	64
10.	Bis(chloromethyl) ether (ng/L)	1.6	1.6	96	79	320
11.	Carbon tetrachloride	2.5	2.1	29	9.5	540
12.	*Chlordane (ng/L)	0.41	0.12	0.41	0.12	54000
13.	Chloroethene (vinyl chloride)	0.18	0.18	10	6.8	37
14.	Chloroform (trichloromethane)	55	53	1960	922	11200
15.	*4,4'−DDT (ng/L)	0.22	0.065	0.22	0.065	206000
16.	1,4−Dichlorobenzene	14	12	163	54	2940
17.	3,3'−Dichlorobenzidine	0.5	0.3	1.3	0.4	140
18.	1,3−Dichloropropene	3.4	3.4	173	108	700
19.	1,2−Dichloroethane	3.8	3.8	217	159	770
20.	Dichloromethane[2] (methylene chloride)	5	5	2700	2100	9600
21.	*Dieldrin (ng/L)	0.0091	0.0027	0.0091	0.0027	4400
22.	2,4−Dinitrotoluene	0.51	0.48	13	5.3	110
23.	1,2−Diphenylhydrazine	0.38	0.31	3.3	1.04	88
24.	Halomethanes[3]	55	53	1960	922	11200
25.	*Hexachlorobenzene (ng/L)	0.73	0.22	0.73	0.22	44000
26.	*Hexachlorobutadiene	0.59	0.19	0.69	0.2	910
27.	Hexachloroethane	7.7	2.9	11	3.3	5000
28.	N−Nitrosodiethylamine (ng/L)	2.3	2.3	150	140	460
29.	N−Nitrosodimethylamine	0.0068	0.0068	0.46	0.46	1.4
30.	N−Nitrosodi−n−butylamine	0.063	0.062	2.5	1.3	13
31.	N−Nitrosodiphenylamine	44	23	116	34	13000
32.	N−Nitrosopyrrolidine	0.17	0.17	11	11	34
33.	*Polychlorinated biphenyls (ng/L)	0.01	0.003	0.01	0.003	9100
34.	*2,3,7,8−Tetrachlorodibenzo−p−dioxin (pg/L)	0.014	0.0041	0.014	0.0041	930
35.	1,1,2,2−Tetrachloroethane	1.7	1.6	52	22	350
36.	Tetrachloroethene[2]	5.0	4.6	46	15	1300
37.	*Toxaphene (ng/L)	0.11	0.034	0.14	0.034	63600
38.	1,1,2−Trichloroethane[2]	5.0	5.0	195	87	1200
39.	Trichloroethene[2]	5	5	539	194	6400
40.	2,4,6−Trichlorophenol	29	24	300	97	6400

* Indicates substances that are BCCs.

[1] A human cancer criterion expressed in micrograms per liter (ug/L), nanograms per liter (ng/L) or picograms per liter (pg/L) can be converted to milligrams per liter (mg/L) by dividing the criterion by 1000, 1,000,000 or 1,000,000,000, respectively.

[2] For this substance the human cancer criteria for public water supply receiving water classifications equal the maximum contaminant level pursuant to s. NR 105.09 (4) (b).

[3] Human cancer criteria for halomethanes are applicable to any combination of the following chemicals: bromomethane (methyl bromide), chloromethane (methyl chloride), tribromomethane (bromoform), bromodichloromethane (dichloromethyl bromide), dichlorodifluoromethane (fluorocarbon 12) and trichlorofluoromethane (fluorocarbon 11).

[4] For BCCs, these criteria apply to all waters of the Great Lakes system.

(4) To derive human cancer criteria for substances not included in Table 9 the following methods shall be used:

(a) The human cancer criterion shall be calculated as follows:

$$HCC = \frac{RAD \times 70\ kg}{W_H + (F_H \times BAF)}$$

Where:

HCC = Human cancer criterion in milligrams per liter (mg/L).

RAD = Risk associated dose in milligrams toxicant per kilogram body weight per day (mg/kg–d) that is associated with a lifetime incremental cancer risk equal to one in 100,000 as derived in sub. (5).

70 kg = Average weight of an adult male in kilograms (kg).

W_H = Average per capita daily water consumption of 2 liters per day (L/d) for surface waters classified as public water supplies or, for other surface waters, 0.01 liters per day (L/d) for exposure through contact or ingestion of small volumes of water during swimming or during other recreational activities.

F_H = Average per capita daily consumption of sport–caught fish by Wisconsin anglers equal to 0.02 kilograms per day (kg/d).

BAF = Aquatic life bioaccumulation factor with units of liter per kilogram (L/kg) as derived in s. NR 105.10.

(b) For surface waters classified as public water supplies, if the human cancer criterion for a toxic substance as calculated in par. (a) exceeds the maximum contaminant level (MCL) for that substance as specified in ch. NR 809 or the July 8, 1987 Federal Register (52 FR 25690), the MCL shall be used as the human cancer criterion.

(5) The risk associated dose (RAD) referenced in sub. (4) represents the maximum amount of a substance which if ingested daily for a lifetime of 70 years has an incremental cancer risk equal to one case of human cancer in a population of 100,000. Methods for deriving the risk associated dose are specified in pars. (a) to (d).

(a) The department shall review available references for acceptable human and animal studies from which the risk associated dose can be derived. The department shall use sound scientific judgment when determining the acceptability of a study and may use the U.S. environmental protection agency's "Guidelines for Carcinogen Risk Assessment" (FR 51 33992, September 24, 1986) as guidance for judging acceptability. Suitable references for review include, but are not limited to, those presented in s. NR 105.04 (5).

(b) If an acceptable human epidemiologic study is available, contains usable exposure data, and indicates a carcinogenic effect, the risk associated dose shall be set equal to the lifetime average exposure which would produce an incremental cancer risk of one in 100,000 based on the exposure information from the study and assuming the excess cancer risk is proportional to the lifetime average exposure. If more than one human epidemiologic study is judged to be acceptable, the most protective risk associated dose derived from the studies is generally used to calculate the human cancer criterion. If the risk associated dose values differ significantly, the department may consult with experts outside of the department for guidance in the selection of the more appropriate value.

(c) In the absence of an acceptable human epidemiologic study, the risk associated dose shall be derived from available studies which use mammalian test species and which are judged acceptable. Methods for deriving the risk associated dose are specified in subds. 1. to 4.

1. A linear, non–threshold dose–response relationship as applied by the U.S. environmental protection agency in "Water Quality Criteria Documents; Availability" (45 FR 79318, November 28, 1980) shall be assumed unless a more appropriate dose–response relationship or extrapolation model is supported by credible scientific evidence.

Note: The linear non–threshold dose–response model used by the U.S. environmental protection agency provides an upper–bound estimate (i.e., the one–sided 95% upper confidence limit) of incremental cancer risk. The true cancer risk is unknown. While the true cancer risk is not likely to be greater than the upper bound estimate, it may be lower.

2. When a linear, non–threshold dose–response relationship is assumed, the risk associated dose shall be calculated using the following equation:

$$RAD = \frac{1}{q_1^*} \times 0.00001$$

Where:

RAD = Risk associated dose in milligrams toxicant per kilogram body weight per day (mg/kg–d).

0.00001 = Incremental risk of human cancer equal to one in 100,000.

q_1^* = Upper 95% confidence limit (one–sided) of the carcinogenic potency factor in days per milligram toxicant per kilogram body weight (d–kg/mg) as derived from the procedures referenced in subd. 1. and the guidance presented in subd. 3.

3. The department shall adhere to the following guidance for deriving carcinogenic potency factors, or corresponding values if an alternate dose–response relationship or extrapolation model is used, unless more appropriate procedures are supported by credible scientific evidence:

a. If 2 or more mammalian studies are judged acceptable, but vary in either species, strain or sex of the test animals, or in tumor type or site, the study giving the greatest carcinogenic potency factor shall be used. Studies which produce a spuriously high carcinogenic potency factor due to the use of a small number of test animals may be excluded.

b. If 2 or more mammalian studies are judged acceptable, are comparable in size and are identical in regard to species, strain and sex of the test animals and to tumor sites, the geometric mean of the carcinogenic potency factors derived from each study shall be used.

c. If in an acceptable study, tumors were induced at more than one site, the number of animals with tumors at one or more of the sites shall be used as incidence data when deriving the cancer potency factor.

d. The combination of benign and malignant tumors shall be used as incidence data when deriving the cancer potency factor.

e. Calculation of an equivalent dose between animal species and humans using a surface area conversion, and conversion of units of exposure to milligrams of toxicant per day (mg/d) shall be performed as specified by the U.S. environmental protection agency in "Water Quality Criteria Documents; Availability" (45 FR 79318, November 28, 1980).

f. If the duration of the mammalian study (D) is less than the natural life span of the test animal (LS), the carcinogenicity potency factor is multiplied by the factor (D/LS)3.

4. When available mammalian studies contain conflicting information, the department shall consult with the department of health and social services and may consult with experts outside of the department for guidance in the selection of the appropriate study.

(d) If both a human epidemiologic study and a study of mammalian test species are judged reliable but only the animal study indicates a carcinogenic effect, it is assumed that a risk of cancer to humans exists but that it is less than could have been detected in the epidemiologic study. An upper limit of cancer incidence may be calculated assuming that the true incidence is just below the level of detection in the cohort of the epidemiologic study. The department may consult with experts outside of the department for guidance in the selection of the appropriate study.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. table 9 and (6), Register, July, 1991, No. 427, eff. 8−1−91; correction in (4) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1995, No. 477; am. (1), (3), r. and recr. Table 9, am. (4) (a), (b), (5) (intro.), (a) (b), (c) (intro.) and 2., r. (6), Register, August, 1997, No. 500, eff. 9−1−97; CR 03−050: am. Table 9 Register February 2004 No. 578, eff. 3−1−04; CR 07−110: am. Table 9 Register November 2008 No. 635, eff. 12−1−08; **CR 09−123: am. Table 9 Register July 2010 No. 655, eff. 8−1−10.**

NR 105.10 Bioaccumulation factor. (1) The bioaccumulation factor used to derive wildlife, human threshold, human cancer and taste and odor criteria or secondary values is determined from a baseline BAF using the methodology provided in Appendix B to 40 CFR part 132. 40 CFR part 132, Appendix B as stated on September 1, 1997, is incorporated by reference. BAFs shall be used to calculate criteria and secondary values for human health and wildlife. Use of a BAF greater than 1000, as determined from either of the methods referred to in sub. (2) (c) or (d) for organic substances, will result in the calculation of a secondary value. The baseline BAF is based on the concentration of freely dissolved substances in the ambient water to facilitate extrapolation from one water to another.

(2) Baseline BAFs shall be derived using one of the following 4 methods, which are listed from most preferred to least preferred.

(a) A measured baseline BAF for an organic or inorganic substance derived from a field study of acceptable quality;

(b) A predicted baseline BAF for an organic substance derived using field−measured BSAFs of acceptable quality;

(c) A predicted baseline BAF for an organic or inorganic substance derived from a BCF measured in a laboratory study of acceptable quality and a food−chain multiplier. Food−chain multipliers are provided in 40 CFR part 132, Appendix B; or

(d) A predicted baseline BAF for an organic substance derived from a K_{OW} of acceptable quality and a food−chain multiplier.

(3) REVIEW AND SELECTION OF DATA. Measured BAFs, BSAFs and BCFs shall meet the quality assurance requirements provided in 40 CFR part 132, Appendix B and shall be obtained from available sources including the following:

(a) EPA Ambient Water Quality Criteria documents issued after January 1, 1980.

(b) Published scientific literature.

(c) Reports issued by EPA or other reliable sources.

(d) Unpublished data.

(4) HUMAN HEALTH AND WILDLIFE BAFS FOR ORGANIC SUBSTANCES. (a) To calculate human health and wildlife BAFs for organic substances, the K_{OW} of the substance shall be used with a POC concentration of 0.00000004 kg/L and a DOC concentration of 0.000002 kg/L to yield the fraction freely dissolved:

$$f_{fd} = \frac{1}{1 + \frac{(DOC)(K_{ow})}{10} + (POC)(Kow)}$$

$$= \frac{1}{1 + \frac{(0.000002\ kg/L)(K_{ow})}{10} + (0.00000004\ kg/L)(Kow)}$$

$$= \frac{1}{1 + (0.00000024\ kg/L)(K_{ow})}$$

Where:

DOC = concentration of dissolved organic carbon, kg of dissolved organic carbon/L of water.

POC = concentration of particulate organic carbon, kg of particulate organic carbon/L of water.

(b) The human health BAFs for an organic substance shall be calculated using the following equations:

For warm water communities:

Human Health BAF = $[(\text{baseline BAF})(0.013)+ 1](f_{fd})$

For cold water communities:

Human Health BAF = $[(\text{baseline BAF})(0.044)+ 1](f_{fd})$

Where: 0.013 and 0.044 are the fraction lipid values for warm and cold water fish and aquatic life communities, respectively, that are required to derive human health criteria and secondary values.

baseline BAF = the baseline BAF calculated according to 40 CFR part 132, Appendix B.

(c) The wildlife BAFs for an organic substance shall be calculated using the following equations:

1. For trophic level 3:
Wildlife BAF = $[(\text{baseline BAF})(0.0646)+ 1](f_{fd})$

2. For trophic level 4:
Wildlife BAF = $[(\text{baseline BAF})(0.1031)+ 1](f_{fd})$

Where: 0.0646 and 0.1031 are the standardized fraction lipid values for dietary consumption from trophic level 3 and 4 fish taxa, respectively, that are required to derive wildlife criteria and secondary values.

baseline BAF = the baseline BAF calculated according to 40 CFR part 132, Appendix B.

(5) HUMAN HEALTH AND WILDLIFE BAFS FOR INORGANIC SUBSTANCES. (a) *Human health.* 1. Measured BAFs and BCFs used to determine human health BAFs for inorganic substances shall be based on edible tissue (e.g., muscle) of freshwater fish. If it is demonstrated that whole−body BAFs or BCFs are similar to edible−tissue BAFs or BCFs, then these data are acceptable. BCFs and BAFs based on measurements of aquatic plants and invertebrates may not be used in the derivation of human health criteria and values.

2. If one or more field−measured baseline BAFs for an inorganic substance are available from studies conducted in the Great Lakes system with the muscle of fish, the geometric mean of the species mean baseline BAFs shall be used as the human health BAF for that substance.

3. If an acceptable measured baseline BAF is not available for an inorganic substance and one or more acceptable edible−portion BCFs are available for the substance, a predicted baseline BAF shall be calculated by multiplying the geometric mean of the BCFs times a FCM. The FCM will be 1.0 unless chemical−specific biomagnification data support using a multiplier other than 1.0. The predicted baseline BAF shall be used as the human health BAF for that substance.

(b) *Wildlife.* 1. Measured BAFs and BCFs used to determine wildlife BAFs for inorganic substances shall be based on whole−body freshwater fish and invertebrate data. If it is demonstrated that edible−tissue BAFs or BCFs are similar to whole−body BAFs or BCFs, then these data are acceptable.

2. If one or more field−measured baseline BAFs for an inorganic substance is available from studies conducted in the Great Lakes system with whole body of fish or invertebrates, then the following apply:

a. For each trophic level, a species mean measured baseline BAF shall be calculated as the geometric mean if more than one measured BAF is available for a given species.

b. For each trophic level, the geometric mean of the species mean measured baseline BAFs shall be used as the wildlife BAF for that substance.

3. If an acceptable measured baseline BAF is not available for an inorganic substance and one or more acceptable whole−body BCFs are available for the substance, a predicted baseline BAF shall be calculated by multiplying the geometric mean of the BCFs times a FCM. The FCM shall be 1.0 unless chemical−specific biomagnification data support using a multiplier other than 1.0. The predicted baseline BAF shall be used as the wildlife BAF for that substance.

Note: Copies of 40 CFR Part 132, Appendix B are available for inspection in the offices of the department of natural resources, secretary of state and the legislative reference bureau, Madison, WI or may be purchased from the superintendent of documents, US government printing office, Washington, D.C. 20402.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; r. and recr., Register, August, 1997, No. 500, eff. 9−1−97.

NR 105.11 Final plant values. (1) A Final Plant Value (FPV) is the lowest plant value that was obtained with an important aquatic plant species in an acceptable toxicity test for which the concentrations of the test substance were measured and the adverse effect was biologically important. Appropriate measures of the toxicity of the substance to aquatic plants are used to compare the relative sensitivities of aquatic plants and animals.

(2) A plant value is the result of a 96−hour test conducted with an algae or a chronic test conducted with an aquatic vascular plant. A test of the toxicity of a metal to a plant may not be used if the medium contained an excessive amount of a complexing agent, such as EDTA, that might affect the toxicity of the metal. Concentrations of EDTA above 200 µg/L should be considered excessive.

(3) The FPV shall be established by selecting the lowest result from a test with an important aquatic plant species in which the concentrations of test material are measured and the endpoint is biologically important.

Note: Although procedures for conducting and interpreting the results of toxicity tests with plants are not well advanced, results of tests with plants usually indicate that criteria which adequately protect aquatic animals and their uses will, in most cases, also protect aquatic plants and their uses.

History: Cr. Register, August, 1997, No. 500, eff. 9−1−97.

Attachment C

Field Activity Documentation

- Enbridge Field Investigation Sampling and Screening Logs
- Surface Water Quality Field Monitoring Data

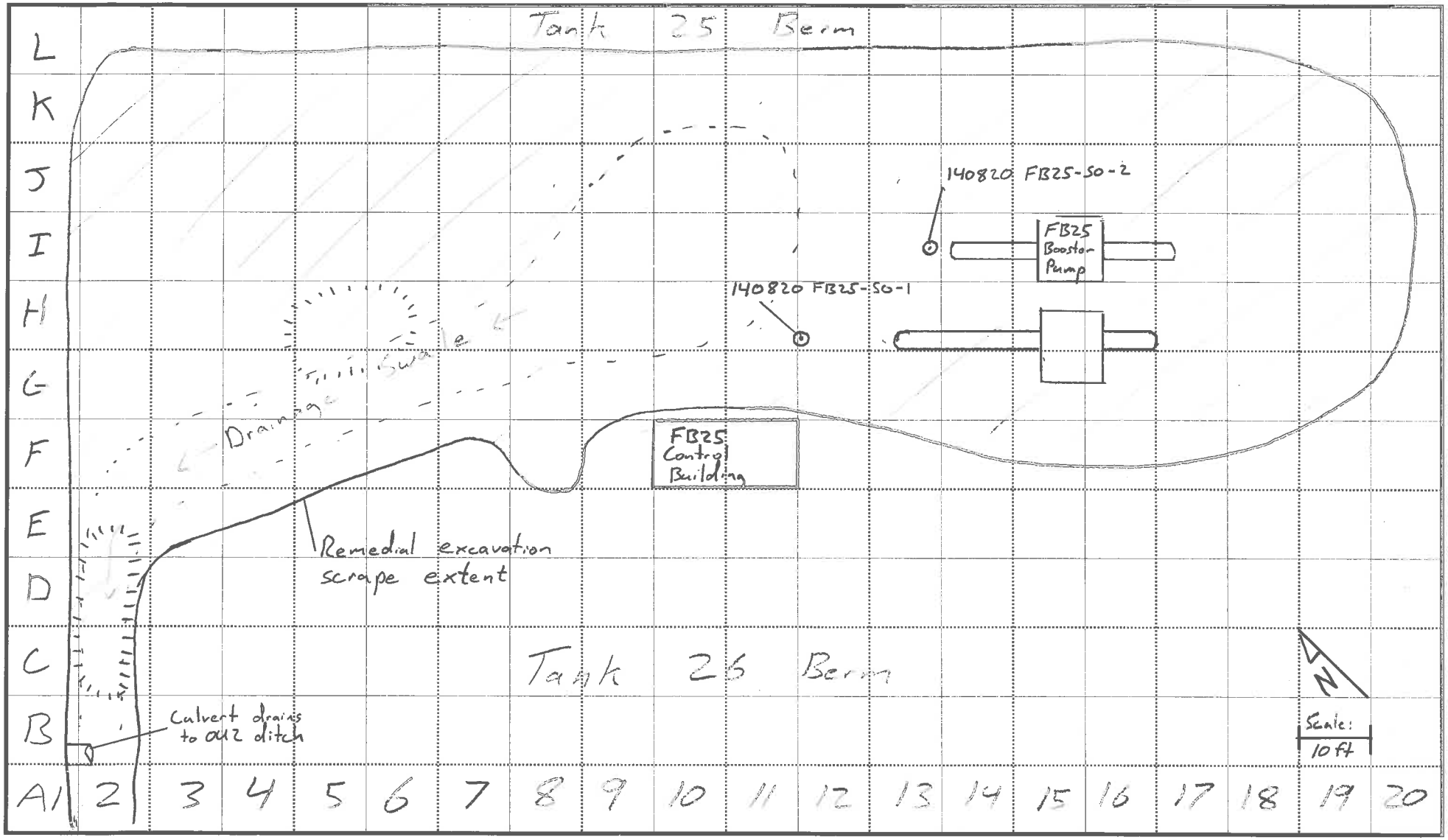
SITE LAYOUT

Location: *Milepost or Facility* FB25 Response, OU1 Area Date: 8.19.2014

Barr Personnel: TJB/CTF

Was a GPS used to document the location of site features? YES or (NO)

Identify the GPS unit: _____



SITE NOTES/LEGEND:

⊙ Analytical sample location

Excavation extent

Non-crude oil sheen observed

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* FB25 Response - OU1 Area

Equipment used: Photo *-ionization detector with* 11.7 *eV lamp*

Sample Nomenclature *(Location - sample type - #):* _____

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Date: 8.19.2014

Sampler: TTS

Calibration Time: 0745 / 1245

BARR

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)	Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Note: See Site Layout sketch for sample location													
Example: Stockpile-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275	*Example: Stockpile-1*	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
OU1-F3	0.4	10:05	ML/GP	Reddish brn	N/N	0.0	OU1-F9	0.3	11:30	GP	Reddish brn	N/N	0.0
OU1-G3	0.3		CH			0.4	OU1-G9	0.3		GP/CL			0.0
OU1-G2	0.3		SP/GP			0.6	OU1-H9	0.3		GP			0.0
OU1-F2	0.2		SP			0.5	OU1-I9	0.8		GP			0.0
OU1-E3	0.2		CH			0.1	OU1-J9	0.3		SP/GP			0.0
OU1-E2	0.0	↓	CL			0.7	OU1-H10	0.3		SP/GP			0.0
OU1-E4	0.3	10:25	CL			0.0	OU1-I10	0.3		SP/GP			0.0
OU1-F4	0.3		CL			1.4	OU1-J10	0.3	↓	SP			0.0
OU1-G4	0.3		ML/GP			0.0	OU1-E2	0.3	13:05	CL			0.0
OU1-H4	0.2	↓	SP/GP			0.0	OU1-D2	0.3		CH			0.0
OU1-F5	0.2	10:35	CH			0.0	OU1-C2	0.3		CH			0.0
OU1-F6	0.2		CL/GP		↓	0.0	OU1-B2	0.4		CH			0.0
OU1-G5	0.2		CH		N/Mod	0.0	OU1-A2	0.3	↓	CH	↓	↓	0.0
OU1-G6	0.2		CH		N/Mod	0.8							
OU1-H5	0.3		SP/GP		N/N	0.0							
OU1-H6	0.3		CL			0.0							
OU1-I5	0.3		GP			0.0							
OU1-I6	0.3	↓	GP			0.0							
OU1-F7	0.2	11:10	CH			0.0							
OU1-G7	0.2		CH			0.0							
OU1-H7	0.2		SP	↓		0.0							
OU1-I7	0.2		GP	Brown		0.2							
OU1-I8	0.2		GP	Multi-colored		0.0							
OU1-H8	0.2		SP/GP	Reddish brn		0.0							
OU1-G8	0.2		CL/GP	↓		0.0							
OU1-F8	0.2	↓	CH	↓	↓	0.0							

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* FB25 Response - OU1 Area

Equipment used: Photo -ionization detector with 11.7 eV lamp

Sample Nomenclature *(Location - sample type - #)*: ______

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Date: 8.20.2014

Sampler: CTF

Calibration Time: 06:45

BARR

Note: See site layout for sample location.

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
OU1-G10	0.2	0700	CL, GP, SM Fill	Reddish brown	N/N	0.3
OU1-H13	0.6	↓	↓	↓	↓	0.0
OU1-J13	0.3					0.0
OU1-G9	0.2					0.0
OU1-H11	0.6					0.1
OU1-K11	0.3					0.0
OU1-F8	0.3					0.0
OU1-H8	0.6					0.0
OU1-J8	0.3					0.0
OU1-F6	0.8					0.0
OU1-I6	0.3					0.0
OU1-K6	0.2	↓				0.0
OU1-I13	0.3	0730	✓			0.0
OU1-I14	0.2	↓	CH			0.5
OU1-I15	0.1		CH			0.0
OU1-J15	0.1		CH			0.0
OU1-J16	0.2		GP/CH			0.0
OU1-I17	0.1		CH/GP	✓		0.0
OU1-H17	0.1		GP	Gray		0.0
OU1-G17	0.1		CH/GP	Reddish brn		0.0
OU1-G16	0.1		CH	↓		0.0
OU1-G15	0.1	✓	CH/GP	✓	✓	30.0

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
Analytical Samples						
140820 FB25-SO-1	0.1	1125				
140820 FB25-SO-2	0.1	1100				
Dup-1						

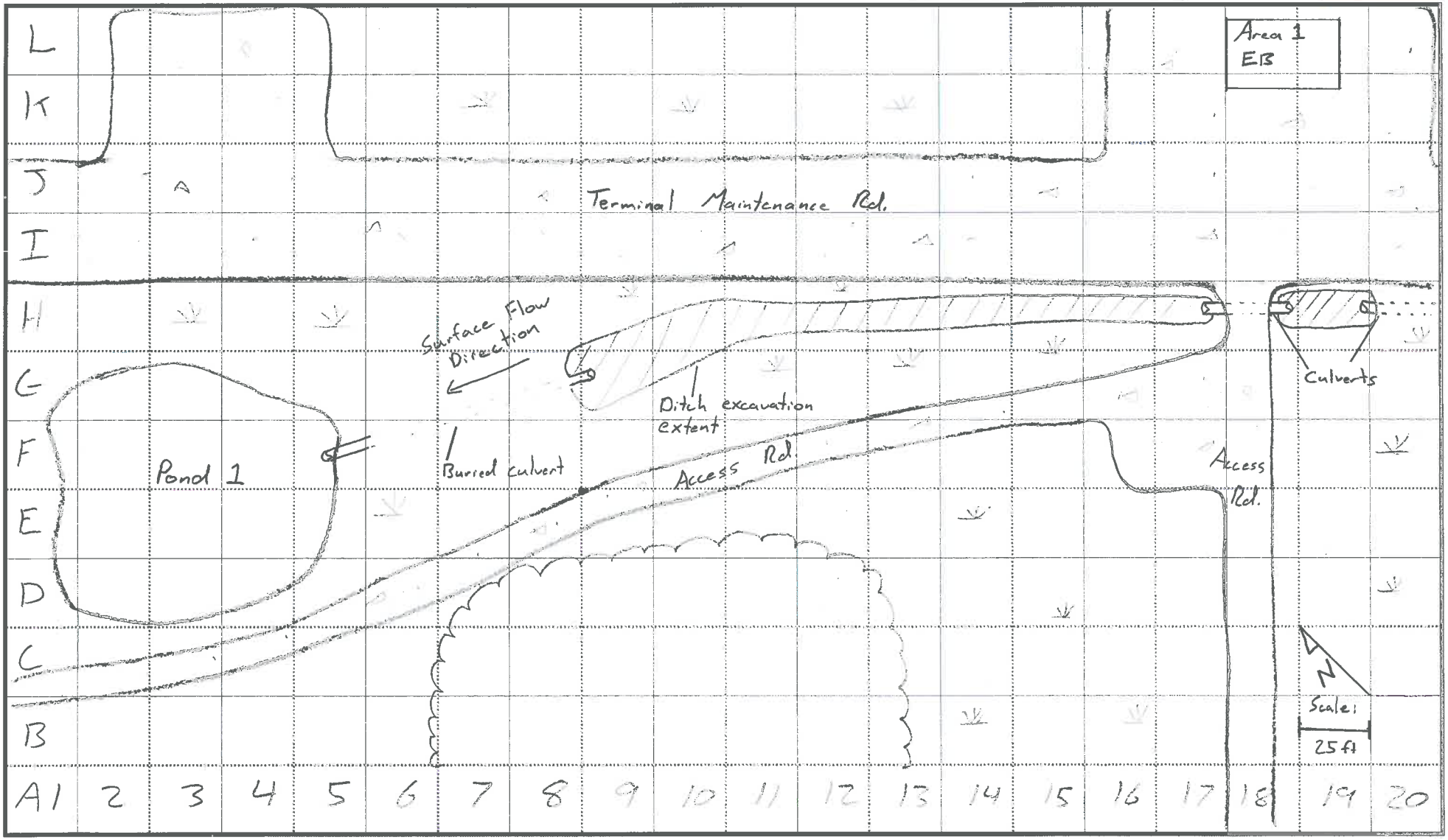
SITE LAYOUT

Location: *Milepost or Facility* FB25 Response - 002 Date: 8.20.2014

Barr Personnel: CTF / TTB / REE

Was a GPS used to document the location of site features? YES or (NO)

Identify the GPS unit: _____



SITE NOTES/LEGEND:

- //// Remedial excavation
- Wooded area
- Grassy area
- Gravel surface

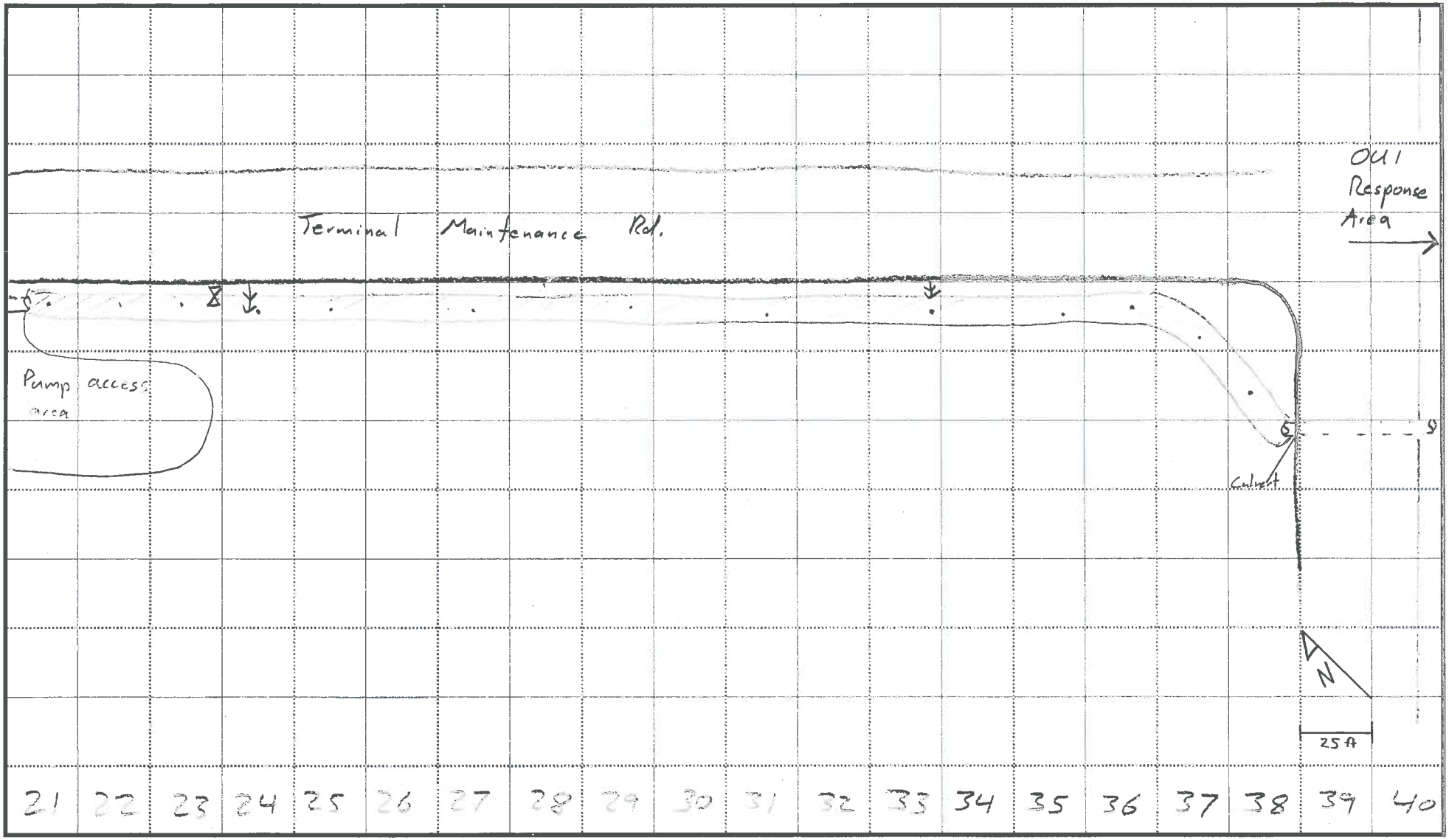
SITE LAYOUT

Location: *Milepost or Facility* FB25 Response - OU2 Date: 8.20.2014

Barr Personnel: CTF/TTB

Was a GPS used to document the location of site features? YES or (NO)

Identify the GPS unit: _____



SITE NOTES/LEGEND:

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* FB25 Response - OU2 Area

Equipment used: Photo *-ionization detector with* 11.7 *eV lamp*

Sample Nomenclature *(Location - sample type - #):* _____

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Date: 8.26.2014

Sampler: TIS

Calibration Time: 1030

BARR

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	*4*	*16:30*	*CL*	*Reddish brown*	*Petroleum/ Rainbow*	*275*
OU2 - G9	1.0	11:00	CH	Reddish brn	N/N	0.0
OU2 - G10	1.0	11:00		↓	↓	0.0
OU2 - H11	1.0	11:35		↓	N/Lt Rainbow	1.5
OU2 - H12	1.0	12:00		Dk brn		0.0
OU2 - H13	1.0	14:15		Reddish brn		0.0
OU2 - H14	1.0	14:15				0.0
OU2 - H15	1.0	15:00				0.0
OU2 - H6	1.0	15:40				0.0
OU2 - H28	1.0	8/27 1446				0.0
OU2 - H29	1.0	8/27 1407				0.0
OU2 - H30	1.0	8/27 1450				0.0
OU2 - H31	1.0	8/27 1455				0.0

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	*4*	*16:30*	*CL*	*Reddish brown*	*Petroleum/ Rainbow*	*275*

Analytical Samples Collected

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* FB25 Response - OU2 Area

Equipment used: Photo *-ionization detector with* 11.7 *eV lamp*

Sample Nomenclature *(Location - sample type - #):* _____

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Date: 8.20.2014

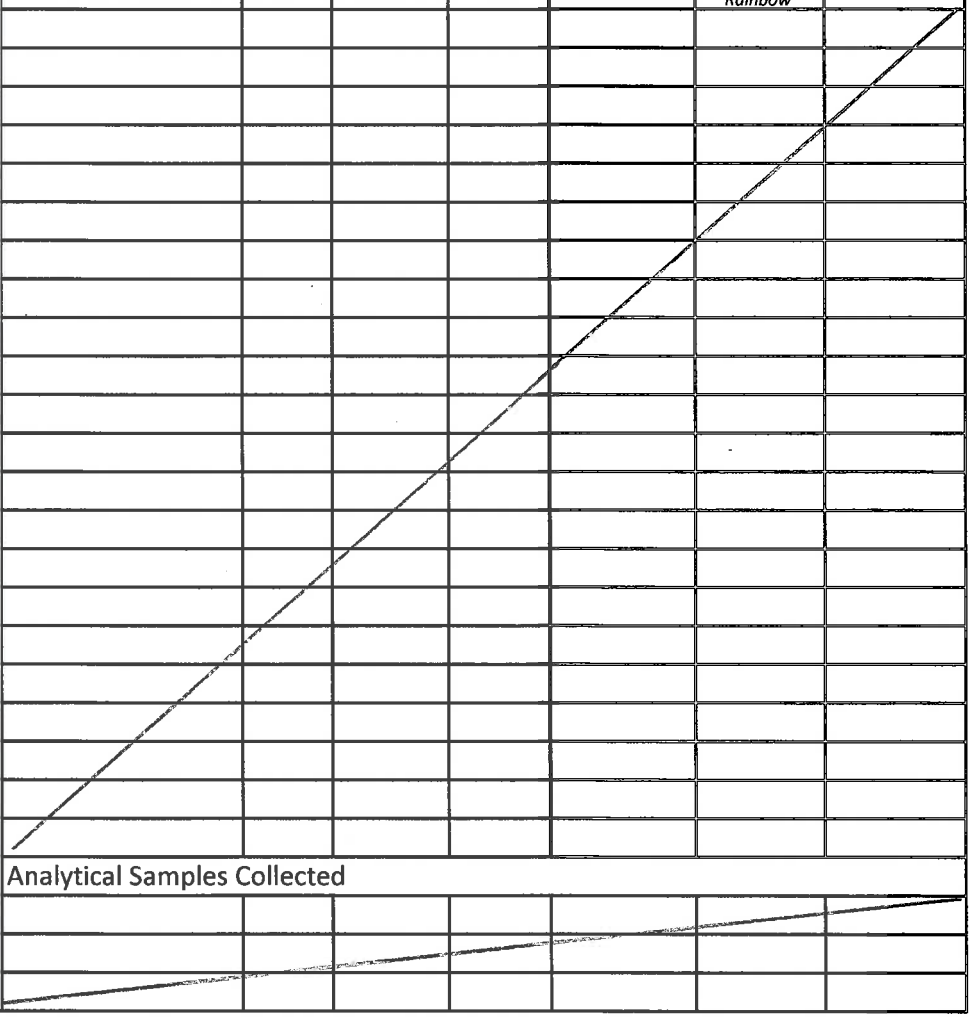
Sampler: LTF

Calibration Time: 0630

BARR

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	*4*	*16:30*	*CL*	*Reddish brown*	*Petroleum/ Rainbow*	*275*
OU2-G9	0.2	14:38	CH/CL	Reddish brn	N/N	0.0
OU2-H11	0.2	↓	↓	↓	Petro/Lt. Rainbow	5.4
OU2-H13	0.3	↓	↓	↓	N/N	0.0
OU2-H15	0.2	↓	↓	Trace Veg	↓	0.0
OU2-H17	0.2	↓	↓	↓	↓	0.0
OU2-H18	0.2	14:46	↓	↓	N/Lt Rainbow	0.0
OU2-H19	0.3	↓	↓	↓	N/N	0.2
OU2-H21	0.2	↓	↓	↓	N/N	0.0
OU2-H22	0.3	15:00	↓	↓	N/Lt Rainbow	0.0
OU2-H23	0.2	↓	↓	↓	Faint Petro/Lt. Rainbow	0.3
OU2-H24	0.2	↓	↓	↓	Faint Petro/Lt. Rainbow	0.0
OU2-H25	0.3	15:09	↓	↓	N/N	0.0
OU2-H27	0.3	↓	↓	↓	↓	0.0
OU2-H29	0.3	↓	↓	↓	↓	0.0
OU2-H31	0.3	↓	↓	↓	N/Lt Rainbow	0.0
OU2-H33	0.3	↓	↓	↓	N/Lt Rainbow	0.0
OU2-H35	0.3	15:30	↓	↓	N/N	0.0
OU2-H36	0.4	↓	↓	↓	↓	0.0
OU2-H37	0.4	↓	↓	↓	↓	1.0
OU2-B38	0.4	↓	↓	↓	↓	0.3

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	*4*	*16:30*	*CL*	*Reddish brown*	*Petroleum/ Rainbow*	*275*



SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Page__of__

Location: *Milepost or Facility* Superior Terminal FB25 Release - Pond 1

Equipment used: PID *-ionization detector with* 11.7 *eV lamp* Background Headspace: 0.0 ppm

Date: 9-9-14

Sampler: LEN + NRS2

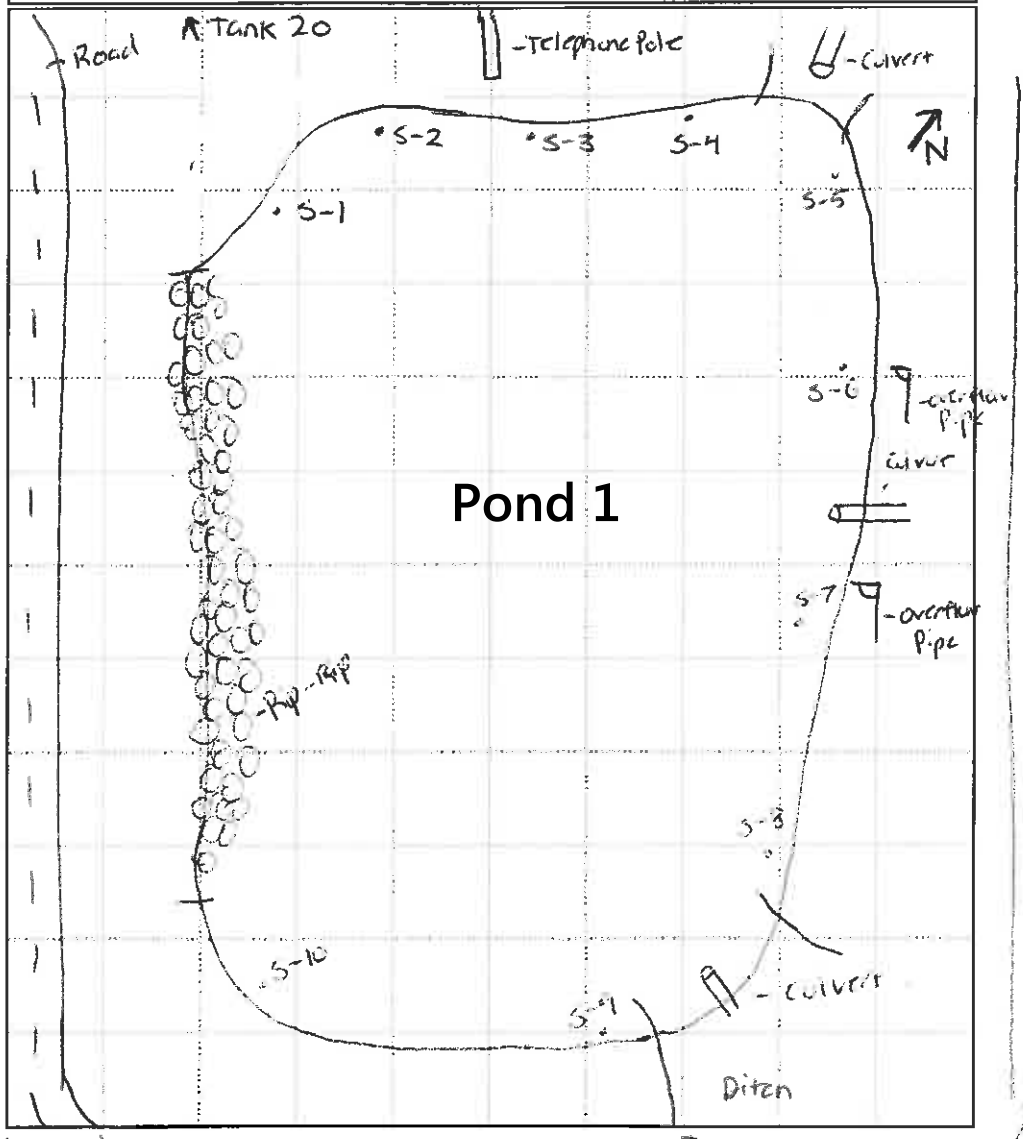
Calibration Time: 13:15

Sample Nomenclature *(Location - sample type - #):* Samples taken from Pond walls

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Sample ID	* Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example TK99-S-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
S-1	1	14:00	CL	Reddish brown/none	organic/none	2.6
S-2	1			Reddish brown/*	Faint petroleum/none	9.5
S-3	.8			/*	organic/none	0.6
S-4	1.5			/none	none/none	0.0
S-5	1			/none	organic/none	3.7
S-6	.7	14:15		/none	organic/none	0.0
S-7	1			/none	organic/none	0.0
S-8	.5			/none	organic/none	0.0
S-9	.5			/none	organic/none	0.0
S-10	1			/Brown gray	organic/none	0.0

SITE SKETCH: *north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features...* ***1 inch/grid*** = 10' ***FEET***



* Depth above water level

* Some black staining

FB25 Release Response

Surface Water Quality Field Monitoring Results from 0U4 & OU5

Sample ID	Date	Time	pH (SU) min	pH (SU) max	D.O. (mg/L)
WDPES Permit Effluent Limititations			***6***	9	***7 min***
140818-FB25-SW-1	8/18/2014	-	NM		NM
140818-FB25-SW-2	8/18/2014	-	NM		NM
140818-FB25-SW-3	8/18/2014	-	NM		NM
140818-FB25-SW-4	8/18/2014	-	NM		NM
140818-FB25-SW-5	8/18/2014	-	NM		NM
140819-FB25-SW-1	8/19/2014	-	NM		NM
140819-FB25-SW-2	8/19/2014	17:15	7.62		**5.28**
140819-FB25-SW-5	8/19/2014	18:10	7.84		**6.98**
140819-FB25-SW-6	8/19/2014	16:10	**5.97**		7.85
140820-FB25-SW-1	8/20/2014	11:40	7.65		**6.87**
140820-FB25-SW-2	8/20/2014	12:05	7.48		**6.45**
140820-FB25-SW-5	8/20/2014	14:05	7.87		7.33
140820-FB25-SW-6	8/20/2014	15:00	7.73		**5.95**
140821-FB25-SW-1	8/21/2014	11:15	7.70		7.28
140821-FB25-SW-2	8/21/2014	10:55	7.72		7.10
140821-FB25-SW-5	8/21/2014	13:40	7.94		8.98
140821-FB25-SW-6	8/21/2014	13:20	7.97		7.23
140822-FB25-SW-1	8/22/2014	9:50	7.78		7.29
140822-FB25-SW-2	8/22/2014	9:30	7.78		7.48
140822-FB25-SW-5	8/22/2014	11:50	8.01		8.48
140822-FB25-SW-6	8/22/2014	11:30	7.86		7.11

Notes:

NM *= Not measured*

BOLD *= WPDES Permit Exceedance*

Attachment D

Laboratory Reports for Excavation Soil Samples and Surface Water Samples

FB25 Release Response

Analytical Sample Summary

Sample ID	Date	Time	Analytical Parameters	Laboratory
SOIL SAMPLES				
140820-FB25-SO-1	8/20/2014	11:25	PVOC, Naphthalene, % Solids	ALS
140820-FB25-SO-1	8/20/2014	11:00	PVOC, Naphthalene, % Solids	ALS
SURFACE WATER SAMPLES				
140818-FB25-SW-1	8/18/2014	14:15	DRO, PAH, BETX, TSS	ALS
140818-FB25-SW-2	8/18/2014	14:35	DRO, PAH, BETX, O&G, TSS	ALS
140818-FB25-SW-3	8/18/2014	15:35	DRO, PAH, BETX, O&G, TSS	ALS
140818-FB25-SW-4	8/18/2014	16:30	DRO, PAH, BETX, O&G, TSS	ALS
140818-FB25-SW-5	8/18/2014	17:00	DRO, BETX, O&G, TSS	ALS
140819-FB25-SW-2	8/19/2014	17:15	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140819-FB25-SW-5	8/19/2014	18:10	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140819-FB25-SW-6	8/19/2014	16:10	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140820-FB25-SW-1	8/20/2014	11:40	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140820-FB25-SW-2	8/20/2014	12:05	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140820-FB25-SW-5	8/20/2014	14:05	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140820-FB25-SW-6	8/20/2014	15:00	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140821-FB25-SW-1	8/21/2014	11:15	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140821-FB25-SW-2	8/21/2014	10:55	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140821-FB25-SW-5	8/21/2014	13:40	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140821-FB25-SW-6	8/21/2014	13:20	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140822-FB25-SW-1	8/22/2014	9:50	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140822-FB25-SW-2	8/22/2014	9:30	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140822-FB25-SW-5	8/22/2014	11:50	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)
140822-FB25-SW-6	8/22/2014	11:30	PAH, BETX, O&G, TSS, BOD	ALS, ERA (BOD)

25-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response Soil 8.20.14** Work Order: **14081069**

Dear Ryan,

ALS Environmental received 3 samples on 21-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 13.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
Work Order: **14081069**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081069-01	140820FB25-SO-1	Soil		8/20/2014 11:25	8/21/2014 10:00	☐
14081069-02	140820FB25-SO-2	Soil		8/20/2014 11:00	8/21/2014 10:00	☐
14081069-03	DUP-1	Soil		8/20/2014	8/21/2014 10:00	☐

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
Work Order: 14081069

Case Narrative

Samples for the above noted Work Order were received on 08/21/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
WorkOrder: **14081069**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
% of sample	Percent of Sample
µg/Kg-dry	Micrograms per Kilogram Dry Weight

ALS Group USA, Corp

Date: *25-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
Work Order: 14081069
Sample ID: 140820FB25-SO-1
Lab ID: 14081069-01
Collection Date: 8/20/2014 11:25 AM
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260B**		Prep: SW5035 / 8/21/14	Analyst: **RS**
1,2,4-Trimethylbenzene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
1,3,5-Trimethylbenzene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
Benzene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
Ethylbenzene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
m,p-Xylene	ND		77	µg/Kg-dry	1	8/21/2014 06:25 PM
Naphthalene	ND		130	µg/Kg-dry	1	8/21/2014 06:25 PM
o-Xylene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
Toluene	ND		38	µg/Kg-dry	1	8/21/2014 06:25 PM
Xylenes, Total	ND		120	µg/Kg-dry	1	8/21/2014 06:25 PM
Surr: 1,2-Dichloroethane-d4	*87.6*		*70-130*	*%REC*	1	8/21/2014 06:25 PM
Surr: 4-Bromofluorobenzene	*102*		*70-130*	*%REC*	1	8/21/2014 06:25 PM
Surr: Dibromofluoromethane	*92.6*		*70-130*	*%REC*	1	8/21/2014 06:25 PM
Surr: Toluene-d8	*95.4*		*70-130*	*%REC*	1	8/21/2014 06:25 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**22**		**0.050**	**% of sample**	1	8/22/2014 12:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *25-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
Work Order: 14081069
Sample ID: 140820FB25-SO-2
Lab ID: 14081069-02
Collection Date: 8/20/2014 11:00 AM
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260B**		Prep: SW5035 / 8/21/14	Analyst: **BG**
1,2,4-Trimethylbenzene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
1,3,5-Trimethylbenzene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
Benzene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
Ethylbenzene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
m,p-Xylene	ND		75	µg/Kg-dry	1	8/21/2014 05:19 PM
Naphthalene	ND		120	µg/Kg-dry	1	8/21/2014 05:19 PM
o-Xylene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
Toluene	ND		37	µg/Kg-dry	1	8/21/2014 05:19 PM
Xylenes, Total	ND		110	µg/Kg-dry	1	8/21/2014 05:19 PM
Surr: 1,2-Dichloroethane-d4	*97.3*		*70-130*	*%REC*	1	8/21/2014 05:19 PM
Surr: 4-Bromofluorobenzene	*98.4*		*70-130*	*%REC*	1	8/21/2014 05:19 PM
Surr: Dibromofluoromethane	*94.4*		*70-130*	*%REC*	1	8/21/2014 05:19 PM
Surr: Toluene-d8	*98.6*		*70-130*	*%REC*	1	8/21/2014 05:19 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**20**		**0.050**	**% of sample**	1	8/22/2014 12:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *25-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response Soil 8.20.14
Work Order: 14081069
Sample ID: DUP-1
Lab ID: 14081069-03
Collection Date: 8/20/2014
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260B**		Prep: SW5035 / 8/21/14	Analyst: **RS**
1,2,4-Trimethylbenzene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
1,3,5-Trimethylbenzene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
Benzene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
Ethylbenzene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
m,p-Xylene	ND		77	µg/Kg-dry	1	8/21/2014 06:52 PM
Naphthalene	ND		130	µg/Kg-dry	1	8/21/2014 06:52 PM
o-Xylene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
Toluene	ND		39	µg/Kg-dry	1	8/21/2014 06:52 PM
Xylenes, Total	ND		120	µg/Kg-dry	1	8/21/2014 06:52 PM
Surr: 1,2-Dichloroethane-d4	*87.9*		*70-130*	*%REC*	1	8/21/2014 06:52 PM
Surr: 4-Bromofluorobenzene	*104*		*70-130*	*%REC*	1	8/21/2014 06:52 PM
Surr: Dibromofluoromethane	*93.0*		*70-130*	*%REC*	1	8/21/2014 06:52 PM
Surr: Toluene-d8	*95.4*		*70-130*	*%REC*	1	8/21/2014 06:52 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**21**		**0.050**	**% of sample**	1	8/22/2014 12:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

QC BATCH REPORT

Batch ID: **61888** Instrument ID **VMS5** Method: **SW8260B**

MBLK Sample ID: **MBLK-61888-61888** Units: **µg/Kg** Analysis Date: **8/21/2014 03:41 PM**

Client ID: Run ID: **VMS5_140821A** SeqNo: **2899484** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	ND	30								
1,3,5-Trimethylbenzene	ND	30								
Benzene	ND	30								
Ethylbenzene	ND	30								
m,p-Xylene	ND	60								
Naphthalene	ND	100								
o-Xylene	ND	30								
Toluene	ND	30								
Xylenes, Total	ND	90								
Surr: 1,2-Dichloroethane-d4	*988.5*	0	*1000*	0	*98.8*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*988*	0	*1000*	0	*98.8*	*70-130*	0			
Surr: Dibromofluoromethane	*964*	0	*1000*	0	*96.4*	*70-130*	0			
Surr: Toluene-d8	*973*	0	*1000*	0	*97.3*	*70-130*	0			

LCS Sample ID: **LCS-61888-61888** Units: **µg/Kg** Analysis Date: **8/21/2014 02:25 PM**

Client ID: Run ID: **VMS5_140821A** SeqNo: **2899483** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	1038	30	1000	0	104	65-135	0			
1,3,5-Trimethylbenzene	1054	30	1000	0	105	65-135	0			
Benzene	1088	30	1000	0	109	75-125	0			
Ethylbenzene	1061	30	1000	0	106	75-125	0			
m,p-Xylene	2121	60	2000	0	106	80-125	0			
Naphthalene	964.5	100	1000	0	96.4	40-140	0			
o-Xylene	1044	30	1000	0	104	75-125	0			
Toluene	1035	30	1000	0	104	70-125	0			
Xylenes, Total	3166	90	3000	0	106	75-125	0			
Surr: 1,2-Dichloroethane-d4	*962.5*	0	*1000*	0	*96.2*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*1030*	0	*1000*	0	*103*	*70-130*	0			
Surr: Dibromofluoromethane	*960*	0	*1000*	0	*96*	*70-130*	0			
Surr: Toluene-d8	*996.5*	0	*1000*	0	*99.6*	*70-130*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081069
Project: Enbridge FB25 Release Response Soil 8.20.14

QC BATCH REPORT

Batch ID: **61888** Instrument ID **VMS5** Method: **SW8260B**

MS Sample ID: **14081069-02B MS** Units: **µg/Kg** Analysis Date: **8/21/2014 11:49 PM**
Client ID: **140820FB25-SO-2** Run ID: **VMS6_140821A** SeqNo: **2899280** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	943	30	1000	0	94.3	65-135	0			
1,3,5-Trimethylbenzene	932.5	30	1000	0	93.2	65-135	0			
Benzene	917.5	30	1000	0	91.8	75-125	0			
Ethylbenzene	924.5	30	1000	0	92.4	75-125	0			
m,p-Xylene	1844	60	2000	0	92.2	80-125	0			
Naphthalene	696.5	100	1000	49.5	64.7	40-140	0			
o-Xylene	942	30	1000	0	94.2	75-125	0			
Toluene	908	30	1000	0	90.8	70-125	0			
Xylenes, Total	2786	90	3000	0	92.9	75-125	0			
Surr: 1,2-Dichloroethane-d4	*941.5*	0	*1000*	0	*94.2*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*990.5*	0	*1000*	0	*99*	*70-130*	0			
Surr: Dibromofluoromethane	*967.5*	0	*1000*	0	*96.8*	*70-130*	0			
Surr: Toluene-d8	*990*	0	*1000*	0	*99*	*70-130*	0			

MSD Sample ID: **14081069-02B MSD** Units: **µg/Kg** Analysis Date: **8/22/2014 12:14 PM**
Client ID: **140820FB25-SO-2** Run ID: **VMS6_140821A** SeqNo: **2899281** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	937.5	30	1000	0	93.8	65-135	943	0.585	30	
1,3,5-Trimethylbenzene	926.5	30	1000	0	92.6	65-135	932.5	0.646	30	
Benzene	898	30	1000	0	89.8	75-125	917.5	2.15	30	
Ethylbenzene	892.5	30	1000	0	89.2	75-125	924.5	3.52	30	
m,p-Xylene	1800	60	2000	0	90	80-125	1844	2.44	30	
Naphthalene	743	100	1000	49.5	69.4	40-140	696.5	6.46	30	
o-Xylene	927	30	1000	0	92.7	75-125	942	1.61	30	
Toluene	880.5	30	1000	0	88	70-125	908	3.08	30	
Xylenes, Total	2727	90	3000	0	90.9	75-125	2786	2.16	30	
Surr: 1,2-Dichloroethane-d4	*935.5*	0	*1000*	0	*93.6*	*70-130*	941.5	*0.639*	*30*	
Surr: 4-Bromofluorobenzene	*992*	0	*1000*	0	*99.2*	*70-130*	990.5	*0.151*	*30*	
Surr: Dibromofluoromethane	*972*	0	*1000*	0	*97.2*	*70-130*	967.5	*0.464*	*30*	
Surr: Toluene-d8	*985.5*	0	*1000*	0	*98.6*	*70-130*	990	*0.456*	*30*	

The following samples were analyzed in this batch: 14081069-01B 14081069-02B 14081069-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081069
Project: Enbridge FB25 Release Response Soil 8.20.14

QC BATCH REPORT

Batch ID: **R146847** Instrument ID **MOIST** Method: **A2540 G**

MBLK Sample ID: **WBLKS-R146847** Units: **% of sample** Analysis Date: **8/22/2014 12:40 PM**
Client ID: Run ID: **MOIST_140822B** SeqNo: **2900743** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	ND	0.050								

LCS Sample ID: **LCS-R146847** Units: **% of sample** Analysis Date: **8/22/2014 12:40 PM**
Client ID: Run ID: **MOIST_140822B** SeqNo: **2900744** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	100	0.050	100	0	100	99.5-100.5	0			

DUP Sample ID: **14081069-02A DUP** Units: **% of sample** Analysis Date: **8/22/2014 12:40 PM**
Client ID: **140820FB25-SO-2** Run ID: **MOIST_140822B** SeqNo: **2900757** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	17.64	0.050	0	0	0	0-0	19.6	10.5	20	

DUP Sample ID: **1408912-16A DUP** Units: **% of sample** Analysis Date: **8/22/2014 12:40 PM**
Client ID: Run ID: **MOIST_140822B** SeqNo: **2900763** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	21.76	0.050	0	0	0	0-0	20.79	4.56	20	

The following samples were analyzed in this batch: 14081069-01A 14081069-02A 14081069-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081069

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292.00-001/100

Project Name: FB25 Release Response

Sample Origination State: W I (use two letter postal state abbreviation)

COC Number: № 41382

COC 1 of 1

Project Manager: REF

Project QC Contact: AAN

Sampled by: CTF

Laboratory: ALS

	Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil: NOC + Naphthalene minus MTBE (4oz jar)	Total Number Of Containers
1	1. 140820FB25-SO-1	.1	.1	ft	08/20/2014	1125		X	X															1	2	3
2	2. 140820FB25-SO-2	.1	.1	ft	08/20/2014	1100		X	X		X													2	4	6
3	3. Dup-1	—	—	—	—	—		X			X													1	2	3
	4.																									
	5.																									
	6.																									
	7.																									
	8.																									
	9.																									
	10.																									

NOC + Naphthalene minus MTBE

(and MS/MSD)

TAT By 8/25/14

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
[signature]	Y	8.20.14	1730	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	Date 8/21/14	Time 1000	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 8753 9348 9983

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

3 pc

H:RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **21-Aug-14 10:00**

Work Order: **14081069** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 21-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Soil

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/21/2014 12:10:54 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Company

Dept./Floor/Suite/Room

ORIGIN ID:DLHA (218) 727-5218
BARR ENGINEERING

332 W SUPERIOR ST

DULUTH, MN 558021808
UNITED STATES US

SHIP DATE: 20AUG14
ACTWGT: 46.1 LB MAN
CAD: /POS1501
DIMS: 24x14x13 IN

BILL SENDER

TO **ATTN: SAMPLE RECEIVING**
ALS
3352 128TH AVE

HOLLAND MI 49424
(616) 399-6070 REF:
INV:
PO: DEPT:

FedEx
Express

3 of 5

MPS# 0681 **7801 3724 8740**

Mstr# 8753 9348 9983 0215

XX HLMA

THU - 21 AUG 10:30A
PRIORITY OVERNIGHT
DSR
49424
MI-US **GRR**

22-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response 8.18.14** Work Order: **1408982**

Dear Ryan,

ALS Environmental received 5 samples on 20-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 29.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: **1408982**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1408982-01	140818 FB25-SW-1	Water		8/18/2014	8/20/2014 09:30	☐
1408982-02	140818 FB25-SW-2	Water		8/18/2014	8/20/2014 09:30	☐
1408982-03	140818 FB25-SW-3	Water		8/18/2014	8/20/2014 09:30	☐
1408982-04	140818 FB25-SW-4	Water		8/18/2014	8/20/2014 09:30	☐
1408982-05	140818 FB25-SW-5	Water		8/18/2014	8/20/2014 09:30	☐

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982

Case Narrative

Samples for the above noted Work Order were received on 08/20/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 61832 samples 1408982-01 through 1408982-05 had significant peaks or baseline rise outside the method defined chromatographic window for DRO.

No glass container was available for PAHs on sample 1408982-05.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
WorkOrder: **1408982**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14 **Work Order:** 1408982
Sample ID: 140818 FB25-SW-1 **Lab ID:** 1408982-01
Collection Date: 8/18/2014 **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	ND		0.10	mg/L	1	8/20/2014 08:07 PM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/20/14	Analyst: **RM**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Acenaphthene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Acenaphthylene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Anthracene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Chrysene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/21/2014 03:28 PM
Fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:28 PM
Fluorene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/21/2014 03:28 PM
Naphthalene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Phenanthrene	ND		2.0	µg/L	1	8/21/2014 03:28 PM
Pyrene	ND		5.0	µg/L	1	8/21/2014 03:28 PM
Surr: 2-Fluorobiphenyl	*128*		*20-140*	*%REC*	1	8/21/2014 03:28 PM
Surr: 4-Terphenyl-d14	*148*		*22-172*	*%REC*	1	8/21/2014 03:28 PM
Surr: Nitrobenzene-d5	*138*		*8-140*	*%REC*	1	8/21/2014 03:28 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **RS**
Benzene	ND		1.0	µg/L	1	8/20/2014 05:04 PM
Ethylbenzene	ND		1.0	µg/L	1	8/20/2014 05:04 PM
m,p-Xylene	ND		2.0	µg/L	1	8/20/2014 05:04 PM
o-Xylene	ND		1.0	µg/L	1	8/20/2014 05:04 PM
Toluene	ND		1.0	µg/L	1	8/20/2014 05:04 PM
Xylenes, Total	ND		3.0	µg/L	1	8/20/2014 05:04 PM
Surr: 1,2-Dichloroethane-d4	*97.2*		*75-120*	*%REC*	1	8/20/2014 05:04 PM
Surr: 4-Bromofluorobenzene	*98.3*		*80-110*	*%REC*	1	8/20/2014 05:04 PM
Surr: Dibromofluoromethane	*97.6*		*85-115*	*%REC*	1	8/20/2014 05:04 PM
Surr: Toluene-d8	*96.5*		*85-110*	*%REC*	1	8/20/2014 05:04 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/20/14	Analyst: **KF**
Total Suspended Solids	**21**		**3.0**	**mg/L**	1	8/20/2014 08:34 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-2
Lab ID: 1408982-02
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	ND		0.10	mg/L	1	8/20/2014 08:32 PM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/20/14	Analyst: **RM**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Acenaphthene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Acenaphthylene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Anthracene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Chrysene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/21/2014 03:56 PM
Fluoranthene	ND		1.0	µg/L	1	8/21/2014 03:56 PM
Fluorene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/21/2014 03:56 PM
Naphthalene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Phenanthrene	ND		2.0	µg/L	1	8/21/2014 03:56 PM
Pyrene	ND		5.0	µg/L	1	8/21/2014 03:56 PM
Surr: 2-Fluorobiphenyl	*129*		*20-140*	*%REC*	1	8/21/2014 03:56 PM
Surr: 4-Terphenyl-d14	*128*		*22-172*	*%REC*	1	8/21/2014 03:56 PM
Surr: Nitrobenzene-d5	*139*		*8-140*	*%REC*	1	8/21/2014 03:56 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **RS**
Benzene	ND		1.0	µg/L	1	8/20/2014 05:29 PM
Ethylbenzene	ND		1.0	µg/L	1	8/20/2014 05:29 PM
m,p-Xylene	ND		2.0	µg/L	1	8/20/2014 05:29 PM
o-Xylene	ND		1.0	µg/L	1	8/20/2014 05:29 PM
Toluene	ND		1.0	µg/L	1	8/20/2014 05:29 PM
Xylenes, Total	ND		3.0	µg/L	1	8/20/2014 05:29 PM
Surr: 1,2-Dichloroethane-d4	*94.4*		*75-120*	*%REC*	1	8/20/2014 05:29 PM
Surr: 4-Bromofluorobenzene	*96.8*		*80-110*	*%REC*	1	8/20/2014 05:29 PM
Surr: Dibromofluoromethane	*95.2*		*85-115*	*%REC*	1	8/20/2014 05:29 PM
Surr: Toluene-d8	*96.4*		*85-110*	*%REC*	1	8/20/2014 05:29 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/20/2014 09:30 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-2
Lab ID: 1408982-02
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/20/14	Analyst: **KF**
Total Suspended Solids	**30**		**3.0**	**mg/L**	1	8/20/2014 08:34 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-3
Lab ID: 1408982-03
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**0.12**		**0.10**	**mg/L**	1	8/20/2014 08:58 PM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/20/14	Analyst: **RM**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Acenaphthene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Acenaphthylene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Anthracene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Chrysene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/21/2014 04:24 PM
Fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:24 PM
Fluorene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/21/2014 04:24 PM
Naphthalene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Phenanthrene	ND		2.0	µg/L	1	8/21/2014 04:24 PM
Pyrene	ND		5.0	µg/L	1	8/21/2014 04:24 PM
Surr: 2-Fluorobiphenyl	*124*		*20-140*	*%REC*	1	8/21/2014 04:24 PM
Surr: 4-Terphenyl-d14	*115*		*22-172*	*%REC*	1	8/21/2014 04:24 PM
Surr: Nitrobenzene-d5	*137*		*8-140*	*%REC*	1	8/21/2014 04:24 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **RS**
Benzene	**1.4**		**1.0**	**µg/L**	1	8/20/2014 05:53 PM
Ethylbenzene	**1.3**		**1.0**	**µg/L**	1	8/20/2014 05:53 PM
m,p-Xylene	**3.9**		**2.0**	**µg/L**	1	8/20/2014 05:53 PM
o-Xylene	**1.9**		**1.0**	**µg/L**	1	8/20/2014 05:53 PM
Toluene	**3.4**		**1.0**	**µg/L**	1	8/20/2014 05:53 PM
Xylenes, Total	**5.7**		**3.0**	**µg/L**	1	8/20/2014 05:53 PM
Surr: 1,2-Dichloroethane-d4	*95.0*		*75-120*	*%REC*	1	8/20/2014 05:53 PM
Surr: 4-Bromofluorobenzene	*96.1*		*80-110*	*%REC*	1	8/20/2014 05:53 PM
Surr: Dibromofluoromethane	*97.4*		*85-115*	*%REC*	1	8/20/2014 05:53 PM
Surr: Toluene-d8	*94.7*		*85-110*	*%REC*	1	8/20/2014 05:53 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/20/2014 09:30 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14 **Work Order:** 1408982
Sample ID: 140818 FB25-SW-3 **Lab ID:** 1408982-03
Collection Date: 8/18/2014 **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/20/14	Analyst: **KF**
Total Suspended Solids	**200**		**4.6**	**mg/L**	1	8/20/2014 08:34 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-4
Lab ID: 1408982-04
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**0.13**		**0.10**	**mg/L**	1	8/20/2014 09:24 PM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/20/14	Analyst: **RM**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Acenaphthene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Acenaphthylene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Anthracene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Chrysene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/21/2014 04:53 PM
Fluoranthene	ND		1.0	µg/L	1	8/21/2014 04:53 PM
Fluorene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/21/2014 04:53 PM
Naphthalene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Phenanthrene	ND		2.0	µg/L	1	8/21/2014 04:53 PM
Pyrene	ND		5.0	µg/L	1	8/21/2014 04:53 PM
Surr: 2-Fluorobiphenyl	*104*		*20-140*	*%REC*	1	8/21/2014 04:53 PM
Surr: 4-Terphenyl-d14	*97.6*		*22-172*	*%REC*	1	8/21/2014 04:53 PM
Surr: Nitrobenzene-d5	*115*		*8-140*	*%REC*	1	8/21/2014 04:53 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **RS**
Benzene	**1.3**		**1.0**	**µg/L**	1	8/20/2014 06:18 PM
Ethylbenzene	**1.2**		**1.0**	**µg/L**	1	8/20/2014 06:18 PM
m,p-Xylene	**3.5**		**2.0**	**µg/L**	1	8/20/2014 06:18 PM
o-Xylene	**1.7**		**1.0**	**µg/L**	1	8/20/2014 06:18 PM
Toluene	**2.9**		**1.0**	**µg/L**	1	8/20/2014 06:18 PM
Xylenes, Total	**5.2**		**3.0**	**µg/L**	1	8/20/2014 06:18 PM
Surr: 1,2-Dichloroethane-d4	*97.0*		*75-120*	*%REC*	1	8/20/2014 06:18 PM
Surr: 4-Bromofluorobenzene	*101*		*80-110*	*%REC*	1	8/20/2014 06:18 PM
Surr: Dibromofluoromethane	*98.3*		*85-115*	*%REC*	1	8/20/2014 06:18 PM
Surr: Toluene-d8	*96.2*		*85-110*	*%REC*	1	8/20/2014 06:18 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/20/2014 09:30 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-4
Lab ID: 1408982-04
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/20/14	Analyst: **KF**
Total Suspended Solids	**110**		**3.0**	**mg/L**	1	8/20/2014 08:34 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.18.14
Work Order: 1408982
Sample ID: 140818 FB25-SW-5
Lab ID: 1408982-05
Collection Date: 8/18/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**0.14**		**0.10**	**mg/L**	1	8/20/2014 07:41 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **RS**
Benzene	**1.2**		**1.0**	**µg/L**	1	8/20/2014 06:42 PM
Ethylbenzene	**1.1**		**1.0**	**µg/L**	1	8/20/2014 06:42 PM
m,p-Xylene	**3.1**		**2.0**	**µg/L**	1	8/20/2014 06:42 PM
o-Xylene	**1.5**		**1.0**	**µg/L**	1	8/20/2014 06:42 PM
Toluene	**2.5**		**1.0**	**µg/L**	1	8/20/2014 06:42 PM
Xylenes, Total	**4.6**		**3.0**	**µg/L**	1	8/20/2014 06:42 PM
Surr: 1,2-Dichloroethane-d4	*97.8*		*75-120*	*%REC*	1	8/20/2014 06:42 PM
Surr: 4-Bromofluorobenzene	*98.6*		*80-110*	*%REC*	1	8/20/2014 06:42 PM
Surr: Dibromofluoromethane	*99.6*		*85-115*	*%REC*	1	8/20/2014 06:42 PM
Surr: Toluene-d8	*94.9*		*85-110*	*%REC*	1	8/20/2014 06:42 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/20/2014 09:30 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/20/14	Analyst: **KF**
Total Suspended Solids	**120**		**3.0**	**mg/L**	1	8/20/2014 08:34 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company

QC BATCH REPORT

Work Order: 1408982

Project: Enbridge FB25 Release Response 8.18.14

Batch ID: **61832** Instrument ID **GC8** Method: **PUBL-SW-141**

MBLK Sample ID: **DBLKW1-61832-61832** Units: **mg/L** Analysis Date: **8/20/2014 05:59 PM**

Client ID: Run ID: **GC8_140820B** SeqNo: **2897605** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	ND	0.10								

LCS Sample ID: **DLCSW1-61832-61832** Units: **mg/L** Analysis Date: **8/20/2014 06:25 PM**

Client ID: Run ID: **GC8_140820B** SeqNo: **2897606** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	3.894	0.10	5	0	77.9	75-115	0			

LCSD Sample ID: **DLCSDW1-61832-61832** Units: **mg/L** Analysis Date: **8/21/2014 05:52 AM**

Client ID: Run ID: **GC8_140820B** SeqNo: **2897622** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	3.907	0.10	5	0	78.1	75-115	3.894	0.335	20	

MS Sample ID: **1408982-05C MS** Units: **mg/L** Analysis Date: **8/20/2014 06:50 PM**

Client ID: **140818 FB25-SW-5** Run ID: **GC8_140820B** SeqNo: **2897607** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	37.08	1.0	50	0.1396	73.9	44-116	0			

MSD Sample ID: **1408982-05C MSD** Units: **mg/L** Analysis Date: **8/20/2014 07:16 PM**

Client ID: **140818 FB25-SW-5** Run ID: **GC8_140820B** SeqNo: **2897608** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	31.52	1.0	50	0.1396	62.8	44-116	37.08	16.2	30	

The following samples were analyzed in this batch:

1408982-01C	1408982-02C	1408982-03C
1408982-04C	1408982-05C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **PBLKW1-61822-61822** Units: **µg/L** Analysis Date: **8/21/2014 02:32 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900298** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*147.3*	0	*114*	0	*129*	*20-140*	0			
Surr: 4-Terphenyl-d14	*157.6*	0	*114*	0	*138*	*22-172*	0			
Surr: Nitrobenzene-d5	*159.4*	0	*114*	0	*140*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **PLCSW1-61822-61822** Units: **µg/L** Analysis Date: **8/21/2014 03:00 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900299** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	50.77	5.0	45.7	0	111	50-140	0			
2-Methylnaphthalene	43.7	5.0	45.7	0	95.6	50-140	0			
Acenaphthene	53.9	5.0	45.7	0	118	60-140	0			
Acenaphthylene	56.16	5.0	45.7	0	123	60-140	0			
Anthracene	52.8	5.0	45.7	0	116	60-140	0			
Benzo(a)anthracene	53.23	5.0	45.7	0	116	60-140	0			
Benzo(a)pyrene	52.62	5.0	45.7	0	115	60-140	0			
Benzo(b)fluoranthene	54.74	5.0	45.7	0	120	60-140	0			
Benzo(g,h,i)perylene	45.58	5.0	45.7	0	99.7	60-140	0			
Benzo(k)fluoranthene	55.61	5.0	45.7	0	122	60-140	0			
Chrysene	58.79	5.0	45.7	0	129	60-140	0			
Dibenzo(a,h)anthracene	35.66	5.0	45.7	0	78	60-140	0			
Fluoranthene	52.09	5.0	45.7	0	114	60-140	0			
Fluorene	53.65	5.0	45.7	0	117	60-140	0			
Indeno(1,2,3-cd)pyrene	40.27	5.0	45.7	0	88.1	60-140	0			
Naphthalene	41.17	5.0	45.7	0	90.1	40-140	0			
Phenanthrene	53.76	5.0	45.7	0	118	60-140	0			
Pyrene	63.63	5.0	45.7	0	139	60-140	0			
Surr: 2-Fluorobiphenyl	*112.9*	0	*114*	0	*99.1*	*20-140*	0			
Surr: 4-Terphenyl-d14	*86.08*	0	*114*	0	*75.5*	*22-172*	0			
Surr: Nitrobenzene-d5	*125.8*	0	*114*	0	*110*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **1408982-05B MS** Units: **µg/L** Analysis Date: **8/21/2014 06:17 PM**
Client ID: **140818 FB25-SW-5** Run ID: **SVMS7_140821A** SeqNo: **2900306** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	164.9	18	160	0	103	50-140	0			
2-Methylnaphthalene	135	18	160	0	84.4	50-140	0			
Acenaphthene	190	18	160	0	119	60-140	0			
Acenaphthylene	194.3	18	160	0	121	60-140	0			
Anthracene	189.7	18	160	0	119	60-140	0			
Benzo(a)anthracene	186.6	18	160	0	117	60-140	0			
Benzo(a)pyrene	185	18	160	0	116	60-140	0			
Benzo(b)fluoranthene	187.8	18	160	0	117	60-140	0			
Benzo(g,h,i)perylene	148.2	18	160	0	92.6	60-140	0			
Benzo(k)fluoranthene	202.7	18	160	0	127	60-140	0			
Chrysene	198.5	18	160	0	124	60-140	0			
Dibenzo(a,h)anthracene	120.4	18	160	0	75.3	60-140	0			
Fluoranthene	183.6	18	160	0	115	60-140	0			
Fluorene	190.9	18	160	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	136.2	18	160	0	85.1	60-140	0			
Naphthalene	134.1	18	160	0	83.8	40-140	0			
Phenanthrene	195.1	18	160	0	122	60-140	0			
Pyrene	223.5	18	160	0	140	60-140	0			
Surr: 2-Fluorobiphenyl	*399.9*	0	*399*	0	*100*	*20-140*	0			
Surr: 4-Terphenyl-d14	*302.9*	0	*399*	0	*75.9*	*22-172*	0			
Surr: Nitrobenzene-d5	*455.8*	0	*399*	0	*114*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **1408798-01B MS** Units: **µg/L** Analysis Date: **8/21/2014 07:13 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900308** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	186.5	18	160	0	117	50-140	0			
2-Methylnaphthalene	162.1	18	160	0	101	50-140	0			
Acenaphthene	205.2	18	160	0	128	60-140	0			
Acenaphthylene	213.4	18	160	0	133	60-140	0			
Anthracene	198.5	18	160	0	124	60-140	0			
Benzo(a)anthracene	195.4	18	160	0	122	60-140	0			
Benzo(a)pyrene	201.2	18	160	0	126	60-140	0			
Benzo(b)fluoranthene	205.9	18	160	0	129	60-140	0			
Benzo(g,h,i)perylene	167.9	18	160	0	105	60-140	0			
Benzo(k)fluoranthene	218.3	18	160	0	136	60-140	0			
Chrysene	209.4	18	160	0	131	60-140	0			
Dibenzo(a,h)anthracene	128.8	18	160	0	80.5	60-140	0			
Fluoranthene	191	18	160	0	119	60-140	0			
Fluorene	200	18	160	0	125	60-140	0			
Indeno(1,2,3-cd)pyrene	147.7	18	160	0	92.3	60-140	0			
Naphthalene	146	18	160	0	91.3	40-140	0			
Phenanthrene	203	18	160	0	127	60-140	0			
Pyrene	217.4	18	160	0	136	60-140	0			
Surr: 2-Fluorobiphenyl	*431.2*	0	*399*	0	*108*	*20-140*	0			
Surr: 4-Terphenyl-d14	*335*	0	*399*	0	*84*	*22-172*	0			
Surr: Nitrobenzene-d5	*480*	0	*399*	0	*120*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **1408939-02B MS** Units: **µg/L** Analysis Date: **8/21/2014 08:38 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900311** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	157.5	18	160	0	98.5	50-140	0			
2-Methylnaphthalene	131.3	18	160	0	82.1	50-140	0			
Acenaphthene	189.3	18	160	0	118	60-140	0			
Acenaphthylene	195.2	18	160	0	122	60-140	0			
Anthracene	199.6	18	160	0	125	60-140	0			
Benzo(a)anthracene	195.6	18	160	0	122	60-140	0			
Benzo(a)pyrene	198.2	18	160	0	124	60-140	0			
Benzo(b)fluoranthene	207.4	18	160	0	130	60-140	0			
Benzo(g,h,i)perylene	151	18	160	0	94.4	60-140	0			
Benzo(k)fluoranthene	216.6	18	160	0	135	60-140	0			
Chrysene	205.3	18	160	0	128	60-140	0			
Dibenzo(a,h)anthracene	127.8	18	160	0	79.9	60-140	0			
Fluoranthene	196.2	18	160	0	123	60-140	0			
Fluorene	197.8	18	160	0	124	60-140	0			
Indeno(1,2,3-cd)pyrene	123.8	18	160	0	77.4	60-140	0			
Naphthalene	133.1	18	160	0	83.2	40-140	0			
Phenanthrene	203.2	18	160	0	127	60-140	0			
Pyrene	220.9	18	160	0	138	60-140	0			
Surr: 2-Fluorobiphenyl	*413.6*	0	*399*	0	*104*	*20-140*	0			
Surr: 4-Terphenyl-d14	*342.4*	0	*399*	0	*85.8*	*22-172*	0			
Surr: Nitrobenzene-d5	*478*	0	*399*	0	*120*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **1408982-05B MSD** Units: **µg/L** Analysis Date: **8/21/2014 06:45 PM**
Client ID: **140818 FB25-SW-5** Run ID: **SVMS7_140821A** SeqNo: **2900307** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	184.1	18	160	0	115	50-140	164.9	11	30	
2-Methylnaphthalene	144.2	18	160	0	90.2	50-140	135	6.59	30	
Acenaphthene	208.4	18	160	0	130	60-140	190	9.24	30	
Acenaphthylene	221.6	18	160	0	139	60-140	194.3	13.1	30	
Anthracene	214.1	18	160	0	134	60-140	189.7	12.1	30	
Benzo(a)anthracene	213.1	18	160	0	133	60-140	186.6	13.2	30	
Benzo(a)pyrene	212	18	160	0	133	60-140	185	13.6	30	
Benzo(b)fluoranthene	218.2	18	160	0	136	60-140	187.8	15	30	
Benzo(g,h,i)perylene	180.6	18	160	0	113	60-140	148.2	19.7	30	
Benzo(k)fluoranthene	213.6	18	160	0	134	60-140	202.7	5.23	30	
Chrysene	218.5	18	160	0	137	60-140	198.5	9.59	30	
Dibenzo(a,h)anthracene	134.2	18	160	0	83.9	60-140	120.4	10.8	30	
Fluoranthene	206.5	18	160	0	129	60-140	183.6	11.7	30	
Fluorene	208.7	18	160	0	130	60-140	190.9	8.93	30	
Indeno(1,2,3-cd)pyrene	154.2	18	160	0	96.4	60-140	136.2	12.5	30	
Naphthalene	132.8	18	160	0	83	40-140	134.1	0.959	30	
Phenanthrene	213.2	18	160	0	133	60-140	195.1	8.86	30	
Pyrene	219.7	18	160	0	137	60-140	223.5	1.73	30	
Surr: 2-Fluorobiphenyl	*443.3*	0	*399*	0	*111*	*20-140*	399.9	*10.3*	*30*	
Surr: 4-Terphenyl-d14	*358.2*	0	*399*	0	*89.8*	*22-172*	302.9	*16.7*	*30*	
Surr: Nitrobenzene-d5	*516.8*	0	*399*	0	*130*	*8-140*	455.8	*12.5*	*30*	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **1408798-01B MSD** Units: **µg/L** Analysis Date: **8/21/2014 07:42 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900309** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	175.1	18	160	0	109	50-140	186.5	6.28	30	
2-Methylnaphthalene	152.2	18	160	0	95.1	50-140	162.1	6.31	30	
Acenaphthene	201.2	18	160	0	126	60-140	205.2	1.97	30	
Acenaphthylene	206.9	18	160	0	129	60-140	213.4	3.12	30	
Anthracene	202.5	18	160	0	127	60-140	198.5	2	30	
Benzo(a)anthracene	193	18	160	0	121	60-140	195.4	1.24	30	
Benzo(a)pyrene	201.3	18	160	0	126	60-140	201.2	0.0398	30	
Benzo(b)fluoranthene	203.5	18	160	0	127	60-140	205.9	1.17	30	
Benzo(g,h,i)perylene	169.7	18	160	0	106	60-140	167.9	1.04	30	
Benzo(k)fluoranthene	218.9	18	160	0	137	60-140	218.3	0.256	30	
Chrysene	206.7	18	160	0	129	60-140	209.4	1.31	30	
Dibenzo(a,h)anthracene	132.8	18	160	0	83	60-140	128.8	3.06	30	
Fluoranthene	194.1	18	160	0	121	60-140	191	1.62	30	
Fluorene	207	18	160	0	129	60-140	200	3.42	30	
Indeno(1,2,3-cd)pyrene	147.5	18	160	0	92.2	60-140	147.7	0.108	30	
Naphthalene	139.3	18	160	0	87.1	40-140	146	4.71	30	
Phenanthrene	203.1	18	160	0	127	60-140	203	0.0394	30	
Pyrene	216.6	18	160	0	135	60-140	217.4	0.406	30	
Surr: 2-Fluorobiphenyl	*400.2*	0	*399*	0	*100*	*20-140*	431.2	*7.47*	*30*	
Surr: 4-Terphenyl-d14	*322.6*	0	*399*	0	*80.9*	*22-172*	335	*3.77*	*30*	
Surr: Nitrobenzene-d5	*463.8*	0	*399*	0	*116*	*8-140*	480	*3.42*	*30*	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61822** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **1408939-02B MSD** Units: **µg/L** Analysis Date: **8/21/2014 09:06 PM**
Client ID: Run ID: **SVMS7_140821A** SeqNo: **2900312** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	165.5	18	160	0	103	50-140	157.5	4.95	30	
2-Methylnaphthalene	130.1	18	160	0	81.3	50-140	131.3	0.918	30	
Acenaphthene	203.6	18	160	0	127	60-140	189.3	7.29	30	
Acenaphthylene	211.4	18	160	0	132	60-140	195.2	7.99	30	
Anthracene	218.6	18	160	0	137	60-140	199.6	9.07	30	
Benzo(a)anthracene	210.2	18	160	0	131	60-140	195.6	7.21	30	
Benzo(a)pyrene	217.1	18	160	0	136	60-140	198.2	9.09	30	
Benzo(b)fluoranthene	217.1	18	160	0	136	60-140	207.4	4.6	30	
Benzo(g,h,i)perylene	185.5	18	160	0	116	60-140	151	20.5	30	
Benzo(k)fluoranthene	221.5	18	160	0	138	60-140	216.6	2.23	30	
Chrysene	218.9	18	160	0	137	60-140	205.3	6.41	30	
Dibenzo(a,h)anthracene	134.3	18	160	0	84	60-140	127.8	4.94	30	
Fluoranthene	211.9	18	160	0	132	60-140	196.2	7.68	30	
Fluorene	214.6	18	160	0	134	60-140	197.8	8.19	30	
Indeno(1,2,3-cd)pyrene	154.7	18	160	0	96.7	60-140	123.8	22.2	30	
Naphthalene	115.5	18	160	0	72.2	40-140	133.1	14.2	30	
Phenanthrene	219.9	18	160	0	137	60-140	203.2	7.9	30	
Pyrene	222.1	18	160	0	139	60-140	220.9	0.542	30	
Surr: 2-Fluorobiphenyl	*442.3*	0	*399*	0	*111*	*20-140*	413.6	*6.71*	*30*	
Surr: 4-Terphenyl-d14	*369.9*	0	*399*	0	*92.7*	*22-172*	342.4	*7.73*	*30*	
Surr: Nitrobenzene-d5	*520.2*	0	*399*	0	*130*	*8-140*	478	*8.46*	*30*	

The following samples were analyzed in this batch:

1408982-01B	1408982-02B	1408982-03B
1408982-04B	1408982-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **R146608** Instrument ID **VMS8** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140820-R146608** Units: **µg/L** Analysis Date: **8/20/2014 02:58 PM**
Client ID: Run ID: **VMS8_140820A** SeqNo: **2898306** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.41*	0	*20*	0	*97*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.51*	0	*20*	0	*97.6*	*80-110*	0			
Surr: Dibromofluoromethane	*19.07*	0	*20*	0	*95.4*	*85-115*	0			
Surr: Toluene-d8	*19.21*	0	*20*	0	*96*	*85-110*	0			

LCS Sample ID: **VLCSW1-140820-R146608** Units: **µg/L** Analysis Date: **8/20/2014 01:19 PM**
Client ID: Run ID: **VMS8_140820A** SeqNo: **2898305** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.69	1.0	20	0	108	85-125	0			
Ethylbenzene	22.06	1.0	20	0	110	85-125	0			
m,p-Xylene	44.19	2.0	40	0	110	75-130	0			
o-Xylene	21.73	1.0	20	0	109	80-125	0			
Toluene	21.63	1.0	20	0	108	85-125	0			
Xylenes, Total	65.92	3.0	60	0	110	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.09*	0	*20*	0	*95.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.88*	0	*20*	0	*99.4*	*80-110*	0			
Surr: Dibromofluoromethane	*19.96*	0	*20*	0	*99.8*	*85-115*	0			
Surr: Toluene-d8	*19.48*	0	*20*	0	*97.4*	*85-110*	0			

MS Sample ID: **1408814-11A MS** Units: **µg/L** Analysis Date: **8/20/2014 11:36 PM**
Client ID: Run ID: **VMS8_140820A** SeqNo: **2898373** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.75	1.0	20	0	104	85-125	0			
Ethylbenzene	20.3	1.0	20	0	102	85-125	0			
m,p-Xylene	40.05	2.0	40	0	100	75-130	0			
o-Xylene	19.83	1.0	20	0	99.2	80-125	0			
Toluene	20.18	1.0	20	0	101	85-125	0			
Xylenes, Total	59.88	3.0	60	0	99.8	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.59*	0	*20*	0	*98*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.42*	0	*20*	0	*97.1*	*80-110*	0			
Surr: Dibromofluoromethane	*19.97*	0	*20*	0	*99.8*	*85-115*	0			
Surr: Toluene-d8	*19.14*	0	*20*	0	*95.7*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **R146608** Instrument ID **VMS8** Method: **SW8260**

MSD	Sample ID: **1408814-11A MSD**				Units: **µg/L**			Analysis Date: **8/21/2014 12:01 PM**		
Client ID:		Run ID: **VMS8_140820A**			SeqNo: **2898374**		Prep Date:		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.9	1.0	20	0	104	85-125	20.75	0.72	30	
Ethylbenzene	20.29	1.0	20	0	101	85-125	20.3	0.0493	30	
m,p-Xylene	40.32	2.0	40	0	101	75-130	40.05	0.672	30	
o-Xylene	20.22	1.0	20	0	101	80-125	19.83	1.95	30	
Toluene	20.33	1.0	20	0	102	85-125	20.18	0.741	30	
Xylenes, Total	60.54	3.0	60	0	101	80-126	59.88	1.1	30	
Surr: 1,2-Dichloroethane-d4	*19.33*	0	*20*	0	*96.6*	*75-120*	19.59	*1.34*	*30*	
Surr: 4-Bromofluorobenzene	*19.85*	0	*20*	0	*99.2*	*80-110*	19.42	*2.19*	*30*	
Surr: Dibromofluoromethane	*20.01*	0	*20*	0	*100*	*85-115*	19.97	*0.2*	*30*	
Surr: Toluene-d8	*19.25*	0	*20*	0	*96.2*	*85-110*	19.14	*0.573*	*30*	

The following samples were analyzed in this batch: 1408982-01A 1408982-02A 1408982-03A 1408982-04A 1408982-05A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **61873** Instrument ID **TSS** Method: **A2540 D-97**

MBLK	Sample ID: **MBLK-61873-61873**				Units: **mg/L**			Analysis Date: **8/20/2014 08:34 PM**		
Client ID:	Run ID: **TSS_140820C**				SeqNo: **2898023**			Prep Date: **8/20/2014**		DF: **1**
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS	Sample ID: **LCS-61873-61873**				Units: **mg/L**			Analysis Date: **8/20/2014 08:34 PM**		
Client ID:	Run ID: **TSS_140820C**				SeqNo: **2898021**			Prep Date: **8/20/2014**		DF: **1**
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	91	6.0	100	0	91	80-115	0			

DUP	Sample ID: **1408071-19A DUP**				Units: **mg/L**			Analysis Date: **8/20/2014 08:34 PM**		
Client ID:	Run ID: **TSS_140820C**				SeqNo: **2898003**			Prep Date: **8/20/2014**		DF: **1**
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	116	12	0	0	0	0-0	122	5.04	15	

The following samples were analyzed in this batch:

1408982-01B	1408982-02B	1408982-03B
1408982-04B	1408982-05B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408982
Project: Enbridge FB25 Release Response 8.18.14

QC BATCH REPORT

Batch ID: **R146628** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146628-R146628** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896705** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R146628-R146628** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896706** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.1	5.0	40	0	95.2	78-114	0			

MS Sample ID: **1408944-02A MS** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896719** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	43.53	5.0	40	3.18	101	78-114	0			

DUP Sample ID: **1408944-04A DUP** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896721** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	2.82	5.0	0	0	0	0-0	2	0	18	J

The following samples were analyzed in this batch: 1408982-02D 1408982-03D 1408982-04D 1408982-05D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408982

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49/61292.00_001_100

Project Name: FB25 Release Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 41256

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB/GLI

Laboratory: ALS

Number of Containers/Preservative

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1 BTEX	Water: ~~SVOCs~~ (unpreserved) #2 TSS, ~~PAHs~~	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl) W/-DRO	Water: ~~Nutrients~~ (H_2SO_4) #4 Oil + Grease	Water: ~~T.O.C. 40ml H_2SO_4~~	Water:	Water: PAHs	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil:	Soil:	Total Number Of Containers	
1. 140818 FB25 - ~~Water 1~~ SW-1	0	.5	ft	08/18/2014		X			X			3	1				1		[illegible]		✓										
2. 140818 FB25 - ~~Water 2~~ SW-2	0	.5	↓	↓		↓			↓			3	2				1	1	2		✓										Rush
3. 140818 FB25 - ~~Water 3~~ SW-3	0	.5	↓	↓		↓			↓			3	3				1	1			✓										ASAP
4. 140818 FB25 - ~~Water 4~~ SW-4	0	.5	↓	↓		↓			↓			3	3				1	1			✓										TAT
5. 140818 FB25 - ~~Water 5~~ SW-5	0	.5	↓	↓		↓			↓			3	2				1	1	2					—		MS/MSD					
6.																															
7.																															
8.																															
9.																															
10.																															

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	(Y) N	8/19/14	16:00	[signature]	8/20/14	9:30
Fed Ex	(Y) N	8/20/14	9:30	[signature]	8/20/14	9:30

Samples Shipped VIA: ☐ Air Freight ☒ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09/01/09

BARR

Chain of Custody

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49/1292.00 001 100

Project Name: FB25 Release Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 41256

COC 1 of 1

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB / GLZ

Laboratory: ALS

Number of Containers/Preservative (Water / Soil)

Handwritten column notes: BTEX only by 8260B; TSS Unfiltered; WI DRO; Oil + Grease 1664A; + O/G by 1664; Add PAH by 8270C

Location	Start Depth	Stop Depth	Depth Unit (m or ft or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp	Type: QC	VOCs (HCl) #1	(unpreserved) #2	Dissolved Metals (HNO3)	Total Metals (HNO3)	General (unpreserved) #3	Diesel Range Organics (HCl)	(H2SO4) #4 + O/G	Add PAH	Remarks
140818 FB25 - ~~Water 1~~ SW-1	0	.5	ft	08/18/2014		X		X			3	1				1	•	X	wrong bottle type for PAHs
140818 FB25 - ~~Water 2~~ SW-2	0	.5	↓	↓		↓		↓			3	2			1	1	2	X	Rush
140818 FB25 - ~~Water 3~~ SW-3	0	.5									3	3				1		X	ASAP
140818 FB25 - ~~Water 4~~ SW-4	0	.5									3	3				1		X	TAT
140818 FB25 - ~~Water 5~~ SW-5	0	.5									3	3			1	1	2		← Cancel PAHs on SW-5
6.																			
7.																			
8.																			
9.																			
10.																			

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH/8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By: [signature]

Relinquished By:

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Other

Distribution: White-Original

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **20-Aug-14 09:30**

Work Order: **1408982** Received by: **JR**

Checklist completed by Ann Preston 20-Aug-14 Reviewed by: Ann Preston 20-Aug-14
eSignature Date eSignature Date

Matrices: Water
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	2.8°	c	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:			
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:


Recipient's Name Please print.
Phone Number
ORIGIN ID:DLHA (218) 727-5218
BARR ENGINEERING
332 W SUPERIOR ST
DULUTH, MN 558021808
UNITED STATES US
SHIP DATE: 19AUG14
ACTWGT: 42.5 LB MAN
CAD: /POS1501
DIMS: 24x14x13 IN
BILL SENDER
TO SAMPLE RECEIVING
ALS
3352 128TH AVE
HOLLAND MI 49424
(616) 399-6070
INV:
PO:
REF:
DEPT:
FedEx
Express
4 of 4
MPS# 0881 7801 3698 8220
Mstr# 8059 3855 7748
WED - 20 AUG 10:30A
PRIORITY OVERNIGHT
XX HLMA
0200
49424
MI-US GRR
RT 828 5
ST 9
Part # 156237-435 REV2 06/14

26-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response SW 8.19.14** Work Order: **14081072**

Dear Ryan,

ALS Environmental received 5 samples on 21-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 20.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14
Work Order: **14081072**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081072-01	140819-FB25-SW-2	Water		8/19/2014 17:15	8/21/2014 10:00	☐
14081072-02	140819-FB25-SW-5	Water		8/19/2014 18:10	8/21/2014 10:00	☐
14081072-03	140819-FB25-SW-6	Water		8/19/2014 16:10	8/21/2014 10:00	☐
14081072-04	140819-FB25-FD-1	Water		8/19/2014	8/21/2014 10:00	☐
14081072-05	Trip Blank	Water			8/21/2014 10:00	☐

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14
Work Order: 14081072

Case Narrative

Samples for the above noted Work Order were received on 08/21/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
The reporting limits for PAHs were elevated because the extract could not be reduced down to 1 ml.
Batch 61935 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14
WorkOrder: **14081072**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14 **Work Order:** 14081072
Sample ID: 140819-FB25-SW-2 **Lab ID:** 14081072-01
Collection Date: 8/19/2014 05:15 PM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 12:43 PM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 12:43 PM
Acenaphthene	ND		10	µg/L	1	8/25/2014 12:43 PM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 12:43 PM
Anthracene	ND		10	µg/L	1	8/25/2014 12:43 PM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Chrysene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 12:43 PM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:43 PM
Fluorene	ND		10	µg/L	1	8/25/2014 12:43 PM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 12:43 PM
Naphthalene	ND		10	µg/L	1	8/25/2014 12:43 PM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 12:43 PM
Pyrene	ND		10	µg/L	1	8/25/2014 12:43 PM
Surr: 2-Fluorobiphenyl	*88.2*		*20-140*	*%REC*	1	8/25/2014 12:43 PM
Surr: 4-Terphenyl-d14	*97.0*		*22-172*	*%REC*	1	8/25/2014 12:43 PM
Surr: Nitrobenzene-d5	*82.6*		*8-140*	*%REC*	1	8/25/2014 12:43 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 05:49 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 05:49 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 05:49 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 05:49 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 05:49 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 05:49 PM
Surr: 1,2-Dichloroethane-d4	*99.6*		*75-120*	*%REC*	1	8/21/2014 05:49 PM
Surr: 4-Bromofluorobenzene	*97.8*		*80-110*	*%REC*	1	8/21/2014 05:49 PM
Surr: Dibromofluoromethane	*98.8*		*85-115*	*%REC*	1	8/21/2014 05:49 PM
Surr: Toluene-d8	*96.8*		*85-110*	*%REC*	1	8/21/2014 05:49 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**36**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14 **Work Order:** 14081072
Sample ID: 140819-FB25-SW-5 **Lab ID:** 14081072-02
Collection Date: 8/19/2014 06:10 PM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 01:11 PM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 01:11 PM
Acenaphthene	ND		10	µg/L	1	8/25/2014 01:11 PM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 01:11 PM
Anthracene	ND		10	µg/L	1	8/25/2014 01:11 PM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Chrysene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 01:11 PM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:11 PM
Fluorene	ND		10	µg/L	1	8/25/2014 01:11 PM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 01:11 PM
Naphthalene	ND		10	µg/L	1	8/25/2014 01:11 PM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 01:11 PM
Pyrene	ND		10	µg/L	1	8/25/2014 01:11 PM
Surr: 2-Fluorobiphenyl	*96.7*		*20-140*	*%REC*	1	8/25/2014 01:11 PM
Surr: 4-Terphenyl-d14	*90.1*		*22-172*	*%REC*	1	8/25/2014 01:11 PM
Surr: Nitrobenzene-d5	*110*		*8-140*	*%REC*	1	8/25/2014 01:11 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 06:15 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 06:15 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 06:15 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 06:15 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 06:15 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 06:15 PM
Surr: 1,2-Dichloroethane-d4	*98.2*		*75-120*	*%REC*	1	8/21/2014 06:15 PM
Surr: 4-Bromofluorobenzene	*98.8*		*80-110*	*%REC*	1	8/21/2014 06:15 PM
Surr: Dibromofluoromethane	*97.8*		*85-115*	*%REC*	1	8/21/2014 06:15 PM
Surr: Toluene-d8	*97.4*		*85-110*	*%REC*	1	8/21/2014 06:15 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	**5.3**		**5.0**	**mg/L**	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**80**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14 **Work Order:** 14081072
Sample ID: 140819-FB25-SW-6 **Lab ID:** 14081072-03
Collection Date: 8/19/2014 04:10 PM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 01:39 PM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 01:39 PM
Acenaphthene	ND		10	µg/L	1	8/25/2014 01:39 PM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 01:39 PM
Anthracene	ND		10	µg/L	1	8/25/2014 01:39 PM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Chrysene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 01:39 PM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 01:39 PM
Fluorene	ND		10	µg/L	1	8/25/2014 01:39 PM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 01:39 PM
Naphthalene	ND		10	µg/L	1	8/25/2014 01:39 PM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 01:39 PM
Pyrene	ND		10	µg/L	1	8/25/2014 01:39 PM
Surr: 2-Fluorobiphenyl	*82.0*		*20-140*	*%REC*	1	8/25/2014 01:39 PM
Surr: 4-Terphenyl-d14	*81.4*		*22-172*	*%REC*	1	8/25/2014 01:39 PM
Surr: Nitrobenzene-d5	*96.1*		*8-140*	*%REC*	1	8/25/2014 01:39 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 06:40 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 06:40 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 06:40 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 06:40 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 06:40 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 06:40 PM
Surr: 1,2-Dichloroethane-d4	*99.5*		*75-120*	*%REC*	1	8/21/2014 06:40 PM
Surr: 4-Bromofluorobenzene	*99.6*		*80-110*	*%REC*	1	8/21/2014 06:40 PM
Surr: Dibromofluoromethane	*98.8*		*85-115*	*%REC*	1	8/21/2014 06:40 PM
Surr: Toluene-d8	*97.3*		*85-110*	*%REC*	1	8/21/2014 06:40 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**64**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14 **Work Order:** 14081072
Sample ID: 140819-FB25-FD-1 **Lab ID:** 14081072-04
Collection Date: 8/19/2014 **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 02:07 PM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 02:07 PM
Acenaphthene	ND		10	µg/L	1	8/25/2014 02:07 PM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 02:07 PM
Anthracene	ND		10	µg/L	1	8/25/2014 02:07 PM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Chrysene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 02:07 PM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 02:07 PM
Fluorene	ND		10	µg/L	1	8/25/2014 02:07 PM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 02:07 PM
Naphthalene	ND		10	µg/L	1	8/25/2014 02:07 PM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 02:07 PM
Pyrene	ND		10	µg/L	1	8/25/2014 02:07 PM
Surr: 2-Fluorobiphenyl	*83.8*		*20-140*	*%REC*	1	8/25/2014 02:07 PM
Surr: 4-Terphenyl-d14	*85.5*		*22-172*	*%REC*	1	8/25/2014 02:07 PM
Surr: Nitrobenzene-d5	*99.4*		*8-140*	*%REC*	1	8/25/2014 02:07 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 07:06 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 07:06 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 07:06 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 07:06 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 07:06 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 07:06 PM
Surr: 1,2-Dichloroethane-d4	*101*		*75-120*	*%REC*	1	8/21/2014 07:06 PM
Surr: 4-Bromofluorobenzene	*99.6*		*80-110*	*%REC*	1	8/21/2014 07:06 PM
Surr: Dibromofluoromethane	*98.8*		*85-115*	*%REC*	1	8/21/2014 07:06 PM
Surr: Toluene-d8	*97.5*		*85-110*	*%REC*	1	8/21/2014 07:06 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**36**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.19.14
Work Order: 14081072
Sample ID: Trip Blank
Lab ID: 14081072-05
Collection Date:
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 04:58 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 04:58 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 04:58 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 04:58 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 04:58 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 04:58 PM
Surr: 1,2-Dichloroethane-d4	*99.9*		*75-120*	*%REC*	1	8/21/2014 04:58 PM
Surr: 4-Bromofluorobenzene	*98.2*		*80-110*	*%REC*	1	8/21/2014 04:58 PM
Surr: Dibromofluoromethane	*97.0*		*85-115*	*%REC*	1	8/21/2014 04:58 PM
Surr: Toluene-d8	*97.7*		*85-110*	*%REC*	1	8/21/2014 04:58 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 09:54 AM**

Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902640** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*122.1*	0	*114*	0	*107*	*20-140*	0			
Surr: 4-Terphenyl-d14	*128.4*	0	*114*	0	*113*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 10:22 AM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902662** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.28	5.0	45.7	0	99.1	50-140	0			
2-Methylnaphthalene	34.61	5.0	45.7	0	75.7	50-140	0			
Acenaphthene	53.67	5.0	45.7	0	117	60-140	0			
Acenaphthylene	57.53	5.0	45.7	0	126	60-140	0			
Anthracene	56.21	5.0	45.7	0	123	60-140	0			
Benzo(a)anthracene	54.74	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	57.17	5.0	45.7	0	125	60-140	0			
Benzo(b)fluoranthene	60.64	5.0	45.7	0	133	60-140	0			
Benzo(g,h,i)perylene	48.82	5.0	45.7	0	107	60-140	0			
Benzo(k)fluoranthene	59.41	5.0	45.7	0	130	60-140	0			
Chrysene	59.7	5.0	45.7	0	131	60-140	0			
Dibenzo(a,h)anthracene	33.53	5.0	45.7	0	73.4	60-140	0			
Fluoranthene	55.82	5.0	45.7	0	122	60-140	0			
Fluorene	56.91	5.0	45.7	0	125	60-140	0			
Indeno(1,2,3-cd)pyrene	40.96	5.0	45.7	0	89.6	60-140	0			
Naphthalene	31.25	5.0	45.7	0	68.4	40-140	0			
Phenanthrene	57.37	5.0	45.7	0	126	60-140	0			
Pyrene	61.65	5.0	45.7	0	135	60-140	0			
Surr: 2-Fluorobiphenyl	*127.9*	0	*114*	0	*112*	*20-140*	0			
Surr: 4-Terphenyl-d14	*96.82*	0	*114*	0	*84.9*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081070-01C MS** Units: **µg/L** Analysis Date: **8/25/2014 02:35 PM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2903821** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	42.51	10	45.7	0	93	50-140	0			
2-Methylnaphthalene	40	10	45.7	0	87.5	50-140	0			
Acenaphthene	44.75	10	45.7	0	97.9	60-140	0			
Acenaphthylene	44.25	10	45.7	0	96.8	60-140	0			
Anthracene	46.03	10	45.7	0	101	60-140	0			
Benzo(a)anthracene	47.45	10	45.7	0	104	60-140	0			
Benzo(a)pyrene	51.02	10	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	55.91	10	45.7	0	122	60-140	0			
Benzo(g,h,i)perylene	41.51	10	45.7	0	90.8	60-140	0			
Benzo(k)fluoranthene	52.16	10	45.7	0	114	60-140	0			
Chrysene	61.85	10	45.7	0	135	60-140	0			
Dibenzo(a,h)anthracene	10.01	10	45.7	0	21.9	60-140	0			S
Fluoranthene	45.26	10	45.7	0	99	60-140	0			
Fluorene	44.02	10	45.7	0	96.3	60-140	0			
Indeno(1,2,3-cd)pyrene	51.98	10	45.7	0	114	60-140	0			
Naphthalene	36.98	10	45.7	0	80.9	40-140	0			
Phenanthrene	46.31	10	45.7	0	101	60-140	0			
Pyrene	62.58	10	45.7	0	137	60-140	0			
Surr: 2-Fluorobiphenyl	*102.2*	0	*114*	0	*89.6*	*20-140*	0			
Surr: 4-Terphenyl-d14	*73.01*	0	*114*	0	*64*	*22-172*	0			
Surr: Nitrobenzene-d5	*121.6*	0	*114*	0	*107*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081070-01C MSD** Units: **µg/L** Analysis Date: **8/25/2014 03:03 PM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2903822** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.21	10	45.7	0	98.9	50-140	42.51	6.15	30	
2-Methylnaphthalene	43.29	10	45.7	0	94.7	50-140	40	7.9	30	
Acenaphthene	48.78	10	45.7	0	107	60-140	44.75	8.6	30	
Acenaphthylene	47.22	10	45.7	0	103	60-140	44.25	6.5	30	
Anthracene	49.01	10	45.7	0	107	60-140	46.03	6.25	30	
Benzo(a)anthracene	47.18	10	45.7	0	103	60-140	47.45	0.58	30	
Benzo(a)pyrene	56.23	10	45.7	0	123	60-140	51.02	9.72	30	
Benzo(b)fluoranthene	57.33	10	45.7	0	125	60-140	55.91	2.5	30	
Benzo(g,h,i)perylene	49.51	10	45.7	0	108	60-140	41.51	17.6	30	
Benzo(k)fluoranthene	58.93	10	45.7	0	129	60-140	52.16	12.2	30	
Chrysene	59.11	10	45.7	0	129	60-140	61.85	4.54	30	
Dibenzo(a,h)anthracene	16.96	10	45.7	0	37.1	60-140	10.01	51.5	30	SR
Fluoranthene	48.46	10	45.7	0	106	60-140	45.26	6.83	30	
Fluorene	46.31	10	45.7	0	101	60-140	44.02	5.06	30	
Indeno(1,2,3-cd)pyrene	63.04	10	45.7	0	138	60-140	51.98	19.2	30	
Naphthalene	40.14	10	45.7	0	87.8	40-140	36.98	8.18	30	
Phenanthrene	50.7	10	45.7	0	111	60-140	46.31	9.05	30	
Pyrene	62.31	10	45.7	0	136	60-140	62.58	0.439	30	
Surr: 2-Fluorobiphenyl	*105.2*	0	*114*	0	*92.3*	*20-140*	102.2	*2.91*	*30*	
Surr: 4-Terphenyl-d14	*77.67*	0	*114*	0	*68.1*	*22-172*	73.01	*6.19*	*30*	
Surr: Nitrobenzene-d5	*124.8*	0	*114*	0	*110*	*8-140*	121.6	*2.6*	*30*	

The following samples were analyzed in this batch:

14081072-01C	14081072-02C	14081072-03C
14081072-04C		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 03:16 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899445** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.8*	0	*20*	0	*99*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.86*	0	*20*	0	*99.3*	*80-110*	0			
Surr: Dibromofluoromethane	*19.65*	0	*20*	0	*98.2*	*85-115*	0			
Surr: Toluene-d8	*19.55*	0	*20*	0	*97.8*	*85-110*	0			

LCS Sample ID: **VLCSW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 01:59 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899442** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.56	1.0	20	0	108	85-125	0			
Ethylbenzene	20.38	1.0	20	0	102	85-125	0			
m,p-Xylene	40.36	2.0	40	0	101	75-130	0			
o-Xylene	20.03	1.0	20	0	100	80-125	0			
Toluene	20.35	1.0	20	0	102	85-125	0			
Xylenes, Total	60.39	3.0	60	0	101	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.28*	0	*20*	0	*96.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.26*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.26*	0	*20*	0	*96.3*	*85-115*	0			
Surr: Toluene-d8	*19.75*	0	*20*	0	*98.8*	*85-110*	0			

MS Sample ID: **14081072-01A MS** Units: **µg/L** Analysis Date: **8/22/2014 12:11 PM**
Client ID: **140819-FB25-SW-2** Run ID: **VMS5_140821A** SeqNo: **2899479** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.73	1.0	20	0	104	85-125	0			
Ethylbenzene	19.88	1.0	20	0	99.4	85-125	0			
m,p-Xylene	39.11	2.0	40	0	97.8	75-130	0			
o-Xylene	19.2	1.0	20	0	96	80-125	0			
Toluene	19.4	1.0	20	0	97	85-125	0			
Xylenes, Total	58.31	3.0	60	0	97.2	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.54*	0	*20*	0	*97.7*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.73*	0	*20*	0	*104*	*80-110*	0			
Surr: Dibromofluoromethane	*19.39*	0	*20*	0	*97*	*85-115*	0			
Surr: Toluene-d8	*19.63*	0	*20*	0	*98.2*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MSD	Sample ID: **14081072-01A MSD**				Units: **µg/L**			Analysis Date: **8/22/2014 12:36 PM**		
Client ID: **140819-FB25-SW-2**		Run ID: **VMS5_140821A**			SeqNo: **2899480**		Prep Date:		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.21	1.0	20	0	101	85-125	20.73	2.54	30	
Ethylbenzene	20.18	1.0	20	0	101	85-125	19.88	1.5	30	
m,p-Xylene	40.38	2.0	40	0	101	75-130	39.11	3.2	30	
o-Xylene	19.67	1.0	20	0	98.4	80-125	19.2	2.42	30	
Toluene	19.25	1.0	20	0	96.2	85-125	19.4	0.776	30	
Xylenes, Total	60.05	3.0	60	0	100	80-126	58.31	2.94	30	
Surr: 1,2-Dichloroethane-d4	*19.52*	0	*20*	0	*97.6*	*75-120*	19.54	*0.102*	*30*	
Surr: 4-Bromofluorobenzene	*20.61*	0	*20*	0	*103*	*80-110*	20.73	*0.581*	*30*	
Surr: Dibromofluoromethane	*19.7*	0	*20*	0	*98.5*	*85-115*	19.39	*1.59*	*30*	
Surr: Toluene-d8	*19.71*	0	*20*	0	*98.6*	*85-110*	19.63	*0.407*	*30*	

The following samples were analyzed in this batch:

14081072-01A	14081072-02A	14081072-03A
14081072-04A	14081072-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **61919** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898801** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	6.0								

LCS Sample ID: **LCS-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898800** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	93	6.0	100	0	93	80-115	0			

DUP Sample ID: **14081070-01B DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898785** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	20.5	3.0	0	0	0	0-0	21	2.41	15	

DUP Sample ID: **1408954-01A DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898794** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	156	12	0	0	0	0-0	158	1.27	15	

The following samples were analyzed in this batch: 14081072-01B 14081072-02B 14081072-03B 14081072-04B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081072
Project: Enbridge FB25 Release Response SW 8.19.14

QC BATCH REPORT

Batch ID: **R146822** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900215** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900216** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	5.0	40	0	90.2	78-114	0			

MS Sample ID: **14081119-02A MS** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	33.66	5.0	40	1.74	79.8	78-114	0			

DUP Sample ID: **14081119-04A DUP** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900220** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1.41	5.0	0	0	0	0-0	1.24	0	18	J

The following samples were analyzed in this batch:

14081072-01D	14081072-02D	14081072-03D
14081072-04D		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081072

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49/6129200-001-100
Project Name: FB25 Release Response
Sample Origination State: WI (use two letter postal state abbreviation)
COC Number: № 43437

COC 1 of 1

Project Manager: REE
Project QC Contact: AAN
Sampled by: TTB/CJGZ
Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: ~~#0 (HCl)~~ #1 BTEX	~~#0~~ #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	#3 TSS	Diesel Range Organics (HCl)	#4 Oil & Grease	Nutrients (H_2SO_4)	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers
1. SW-1	0	0.5	ft			X		X			3	1			1		1								
2. 140819-FB25-SW-2	0	0.5		08/19/2014	1715	X		X			3	1			1		1								
3. 140819-FB25-SW-5	0	0.5			1810	X		X			3	1			1		1								
4. 140819-FB25-SW-6	0	0.5			1610	X		X			3	1			1		1								
5. 140819-FB25-FD-1 Duplicate	0	0.5			-	X		X			3	1			1		1								
6. Trip Blank											✓							n/a JT 8/20/14							
7. JM 8/21/14																									
8.																									
9.																									
10.																									

Rush TAT — ASAP

Please Complete Duplicate, MS/MSD on Project Samples if possible

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

	On Ice?	Date	Time		Date	Time
Relinquished By:	Y N	8.20.14	1730	Received by: FEDEX		
Relinquished By: FEDEX	Y N	8/21/14	1000	Received by:		

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other:

Air Bill Number: 8753 9348 9940

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

4.8°C

H:RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **21-Aug-14 10:00**

Work Order: **14081072** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 21-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.8 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/21/2014 12:24:27 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Dept/Floor/Suite/Room

ORIGIN ID:DLHA (218) 727-5218
BARR ENGINEERING

332 W SUPERIOR ST

DULUTH, MN 558021808
UNITED STATES US

SHIP DATE: 20AUG14
ACTWGT: 33.8 LB MAN
CAD: /POS1501
DIMS: 23x14x14 IN

SENDER

TO ATTN: SAMPLE REC
ALS
3352 128TH AVE

HOLLAND MI 49424
(616) 399-6070

REF:

PO:

DEPT:

Part # 158297-435 RIT2 06/14

FedEx
Express

2 of 5
MPS# 0681 7801 3724 8739
Mstr# 8753 9348 9983

THU - 21 AUG 10:30A
PRIORITY OVERNIGHT

0215

XX HLMA

DSR
49424
MI-US GRR

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081219
COC Number: 081219
Date Received: 8/20/2014
Report Date: 8/26/2014
ReportNumber: 127177

Client: MARGARET TREANOR
BARR ENGINEERING CO
4700 WEST 77TH STREET
MINNEAPOLIS MN 55435

Sample ID: 140819-FB25-SW-2 Grab **Sample Date:** 8/19/2014 **SampleTime:** 17:15 **Matrix:** Aqueous
Era Project Number: 081219-1

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/20/2014	18:05	SM 5210 B-97	1	2	2		3

Sample ID: 140819-FB25-SW-5 Grab **Sample Date:** 8/19/2014 **SampleTime:** 18:10 **Matrix:** Aqueous
Era Project Number: 081219-2

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)		4	mg/L	8/20/2014	18:05	SM 5210 B-97	1	2	2		3

Sample ID: 140819-FB25-SW-6 Grab **Sample Date:** 8/19/2014 **SampleTime:** 16:10 **Matrix:** Aqueous
Era Project Number: 081219-3

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)		5	mg/L	8/20/2014	18:05	SM 5210 B-97	1	2	2		3

Sample ID: 140819-FB25-FD-1 Grab **Sample Date:** 8/19/2014 **SampleTime:** **Matrix:** Aqueous
Era Project Number: 081219-4

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/20/2014	18:05	SM 5210 B-97	1	2	2		3

Receipt temperature within regulatory guidelines

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number:	081219
COC Number:	081219
Date Received:	8/20/2014
Report Date:	8/26/2014
ReportNumber:	127177

Results are reported on an as received basis. < Not detected. Less than LOD.

Quality Control Summary Report

Analyte	Date of Analysis	QC Batch	Matrix Spike (% Recovery)	% Recovery Limits	MSD or Duplicate (%RPD)	% RPD Limits	Duplicate Range	Range Limits	LCS (% Recovery)	LCS Limits	Method Blank
BOD (5)	8/20/2014	3	NA	NA	NA	NA	0.00	10	105.90	84.9 - 115.40	<0.2

Report Approved By:
Robert D. Magnuson
Lab Director
MN Certification # 027-137-152

Temperature upon arrival (°C): 3.0
Receipt temperature within regulatory guidelines

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49/6129200-001-100

Project Name: FB25 Release Response

Project Manager: REE

Project QC Contact: AAN / JET

Sample Origination State WI (use two letter postal state abbreviation)

Sampled by: TTS / CJG2

COC Number: № 43435

Laboratory: Era

	Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: General (unpreserved) #3 (1805)	Number of Containers/Preservative: Soil: VOCs (tared MeOH) #1	Number of Containers/Preservative: Soil: GRO, BTEX (tared MeOH) #1	Number of Containers/Preservative: Soil: DRO (tared unpreserved)	Number of Containers/Preservative: Soil: Metals (unpreserved)	Number of Containers/Preservative: Soil: SVOCs (unpreserved) #2	Number of Containers/Preservative: Soil: % Solids (plastic vial, unpres.)	Total Number Of Containers
1.	~~SW-1~~	0	0.5	ft			X		X			1							1
-1 2.	140819-FB25-SW-2	0	0.5	↓	08/19/2014	1715	X		X			1							1
-2 3.	140819-FB25-SW-5	0	0.5	↓	↓	1810	X		X			1							1
3 4.	140819-FB25-SW-6	0	0.5	↓	↓	1610	X		X			1							1
-4 5.	140819-FB25-FD-1 ~~Duplicate~~	0	0.5		↓	—	X		X			1							1
6.																			
7.																			
8.																			
9.																			
10.																			

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TK

Relinquished By:	On Ice?	Date	Time	Received By:	Date	Time
	(Y) N	8/20/14	15:30		8-2014	15:30
Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
	(Y) N			temp 3.0°C		

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____ Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

emai J Farabee

H:RLGSTDFORMS\Chain Of Custody Form 2009 RLG Rev. 06\01\09

26-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response SW 8.20.14** Work Order: **14081070**

Dear Ryan,

ALS Environmental received 2 samples on 21-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
Work Order: **14081070**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081070-01	140820-FB25-SW-1	Water		8/20/2014 11:40	8/21/2014 10:00	☐
14081070-02	140820-FB25-SW-2	Water		8/20/2014 12:05	8/21/2014 10:00	☐

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
Work Order: 14081070

Case Narrative

Samples for the above noted Work Order were received on 08/21/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
The reporting limits for PAHs were elevated because the extract could not be reduced down to 1 ml.
Batch 61935 sample 140820-FB25-SW-1 MS/MSD recoveries and RPD for Dibenzo(a,h)anthracene were outside control limits. The corresponding reporting limit in the parent sample may be biased low for Dibenzo(a,h)anthracene.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
WorkOrder: **14081070**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14 **Work Order:** 14081070
Sample ID: 140820-FB25-SW-1 **Lab ID:** 14081070-01
Collection Date: 8/20/2014 11:40 AM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 10:50 AM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 10:50 AM
Acenaphthene	ND		10	µg/L	1	8/25/2014 10:50 AM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 10:50 AM
Anthracene	ND		10	µg/L	1	8/25/2014 10:50 AM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Chrysene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 10:50 AM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 10:50 AM
Fluorene	ND		10	µg/L	1	8/25/2014 10:50 AM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 10:50 AM
Naphthalene	ND		10	µg/L	1	8/25/2014 10:50 AM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 10:50 AM
Pyrene	ND		10	µg/L	1	8/25/2014 10:50 AM
Surr: 2-Fluorobiphenyl	*99.7*		*20-140*	*%REC*	1	8/25/2014 10:50 AM
Surr: 4-Terphenyl-d14	*93.3*		*22-172*	*%REC*	1	8/25/2014 10:50 AM
Surr: Nitrobenzene-d5	*111*		*8-140*	*%REC*	1	8/25/2014 10:50 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 05:24 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 05:24 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 05:24 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 05:24 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 05:24 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 05:24 PM
Surr: 1,2-Dichloroethane-d4	*99.6*		*75-120*	*%REC*	1	8/21/2014 05:24 PM
Surr: 4-Bromofluorobenzene	*99.6*		*80-110*	*%REC*	1	8/21/2014 05:24 PM
Surr: Dibromofluoromethane	*98.8*		*85-115*	*%REC*	1	8/21/2014 05:24 PM
Surr: Toluene-d8	*97.0*		*85-110*	*%REC*	1	8/21/2014 05:24 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**21**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14 **Work Order:** 14081070
Sample ID: 140820-FB25-SW-2 **Lab ID:** 14081070-02
Collection Date: 8/20/2014 12:05 PM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 11:18 AM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 11:18 AM
Acenaphthene	ND		10	µg/L	1	8/25/2014 11:18 AM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 11:18 AM
Anthracene	ND		10	µg/L	1	8/25/2014 11:18 AM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Chrysene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 11:18 AM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:18 AM
Fluorene	ND		10	µg/L	1	8/25/2014 11:18 AM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 11:18 AM
Naphthalene	ND		10	µg/L	1	8/25/2014 11:18 AM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 11:18 AM
Pyrene	ND		10	µg/L	1	8/25/2014 11:18 AM
Surr: 2-Fluorobiphenyl	*94.9*		*20-140*	*%REC*	1	8/25/2014 11:18 AM
Surr: 4-Terphenyl-d14	*86.3*		*22-172*	*%REC*	1	8/25/2014 11:18 AM
Surr: Nitrobenzene-d5	*104*		*8-140*	*%REC*	1	8/25/2014 11:18 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 07:31 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 07:31 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 07:31 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 07:31 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 07:31 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 07:31 PM
Surr: 1,2-Dichloroethane-d4	*99.2*		*75-120*	*%REC*	1	8/21/2014 07:31 PM
Surr: 4-Bromofluorobenzene	*99.7*		*80-110*	*%REC*	1	8/21/2014 07:31 PM
Surr: Dibromofluoromethane	*99.4*		*85-115*	*%REC*	1	8/21/2014 07:31 PM
Surr: Toluene-d8	*97.0*		*85-110*	*%REC*	1	8/21/2014 07:31 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**20**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 09:54 AM**

Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902640** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*122.1*	0	*114*	0	*107*	*20-140*	0			
Surr: 4-Terphenyl-d14	*128.4*	0	*114*	0	*113*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 10:22 AM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902662** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.28	5.0	45.7	0	99.1	50-140	0			
2-Methylnaphthalene	34.61	5.0	45.7	0	75.7	50-140	0			
Acenaphthene	53.67	5.0	45.7	0	117	60-140	0			
Acenaphthylene	57.53	5.0	45.7	0	126	60-140	0			
Anthracene	56.21	5.0	45.7	0	123	60-140	0			
Benzo(a)anthracene	54.74	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	57.17	5.0	45.7	0	125	60-140	0			
Benzo(b)fluoranthene	60.64	5.0	45.7	0	133	60-140	0			
Benzo(g,h,i)perylene	48.82	5.0	45.7	0	107	60-140	0			
Benzo(k)fluoranthene	59.41	5.0	45.7	0	130	60-140	0			
Chrysene	59.7	5.0	45.7	0	131	60-140	0			
Dibenzo(a,h)anthracene	33.53	5.0	45.7	0	73.4	60-140	0			
Fluoranthene	55.82	5.0	45.7	0	122	60-140	0			
Fluorene	56.91	5.0	45.7	0	125	60-140	0			
Indeno(1,2,3-cd)pyrene	40.96	5.0	45.7	0	89.6	60-140	0			
Naphthalene	31.25	5.0	45.7	0	68.4	40-140	0			
Phenanthrene	57.37	5.0	45.7	0	126	60-140	0			
Pyrene	61.65	5.0	45.7	0	135	60-140	0			
Surr: 2-Fluorobiphenyl	*127.9*	0	*114*	0	*112*	*20-140*	0			
Surr: 4-Terphenyl-d14	*96.82*	0	*114*	0	*84.9*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081070-01C MS** Units: **µg/L** Analysis Date: **8/25/2014 02:35 PM**
Client ID: **140820-FB25-SW-1** Run ID: **SVMS7_140825A** SeqNo: **2903821** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	42.51	10	45.7	0	93	50-140	0			
2-Methylnaphthalene	40	10	45.7	0	87.5	50-140	0			
Acenaphthene	44.75	10	45.7	0	97.9	60-140	0			
Acenaphthylene	44.25	10	45.7	0	96.8	60-140	0			
Anthracene	46.03	10	45.7	0	101	60-140	0			
Benzo(a)anthracene	47.45	10	45.7	0	104	60-140	0			
Benzo(a)pyrene	51.02	10	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	55.91	10	45.7	0	122	60-140	0			
Benzo(g,h,i)perylene	41.51	10	45.7	0	90.8	60-140	0			
Benzo(k)fluoranthene	52.16	10	45.7	0	114	60-140	0			
Chrysene	61.85	10	45.7	0	135	60-140	0			
Dibenzo(a,h)anthracene	10.01	10	45.7	0	21.9	60-140	0			S
Fluoranthene	45.26	10	45.7	0	99	60-140	0			
Fluorene	44.02	10	45.7	0	96.3	60-140	0			
Indeno(1,2,3-cd)pyrene	51.98	10	45.7	0	114	60-140	0			
Naphthalene	36.98	10	45.7	0	80.9	40-140	0			
Phenanthrene	46.31	10	45.7	0	101	60-140	0			
Pyrene	62.58	10	45.7	0	137	60-140	0			
Surr: 2-Fluorobiphenyl	*102.2*	0	*114*	0	*89.6*	*20-140*	0			
Surr: 4-Terphenyl-d14	*73.01*	0	*114*	0	*64*	*22-172*	0			
Surr: Nitrobenzene-d5	*121.6*	0	*114*	0	*107*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081070-01C MSD** Units: **µg/L** Analysis Date: **8/25/2014 03:03 PM**
Client ID: **140820-FB25-SW-1** Run ID: **SVMS7_140825A** SeqNo: **2903822** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.21	10	45.7	0	98.9	50-140	42.51	6.15	30	
2-Methylnaphthalene	43.29	10	45.7	0	94.7	50-140	40	7.9	30	
Acenaphthene	48.78	10	45.7	0	107	60-140	44.75	8.6	30	
Acenaphthylene	47.22	10	45.7	0	103	60-140	44.25	6.5	30	
Anthracene	49.01	10	45.7	0	107	60-140	46.03	6.25	30	
Benzo(a)anthracene	47.18	10	45.7	0	103	60-140	47.45	0.58	30	
Benzo(a)pyrene	56.23	10	45.7	0	123	60-140	51.02	9.72	30	
Benzo(b)fluoranthene	57.33	10	45.7	0	125	60-140	55.91	2.5	30	
Benzo(g,h,i)perylene	49.51	10	45.7	0	108	60-140	41.51	17.6	30	
Benzo(k)fluoranthene	58.93	10	45.7	0	129	60-140	52.16	12.2	30	
Chrysene	59.11	10	45.7	0	129	60-140	61.85	4.54	30	
Dibenzo(a,h)anthracene	16.96	10	45.7	0	37.1	60-140	10.01	51.5	30	SR
Fluoranthene	48.46	10	45.7	0	106	60-140	45.26	6.83	30	
Fluorene	46.31	10	45.7	0	101	60-140	44.02	5.06	30	
Indeno(1,2,3-cd)pyrene	63.04	10	45.7	0	138	60-140	51.98	19.2	30	
Naphthalene	40.14	10	45.7	0	87.8	40-140	36.98	8.18	30	
Phenanthrene	50.7	10	45.7	0	111	60-140	46.31	9.05	30	
Pyrene	62.31	10	45.7	0	136	60-140	62.58	0.439	30	
Surr: 2-Fluorobiphenyl	*105.2*	0	*114*	0	*92.3*	*20-140*	102.2	*2.91*	*30*	
Surr: 4-Terphenyl-d14	*77.67*	0	*114*	0	*68.1*	*22-172*	73.01	*6.19*	*30*	
Surr: Nitrobenzene-d5	*124.8*	0	*114*	0	*110*	*8-140*	121.6	*2.6*	*30*	

The following samples were analyzed in this batch:

14081070-01C	14081070-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 03:16 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899445** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.8*	0	*20*	0	*99*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.86*	0	*20*	0	*99.3*	*80-110*	0			
Surr: Dibromofluoromethane	*19.65*	0	*20*	0	*98.2*	*85-115*	0			
Surr: Toluene-d8	*19.55*	0	*20*	0	*97.8*	*85-110*	0			

LCS Sample ID: **VLCSW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 01:59 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899442** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.56	1.0	20	0	108	85-125	0			
Ethylbenzene	20.38	1.0	20	0	102	85-125	0			
m,p-Xylene	40.36	2.0	40	0	101	75-130	0			
o-Xylene	20.03	1.0	20	0	100	80-125	0			
Toluene	20.35	1.0	20	0	102	85-125	0			
Xylenes, Total	60.39	3.0	60	0	101	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.28*	0	*20*	0	*96.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.26*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.26*	0	*20*	0	*96.3*	*85-115*	0			
Surr: Toluene-d8	*19.75*	0	*20*	0	*98.8*	*85-110*	0			

MS Sample ID: **14081072-01A MS** Units: **µg/L** Analysis Date: **8/22/2014 12:11 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899479** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.73	1.0	20	0	104	85-125	0			
Ethylbenzene	19.88	1.0	20	0	99.4	85-125	0			
m,p-Xylene	39.11	2.0	40	0	97.8	75-130	0			
o-Xylene	19.2	1.0	20	0	96	80-125	0			
Toluene	19.4	1.0	20	0	97	85-125	0			
Xylenes, Total	58.31	3.0	60	0	97.2	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.54*	0	*20*	0	*97.7*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.73*	0	*20*	0	*104*	*80-110*	0			
Surr: Dibromofluoromethane	*19.39*	0	*20*	0	*97*	*85-115*	0			
Surr: Toluene-d8	*19.63*	0	*20*	0	*98.2*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MSD	Sample ID: **14081072-01A MSD**				Units: **µg/L**			Analysis Date: **8/22/2014 12:36 PM**		
Client ID:		Run ID: **VMS5_140821A**			SeqNo: **2899480**		Prep Date:		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.21	1.0	20	0	101	85-125	20.73	2.54	30	
Ethylbenzene	20.18	1.0	20	0	101	85-125	19.88	1.5	30	
m,p-Xylene	40.38	2.0	40	0	101	75-130	39.11	3.2	30	
o-Xylene	19.67	1.0	20	0	98.4	80-125	19.2	2.42	30	
Toluene	19.25	1.0	20	0	96.2	85-125	19.4	0.776	30	
Xylenes, Total	60.05	3.0	60	0	100	80-126	58.31	2.94	30	
Surr: 1,2-Dichloroethane-d4	*19.52*	0	*20*	0	*97.6*	*75-120*	19.54	*0.102*	*30*	
Surr: 4-Bromofluorobenzene	*20.61*	0	*20*	0	*103*	*80-110*	20.73	*0.581*	*30*	
Surr: Dibromofluoromethane	*19.7*	0	*20*	0	*98.5*	*85-115*	19.39	*1.59*	*30*	
Surr: Toluene-d8	*19.71*	0	*20*	0	*98.6*	*85-110*	19.63	*0.407*	*30*	

The following samples were analyzed in this batch: 14081070-01A 14081070-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61919** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898801** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	6.0								

LCS Sample ID: **LCS-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898800** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	93	6.0	100	0	93	80-115	0			

DUP Sample ID: **14081070-01B DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: **140820-FB25-SW-1** Run ID: **TSS_140821B** SeqNo: **2898785** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	20.5	3.0	0	0	0	0-0	21	2.41	15	

DUP Sample ID: **1408954-01A DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898794** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	156	12	0	0	0	0-0	158	1.27	15	

The following samples were analyzed in this batch: 14081070-01B 14081070-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081070
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146822** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900215** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900216** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	5.0	40	0	90.2	78-114	0			

MS Sample ID: **14081119-02A MS** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	33.66	5.0	40	1.74	79.8	78-114	0			

DUP Sample ID: **14081119-04A DUP** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900220** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1.41	5.0	0	0	0	0-0	1.24	0	18	J

The following samples were analyzed in this batch: 14081070-01D 14081070-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081070

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Release Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 40276

Project Manager: REE/HAW

Project QC Contact: AAN

Sampled by: GL1/BJ22

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	QC	Number of Containers/Preservative: Water: ~~TDS~~ (HCl) #1 BTEX	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water: ~~BOD~~, TSS	Water: PAH, Oil & Grease	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Total Number Of Containers	
1. 140820-FB25-SW-1	0	0.5	ft	8/20/14	1140	X		X			X							X	X							6	BTEX, ~~BOD~~, TSS, PAH, Oil & Grease
2. 140820-FB25-SW-2	0	0.5	ft	8/20/14	1205	X		X			X							X	X							6	BTEX, ~~BOD~~, TSS, PAH Oil & Grease
3.																											
4.																											Rush TAT
5.																											
6.																											Please complete MS/MSD or duplicates on Project Sample
7.																											
8.																											
9.																											
10.																											

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
Brad Sen	(Y) N	8/20/14	1330	FedEx		
Relinquished By: FedEx	On Ice? Y N	8/21/14	1000	Received by:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 8753 9348 9950

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

4.2°C

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **21-Aug-14 10:00**

Work Order: **14081070** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 21-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.2 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/21/2014 12:16:15 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Company

Dept/Floor/Suite/Room

ORIGIN ID:DLHA (218) 727-5218
BARR ENGINEERING
332 W SUPERIOR ST
DULUTH, MN 558021808
UNITED STATES US

SHIP DATE: 20AUG14
ACTWGT: 34.5 LB MAN
CAD: /PD81501
DIMS: 24x14x13 IN
BILL SENDER

Part # 156207-435 REV2 08/14

TO ATTN: SAMPLE RECEIVING
ALS
3352 128TH AVE

HOLLAND MI 49424
(616) 399-6070
INV:
PO:
REF:
DEPT:

FedEx Express

1 of 5
TRK# 0215 8753 9348 9983
MASTER
XX HLMA

THU - 21 AUG 10:30A
PRIORITY OVERNIGHT
DSR
49424
MI-US GRR

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number:	081229
COC Number:	081229
Date Received:	8/21/2014
Report Date:	8/28/2014
ReportNumber:	127218

Client: MARGARET TREANOR
BARR ENGINEERING CO
4700 WEST 77TH STREET
MINNEAPOLIS MN 55435

Sample ID: 140820-FB25-SW-1 Grab **Sample Date:** 8/20/2014 **SampleTime:** 11:40 **Matrix:** Aqueous
Era Project Number: 081229-1

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/21/2014	17:16	SM 5210 B-97	1	2	2		1

Sample ID: 140820-FB25-SW-2 Grab **Sample Date:** 8/20/2014 **SampleTime:** 12:05 **Matrix:** Aqueous
Era Project Number: 081229-2

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/21/2014	17:39	SM 5210 B-97	1	2	2		1

Sample ID: 140820-FB25-SW-5 Grab **Sample Date:** 8/20/2014 **SampleTime:** 14:05 **Matrix:** Aqueous
Era Project Number: 081229-3

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)		6	mg/L	8/21/2014	17:39	SM 5210 B-97	1	2	2		1

Sample ID: 140820-FB25-SW-6 Grab **Sample Date:** 8/20/2014 **SampleTime:** 15:00 **Matrix:** Aqueous
Era Project Number: 081229-4

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)		4	mg/L	8/21/2014	17:39	SM 5210 B-97	1	2	2		1

Receipt temperature within regulatory guidelines

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081229
COC Number: 081229
Date Received: 8/21/2014
Report Date: 8/28/2014
ReportNumber: 127218

Results are reported on an as received basis. < Not detected. Less than LOD.

Quality Control Summary Report

Analyte	Date of Analysis	QC Batch	Matrix Spike (% Recovery)	% Recovery Limits	MSD or Duplicate (%RPD)	% RPD Limits	Duplicate Range	Range Limits	LCS (% Recovery)	LCS Limits	Method Blank
BOD (5)	8/21/2014	1	NA	NA	NA	NA	0.23	10	105.76	84.9 - 115.40	<0.2

Report Approved By:
Robert D. Magnuson
Lab Director
MN Certification # 027-137-152

Temperature upon arrival (°C): 3.0
Receipt temperature within regulatory guidelines

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

081229

Project Number: 49161292

Project Name: FB25 Release Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 40269

COC 1 of 1

Project Manager: REE/HAW

Project QC Contact: AAN

Sampled by: GLI/BJLL

Laboratory: ERA

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4 BOD	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers	
1. 140820-FB25-SW-1	0	0.5	ft	8/20/14	11:40	X		X									X							1	BOD
2. 140820-FB25-SW-2	0	0.5	ft	8/20/14	12:05	X		X									X							1	BOD
3. 140820-FB-25 SW-5	0	0.5	ft	8/20/14	14:05	X		X									X							1	BOD
4. 140820-FB25-SW-6	0	0.5	ft	8/20/14	15:00	X		X									X							1	BOD
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TK

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
Gina Lee	(Y) N	8/20/14	15:35	[signature]	8/21/14	10:15
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
				[signature]	8/21/14	10:15

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

3.0°C

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

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26-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response SW 8.20.14** Work Order: **14081071**

Dear Ryan,

ALS Environmental received 2 samples on 21-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
Work Order: **14081071**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081071-01	140820-FB25-SW-5	Water		8/20/2014 14:05	8/21/2014 10:00	☐
14081071-02	140820-FB25-SW-6	Water		8/20/2014 15:00	8/21/2014 10:00	☐

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
Work Order: 14081071

Case Narrative

Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
The reporting limits for PAHs were elevated because the extract could not be reduced down to 1 ml.
Batch 61935 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
WorkOrder: **14081071**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14 **Work Order:** 14081071
Sample ID: 140820-FB25-SW-5 **Lab ID:** 14081071-01
Collection Date: 8/20/2014 02:05 PM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 11:46 AM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 11:46 AM
Acenaphthene	ND		10	µg/L	1	8/25/2014 11:46 AM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 11:46 AM
Anthracene	ND		10	µg/L	1	8/25/2014 11:46 AM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Chrysene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 11:46 AM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 11:46 AM
Fluorene	ND		10	µg/L	1	8/25/2014 11:46 AM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 11:46 AM
Naphthalene	ND		10	µg/L	1	8/25/2014 11:46 AM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 11:46 AM
Pyrene	ND		10	µg/L	1	8/25/2014 11:46 AM
Surr: 2-Fluorobiphenyl	*104*		*20-140*	*%REC*	1	8/25/2014 11:46 AM
Surr: 4-Terphenyl-d14	*95.0*		*22-172*	*%REC*	1	8/25/2014 11:46 AM
Surr: Nitrobenzene-d5	*117*		*8-140*	*%REC*	1	8/25/2014 11:46 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 07:57 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 07:57 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 07:57 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 07:57 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 07:57 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 07:57 PM
Surr: 1,2-Dichloroethane-d4	*100*		*75-120*	*%REC*	1	8/21/2014 07:57 PM
Surr: 4-Bromofluorobenzene	*98.0*		*80-110*	*%REC*	1	8/21/2014 07:57 PM
Surr: Dibromofluoromethane	*99.3*		*85-115*	*%REC*	1	8/21/2014 07:57 PM
Surr: Toluene-d8	*97.8*		*85-110*	*%REC*	1	8/21/2014 07:57 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**110**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response SW 8.20.14
Work Order: 14081071
Sample ID: 140820-FB25-SW-6
Lab ID: 14081071-02
Collection Date: 8/20/2014 03:00 PM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/22/14	Analyst: **RM**
2-Chloronaphthalene	ND		10	µg/L	1	8/25/2014 12:15 PM
2-Methylnaphthalene	ND		10	µg/L	1	8/25/2014 12:15 PM
Acenaphthene	ND		10	µg/L	1	8/25/2014 12:15 PM
Acenaphthylene	ND		10	µg/L	1	8/25/2014 12:15 PM
Anthracene	ND		10	µg/L	1	8/25/2014 12:15 PM
Benzo(a)anthracene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Benzo(a)pyrene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Benzo(b)fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Benzo(g,h,i)perylene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Benzo(k)fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Chrysene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Dibenzo(a,h)anthracene	ND		4.0	µg/L	1	8/25/2014 12:15 PM
Fluoranthene	ND		2.0	µg/L	1	8/25/2014 12:15 PM
Fluorene	ND		10	µg/L	1	8/25/2014 12:15 PM
Indeno(1,2,3-cd)pyrene	ND		4.0	µg/L	1	8/25/2014 12:15 PM
Naphthalene	ND		10	µg/L	1	8/25/2014 12:15 PM
Phenanthrene	ND		4.0	µg/L	1	8/25/2014 12:15 PM
Pyrene	ND		10	µg/L	1	8/25/2014 12:15 PM
Surr: 2-Fluorobiphenyl	*93.3*		*20-140*	*%REC*	1	8/25/2014 12:15 PM
Surr: 4-Terphenyl-d14	*81.6*		*22-172*	*%REC*	1	8/25/2014 12:15 PM
Surr: Nitrobenzene-d5	*106*		*8-140*	*%REC*	1	8/25/2014 12:15 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/21/2014 08:22 PM
Ethylbenzene	ND		1.0	µg/L	1	8/21/2014 08:22 PM
m,p-Xylene	ND		2.0	µg/L	1	8/21/2014 08:22 PM
o-Xylene	ND		1.0	µg/L	1	8/21/2014 08:22 PM
Toluene	ND		1.0	µg/L	1	8/21/2014 08:22 PM
Xylenes, Total	ND		3.0	µg/L	1	8/21/2014 08:22 PM
Surr: 1,2-Dichloroethane-d4	*99.7*		*75-120*	*%REC*	1	8/21/2014 08:22 PM
Surr: 4-Bromofluorobenzene	*97.7*		*80-110*	*%REC*	1	8/21/2014 08:22 PM
Surr: Dibromofluoromethane	*97.9*		*85-115*	*%REC*	1	8/21/2014 08:22 PM
Surr: Toluene-d8	*97.1*		*85-110*	*%REC*	1	8/21/2014 08:22 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/22/2014 09:00 AM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/21/14	Analyst: **STP**
Total Suspended Solids	**85**		**3.0**	**mg/L**	1	8/21/2014 04:40 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 09:54 AM**

Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902640** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*122.1*	0	*114*	0	*107*	*20-140*	0			
Surr: 4-Terphenyl-d14	*128.4*	0	*114*	0	*113*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-61935-61935** Units: **µg/L** Analysis Date: **8/25/2014 10:22 AM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2902662** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.28	5.0	45.7	0	99.1	50-140	0			
2-Methylnaphthalene	34.61	5.0	45.7	0	75.7	50-140	0			
Acenaphthene	53.67	5.0	45.7	0	117	60-140	0			
Acenaphthylene	57.53	5.0	45.7	0	126	60-140	0			
Anthracene	56.21	5.0	45.7	0	123	60-140	0			
Benzo(a)anthracene	54.74	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	57.17	5.0	45.7	0	125	60-140	0			
Benzo(b)fluoranthene	60.64	5.0	45.7	0	133	60-140	0			
Benzo(g,h,i)perylene	48.82	5.0	45.7	0	107	60-140	0			
Benzo(k)fluoranthene	59.41	5.0	45.7	0	130	60-140	0			
Chrysene	59.7	5.0	45.7	0	131	60-140	0			
Dibenzo(a,h)anthracene	33.53	5.0	45.7	0	73.4	60-140	0			
Fluoranthene	55.82	5.0	45.7	0	122	60-140	0			
Fluorene	56.91	5.0	45.7	0	125	60-140	0			
Indeno(1,2,3-cd)pyrene	40.96	5.0	45.7	0	89.6	60-140	0			
Naphthalene	31.25	5.0	45.7	0	68.4	40-140	0			
Phenanthrene	57.37	5.0	45.7	0	126	60-140	0			
Pyrene	61.65	5.0	45.7	0	135	60-140	0			
Surr: 2-Fluorobiphenyl	*127.9*	0	*114*	0	*112*	*20-140*	0			
Surr: 4-Terphenyl-d14	*96.82*	0	*114*	0	*84.9*	*22-172*	0			
Surr: Nitrobenzene-d5	*137.8*	0	*114*	0	*121*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081070-01C MS** Units: **µg/L** Analysis Date: **8/25/2014 02:35 PM**
Client ID: Run ID: **SVMS7_140825A** SeqNo: **2903821** Prep Date: **8/22/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	42.51	10	45.7	0	93	50-140	0			
2-Methylnaphthalene	40	10	45.7	0	87.5	50-140	0			
Acenaphthene	44.75	10	45.7	0	97.9	60-140	0			
Acenaphthylene	44.25	10	45.7	0	96.8	60-140	0			
Anthracene	46.03	10	45.7	0	101	60-140	0			
Benzo(a)anthracene	47.45	10	45.7	0	104	60-140	0			
Benzo(a)pyrene	51.02	10	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	55.91	10	45.7	0	122	60-140	0			
Benzo(g,h,i)perylene	41.51	10	45.7	0	90.8	60-140	0			
Benzo(k)fluoranthene	52.16	10	45.7	0	114	60-140	0			
Chrysene	61.85	10	45.7	0	135	60-140	0			
Dibenzo(a,h)anthracene	10.01	10	45.7	0	21.9	60-140	0			S
Fluoranthene	45.26	10	45.7	0	99	60-140	0			
Fluorene	44.02	10	45.7	0	96.3	60-140	0			
Indeno(1,2,3-cd)pyrene	51.98	10	45.7	0	114	60-140	0			
Naphthalene	36.98	10	45.7	0	80.9	40-140	0			
Phenanthrene	46.31	10	45.7	0	101	60-140	0			
Pyrene	62.58	10	45.7	0	137	60-140	0			
Surr: 2-Fluorobiphenyl	*102.2*	0	*114*	0	*89.6*	*20-140*	0			
Surr: 4-Terphenyl-d14	*73.01*	0	*114*	0	*64*	*22-172*	0			
Surr: Nitrobenzene-d5	*121.6*	0	*114*	0	*107*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61935** Instrument ID **SVMS7** Method: **SW8270**

MSD	Sample ID: **14081070-01C MSD**				Units: **µg/L**			Analysis Date: **8/25/2014 03:03 PM**		
Client ID:		Run ID: **SVMS7_140825A**			SeqNo: **2903822**		Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	45.21	10	45.7	0	98.9	50-140	42.51	6.15	30	
2-Methylnaphthalene	43.29	10	45.7	0	94.7	50-140	40	7.9	30	
Acenaphthene	48.78	10	45.7	0	107	60-140	44.75	8.6	30	
Acenaphthylene	47.22	10	45.7	0	103	60-140	44.25	6.5	30	
Anthracene	49.01	10	45.7	0	107	60-140	46.03	6.25	30	
Benzo(a)anthracene	47.18	10	45.7	0	103	60-140	47.45	0.58	30	
Benzo(a)pyrene	56.23	10	45.7	0	123	60-140	51.02	9.72	30	
Benzo(b)fluoranthene	57.33	10	45.7	0	125	60-140	55.91	2.5	30	
Benzo(g,h,i)perylene	49.51	10	45.7	0	108	60-140	41.51	17.6	30	
Benzo(k)fluoranthene	58.93	10	45.7	0	129	60-140	52.16	12.2	30	
Chrysene	59.11	10	45.7	0	129	60-140	61.85	4.54	30	
Dibenzo(a,h)anthracene	16.96	10	45.7	0	37.1	60-140	10.01	51.5	30	SR
Fluoranthene	48.46	10	45.7	0	106	60-140	45.26	6.83	30	
Fluorene	46.31	10	45.7	0	101	60-140	44.02	5.06	30	
Indeno(1,2,3-cd)pyrene	63.04	10	45.7	0	138	60-140	51.98	19.2	30	
Naphthalene	40.14	10	45.7	0	87.8	40-140	36.98	8.18	30	
Phenanthrene	50.7	10	45.7	0	111	60-140	46.31	9.05	30	
Pyrene	62.31	10	45.7	0	136	60-140	62.58	0.439	30	
Surr: 2-Fluorobiphenyl	*105.2*	0	*114*	0	*92.3*	*20-140*	102.2	*2.91*	*30*	
Surr: 4-Terphenyl-d14	*77.67*	0	*114*	0	*68.1*	*22-172*	73.01	*6.19*	*30*	
Surr: Nitrobenzene-d5	*124.8*	0	*114*	0	*110*	*8-140*	121.6	*2.6*	*30*	

The following samples were analyzed in this batch:

14081071-01C	14081071-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 03:16 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899445** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.8*	0	*20*	0	*99*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.86*	0	*20*	0	*99.3*	*80-110*	0			
Surr: Dibromofluoromethane	*19.65*	0	*20*	0	*98.2*	*85-115*	0			
Surr: Toluene-d8	*19.55*	0	*20*	0	*97.8*	*85-110*	0			

LCS Sample ID: **VLCSW1-140821-R146704** Units: **µg/L** Analysis Date: **8/21/2014 01:59 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899442** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.56	1.0	20	0	108	85-125	0			
Ethylbenzene	20.38	1.0	20	0	102	85-125	0			
m,p-Xylene	40.36	2.0	40	0	101	75-130	0			
o-Xylene	20.03	1.0	20	0	100	80-125	0			
Toluene	20.35	1.0	20	0	102	85-125	0			
Xylenes, Total	60.39	3.0	60	0	101	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.28*	0	*20*	0	*96.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.26*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.26*	0	*20*	0	*96.3*	*85-115*	0			
Surr: Toluene-d8	*19.75*	0	*20*	0	*98.8*	*85-110*	0			

MS Sample ID: **14081072-01A MS** Units: **µg/L** Analysis Date: **8/22/2014 12:11 PM**
Client ID: Run ID: **VMS5_140821A** SeqNo: **2899479** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.73	1.0	20	0	104	85-125	0			
Ethylbenzene	19.88	1.0	20	0	99.4	85-125	0			
m,p-Xylene	39.11	2.0	40	0	97.8	75-130	0			
o-Xylene	19.2	1.0	20	0	96	80-125	0			
Toluene	19.4	1.0	20	0	97	85-125	0			
Xylenes, Total	58.31	3.0	60	0	97.2	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.54*	0	*20*	0	*97.7*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.73*	0	*20*	0	*104*	*80-110*	0			
Surr: Dibromofluoromethane	*19.39*	0	*20*	0	*97*	*85-115*	0			
Surr: Toluene-d8	*19.63*	0	*20*	0	*98.2*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146704** Instrument ID **VMS5** Method: **SW8260**

MSD	Sample ID: **14081072-01A MSD**				Units: **µg/L**			Analysis Date: **8/22/2014 12:36 PM**		
Client ID:		Run ID: **VMS5_140821A**			SeqNo: **2899480**		Prep Date:		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.21	1.0	20	0	101	85-125	20.73	2.54	30	
Ethylbenzene	20.18	1.0	20	0	101	85-125	19.88	1.5	30	
m,p-Xylene	40.38	2.0	40	0	101	75-130	39.11	3.2	30	
o-Xylene	19.67	1.0	20	0	98.4	80-125	19.2	2.42	30	
Toluene	19.25	1.0	20	0	96.2	85-125	19.4	0.776	30	
Xylenes, Total	60.05	3.0	60	0	100	80-126	58.31	2.94	30	
Surr: 1,2-Dichloroethane-d4	*19.52*	0	*20*	0	*97.6*	*75-120*	19.54	*0.102*	*30*	
Surr: 4-Bromofluorobenzene	*20.61*	0	*20*	0	*103*	*80-110*	20.73	*0.581*	*30*	
Surr: Dibromofluoromethane	*19.7*	0	*20*	0	*98.5*	*85-115*	19.39	*1.59*	*30*	
Surr: Toluene-d8	*19.71*	0	*20*	0	*98.6*	*85-110*	19.63	*0.407*	*30*	

The following samples were analyzed in this batch: 14081071-01A 14081071-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **61919** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898801** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	6.0								

LCS Sample ID: **LCS-61919-61919** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898800** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	93	6.0	100	0	93	80-115	0			

DUP Sample ID: **14081070-01B DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898785** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	20.5	3.0	0	0	0	0-0	21	2.41	15	

DUP Sample ID: **1408954-01A DUP** Units: **mg/L** Analysis Date: **8/21/2014 04:40 PM**
Client ID: Run ID: **TSS_140821B** SeqNo: **2898794** Prep Date: **8/21/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	156	12	0	0	0	0-0	158	1.27	15	

The following samples were analyzed in this batch: 14081071-01B 14081071-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081071
Project: Enbridge FB25 Release Response SW 8.20.14

QC BATCH REPORT

Batch ID: **R146822** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900215** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R146822-R146822** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900216** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	5.0	40	0	90.2	78-114	0			

MS Sample ID: **14081119-02A MS** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	33.66	5.0	40	1.74	79.8	78-114	0			

DUP Sample ID: **14081119-04A DUP** Units: **mg/L** Analysis Date: **8/22/2014 09:00 AM**
Client ID: Run ID: **O&G_140822A** SeqNo: **2900220** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1.41	5.0	0	0	0	0-0	1.24	0	18	J

The following samples were analyzed in this batch:

14081071-01D	14081071-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081071

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Release Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 40270

Project Manager: REE/HAW

Project QC Contact: AAN

Sampled by: GL1/TTB

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: BTEX (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	TSS	PAH, oil & grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)		Total Number Of Containers	
1. 140820-FB25-SW-5	0	0.5	feet	8/20/14	14:05	X			X			X							X	X								6	BTEX, TSS, PAH oil & grease
2. 140820-FB25-SW-6	0	0.5	feet	8/20/14	15:00	X			X			X							X	X								6	BTEX, TSS, PAH oil & grease
3.																													Rush TAT
4.																													
5.																													Please
6.																													Complete
7.																													MS/MSD for
8.																													duplicates
9.																													on Project
10.																													Samples

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
Gina Lee	(Y) N	8/20/14	15:45	FedEx		
Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
FedEx	Y (N)	8/21/14	1000			

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 8753 9348 9961

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

4.2°C

H:RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **21-Aug-14 10:00**

Work Order: **14081071** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 21-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.2 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/21/2014 12:20:36 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Company | Dept./Floor/Suite/Room

ORIGIN ID:DLHA (218) 727-5218
BARR ENGINEERING
332 W SUPERIOR ST
DULUTH, MN 558021808
UNITED STATES US

SHIP DATE: 20AUG14
ACTWGT: 43.8 LB MAN
CAD: /POS1501
DIMS: 24x14x14 IN
BILL SENDER

Part # 156297-435 RIT 08/14

TO **ATTN: SAMPLE RECEIVING**
ALS
3352 128TH AVE

HOLLAND MI 49424
(616) 399-6070
INV:
PO:
REF:
DEPT:

FedEx Express

5 of 5

MPS# 0681 **7801 3724 8761**
Mstr# 8763 9348 9983

0215

XX HLMA

THU - 21 AUG 10:30A
PRIORITY OVERNIGHT
DSR
49424
MI-US **GRR**

30-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response SW 8.21.14** Work Order: **14081138**

Dear Ryan,

ALS Environmental received 3 samples on 22-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 18.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: **14081138**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081138-01	140821 FB25-SW-2	Water		8/21/2014 10:55	8/22/2014 09:30	☐
14081138-02	140821 FB25-SW-5	Water		8/21/2014 13:40	8/22/2014 09:30	☐
14081138-03	Trip Blank	Water		8/21/2014	8/22/2014 09:30	☐

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081138

Case Narrative

Samples for the above noted Work Order were received on 08/22/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 62060 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
WorkOrder: **14081138**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081138
Sample ID: 140821 FB25-SW-2
Lab ID: 14081138-01
Collection Date: 8/21/2014 10:55 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 03:51 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 03:51 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 03:51 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 03:51 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 03:51 AM
Surr: 2-Fluorobiphenyl	*91.3*		*20-140*	*%REC*	1	8/29/2014 03:51 AM
Surr: 4-Terphenyl-d14	*102*		*22-172*	*%REC*	1	8/29/2014 03:51 AM
Surr: Nitrobenzene-d5	*120*		*8-140*	*%REC*	1	8/29/2014 03:51 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/28/2014 06:16 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 06:16 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 06:16 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 06:16 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 06:16 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 06:16 AM
Surr: 1,2-Dichloroethane-d4	*97.6*		*75-120*	*%REC*	1	8/28/2014 06:16 AM
Surr: 4-Bromofluorobenzene	*97.6*		*80-110*	*%REC*	1	8/28/2014 06:16 AM
Surr: Dibromofluoromethane	*98.5*		*85-115*	*%REC*	1	8/28/2014 06:16 AM
Surr: Toluene-d8	*96.6*		*85-110*	*%REC*	1	8/28/2014 06:16 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**39**		**6.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081138
Sample ID: 140821 FB25-SW-5
Lab ID: 14081138-02
Collection Date: 8/21/2014 01:40 PM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 04:19 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:19 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 04:19 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 04:19 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 04:19 AM
Surr: 2-Fluorobiphenyl	*105*		*20-140*	*%REC*	1	8/29/2014 04:19 AM
Surr: 4-Terphenyl-d14	*110*		*22-172*	*%REC*	1	8/29/2014 04:19 AM
Surr: Nitrobenzene-d5	*131*		*8-140*	*%REC*	1	8/29/2014 04:19 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/28/2014 06:40 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 06:40 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 06:40 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 06:40 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 06:40 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 06:40 AM
Surr: 1,2-Dichloroethane-d4	*97.9*		*75-120*	*%REC*	1	8/28/2014 06:40 AM
Surr: 4-Bromofluorobenzene	*98.4*		*80-110*	*%REC*	1	8/28/2014 06:40 AM
Surr: Dibromofluoromethane	*97.4*		*85-115*	*%REC*	1	8/28/2014 06:40 AM
Surr: Toluene-d8	*95.9*		*85-110*	*%REC*	1	8/28/2014 06:40 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**140**		**6.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081138
Sample ID: Trip Blank
Lab ID: 14081138-03
Collection Date: 8/21/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/28/2014 03:49 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 03:49 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 03:49 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 03:49 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 03:49 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 03:49 AM
Surr: 1,2-Dichloroethane-d4	*96.4*		*75-120*	*%REC*	1	8/28/2014 03:49 AM
Surr: 4-Bromofluorobenzene	*99.5*		*80-110*	*%REC*	1	8/28/2014 03:49 AM
Surr: Dibromofluoromethane	*97.5*		*85-115*	*%REC*	1	8/28/2014 03:49 AM
Surr: Toluene-d8	*97.4*		*85-110*	*%REC*	1	8/28/2014 03:49 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:05 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911511** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*90.93*	0	*114*	0	*79.8*	*20-140*	0			
Surr: 4-Terphenyl-d14	*102.7*	0	*114*	0	*90.1*	*22-172*	0			
Surr: Nitrobenzene-d5	*129.1*	0	*114*	0	*113*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:33 PM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911512** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	54.95	5.0	45.7	0	120	50-140	0			
2-Methylnaphthalene	52.8	5.0	45.7	0	116	50-140	0			
Acenaphthene	56.5	5.0	45.7	0	124	60-140	0			
Acenaphthylene	56.98	5.0	45.7	0	125	60-140	0			
Anthracene	49.12	5.0	45.7	0	107	60-140	0			
Benzo(a)anthracene	50.31	5.0	45.7	0	110	60-140	0			
Benzo(a)pyrene	51.04	5.0	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	50.99	5.0	45.7	0	112	60-140	0			
Benzo(g,h,i)perylene	52.32	5.0	45.7	0	114	60-140	0			
Benzo(k)fluoranthene	52.39	5.0	45.7	0	115	60-140	0			
Chrysene	51.31	5.0	45.7	0	112	60-140	0			
Dibenzo(a,h)anthracene	47.93	5.0	45.7	0	105	60-140	0			
Fluoranthene	47.98	5.0	45.7	0	105	60-140	0			
Fluorene	54.19	5.0	45.7	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	50.17	5.0	45.7	0	110	60-140	0			
Naphthalene	49.05	5.0	45.7	0	107	40-140	0			
Phenanthrene	49.39	5.0	45.7	0	108	60-140	0			
Pyrene	50.06	5.0	45.7	0	110	60-140	0			
Surr: 2-Fluorobiphenyl	*104.8*	0	*114*	0	*91.9*	*20-140*	0			
Surr: 4-Terphenyl-d14	*80.27*	0	*114*	0	*70.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*127.5*	0	*114*	0	*112*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081140-01B MS** Units: **µg/L** Analysis Date: **8/29/2014 01:01 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911492** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	62.08	5.0	45.7	0	136	50-140	0			
2-Methylnaphthalene	58.03	5.0	45.7	0	127	50-140	0			
Acenaphthene	62.19	5.0	45.7	0	136	60-140	0			
Acenaphthylene	66.08	5.0	45.7	0	145	60-140	0			S
Anthracene	55.09	5.0	45.7	0	121	60-140	0			
Benzo(a)anthracene	54.65	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	55.31	5.0	45.7	0	121	60-140	0			
Benzo(b)fluoranthene	56.27	5.0	45.7	0	123	60-140	0			
Benzo(g,h,i)perylene	59.93	5.0	45.7	0	131	60-140	0			
Benzo(k)fluoranthene	57.78	5.0	45.7	0	126	60-140	0			
Chrysene	58.49	5.0	45.7	0	128	60-140	0			
Dibenzo(a,h)anthracene	55.38	5.0	45.7	0	121	60-140	0			
Fluoranthene	54.93	5.0	45.7	0	120	60-140	0			
Fluorene	58.79	5.0	45.7	0	129	60-140	0			
Indeno(1,2,3-cd)pyrene	57.67	5.0	45.7	0	126	60-140	0			
Naphthalene	52.5	5.0	45.7	0	115	40-140	0			
Phenanthrene	55.27	5.0	45.7	0	121	60-140	0			
Pyrene	55.84	5.0	45.7	0	122	60-140	0			
Surr: 2-Fluorobiphenyl	*116.2*	0	*114*	0	*102*	*20-140*	0			
Surr: 4-Terphenyl-d14	*71.13*	0	*114*	0	*62.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*133.5*	0	*114*	0	*117*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081140-01B MSD** Units: **µg/L** Analysis Date: **8/29/2014 01:30 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911493** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	47.86	5.0	45.7	0	105	50-140	62.08	25.9	30	
2-Methylnaphthalene	42.86	5.0	45.7	0	93.8	50-140	58.03	30.1	30	R
Acenaphthene	54.81	5.0	45.7	0	120	60-140	62.19	12.6	30	
Acenaphthylene	57.49	5.0	45.7	0	126	60-140	66.08	13.9	30	
Anthracene	57.03	5.0	45.7	0	125	60-140	55.09	3.47	30	
Benzo(a)anthracene	58.72	5.0	45.7	0	128	60-140	54.65	7.18	30	
Benzo(a)pyrene	60.8	5.0	45.7	0	133	60-140	55.31	9.45	30	
Benzo(b)fluoranthene	61.07	5.0	45.7	0	134	60-140	56.27	8.18	30	
Benzo(g,h,i)perylene	63.27	5.0	45.7	0	138	60-140	59.93	5.42	30	
Benzo(k)fluoranthene	61.26	5.0	45.7	0	134	60-140	57.78	5.84	30	
Chrysene	60.69	5.0	45.7	0	133	60-140	58.49	3.68	30	
Dibenzo(a,h)anthracene	57.94	5.0	45.7	0	127	60-140	55.38	4.52	30	
Fluoranthene	56.87	5.0	45.7	0	124	60-140	54.93	3.48	30	
Fluorene	57.35	5.0	45.7	0	125	60-140	58.79	2.48	30	
Indeno(1,2,3-cd)pyrene	60.05	5.0	45.7	0	131	60-140	57.67	4.04	30	
Naphthalene	39.77	5.0	45.7	0	87	40-140	52.5	27.6	30	
Phenanthrene	56.78	5.0	45.7	0	124	60-140	55.27	2.69	30	
Pyrene	64.62	5.0	45.7	0	141	60-140	55.84	14.6	30	S
Surr: 2-Fluorobiphenyl	*104.1*	0	*114*	0	*91.3*	*20-140*	116.2	*11*	*30*	
Surr: 4-Terphenyl-d14	*84.78*	0	*114*	0	*74.4*	*22-172*	71.13	*17.5*	*30*	
Surr: Nitrobenzene-d5	*132.9*	0	*114*	0	*117*	*8-140*	133.5	*0.429*	*30*	

The following samples were analyzed in this batch: 14081138-01B 14081138-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147130A** Instrument ID **VMS8** Method: **SW8260**

MBLK Sample ID: **VBLKW2-140827-R147130A** Units: **µg/L** Analysis Date: **8/28/2014 02:11 AM**
Client ID: Run ID: **VMS8_140827B** SeqNo: **2908394** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.14*	0	*20*	0	*95.7*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.51*	0	*20*	0	*97.6*	*80-110*	0			
Surr: Dibromofluoromethane	*19.37*	0	*20*	0	*96.8*	*85-115*	0			
Surr: Toluene-d8	*19.31*	0	*20*	0	*96.6*	*85-110*	0			

LCS Sample ID: **VLCSW2-140827-R147130A** Units: **µg/L** Analysis Date: **8/28/2014 12:33 PM**
Client ID: Run ID: **VMS8_140827B** SeqNo: **2908420** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.52	1.0	20	0	108	85-125	0			
Ethylbenzene	21.25	1.0	20	0	106	85-125	0			
m,p-Xylene	42.05	2.0	40	0	105	75-130	0			
o-Xylene	21.1	1.0	20	0	106	80-125	0			
Toluene	20.9	1.0	20	0	104	85-125	0			
Xylenes, Total	63.15	3.0	60	0	105	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.44*	0	*20*	0	*97.2*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.25*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.82*	0	*20*	0	*99.1*	*85-115*	0			
Surr: Toluene-d8	*19.28*	0	*20*	0	*96.4*	*85-110*	0			

MS Sample ID: **14081140-01A MS** Units: **µg/L** Analysis Date: **8/28/2014 10:21 AM**
Client ID: Run ID: **VMS8_140827B** SeqNo: **2908412** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.35	1.0	20	0	102	85-125	0			
Ethylbenzene	19.53	1.0	20	0	97.6	85-125	0			
m,p-Xylene	38.77	2.0	40	0	96.9	75-130	0			
o-Xylene	19.48	1.0	20	0	97.4	80-125	0			
Toluene	19.33	1.0	20	0	96.6	85-125	0			
Xylenes, Total	58.25	3.0	60	0	97.1	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.85*	0	*20*	0	*99.2*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.37*	0	*20*	0	*102*	*80-110*	0			
Surr: Dibromofluoromethane	*20.01*	0	*20*	0	*100*	*85-115*	0			
Surr: Toluene-d8	*18.91*	0	*20*	0	*94.6*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147130A** Instrument ID **VMS8** Method: **SW8260**

MSD	Sample ID: **14081140-01A MSD**				Units: **µg/L**			Analysis Date: **8/28/2014 10:46 AM**		
Client ID:		Run ID: **VMS8_140827B**			SeqNo: **2908419**		Prep Date:		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.07	1.0	20	0	100	85-125	20.35	1.39	30	
Ethylbenzene	19.66	1.0	20	0	98.3	85-125	19.53	0.663	30	
m,p-Xylene	39.09	2.0	40	0	97.7	75-130	38.77	0.822	30	
o-Xylene	19.44	1.0	20	0	97.2	80-125	19.48	0.206	30	
Toluene	19.46	1.0	20	0	97.3	85-125	19.33	0.67	30	
Xylenes, Total	58.53	3.0	60	0	97.6	80-126	58.25	0.48	30	
Surr: 1,2-Dichloroethane-d4	*19.44*	0	*20*	0	*97.2*	*75-120*	19.85	*2.09*	*30*	
Surr: 4-Bromofluorobenzene	*20.35*	0	*20*	0	*102*	*80-110*	20.37	*0.0982*	*30*	
Surr: Dibromofluoromethane	*20.02*	0	*20*	0	*100*	*85-115*	20.01	*0.05*	*30*	
Surr: Toluene-d8	*19.12*	0	*20*	0	*95.6*	*85-110*	18.91	*1.1*	*30*	

The following samples were analyzed in this batch: 14081138-01A 14081138-02A 14081138-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62039** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902941** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS Sample ID: **LCS-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902940** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	94	6.0	100	0	94	80-115	0			

DUP Sample ID: **1408070-25A DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902915** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	190	12	0	0	0	0-0	188	1.06	15	

DUP Sample ID: **14081140-01C DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902922** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	21	3.0	0	0	0	0-0	20.5	2.41	15	

The following samples were analyzed in this batch:

14081138-01C	14081138-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081138
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147201** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK Sample ID: **MB-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908967** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908968** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	94.6	5.0	100	0	94.6	50-150	0			

MS Sample ID: **14081140-01DMS** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908972** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	95	5.0	100	2.82	92.2	50-150	0			

MSD Sample ID: **14081140-01DMSD** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908973** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	90	5.0	100	2.82	87.2	50-150	95	5.41	30	

The following samples were analyzed in this batch:

14081138-01D	14081138-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

140 81138

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 43443

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: ~~VOCs~~ (HCl) #1 BTEX	~~SVOCs~~ (unpreserved) #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	~~General~~ (unpreserved) #3 TSS	Diesel Range Organics (HCl)	~~Nutrients~~ (H_2SO_4) #4 Oil + Grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers	
1. 140821 FB25-SW-2	0	.5	ft	08/21/2014	10:55	X		X			3	1			1		1							6	[BTEX, PAH, Oil + Grease, TSS]
2. 140821 ~~FB25~~ SW-5	↓	↓	↓	↓	13:40	X		X			3	1			1		1							6	
3. Trip Blank	—	—	—	—	—					X	1													1	
4.																									
5.																									
6.																									Standard TAT
7.																									
8.																									
9.																									
10.																									

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
[signature]	Y	8.21.14	1630	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	Date 8/22/14	Time 0930	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

4.0 °C

H:RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **22-Aug-14 09:30**

Work Order: **14081138** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 22-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 22-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.6 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/22/2014 11:03:13 AM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

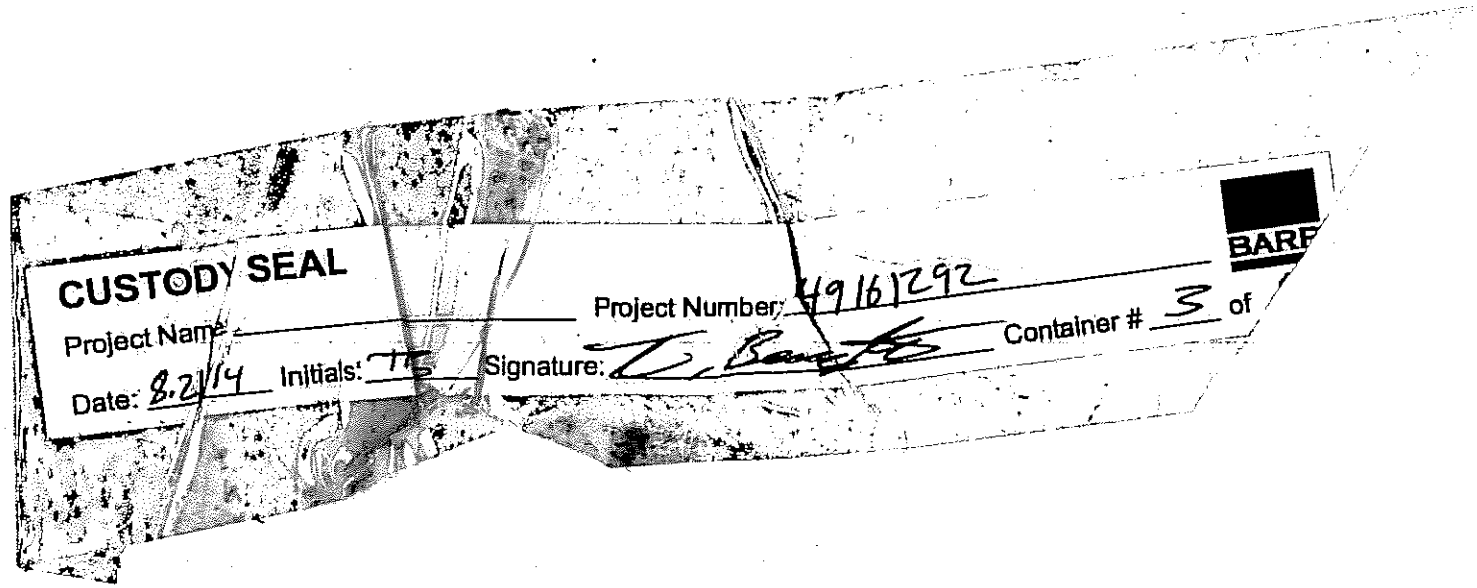
Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:


CUSTODY SEAL
Project Name:
Project Number: 49161292
Date: 8.21.14
Initials: TE
Signature:
Container # 3 of
BARR

30-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response SW 8.21.14** Work Order: **14081140**

Dear Ryan,

ALS Environmental received 1 sample on 22-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 16.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

Report of Laboratory Analysis

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: **14081140**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081140-01	140821 FB25-SW-1	Water		8/21/2014 11:15	8/22/2014 09:30	☐

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081140

Case Narrative

Samples for the above noted Work Order were received on 08/22/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 62060 sample 14081140-01 MS recovery for Acenaphthylene was above the control limit. However, the MSD recovery and the RPD between the MS and MSD were in control. No qualification is required for Acenaphthylene. The MSD recoveries for Pyrene and the RPD between the MS and MSD for 2- Methylnaphthalene were above control limits. The MS recovery for Pyrene and the individual MS/MSD recoveries for 2-Methylnaphthalene met quality control criteria. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
WorkOrder: **14081140**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14 **Work Order:** 14081140
Sample ID: 140821 FB25-SW-1 **Lab ID:** 14081140-01
Collection Date: 8/21/2014 11:15 AM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 01:58 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 01:58 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 01:58 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 01:58 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 01:58 AM
Surr: 2-Fluorobiphenyl	*89.0*		*20-140*	*%REC*	1	8/29/2014 01:58 AM
Surr: 4-Terphenyl-d14	*92.6*		*22-172*	*%REC*	1	8/29/2014 01:58 AM
Surr: Nitrobenzene-d5	*121*		*8-140*	*%REC*	1	8/29/2014 01:58 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/28/2014 07:05 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 07:05 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 07:05 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 07:05 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 07:05 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 07:05 AM
Surr: 1,2-Dichloroethane-d4	*95.8*		*75-120*	*%REC*	1	8/28/2014 07:05 AM
Surr: 4-Bromofluorobenzene	*99.7*		*80-110*	*%REC*	1	8/28/2014 07:05 AM
Surr: Dibromofluoromethane	*97.8*		*85-115*	*%REC*	1	8/28/2014 07:05 AM
Surr: Toluene-d8	*94.0*		*85-110*	*%REC*	1	8/28/2014 07:05 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**20**		**3.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:05 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911511** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*90.93*	0	*114*	0	*79.8*	*20-140*	0			
Surr: 4-Terphenyl-d14	*102.7*	0	*114*	0	*90.1*	*22-172*	0			
Surr: Nitrobenzene-d5	*129.1*	0	*114*	0	*113*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:33 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911512** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	54.95	5.0	45.7	0	120	50-140	0			
2-Methylnaphthalene	52.8	5.0	45.7	0	116	50-140	0			
Acenaphthene	56.5	5.0	45.7	0	124	60-140	0			
Acenaphthylene	56.98	5.0	45.7	0	125	60-140	0			
Anthracene	49.12	5.0	45.7	0	107	60-140	0			
Benzo(a)anthracene	50.31	5.0	45.7	0	110	60-140	0			
Benzo(a)pyrene	51.04	5.0	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	50.99	5.0	45.7	0	112	60-140	0			
Benzo(g,h,i)perylene	52.32	5.0	45.7	0	114	60-140	0			
Benzo(k)fluoranthene	52.39	5.0	45.7	0	115	60-140	0			
Chrysene	51.31	5.0	45.7	0	112	60-140	0			
Dibenzo(a,h)anthracene	47.93	5.0	45.7	0	105	60-140	0			
Fluoranthene	47.98	5.0	45.7	0	105	60-140	0			
Fluorene	54.19	5.0	45.7	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	50.17	5.0	45.7	0	110	60-140	0			
Naphthalene	49.05	5.0	45.7	0	107	40-140	0			
Phenanthrene	49.39	5.0	45.7	0	108	60-140	0			
Pyrene	50.06	5.0	45.7	0	110	60-140	0			
Surr: 2-Fluorobiphenyl	*104.8*	0	*114*	0	*91.9*	*20-140*	0			
Surr: 4-Terphenyl-d14	*80.27*	0	*114*	0	*70.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*127.5*	0	*114*	0	*112*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081140-01B MS** Units: **µg/L** Analysis Date: **8/29/2014 01:01 AM**
Client ID: **140821 FB25-SW-1** Run ID: **SVMS7_140828A** SeqNo: **2911492** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	62.08	5.0	45.7	0	136	50-140	0			
2-Methylnaphthalene	58.03	5.0	45.7	0	127	50-140	0			
Acenaphthene	62.19	5.0	45.7	0	136	60-140	0			
Acenaphthylene	66.08	5.0	45.7	0	145	60-140	0			S
Anthracene	55.09	5.0	45.7	0	121	60-140	0			
Benzo(a)anthracene	54.65	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	55.31	5.0	45.7	0	121	60-140	0			
Benzo(b)fluoranthene	56.27	5.0	45.7	0	123	60-140	0			
Benzo(g,h,i)perylene	59.93	5.0	45.7	0	131	60-140	0			
Benzo(k)fluoranthene	57.78	5.0	45.7	0	126	60-140	0			
Chrysene	58.49	5.0	45.7	0	128	60-140	0			
Dibenzo(a,h)anthracene	55.38	5.0	45.7	0	121	60-140	0			
Fluoranthene	54.93	5.0	45.7	0	120	60-140	0			
Fluorene	58.79	5.0	45.7	0	129	60-140	0			
Indeno(1,2,3-cd)pyrene	57.67	5.0	45.7	0	126	60-140	0			
Naphthalene	52.5	5.0	45.7	0	115	40-140	0			
Phenanthrene	55.27	5.0	45.7	0	121	60-140	0			
Pyrene	55.84	5.0	45.7	0	122	60-140	0			
Surr: 2-Fluorobiphenyl	*116.2*	0	*114*	0	*102*	*20-140*	0			
Surr: 4-Terphenyl-d14	*71.13*	0	*114*	0	*62.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*133.5*	0	*114*	0	*117*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081140-01B MSD** Units: **µg/L** Analysis Date: **8/29/2014 01:30 AM**
Client ID: **140821 FB25-SW-1** Run ID: **SVMS7_140828A** SeqNo: **2911493** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	47.86	5.0	45.7	0	105	50-140	62.08	25.9	30	
2-Methylnaphthalene	42.86	5.0	45.7	0	93.8	50-140	58.03	30.1	30	R
Acenaphthene	54.81	5.0	45.7	0	120	60-140	62.19	12.6	30	
Acenaphthylene	57.49	5.0	45.7	0	126	60-140	66.08	13.9	30	
Anthracene	57.03	5.0	45.7	0	125	60-140	55.09	3.47	30	
Benzo(a)anthracene	58.72	5.0	45.7	0	128	60-140	54.65	7.18	30	
Benzo(a)pyrene	60.8	5.0	45.7	0	133	60-140	55.31	9.45	30	
Benzo(b)fluoranthene	61.07	5.0	45.7	0	134	60-140	56.27	8.18	30	
Benzo(g,h,i)perylene	63.27	5.0	45.7	0	138	60-140	59.93	5.42	30	
Benzo(k)fluoranthene	61.26	5.0	45.7	0	134	60-140	57.78	5.84	30	
Chrysene	60.69	5.0	45.7	0	133	60-140	58.49	3.68	30	
Dibenzo(a,h)anthracene	57.94	5.0	45.7	0	127	60-140	55.38	4.52	30	
Fluoranthene	56.87	5.0	45.7	0	124	60-140	54.93	3.48	30	
Fluorene	57.35	5.0	45.7	0	125	60-140	58.79	2.48	30	
Indeno(1,2,3-cd)pyrene	60.05	5.0	45.7	0	131	60-140	57.67	4.04	30	
Naphthalene	39.77	5.0	45.7	0	87	40-140	52.5	27.6	30	
Phenanthrene	56.78	5.0	45.7	0	124	60-140	55.27	2.69	30	
Pyrene	64.62	5.0	45.7	0	141	60-140	55.84	14.6	30	S
Surr: 2-Fluorobiphenyl	*104.1*	0	*114*	0	*91.3*	*20-140*	116.2	*11*	*30*	
Surr: 4-Terphenyl-d14	*84.78*	0	*114*	0	*74.4*	*22-172*	71.13	*17.5*	*30*	
Surr: Nitrobenzene-d5	*132.9*	0	*114*	0	*117*	*8-140*	133.5	*0.429*	*30*	

The following samples were analyzed in this batch: 14081140-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147130A** Instrument ID **VMS8** Method: **SW8260**

MBLK Sample ID: **VBLKW2-140827-R147130A** Units: **µg/L** Analysis Date: **8/28/2014 02:11 AM**
Client ID: Run ID: **VMS8_140827B** SeqNo: **2908394** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.14*	0	*20*	0	*95.7*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.51*	0	*20*	0	*97.6*	*80-110*	0			
Surr: Dibromofluoromethane	*19.37*	0	*20*	0	*96.8*	*85-115*	0			
Surr: Toluene-d8	*19.31*	0	*20*	0	*96.6*	*85-110*	0			

LCS Sample ID: **VLCSW2-140827-R147130A** Units: **µg/L** Analysis Date: **8/28/2014 12:33 PM**
Client ID: Run ID: **VMS8_140827B** SeqNo: **2908420** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.52	1.0	20	0	108	85-125	0			
Ethylbenzene	21.25	1.0	20	0	106	85-125	0			
m,p-Xylene	42.05	2.0	40	0	105	75-130	0			
o-Xylene	21.1	1.0	20	0	106	80-125	0			
Toluene	20.9	1.0	20	0	104	85-125	0			
Xylenes, Total	63.15	3.0	60	0	105	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.44*	0	*20*	0	*97.2*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.25*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.82*	0	*20*	0	*99.1*	*85-115*	0			
Surr: Toluene-d8	*19.28*	0	*20*	0	*96.4*	*85-110*	0			

MS Sample ID: **14081140-01A MS** Units: **µg/L** Analysis Date: **8/28/2014 10:21 AM**
Client ID: **140821 FB25-SW-1** Run ID: **VMS8_140827B** SeqNo: **2908412** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.35	1.0	20	0	102	85-125	0			
Ethylbenzene	19.53	1.0	20	0	97.6	85-125	0			
m,p-Xylene	38.77	2.0	40	0	96.9	75-130	0			
o-Xylene	19.48	1.0	20	0	97.4	80-125	0			
Toluene	19.33	1.0	20	0	96.6	85-125	0			
Xylenes, Total	58.25	3.0	60	0	97.1	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.85*	0	*20*	0	*99.2*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.37*	0	*20*	0	*102*	*80-110*	0			
Surr: Dibromofluoromethane	*20.01*	0	*20*	0	*100*	*85-115*	0			
Surr: Toluene-d8	*18.91*	0	*20*	0	*94.6*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147130A** Instrument ID **VMS8** Method: **SW8260**

MSD	Sample ID: **14081140-01A MSD**				Units: **µg/L**			Analysis Date: **8/28/2014 10:46 AM**		
Client ID: **140821 FB25-SW-1**		Run ID: **VMS8_140827B**			SeqNo: **2908419**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.07	1.0	20	0	100	85-125	20.35	1.39	30	
Ethylbenzene	19.66	1.0	20	0	98.3	85-125	19.53	0.663	30	
m,p-Xylene	39.09	2.0	40	0	97.7	75-130	38.77	0.822	30	
o-Xylene	19.44	1.0	20	0	97.2	80-125	19.48	0.206	30	
Toluene	19.46	1.0	20	0	97.3	85-125	19.33	0.67	30	
Xylenes, Total	58.53	3.0	60	0	97.6	80-126	58.25	0.48	30	
Surr: 1,2-Dichloroethane-d4	*19.44*	0	*20*	0	*97.2*	*75-120*	19.85	*2.09*	*30*	
Surr: 4-Bromofluorobenzene	*20.35*	0	*20*	0	*102*	*80-110*	20.37	*0.0982*	*30*	
Surr: Dibromofluoromethane	*20.02*	0	*20*	0	*100*	*85-115*	20.01	*0.05*	*30*	
Surr: Toluene-d8	*19.12*	0	*20*	0	*95.6*	*85-110*	18.91	*1.1*	*30*	

The following samples were analyzed in this batch: 14081140-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62039** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902941** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS Sample ID: **LCS-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902940** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	94	6.0	100	0	94	80-115	0			

DUP Sample ID: **1408070-25A DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902915** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	190	12	0	0	0	0-0	188	1.06	15	

DUP Sample ID: **14081140-01C DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: **140821 FB25-SW-1** Run ID: **TSS_140825A** SeqNo: **2902922** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	21	3.0	0	0	0	0-0	20.5	2.41	15	

The following samples were analyzed in this batch: 14081140-01C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081140
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147201** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK Sample ID: **MB-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908967** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908968** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	94.6	5.0	100	0	94.6	50-150	0			

MS Sample ID: **14081140-01DMS** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: **140821 FB25-SW-1** Run ID: **O&GMOD_140828A** SeqNo: **2908972** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	95	5.0	100	2.82	92.2	50-150	0			

MSD Sample ID: **14081140-01DMSD** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: **140821 FB25-SW-1** Run ID: **O&GMOD_140828A** SeqNo: **2908973** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	90	5.0	100	2.82	87.2	50-150	95	5.41	30	

The following samples were analyzed in this batch: 14081140-01D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081140

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43442

COC 1 of 1

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB/CSGZ

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: ~~VOCs~~ (HCl) #1 BTEX	~~SVOCs~~ (unpreserved) #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	~~General~~ (unpreserved) #3 TSS	Diesel Range Organics (HCl)	~~Nutrients~~ (H_2SO_4) #4 Oil + Grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers	
1. 140821 FB25-SW-1 [redacted]	0	0.5	ft	08/21/2014	11:15	X		X			3	1			1		1							6	BTEX, PAH, Oil + Grease, TSS
2. 140821 FB25-SW-1 -MSD	↓	↓	↓	↓	11:15	↓		↓			3	1					1							5	[As above, minus TSS]
3. 140821 FB25-SW-1 -MS	↓	↓	↓	↓	11:15	↓		↓			3	1					1							5	
4.																									
5.																									
6.																									Standard TAT
7.																									
8.																									
9.																									
10.																									

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

	On Ice?	Date	Time		Date	Time
Relinquished By: [signature]	○ N	6.21.14	1630	Received by: FEDEX		
Relinquished By: FEDEX	On Ice? Y N	6/22/14	0930	Received By: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

4.2°C

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **22-Aug-14 09:30**

Work Order: **14081140** Received by: **KRW**

Checklist completed by Keith Wierenga eSignature 22-Aug-14 Date Reviewed by: Ann Preston eSignature 22-Aug-14 Date

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.2 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/22/2014 11:08:24 AM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

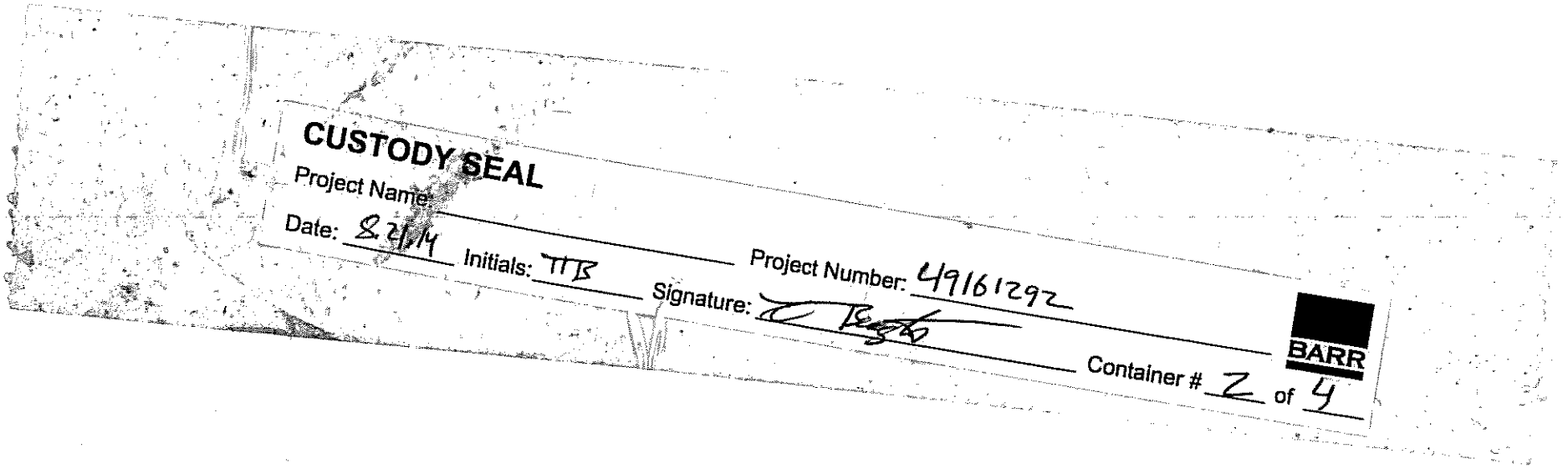
Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



CUSTODY SEAL

Project Name:

Project Number: 49161292

Date: 8/21/14 Initials: TTB Signature:

Container # 2 of 4

BARR

30-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response SW 8.21.14** Work Order: **14081208**

Dear Ryan,

ALS Environmental received 2 samples on 22-Aug-2014 03:00 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: **14081208**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081208-01	140821 FB25-SW-6	Water		8/21/2014 13:20	8/22/2014 15:00	☐
14081208-02	140821 FB25-FD-1	Water		8/21/2014	8/22/2014 15:00	☐

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081208

Case Narrative

Samples for the above noted Work Order were received on 08/22/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
Batch R147134A sample 14081208-01 MS recoveries for BTEX were below control limits causing the RPDS to be above control limits. It was determined that the low MS recoveries were from an autosampler error, not a matrix interference. No data requires qualification.

Extractable Organics :
Batch 62060 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
WorkOrder: **14081208**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081208
Sample ID: 140821 FB25-SW-6
Lab ID: 14081208-01
Collection Date: 8/21/2014 01:20 PM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 04:47 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 04:47 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 04:47 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 04:47 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 04:47 AM
Surr: 2-Fluorobiphenyl	*87.6*		*20-140*	*%REC*	1	8/29/2014 04:47 AM
Surr: 4-Terphenyl-d14	*94.1*		*22-172*	*%REC*	1	8/29/2014 04:47 AM
Surr: Nitrobenzene-d5	*116*		*8-140*	*%REC*	1	8/29/2014 04:47 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/28/2014 08:03 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 08:03 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 08:03 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 08:03 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 08:03 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 08:03 AM
Surr: 1,2-Dichloroethane-d4	*95.8*		*75-120*	*%REC*	1	8/28/2014 08:03 AM
Surr: 4-Bromofluorobenzene	*101*		*80-110*	*%REC*	1	8/28/2014 08:03 AM
Surr: Dibromofluoromethane	*98.6*		*85-115*	*%REC*	1	8/28/2014 08:03 AM
Surr: Toluene-d8	*94.6*		*85-110*	*%REC*	1	8/28/2014 08:03 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**110**		**6.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.21.14
Work Order: 14081208
Sample ID: 140821 FB25-FD-1
Lab ID: 14081208-02
Collection Date: 8/21/2014
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 05:15 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:15 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 05:15 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 05:15 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 05:15 AM
Surr: 2-Fluorobiphenyl	*92.9*		*20-140*	*%REC*	1	8/29/2014 05:15 AM
Surr: 4-Terphenyl-d14	*88.1*		*22-172*	*%REC*	1	8/29/2014 05:15 AM
Surr: Nitrobenzene-d5	*122*		*8-140*	*%REC*	1	8/29/2014 05:15 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	ND		1.0	µg/L	1	8/28/2014 08:29 AM
Ethylbenzene	ND		1.0	µg/L	1	8/28/2014 08:29 AM
m,p-Xylene	ND		2.0	µg/L	1	8/28/2014 08:29 AM
o-Xylene	ND		1.0	µg/L	1	8/28/2014 08:29 AM
Toluene	ND		1.0	µg/L	1	8/28/2014 08:29 AM
Xylenes, Total	ND		3.0	µg/L	1	8/28/2014 08:29 AM
Surr: 1,2-Dichloroethane-d4	*96.2*		*75-120*	*%REC*	1	8/28/2014 08:29 AM
Surr: 4-Bromofluorobenzene	*102*		*80-110*	*%REC*	1	8/28/2014 08:29 AM
Surr: Dibromofluoromethane	*99.6*		*85-115*	*%REC*	1	8/28/2014 08:29 AM
Surr: Toluene-d8	*94.4*		*85-110*	*%REC*	1	8/28/2014 08:29 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**36**		**3.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:05 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911511** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*90.93*	0	*114*	0	*79.8*	*20-140*	0			
Surr: 4-Terphenyl-d14	*102.7*	0	*114*	0	*90.1*	*22-172*	0			
Surr: Nitrobenzene-d5	*129.1*	0	*114*	0	*113*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:33 PM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911512** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	54.95	5.0	45.7	0	120	50-140	0			
2-Methylnaphthalene	52.8	5.0	45.7	0	116	50-140	0			
Acenaphthene	56.5	5.0	45.7	0	124	60-140	0			
Acenaphthylene	56.98	5.0	45.7	0	125	60-140	0			
Anthracene	49.12	5.0	45.7	0	107	60-140	0			
Benzo(a)anthracene	50.31	5.0	45.7	0	110	60-140	0			
Benzo(a)pyrene	51.04	5.0	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	50.99	5.0	45.7	0	112	60-140	0			
Benzo(g,h,i)perylene	52.32	5.0	45.7	0	114	60-140	0			
Benzo(k)fluoranthene	52.39	5.0	45.7	0	115	60-140	0			
Chrysene	51.31	5.0	45.7	0	112	60-140	0			
Dibenzo(a,h)anthracene	47.93	5.0	45.7	0	105	60-140	0			
Fluoranthene	47.98	5.0	45.7	0	105	60-140	0			
Fluorene	54.19	5.0	45.7	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	50.17	5.0	45.7	0	110	60-140	0			
Naphthalene	49.05	5.0	45.7	0	107	40-140	0			
Phenanthrene	49.39	5.0	45.7	0	108	60-140	0			
Pyrene	50.06	5.0	45.7	0	110	60-140	0			
Surr: 2-Fluorobiphenyl	*104.8*	0	*114*	0	*91.9*	*20-140*	0			
Surr: 4-Terphenyl-d14	*80.27*	0	*114*	0	*70.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*127.5*	0	*114*	0	*112*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081140-01B MS** Units: **µg/L** Analysis Date: **8/29/2014 01:01 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911492** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	62.08	5.0	45.7	0	136	50-140	0			
2-Methylnaphthalene	58.03	5.0	45.7	0	127	50-140	0			
Acenaphthene	62.19	5.0	45.7	0	136	60-140	0			
Acenaphthylene	66.08	5.0	45.7	0	145	60-140	0			S
Anthracene	55.09	5.0	45.7	0	121	60-140	0			
Benzo(a)anthracene	54.65	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	55.31	5.0	45.7	0	121	60-140	0			
Benzo(b)fluoranthene	56.27	5.0	45.7	0	123	60-140	0			
Benzo(g,h,i)perylene	59.93	5.0	45.7	0	131	60-140	0			
Benzo(k)fluoranthene	57.78	5.0	45.7	0	126	60-140	0			
Chrysene	58.49	5.0	45.7	0	128	60-140	0			
Dibenzo(a,h)anthracene	55.38	5.0	45.7	0	121	60-140	0			
Fluoranthene	54.93	5.0	45.7	0	120	60-140	0			
Fluorene	58.79	5.0	45.7	0	129	60-140	0			
Indeno(1,2,3-cd)pyrene	57.67	5.0	45.7	0	126	60-140	0			
Naphthalene	52.5	5.0	45.7	0	115	40-140	0			
Phenanthrene	55.27	5.0	45.7	0	121	60-140	0			
Pyrene	55.84	5.0	45.7	0	122	60-140	0			
Surr: 2-Fluorobiphenyl	*116.2*	0	*114*	0	*102*	*20-140*	0			
Surr: 4-Terphenyl-d14	*71.13*	0	*114*	0	*62.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*133.5*	0	*114*	0	*117*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081140-01B MSD** Units: **µg/L** Analysis Date: **8/29/2014 01:30 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911493** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	47.86	5.0	45.7	0	105	50-140	62.08	25.9	30	
2-Methylnaphthalene	42.86	5.0	45.7	0	93.8	50-140	58.03	30.1	30	R
Acenaphthene	54.81	5.0	45.7	0	120	60-140	62.19	12.6	30	
Acenaphthylene	57.49	5.0	45.7	0	126	60-140	66.08	13.9	30	
Anthracene	57.03	5.0	45.7	0	125	60-140	55.09	3.47	30	
Benzo(a)anthracene	58.72	5.0	45.7	0	128	60-140	54.65	7.18	30	
Benzo(a)pyrene	60.8	5.0	45.7	0	133	60-140	55.31	9.45	30	
Benzo(b)fluoranthene	61.07	5.0	45.7	0	134	60-140	56.27	8.18	30	
Benzo(g,h,i)perylene	63.27	5.0	45.7	0	138	60-140	59.93	5.42	30	
Benzo(k)fluoranthene	61.26	5.0	45.7	0	134	60-140	57.78	5.84	30	
Chrysene	60.69	5.0	45.7	0	133	60-140	58.49	3.68	30	
Dibenzo(a,h)anthracene	57.94	5.0	45.7	0	127	60-140	55.38	4.52	30	
Fluoranthene	56.87	5.0	45.7	0	124	60-140	54.93	3.48	30	
Fluorene	57.35	5.0	45.7	0	125	60-140	58.79	2.48	30	
Indeno(1,2,3-cd)pyrene	60.05	5.0	45.7	0	131	60-140	57.67	4.04	30	
Naphthalene	39.77	5.0	45.7	0	87	40-140	52.5	27.6	30	
Phenanthrene	56.78	5.0	45.7	0	124	60-140	55.27	2.69	30	
Pyrene	64.62	5.0	45.7	0	141	60-140	55.84	14.6	30	S
Surr: 2-Fluorobiphenyl	*104.1*	0	*114*	0	*91.3*	*20-140*	116.2	*11*	*30*	
Surr: 4-Terphenyl-d14	*84.78*	0	*114*	0	*74.4*	*22-172*	71.13	*17.5*	*30*	
Surr: Nitrobenzene-d5	*132.9*	0	*114*	0	*117*	*8-140*	133.5	*0.429*	*30*	

The following samples were analyzed in this batch: 14081208-01B 14081208-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147134A** Instrument ID **VMS5** Method: **SW8260**

MBLK Sample ID: **VBLKW2-140827-R147134A** Units: **µg/L** Analysis Date: **8/28/2014 07:12 AM**
Client ID: Run ID: **VMS5_140827B** SeqNo: **2908809** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.39*	0	*20*	0	*97*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.2*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.51*	0	*20*	0	*97.6*	*85-115*	0			
Surr: Toluene-d8	*18.99*	0	*20*	0	*95*	*85-110*	0			

LCS Sample ID: **VLCSW2-140827-R147134A** Units: **µg/L** Analysis Date: **8/28/2014 06:20 AM**
Client ID: Run ID: **VMS5_140827B** SeqNo: **2908808** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.78	1.0	20	0	104	85-125	0			
Ethylbenzene	20.66	1.0	20	0	103	85-125	0			
m,p-Xylene	41.6	2.0	40	0	104	75-130	0			
o-Xylene	20.87	1.0	20	0	104	80-125	0			
Toluene	20.17	1.0	20	0	101	85-125	0			
Xylenes, Total	62.47	3.0	60	0	104	80-126	0			
Surr: 1,2-Dichloroethane-d4	*18.4*	0	*20*	0	*92*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.34*	0	*20*	0	*102*	*80-110*	0			
Surr: Dibromofluoromethane	*19.33*	0	*20*	0	*96.6*	*85-115*	0			
Surr: Toluene-d8	*19.05*	0	*20*	0	*95.2*	*85-110*	0			

MS Sample ID: **14081208-01A MS** Units: **µg/L** Analysis Date: **8/28/2014 02:49 PM**
Client ID: **140821 FB25-SW-6** Run ID: **VMS5_140827B** SeqNo: **2908820** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	7.98	1.0	20	0	39.9	85-125	0			S
Ethylbenzene	7.25	1.0	20	0	36.2	85-125	0			S
m,p-Xylene	14.17	2.0	40	0	35.4	75-130	0			S
o-Xylene	7.37	1.0	20	0	36.8	80-125	0			S
Toluene	7.38	1.0	20	0	36.9	85-125	0			S
Xylenes, Total	21.54	3.0	60	0	35.9	80-126	0			S
Surr: 1,2-Dichloroethane-d4	*18.88*	0	*20*	0	*94.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.6*	0	*20*	0	*103*	*80-110*	0			
Surr: Dibromofluoromethane	*19.66*	0	*20*	0	*98.3*	*85-115*	0			
Surr: Toluene-d8	*18.87*	0	*20*	0	*94.4*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147134A** Instrument ID **VMS5** Method: **SW8260**

MSD	Sample ID: **14081208-01A MSD**				Units: **µg/L**			Analysis Date: **8/28/2014 03:14 PM**			
Client ID: **140821 FB25-SW-6**		Run ID: **VMS5_140827B**			SeqNo: **2908821**		Prep Date:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	23.47	1.0	20	0	117	85-125	7.98	98.5	30	R
Ethylbenzene	21.54	1.0	20	0	108	85-125	7.25	99.3	30	R
m,p-Xylene	42.42	2.0	40	0	106	75-130	14.17	99.8	30	R
o-Xylene	22.16	1.0	20	0	111	80-125	7.37	100	30	R
Toluene	21.67	1.0	20	0	108	85-125	7.38	98.4	30	R
Xylenes, Total	64.58	3.0	60	0	108	80-126	21.54	100	30	R
Surr: 1,2-Dichloroethane-d4	*18.65*	0	*20*	0	*93.2*	*75-120*	18.88	*1.23*	*30*	
Surr: 4-Bromofluorobenzene	*20.64*	0	*20*	0	*103*	*80-110*	20.6	*0.194*	*30*	
Surr: Dibromofluoromethane	*19.44*	0	*20*	0	*97.2*	*85-115*	19.66	*1.13*	*30*	
Surr: Toluene-d8	*19.3*	0	*20*	0	*96.5*	*85-110*	18.87	*2.25*	*30*	

The following samples were analyzed in this batch: 14081208-01A 14081208-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **62039** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902941** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS Sample ID: **LCS-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902940** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	94	6.0	100	0	94	80-115	0			

DUP Sample ID: **1408070-25A DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902915** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	190	12	0	0	0	0-0	188	1.06	15	

DUP Sample ID: **14081140-01C DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902922** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	21	3.0	0	0	0	0-0	20.5	2.41	15	

The following samples were analyzed in this batch:

14081208-01C	14081208-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081208
Project: Enbridge FB25 Response SW 8.21.14

QC BATCH REPORT

Batch ID: **R147201** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK	Sample ID: **MB-R147201-R147201**				Units: **mg/L**			Analysis Date: **8/28/2014 12:00 PM**		
Client ID:	Run ID: **O&GMOD_140828A**				SeqNo: **2908967**			Prep Date:	DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS	Sample ID: **LCS-R147201-R147201**				Units: **mg/L**			Analysis Date: **8/28/2014 12:00 PM**		
Client ID:	Run ID: **O&GMOD_140828A**				SeqNo: **2908968**			Prep Date:	DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	94.6	5.0	100	0	94.6	50-150	0			

MS	Sample ID: **14081140-01DMS**				Units: **mg/L**			Analysis Date: **8/28/2014 12:00 PM**		
Client ID:	Run ID: **O&GMOD_140828A**				SeqNo: **2908972**			Prep Date:	DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	95	5.0	100	2.82	92.2	50-150	0			

MSD	Sample ID: **14081140-01DMSD**				Units: **mg/L**			Analysis Date: **8/28/2014 12:00 PM**		
Client ID:	Run ID: **O&GMOD_140828A**				SeqNo: **2908973**			Prep Date:	DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	90	5.0	100	2.82	87.2	50-150	95	5.41	30	

The following samples were analyzed in this batch:

14081208-01D	14081208-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

14081208

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 43444

COC 1 of 1

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB/COGZ

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: ~~VOCs~~ (HCl) #1 BTEX	~~SVOCs~~ (unpreserved) #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	~~General~~ (unpreserved) #3 TSS	Diesel Range Organics (HCl)	~~Nutrients~~ (H_2SO_4) #4 0:1 + Grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers
1. 140821 FB25-SW-6	0	0.5	ft	08/21/2014	13:20	X		X			3	1			1		1							6
2. 140821 FB25-FD-1	0	0.5	ft	08/21/2014	-	X		X			3	1			1		1							6
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

[BTEX, PAH, 0:1 + Grease, TSS]

Standard TAT

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	Y N	8.21.14	1630	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	9/22/14	1500	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

3.2°C

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ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **22-Aug-14 15:00**

Work Order: **14081208** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 22-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 22-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.2 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/22/2014 5:05:50 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

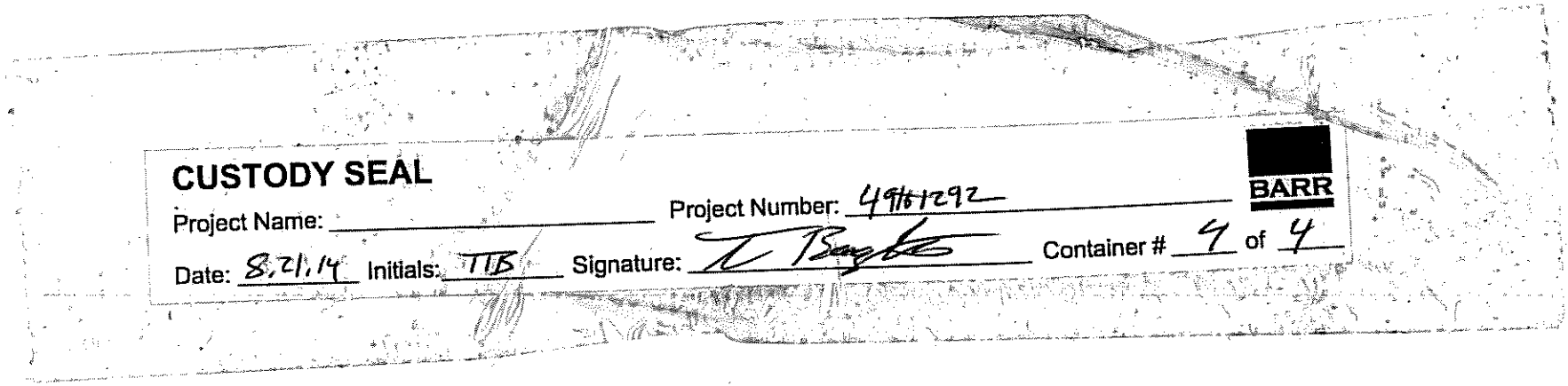
Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



CUSTODY SEAL

Project Name: _____ Project Number: 49161292

BARR

Date: 8.21.14 Initials: TTB Signature: T Bayke Container # 4 of 4

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081267
COC Number: 081267
Date Received: 8/22/2014
Report Date: 8/29/2014
ReportNumber: 127221

Client: MARGARET TREANOR
BARR ENGINEERING CO
4700 WEST 77TH STREET
MINNEAPOLIS MN 55435

Sample ID: 140821-FB25-SW-1 Grab **Sample Date:** 8/21/2014 **SampleTime:** 11:15 **Matrix:** Aqueous
Era Project Number: 081267-1

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140821-FB25-SW-2 Grab **Sample Date:** 8/21/2014 **SampleTime:** 10:55 **Matrix:** Aqueous
Era Project Number: 081267-2

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140821-FB25-SW-5 Grab **Sample Date:** 8/21/2014 **SampleTime:** 13:40 **Matrix:** Aqueous
Era Project Number: 081267-3

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140821-FB25-SW-6 Grab **Sample Date:** 8/21/2014 **SampleTime:** 13:20 **Matrix:** Aqueous
Era Project Number: 081267-4

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Receipt temperature within regulatory guidelines

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081267
COC Number: 081267
Date Received: 8/22/2014
Report Date: 8/29/2014
ReportNumber: 127221

Sample ID: 140821-FB25-FD-1 Grab **Sample Date:** 8/21/2014 **SampleTime:** **Matrix:** Aqueous
Era Project Number: 081267-5

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Results are reported on an as received basis. < Not detected. Less than LOD.

Quality Control Summary Report

Analyte	Date of Analysis	QC Batch	Matrix Spike (% Recovery)	% Recovery Limits	MSD or Duplicate (%RPD)	% RPD Limits	Duplicate Range	Range Limits	LCS (% Recovery)	LCS Limits	Method Blank
BOD (5)	8/22/2014	1	NA	NA	NA	NA	0.02	10	108.21	84.9 - 115.40	<0.2

Report Approved By:
Robert D. Magnuson
Lab Director
MN Certification # 027-137-152

Temperature upon arrival (°C): 5.5
Receipt temperature within regulatory guidelines

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

081267

COC 1 of 1

Project Number: 49161292

Project Name: Enbridge FB25 Response - Surface Water

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43445

Project Manager: REE

Project QC Contact: AAN

Sampled by: TTB/CJG2

Laboratory: ERA

	Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	BOD	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers	
-1	1. 140821 FB25-SW-1	—			08/21/14	11:15	X		X																		BOD
-2	2. 140821 FB25-SW-2	—			↓	1055	↓		↓																		↓
-3	3. 140821 FB25-SW-5	—				1340																					
-4	4. 140821 FB25-SW-6	—				1320																					
-6	5. 140821 FB25-FD-1					—																					
	6.																										
	7.																										Standard TAT
	8.																										
	9.																										
	10.																										

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TK

Relinquished By:	On Ice? Y N	Date	Time	Received By:	Date	Time
	Y	8/21/14	09:48		8/22/14	9:45
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
				5.5 °C ice		

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____ Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

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30-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response SW 8.22.14** Work Order: **14081240**

Dear Ryan,

ALS Environmental received 2 samples on 23-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

Report of Laboratory Analysis

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: **14081240**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081240-01	140822 FB25-SW-5	Water		8/22/2014 11:50	8/23/2014 10:00	☐
14081240-02	140822 FB25-SW-6	Water		8/22/2014 11:30	8/23/2014 10:00	☐

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: 14081240

Case Narrative

Samples for the above noted Work Order were received on 08/23/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 62060 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
WorkOrder: **14081240**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14 **Work Order:** 14081240
Sample ID: 140822 FB25-SW-5 **Lab ID:** 14081240-01
Collection Date: 8/22/2014 11:50 AM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 05:43 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 05:43 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 05:43 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 05:43 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 05:43 AM
Surr: 2-Fluorobiphenyl	*94.3*		*20-140*	*%REC*	1	8/29/2014 05:43 AM
Surr: 4-Terphenyl-d14	*72.6*		*22-172*	*%REC*	1	8/29/2014 05:43 AM
Surr: Nitrobenzene-d5	*119*		*8-140*	*%REC*	1	8/29/2014 05:43 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/29/2014 05:48 AM
Ethylbenzene	ND		1.0	µg/L	1	8/29/2014 05:48 AM
m,p-Xylene	ND		2.0	µg/L	1	8/29/2014 05:48 AM
o-Xylene	ND		1.0	µg/L	1	8/29/2014 05:48 AM
Toluene	ND		1.0	µg/L	1	8/29/2014 05:48 AM
Xylenes, Total	ND		3.0	µg/L	1	8/29/2014 05:48 AM
Surr: 1,2-Dichloroethane-d4	*83.5*		*75-120*	*%REC*	1	8/29/2014 05:48 AM
Surr: 4-Bromofluorobenzene	*101*		*80-110*	*%REC*	1	8/29/2014 05:48 AM
Surr: Dibromofluoromethane	*92.9*		*85-115*	*%REC*	1	8/29/2014 05:48 AM
Surr: Toluene-d8	*96.4*		*85-110*	*%REC*	1	8/29/2014 05:48 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**96**		**6.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: 14081240
Sample ID: 140822 FB25-SW-6
Lab ID: 14081240-02
Collection Date: 8/22/2014 11:30 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 06:12 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:12 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 06:12 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 06:12 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 06:12 AM
Surr: 2-Fluorobiphenyl	*93.5*		*20-140*	*%REC*	1	8/29/2014 06:12 AM
Surr: 4-Terphenyl-d14	*59.5*		*22-172*	*%REC*	1	8/29/2014 06:12 AM
Surr: Nitrobenzene-d5	*120*		*8-140*	*%REC*	1	8/29/2014 06:12 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/29/2014 06:13 AM
Ethylbenzene	ND		1.0	µg/L	1	8/29/2014 06:13 AM
m,p-Xylene	ND		2.0	µg/L	1	8/29/2014 06:13 AM
o-Xylene	ND		1.0	µg/L	1	8/29/2014 06:13 AM
Toluene	ND		1.0	µg/L	1	8/29/2014 06:13 AM
Xylenes, Total	ND		3.0	µg/L	1	8/29/2014 06:13 AM
Surr: 1,2-Dichloroethane-d4	*83.4*		*75-120*	*%REC*	1	8/29/2014 06:13 AM
Surr: 4-Bromofluorobenzene	*101*		*80-110*	*%REC*	1	8/29/2014 06:13 AM
Surr: Dibromofluoromethane	*94.0*		*85-115*	*%REC*	1	8/29/2014 06:13 AM
Surr: Toluene-d8	*96.6*		*85-110*	*%REC*	1	8/29/2014 06:13 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**83**		**6.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:05 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911511** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*90.93*	0	*114*	0	*79.8*	*20-140*	0			
Surr: 4-Terphenyl-d14	*102.7*	0	*114*	0	*90.1*	*22-172*	0			
Surr: Nitrobenzene-d5	*129.1*	0	*114*	0	*113*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:33 PM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911512** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	54.95	5.0	45.7	0	120	50-140	0			
2-Methylnaphthalene	52.8	5.0	45.7	0	116	50-140	0			
Acenaphthene	56.5	5.0	45.7	0	124	60-140	0			
Acenaphthylene	56.98	5.0	45.7	0	125	60-140	0			
Anthracene	49.12	5.0	45.7	0	107	60-140	0			
Benzo(a)anthracene	50.31	5.0	45.7	0	110	60-140	0			
Benzo(a)pyrene	51.04	5.0	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	50.99	5.0	45.7	0	112	60-140	0			
Benzo(g,h,i)perylene	52.32	5.0	45.7	0	114	60-140	0			
Benzo(k)fluoranthene	52.39	5.0	45.7	0	115	60-140	0			
Chrysene	51.31	5.0	45.7	0	112	60-140	0			
Dibenzo(a,h)anthracene	47.93	5.0	45.7	0	105	60-140	0			
Fluoranthene	47.98	5.0	45.7	0	105	60-140	0			
Fluorene	54.19	5.0	45.7	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	50.17	5.0	45.7	0	110	60-140	0			
Naphthalene	49.05	5.0	45.7	0	107	40-140	0			
Phenanthrene	49.39	5.0	45.7	0	108	60-140	0			
Pyrene	50.06	5.0	45.7	0	110	60-140	0			
Surr: 2-Fluorobiphenyl	*104.8*	0	*114*	0	*91.9*	*20-140*	0			
Surr: 4-Terphenyl-d14	*80.27*	0	*114*	0	*70.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*127.5*	0	*114*	0	*112*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081140-01B MS** Units: **µg/L** Analysis Date: **8/29/2014 01:01 AM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911492** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	62.08	5.0	45.7	0	136	50-140	0			
2-Methylnaphthalene	58.03	5.0	45.7	0	127	50-140	0			
Acenaphthene	62.19	5.0	45.7	0	136	60-140	0			
Acenaphthylene	66.08	5.0	45.7	0	145	60-140	0			S
Anthracene	55.09	5.0	45.7	0	121	60-140	0			
Benzo(a)anthracene	54.65	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	55.31	5.0	45.7	0	121	60-140	0			
Benzo(b)fluoranthene	56.27	5.0	45.7	0	123	60-140	0			
Benzo(g,h,i)perylene	59.93	5.0	45.7	0	131	60-140	0			
Benzo(k)fluoranthene	57.78	5.0	45.7	0	126	60-140	0			
Chrysene	58.49	5.0	45.7	0	128	60-140	0			
Dibenzo(a,h)anthracene	55.38	5.0	45.7	0	121	60-140	0			
Fluoranthene	54.93	5.0	45.7	0	120	60-140	0			
Fluorene	58.79	5.0	45.7	0	129	60-140	0			
Indeno(1,2,3-cd)pyrene	57.67	5.0	45.7	0	126	60-140	0			
Naphthalene	52.5	5.0	45.7	0	115	40-140	0			
Phenanthrene	55.27	5.0	45.7	0	121	60-140	0			
Pyrene	55.84	5.0	45.7	0	122	60-140	0			
Surr: 2-Fluorobiphenyl	*116.2*	0	*114*	0	*102*	*20-140*	0			
Surr: 4-Terphenyl-d14	*71.13*	0	*114*	0	*62.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*133.5*	0	*114*	0	*117*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081140-01B MSD** Units: **µg/L** Analysis Date: **8/29/2014 01:30 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911493** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	47.86	5.0	45.7	0	105	50-140	62.08	25.9	30	
2-Methylnaphthalene	42.86	5.0	45.7	0	93.8	50-140	58.03	30.1	30	R
Acenaphthene	54.81	5.0	45.7	0	120	60-140	62.19	12.6	30	
Acenaphthylene	57.49	5.0	45.7	0	126	60-140	66.08	13.9	30	
Anthracene	57.03	5.0	45.7	0	125	60-140	55.09	3.47	30	
Benzo(a)anthracene	58.72	5.0	45.7	0	128	60-140	54.65	7.18	30	
Benzo(a)pyrene	60.8	5.0	45.7	0	133	60-140	55.31	9.45	30	
Benzo(b)fluoranthene	61.07	5.0	45.7	0	134	60-140	56.27	8.18	30	
Benzo(g,h,i)perylene	63.27	5.0	45.7	0	138	60-140	59.93	5.42	30	
Benzo(k)fluoranthene	61.26	5.0	45.7	0	134	60-140	57.78	5.84	30	
Chrysene	60.69	5.0	45.7	0	133	60-140	58.49	3.68	30	
Dibenzo(a,h)anthracene	57.94	5.0	45.7	0	127	60-140	55.38	4.52	30	
Fluoranthene	56.87	5.0	45.7	0	124	60-140	54.93	3.48	30	
Fluorene	57.35	5.0	45.7	0	125	60-140	58.79	2.48	30	
Indeno(1,2,3-cd)pyrene	60.05	5.0	45.7	0	131	60-140	57.67	4.04	30	
Naphthalene	39.77	5.0	45.7	0	87	40-140	52.5	27.6	30	
Phenanthrene	56.78	5.0	45.7	0	124	60-140	55.27	2.69	30	
Pyrene	64.62	5.0	45.7	0	141	60-140	55.84	14.6	30	S
Surr: 2-Fluorobiphenyl	*104.1*	0	*114*	0	*91.3*	*20-140*	116.2	*11*	*30*	
Surr: 4-Terphenyl-d14	*84.78*	0	*114*	0	*74.4*	*22-172*	71.13	*17.5*	*30*	
Surr: Nitrobenzene-d5	*132.9*	0	*114*	0	*117*	*8-140*	133.5	*0.429*	*30*	

The following samples were analyzed in this batch: 14081240-01B 14081240-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R147214** Instrument ID **VMS7** Method: **SW8260**

MBLK	Sample ID: **VBLKW2-140828-R147214**			Units: **µg/L**			Analysis Date: **8/29/2014 02:53 AM**			
Client ID:	Run ID: **VMS7_140828B**			SeqNo: **2910586**			Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*16.8*	0	*20*	0	*84*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.17*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.31*	0	*20*	0	*96.6*	*85-115*	0			
Surr: Toluene-d8	*19.26*	0	*20*	0	*96.3*	*85-110*	0			

LCS	Sample ID: **VLCSW5-140828-R147214**			Units: **µg/L**			Analysis Date: **8/29/2014 01:36 AM**			
Client ID:	Run ID: **VMS7_140828B**			SeqNo: **2910585**			Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	22.57	1.0	20	0	113	85-125	0			
Ethylbenzene	20.94	1.0	20	0	105	85-125	0			
m,p-Xylene	41.26	2.0	40	0	103	75-130	0			
o-Xylene	20.62	1.0	20	0	103	80-125	0			
Toluene	20.63	1.0	20	0	103	85-125	0			
Xylenes, Total	61.88	3.0	60	0	103	80-126	0			
Surr: 1,2-Dichloroethane-d4	*16.83*	0	*20*	0	*84.2*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.08*	0	*20*	0	*100*	*80-110*	0			
Surr: Dibromofluoromethane	*19.16*	0	*20*	0	*95.8*	*85-115*	0			
Surr: Toluene-d8	*19*	0	*20*	0	*95*	*85-110*	0			

MS	Sample ID: **14081240-02A MS**			Units: **µg/L**			Analysis Date: **8/29/2014 11:38 AM**			
Client ID: **140822 FB25-SW-6**	Run ID: **VMS7_140828B**			SeqNo: **2910619**			Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.25	1.0	20	0	101	85-125	0			
Ethylbenzene	18.77	1.0	20	0	93.8	85-125	0			
m,p-Xylene	36.7	2.0	40	0	91.8	75-130	0			
o-Xylene	18.39	1.0	20	0	92	80-125	0			
Toluene	18.59	1.0	20	0	93	85-125	0			
Xylenes, Total	55.09	3.0	60	0	91.8	80-126	0			
Surr: 1,2-Dichloroethane-d4	*16.51*	0	*20*	0	*82.6*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.09*	0	*20*	0	*100*	*80-110*	0			
Surr: Dibromofluoromethane	*19.04*	0	*20*	0	*95.2*	*85-115*	0			
Surr: Toluene-d8	*18.83*	0	*20*	0	*94.2*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R147214** Instrument ID **VMS7** Method: **SW8260**

The following samples were analyzed in this batch: 14081240-01A 14081240-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62039** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902941** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS Sample ID: **LCS-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902940** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	94	6.0	100	0	94	80-115	0			

DUP Sample ID: **1408070-25A DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902915** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	190	12	0	0	0	0-0	188	1.06	15	

DUP Sample ID: **14081140-01C DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902922** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	21	3.0	0	0	0	0-0	20.5	2.41	15	

The following samples were analyzed in this batch:

14081240-01C	14081240-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081240
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R147201** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK Sample ID: **MB-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908967** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908968** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	94.6	5.0	100	0	94.6	50-150	0			

MS Sample ID: **14081140-01DMS** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908972** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	95	5.0	100	2.82	92.2	50-150	0			

MSD Sample ID: **14081140-01DMSD** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908973** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	90	5.0	100	2.82	87.2	50-150	95	5.41	30	

The following samples were analyzed in this batch:

14081240-01D	14081240-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408240

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43458

COC 1 of 1

Project Manager: REE

Project QC Contact: AAN/JET

Sampled by: TTB/CJEZ

Laboratory: ALS-Holland

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: ~~VOCs~~ (HCl) #1 BTEX	~~SVOCs~~ (unpreserved) #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3 TSS	Diesel Range Organics (HCl)	~~Nutrients~~ (H_2SO_4) #4 Oil + Grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers	
1. 140822 FB25-SW-5	0	0.5	ft	08/22/2014	11:50	X			X			3	1			1		1							6	[BTEX, PAH,
2. 140822 FB25-SW-6	↓	↓	↓	↓	11:30	X			X			3	1			1		1							6	Oil + Grease, TSS]
3.																										
4.																										
5.																										
6.																										Standard TAT
7.																										
8.																										
9.																										
10.																										

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	O N	8/22/14	1400	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	Date 8/23/14	Time 1000	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **23-Aug-14 10:00**

Work Order: **14081240** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 23-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 25-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.8 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/23/2014 12:20:50 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

From: (218) 529-7105
Chris Goecinak
Barr Engineering
325 S. Lake Avenue
Suite #700
Duluth, MN 55802

Origin ID: DLHA

FedEx Express

J14201406190Suv

Ship Date: 22AUG14
ActWgt: 43.6 LB
CAD: 8247818/INET3550

Dims: 25 X 14 X 14 IN

Delivery Address Bar Code

Ref # 49161292.00 001 100
Invoice #
PO # TLV
Dept #

SHIP TO: (218) 529-8200

BILL SENDER

Holland Labratory ALS
Holland Labratory ALS
3352 128TH AVE

HOLLAND, MI 49424

SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 7709 1924 2055

X0 HLMA

49424
MI-US
GRR

522G1ECF28A09

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
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30-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response SW 8.22.14** Work Order: **14081241**

Dear Ryan,

ALS Environmental received 2 samples on 23-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 16.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: **14081241**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081241-01	140822 FB25-SW-1	Water		8/22/2014 09:50	8/23/2014 10:00	☐
14081241-02	140822 FB25-SW-2	Water		8/22/2014 09:30	8/23/2014 10:00	☐

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: 14081241

Case Narrative

Samples for the above noted Work Order were received on 08/23/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 62060 MS/MSD data for PAHs is not related to this project's samples. No data requires qualification.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 30-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
WorkOrder: **14081241**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: 14081241
Sample ID: 140822 FB25-SW-1
Lab ID: 14081241-01
Collection Date: 8/22/2014 09:50 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 06:40 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 06:40 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 06:40 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 06:40 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 06:40 AM
Surr: 2-Fluorobiphenyl	*90.1*		*20-140*	*%REC*	1	8/29/2014 06:40 AM
Surr: 4-Terphenyl-d14	*109*		*22-172*	*%REC*	1	8/29/2014 06:40 AM
Surr: Nitrobenzene-d5	*123*		*8-140*	*%REC*	1	8/29/2014 06:40 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/25/2014 02:04 PM
Ethylbenzene	ND		1.0	µg/L	1	8/25/2014 02:04 PM
m,p-Xylene	ND		2.0	µg/L	1	8/25/2014 02:04 PM
o-Xylene	ND		1.0	µg/L	1	8/25/2014 02:04 PM
Toluene	ND		1.0	µg/L	1	8/25/2014 02:04 PM
Xylenes, Total	ND		3.0	µg/L	1	8/25/2014 02:04 PM
Surr: 1,2-Dichloroethane-d4	*87.4*		*75-120*	*%REC*	1	8/25/2014 02:04 PM
Surr: 4-Bromofluorobenzene	*103*		*80-110*	*%REC*	1	8/25/2014 02:04 PM
Surr: Dibromofluoromethane	*95.0*		*85-115*	*%REC*	1	8/25/2014 02:04 PM
Surr: Toluene-d8	*96.4*		*85-110*	*%REC*	1	8/25/2014 02:04 PM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**12**		**3.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *30-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response SW 8.22.14
Work Order: 14081241
Sample ID: 140822 FB25-SW-2
Lab ID: 14081241-02
Collection Date: 8/22/2014 09:30 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW8270**		Prep: SW3511 / 8/26/14	Analyst: **JG**
2-Chloronaphthalene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
2-Methylnaphthalene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Acenaphthene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Acenaphthylene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Anthracene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Benzo(a)anthracene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Benzo(a)pyrene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Benzo(b)fluoranthene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Benzo(g,h,i)perylene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Benzo(k)fluoranthene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Chrysene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Dibenzo(a,h)anthracene	ND		2.0	µg/L	1	8/29/2014 07:08 AM
Fluoranthene	ND		1.0	µg/L	1	8/29/2014 07:08 AM
Fluorene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Indeno(1,2,3-cd)pyrene	ND		2.0	µg/L	1	8/29/2014 07:08 AM
Naphthalene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Phenanthrene	ND		2.0	µg/L	1	8/29/2014 07:08 AM
Pyrene	ND		5.0	µg/L	1	8/29/2014 07:08 AM
Surr: 2-Fluorobiphenyl	*83.7*		*20-140*	*%REC*	1	8/29/2014 07:08 AM
Surr: 4-Terphenyl-d14	*100*		*22-172*	*%REC*	1	8/29/2014 07:08 AM
Surr: Nitrobenzene-d5	*117*		*8-140*	*%REC*	1	8/29/2014 07:08 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **AK**
Benzene	ND		1.0	µg/L	1	8/25/2014 02:29 PM
Ethylbenzene	ND		1.0	µg/L	1	8/25/2014 02:29 PM
m,p-Xylene	ND		2.0	µg/L	1	8/25/2014 02:29 PM
o-Xylene	ND		1.0	µg/L	1	8/25/2014 02:29 PM
Toluene	ND		1.0	µg/L	1	8/25/2014 02:29 PM
Xylenes, Total	ND		3.0	µg/L	1	8/25/2014 02:29 PM
Surr: 1,2-Dichloroethane-d4	*88.0*		*75-120*	*%REC*	1	8/25/2014 02:29 PM
Surr: 4-Bromofluorobenzene	*103*		*80-110*	*%REC*	1	8/25/2014 02:29 PM
Surr: Dibromofluoromethane	*95.3*		*85-115*	*%REC*	1	8/25/2014 02:29 PM
Surr: Toluene-d8	*96.4*		*85-110*	*%REC*	1	8/25/2014 02:29 PM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	ND		5.0	mg/L	1	8/28/2014 12:00 PM
TOTAL SUSPENDED SOLIDS			**A2540 D-97**		Prep: Water Ext. / 8/25/14	Analyst: **STP**
Total Suspended Solids	**12**		**3.0**	**mg/L**	1	8/25/2014 11:45 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MBLK Sample ID: **SBLKW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:05 PM**

Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911511** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	ND	5.0								
2-Methylnaphthalene	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Chrysene	ND	5.0								
Dibenzo(a,h)anthracene	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	5.0								
Naphthalene	ND	5.0								
Phenanthrene	ND	5.0								
Pyrene	ND	5.0								
Surr: 2-Fluorobiphenyl	*90.93*	0	*114*	0	*79.8*	*20-140*	0			
Surr: 4-Terphenyl-d14	*102.7*	0	*114*	0	*90.1*	*22-172*	0			
Surr: Nitrobenzene-d5	*129.1*	0	*114*	0	*113*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

LCS Sample ID: **SLCSW1-62060-62060** Units: **µg/L** Analysis Date: **8/29/2014 12:33 PM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911512** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	54.95	5.0	45.7	0	120	50-140	0			
2-Methylnaphthalene	52.8	5.0	45.7	0	116	50-140	0			
Acenaphthene	56.5	5.0	45.7	0	124	60-140	0			
Acenaphthylene	56.98	5.0	45.7	0	125	60-140	0			
Anthracene	49.12	5.0	45.7	0	107	60-140	0			
Benzo(a)anthracene	50.31	5.0	45.7	0	110	60-140	0			
Benzo(a)pyrene	51.04	5.0	45.7	0	112	60-140	0			
Benzo(b)fluoranthene	50.99	5.0	45.7	0	112	60-140	0			
Benzo(g,h,i)perylene	52.32	5.0	45.7	0	114	60-140	0			
Benzo(k)fluoranthene	52.39	5.0	45.7	0	115	60-140	0			
Chrysene	51.31	5.0	45.7	0	112	60-140	0			
Dibenzo(a,h)anthracene	47.93	5.0	45.7	0	105	60-140	0			
Fluoranthene	47.98	5.0	45.7	0	105	60-140	0			
Fluorene	54.19	5.0	45.7	0	119	60-140	0			
Indeno(1,2,3-cd)pyrene	50.17	5.0	45.7	0	110	60-140	0			
Naphthalene	49.05	5.0	45.7	0	107	40-140	0			
Phenanthrene	49.39	5.0	45.7	0	108	60-140	0			
Pyrene	50.06	5.0	45.7	0	110	60-140	0			
Surr: 2-Fluorobiphenyl	*104.8*	0	*114*	0	*91.9*	*20-140*	0			
Surr: 4-Terphenyl-d14	*80.27*	0	*114*	0	*70.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*127.5*	0	*114*	0	*112*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MS Sample ID: **14081140-01B MS** Units: **µg/L** Analysis Date: **8/29/2014 01:01 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911492** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	62.08	5.0	45.7	0	136	50-140	0			
2-Methylnaphthalene	58.03	5.0	45.7	0	127	50-140	0			
Acenaphthene	62.19	5.0	45.7	0	136	60-140	0			
Acenaphthylene	66.08	5.0	45.7	0	145	60-140	0			S
Anthracene	55.09	5.0	45.7	0	121	60-140	0			
Benzo(a)anthracene	54.65	5.0	45.7	0	120	60-140	0			
Benzo(a)pyrene	55.31	5.0	45.7	0	121	60-140	0			
Benzo(b)fluoranthene	56.27	5.0	45.7	0	123	60-140	0			
Benzo(g,h,i)perylene	59.93	5.0	45.7	0	131	60-140	0			
Benzo(k)fluoranthene	57.78	5.0	45.7	0	126	60-140	0			
Chrysene	58.49	5.0	45.7	0	128	60-140	0			
Dibenzo(a,h)anthracene	55.38	5.0	45.7	0	121	60-140	0			
Fluoranthene	54.93	5.0	45.7	0	120	60-140	0			
Fluorene	58.79	5.0	45.7	0	129	60-140	0			
Indeno(1,2,3-cd)pyrene	57.67	5.0	45.7	0	126	60-140	0			
Naphthalene	52.5	5.0	45.7	0	115	40-140	0			
Phenanthrene	55.27	5.0	45.7	0	121	60-140	0			
Pyrene	55.84	5.0	45.7	0	122	60-140	0			
Surr: 2-Fluorobiphenyl	*116.2*	0	*114*	0	*102*	*20-140*	0			
Surr: 4-Terphenyl-d14	*71.13*	0	*114*	0	*62.4*	*22-172*	0			
Surr: Nitrobenzene-d5	*133.5*	0	*114*	0	*117*	*8-140*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62060** Instrument ID **SVMS7** Method: **SW8270**

MSD Sample ID: **14081140-01B MSD** Units: **µg/L** Analysis Date: **8/29/2014 01:30 AM**
Client ID: Run ID: **SVMS7_140828A** SeqNo: **2911493** Prep Date: **8/26/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Chloronaphthalene	47.86	5.0	45.7	0	105	50-140	62.08	25.9	30	
2-Methylnaphthalene	42.86	5.0	45.7	0	93.8	50-140	58.03	30.1	30	R
Acenaphthene	54.81	5.0	45.7	0	120	60-140	62.19	12.6	30	
Acenaphthylene	57.49	5.0	45.7	0	126	60-140	66.08	13.9	30	
Anthracene	57.03	5.0	45.7	0	125	60-140	55.09	3.47	30	
Benzo(a)anthracene	58.72	5.0	45.7	0	128	60-140	54.65	7.18	30	
Benzo(a)pyrene	60.8	5.0	45.7	0	133	60-140	55.31	9.45	30	
Benzo(b)fluoranthene	61.07	5.0	45.7	0	134	60-140	56.27	8.18	30	
Benzo(g,h,i)perylene	63.27	5.0	45.7	0	138	60-140	59.93	5.42	30	
Benzo(k)fluoranthene	61.26	5.0	45.7	0	134	60-140	57.78	5.84	30	
Chrysene	60.69	5.0	45.7	0	133	60-140	58.49	3.68	30	
Dibenzo(a,h)anthracene	57.94	5.0	45.7	0	127	60-140	55.38	4.52	30	
Fluoranthene	56.87	5.0	45.7	0	124	60-140	54.93	3.48	30	
Fluorene	57.35	5.0	45.7	0	125	60-140	58.79	2.48	30	
Indeno(1,2,3-cd)pyrene	60.05	5.0	45.7	0	131	60-140	57.67	4.04	30	
Naphthalene	39.77	5.0	45.7	0	87	40-140	52.5	27.6	30	
Phenanthrene	56.78	5.0	45.7	0	124	60-140	55.27	2.69	30	
Pyrene	64.62	5.0	45.7	0	141	60-140	55.84	14.6	30	S
Surr: 2-Fluorobiphenyl	*104.1*	0	*114*	0	*91.3*	*20-140*	116.2	*11*	*30*	
Surr: 4-Terphenyl-d14	*84.78*	0	*114*	0	*74.4*	*22-172*	71.13	*17.5*	*30*	
Surr: Nitrobenzene-d5	*132.9*	0	*114*	0	*117*	*8-140*	133.5	*0.429*	*30*	

The following samples were analyzed in this batch: 14081241-01B 14081241-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R146900** Instrument ID **VMS7** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140825-R146900** Units: **µg/L** Analysis Date: **8/25/2014 11:53 AM**
Client ID: Run ID: **VMS7_140825A** SeqNo: **2902740** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*17.27*	0	*20*	0	*86.4*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.29*	0	*20*	0	*101*	*80-110*	0			
Surr: Dibromofluoromethane	*19.27*	0	*20*	0	*96.4*	*85-115*	0			
Surr: Toluene-d8	*19.1*	0	*20*	0	*95.5*	*85-110*	0			

LCS Sample ID: **VLCSW1-140825-R146900** Units: **µg/L** Analysis Date: **8/25/2014 10:37 AM**
Client ID: Run ID: **VMS7_140825A** SeqNo: **2902739** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	19.74	1.0	20	0	98.7	85-125	0			
Ethylbenzene	19.43	1.0	20	0	97.2	85-125	0			
m,p-Xylene	38.4	2.0	40	0	96	75-130	0			
o-Xylene	18.99	1.0	20	0	95	80-125	0			
Toluene	18.58	1.0	20	0	92.9	85-125	0			
Xylenes, Total	57.39	3.0	60	0	95.6	80-126	0			
Surr: 1,2-Dichloroethane-d4	*16.91*	0	*20*	0	*84.6*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.06*	0	*20*	0	*100*	*80-110*	0			
Surr: Dibromofluoromethane	*19.01*	0	*20*	0	*95*	*85-115*	0			
Surr: Toluene-d8	*18.75*	0	*20*	0	*93.8*	*85-110*	0			

MS Sample ID: **14081241-01A MS** Units: **µg/L** Analysis Date: **8/25/2014 08:45 PM**
Client ID: **140822 FB25-SW-1** Run ID: **VMS7_140825A** SeqNo: **2903082** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.64	1.0	20	0	103	85-125	0			
Ethylbenzene	19.48	1.0	20	0	97.4	85-125	0			
m,p-Xylene	38.77	2.0	40	0.43	95.8	75-130	0			
o-Xylene	19.19	1.0	20	0	96	80-125	0			
Toluene	19.08	1.0	20	0	95.4	85-125	0			
Xylenes, Total	57.96	3.0	60	0.43	95.9	80-126	0			
Surr: 1,2-Dichloroethane-d4	*16.98*	0	*20*	0	*84.9*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.37*	0	*20*	0	*102*	*80-110*	0			
Surr: Dibromofluoromethane	*19.1*	0	*20*	0	*95.5*	*85-115*	0			
Surr: Toluene-d8	*19.29*	0	*20*	0	*96.4*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R146900** Instrument ID **VMS7** Method: **SW8260**

MSD	Sample ID: **14081241-01A MSD**				Units: **µg/L**			Analysis Date: **8/25/2014 09:10 PM**		
Client ID: **140822 FB25-SW-1**		Run ID: **VMS7_140825A**			SeqNo: **2903083**	Prep Date:		DF: **1**		

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.23	1.0	20	0	101	85-125	20.64	2.01	30	
Ethylbenzene	19.1	1.0	20	0	95.5	85-125	19.48	1.97	30	
m,p-Xylene	38.24	2.0	40	0.43	94.5	75-130	38.77	1.38	30	
o-Xylene	18.62	1.0	20	0	93.1	80-125	19.19	3.02	30	
Toluene	18.77	1.0	20	0	93.8	85-125	19.08	1.64	30	
Xylenes, Total	56.86	3.0	60	0.43	94	80-126	57.96	1.92	30	
Surr: 1,2-Dichloroethane-d4	*16.96*	0	*20*	0	*84.8*	*75-120*	16.98	*0.118*	*30*	
Surr: 4-Bromofluorobenzene	*20.21*	0	*20*	0	*101*	*80-110*	20.37	*0.789*	*30*	
Surr: Dibromofluoromethane	*19.09*	0	*20*	0	*95.4*	*85-115*	19.1	*0.0524*	*30*	
Surr: Toluene-d8	*19.03*	0	*20*	0	*95.2*	*85-110*	19.29	*1.36*	*30*	

The following samples were analyzed in this batch: 14081241-01A 14081241-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **62039** Instrument ID **TSS** Method: **A2540 D-97**

MBLK Sample ID: **MBLK-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902941** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	2.4								

LCS Sample ID: **LCS-62039-62039** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902940** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	94	6.0	100	0	94	80-115	0			

DUP Sample ID: **1408070-25A DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902915** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	190	12	0	0	0	0-0	188	1.06	15	

DUP Sample ID: **14081140-01C DUP** Units: **mg/L** Analysis Date: **8/25/2014 11:45 AM**
Client ID: Run ID: **TSS_140825A** SeqNo: **2902922** Prep Date: **8/25/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	21	3.0	0	0	0	0-0	20.5	2.41	15	

The following samples were analyzed in this batch:

14081241-01C	14081241-02C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081241
Project: Enbridge FB25 Response SW 8.22.14

QC BATCH REPORT

Batch ID: **R147201** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK Sample ID: **MB-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908967** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R147201-R147201** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908968** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	94.6	5.0	100	0	94.6	50-150	0			

MS Sample ID: **14081140-01DMS** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908972** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	95	5.0	100	2.82	92.2	50-150	0			

MSD Sample ID: **14081140-01DMSD** Units: **mg/L** Analysis Date: **8/28/2014 12:00 PM**
Client ID: Run ID: **O&GMOD_140828A** SeqNo: **2908973** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	90	5.0	100	2.82	87.2	50-150	95	5.41	30	

The following samples were analyzed in this batch:

14081241-01D	14081241-02D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408124 1

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43457

Project Manager: REE

Project QC Contact: AAN/JET

Sampled by: TTB/CJEZ

Laboratory: ALS - Holland

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: ~~VOCs~~ (HCl) #1 BTEX	~~SVOCs~~ (unpreserved) #2 PAH	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3 TSS	Diesel Range Organics (HCl)	~~Nutrients~~ (H_2SO_4) #4. Oil + Grease	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers
1. 140822 FB25-SW-1	0	.5	ft	08/22/2014	09:50	X		X			3	1			1		1							6
2. 140822 FB25-SW-2	↓	↓	↓	↓	09:30	X		X			3	1			1		1							6
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

[BTEX, PAH, Oil + Grease, TSS]

Standard TAT

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	Y (O) N	8.22.2014	1400	FedEx		
Relinquished By: FedEx	On Ice? Y N	Date 8/23/14	Time 1000	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:RLGISTDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **23-Aug-14 10:00**

Work Order: **14081241** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 23-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 25-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.8 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/23/2014 12:22:42 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081276
COC Number: 081276
Date Received: 8/22/2014
Report Date: 8/29/2014
ReportNumber: 127223

Client: MARGARET TREANOR
BARR ENGINEERING CO
4700 WEST 77TH STREET
MINNEAPOLIS MN 55435

Sample ID: 140822-FB25-SW-1 Grab **Sample Date:** 8/22/2014 **SampleTime:** 9:50 **Matrix:** Aqueous
Era Project Number: 081276-1

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140822-FB25-SW-2 Grab **Sample Date:** 8/22/2014 **SampleTime:** 9:30 **Matrix:** Aqueous
Era Project Number: 081276-2

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140822-FB25-SW-5 Grab **Sample Date:** 8/22/2014 **SampleTime:** 11:50 **Matrix:** Aqueous
Era Project Number: 081276-3

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		1

Sample ID: 140822-FB25-SW-6 Grab **Sample Date:** 8/22/2014 **SampleTime:** 11:30 **Matrix:** Aqueous
Era Project Number: 081276-4

Parameter:		Results:	Units:	Analysis Date/Time:		Method:	DF:	LOD:	LOQ:	QC Comments:	QCBatch:
BOD (5)	<	2	mg/L	8/22/2014	17:04	SM 5210 B-97	1	2	2		2

Received on ice

Era Laboratories, Inc.
4730 Oneota Street Duluth MN 55807 Telephone: (218)727-6380 Fax: (218)727-3049

Laboratory Report

Project Number: 081276
COC Number: 081276
Date Received: 8/22/2014
Report Date: 8/29/2014
ReportNumber: 127223

Results are reported on an as received basis. < Not detected. Less than LOD.

Quality Control Summary Report

Analyte	Date of Analysis	QC Batch	Matrix Spike (% Recovery)	% Recovery Limits	MSD or Duplicate (%RPD)	% RPD Limits	Duplicate Range	Range Limits	LCS (% Recovery)	LCS Limits	Method Blank
BOD (5)	8/22/2014	1	NA	NA	NA	NA	0.02	10	108.21	84.9 - 115.40	<0.2
BOD (5)	8/22/2014	2	NA	NA	NA	NA	0.00	10	108.21	84.9 - 115.40	<0.2

Report Approved By:
Robert D. Magnuson
Lab Director
MN Certification # 027-137-152

Temperature upon arrival (°C): 9.0
Received on ice

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: FB25 Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: 43456

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water — VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3 BOD5	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil — VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Total Number Of Containers
1. 140822 FB25-SW-1	0	0.5	ft	08/22/2014	09:50	X			X							1								1
2. 140822 FB25-SW-2	↓	↓	↓	↓	09:30	↓			↓							1								1
3. 140822 FB25-SW-5					11:50																			1
4. 140822 FB25-SW-6	↓	✓	↓	✓	11:30	✓			✓							↓								1
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

COC 1 of 1

Project Manager: REE

Project QC Contact: AAN/JET

Sampled by: TTB/CJG2

Laboratory: ERA

[BOD5]

Standard TAT

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
[signature]	Y N	8/22/2014	1407	[signature]	8/22/14	2:07
Relinquished By:	On Ice? Y N	Date	Time	Received by: 9.0°C ice	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☑ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

Attachment E

Waste Disposal Documentation

Shamrock Landfill

Waste Profile Sheet

Shamrock Landfill

P.O. Number	Customer Code	SKB Representative	CL

I. Generator Information

Generator Name: Enbridge Pipelines Limited Partnership, LLC		Generator EPA ID Number	SIC Code
Generator Location: Enbridge Superior Terminal - Field Booster 25	County: Douglas	Generator Contact: Alex Smith	
		Phone: 715-398-4795	Fax: 832-325-5511
Generator Mailing Address (if different: 1320 Grand Ave, Superior, WI 54880		Generator Email Address: alex.smith@enbridge.com	
Bill To Name & Address: Enbridge Energy, 1100 Louisiana Ave, STE. 3300, Houston, TX 77002	Bill To #:	Billing Contact: Alex Smith	
		Phone: 715-398-4795	Fax: 832-325-5511
Invoice Contact:		Billing Email Address: alex.smith@enbridge.com	

II. Waste Generation Information

Waste Name: Crude contaminated soil - Field Booster 25	Estimated rate of waste generation: 200 ☐ Lbs. ☐ tons ☒ cy ☐ drums	☒ one time ☐ yearly
Generator Facility Operations and/or Site History: Enbridge Pipeline Terminal		
Describe the generating process or source of contaminated soil/debris and/or waste: Release response		

III. Waste Composition and Constituents (list all known)

	Actual Range %	ppm
Crude contaminated soil	95	
Response waste materials (e.g. absorbent booms, pads)	5	

IV. Waste Properties

Physical state:	Free Liquids:	pH Range:	Flash point:	Color:	Odor (describe):
☒ Solid ☐ Liquid ☐ Sludge ☐ Gas	☐ Yes ☒ No Content ____ %	☐ <2 ☐ 2-4 ☐ 5-8 ☐ 8-12.4 ☐ >12.5	☐ ≤ 140°F ☐ > 140°F to < 200°F ☐ > 200°F	Brown	petroleum odor

V. Waste Classification

Waste stream properties (answer ALL questions)			Does this waste contain absorbents?	☐ Yes	☒ No
Does this waste stream contain any D, F, K, U or P listed as hazardous waste, either in pure form, as a mixture, or treatment residue?	☐ Yes	☒ No	Is this waste lethal (by Minn. Rules 7045.0131 Subp. 6)?	☐ Yes	☒ No
Does this waste stream contain PCB material	☐ Yes	☒ No	Is this waste recyclable?	☐ Yes	☒ No
If yes, concentration: ____ppm			Is this waste explosive?	☐ Yes	☒ No
Does this waste stream contain fuming acids?	☐ Yes	☒ No	Is this waste infectious?	☐ Yes	☒ No
Does this waste contain asbestos?	☐ Yes	☒ No	Is this putrescible waste?	☐ Yes	☒ No
Does this waste contain oxidizers?	☐ Yes	☒ No	Is this waste demolition debris?	☐ Yes	☒ No
Does this waste contain radioactive material?	☐ Yes	☒ No	Is this waste sewer sludge?	☐ Yes	☒ No

Please attach any available information or analytical test results that have previously been performed on this waste that substantiates these determinations. Include MSDS's and any information from other agencies (i.e., MPCA, USEPA)

VI. Shipping Information

Proper DOT Shipping Name (per CFR 172.101) where applicable			
Reportable Quantity	DOT Hazard Class	UN/NA Number	Packing Group
Method of packaging: ☐ drums (size ____) ☒ Bulk Solids ☐ boxes (size ____)		Method of shipment ☐ Roll-off ☒ End dump ☐ Rail ☐ Other (Specify) ____	

VII. Certification of Non Hazardous Waste & Approval Conditions

I hereby certify and warrant, on behalf of the generator and myself that, to the best of my knowledge and belief, the information contained herein is accurate, and true and that the waste is nonhazardous as defined in Title 42, Unites States Code Section 6903, Minnesota Statute Section 116.06, Subdivision 13, and/or any rules adopted by the Minnesota Pollution Control Agency under Minnesota Statute Section 116.07.

I understand that any approval is no longer valid if there are any changes in the process generating the waste or there have been changes in the composition of the waste. Therefore, if the composition of the waste stream changes or potentially changes, I or someone representing the generator, will immediately notify SKB Environmental. I, on behalf of the generator, hereby agree to fully indemnify SKB Environmental for any damages and/or costs incurred as a result of this certification being inaccurate or untrue.

Signature	Alex Smith Printed Name	Environmental Analyst Title	8/22/14 Date

22-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge Field Booster 25 Stockpile 8.18.14** Work Order: **1408987**

Dear Ryan,

ALS Environmental received 2 samples on 20-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 18.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge Field Booster 25 Stockpile 8.18.14
Work Order: **1408987**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1408987-01	140818FB25 Stockpile 1	Soil		8/18/2014 17:00	8/20/2014 09:30	☐
1408987-02	140818FB25 Stockpile 2	Soil		8/18/2014 17:00	8/20/2014 09:30	☐

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge Field Booster 25 Stockpile 8.18.14
Work Order: 1408987

Case Narrative

Samples for the above noted Work Order were received on 08/20/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 61858 samples 1408987-01 and 1408987-02 had significant peaks or baseline rise outside the method defined chromatographic window for DRO.

Wet Chemistry:
Batch R146700 sample 1408987-01 MS/MSD recoveries for O&G were below the lower control limit. The corresponding result in the parent sample may be biased low for O&G.

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge Field Booster 25 Stockpile 8.18.14
WorkOrder: **1408987**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
% of sample	Percent of Sample
µg/Kg-dry	Micrograms per Kilogram Dry Weight
mg/Kg-dry	Milligrams per Kilogram Dry Weight

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge Field Booster 25 Stockpile 8.18.14
Work Order: 1408987
Sample ID: 140818FB25 Stockpile 1
Lab ID: 1408987-01
Collection Date: 8/18/2014 05:00 PM
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**6.6**		**6.0**	**mg/Kg-dry**	1	8/20/2014 11:31 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260B**		Prep: SW5035 / 8/20/14	Analyst: **BG**
Benzene	ND		31	µg/Kg-dry	1	8/20/2014 04:55 PM
Ethylbenzene	ND		46	µg/Kg-dry	1	8/20/2014 04:55 PM
m,p-Xylene	ND		92	µg/Kg-dry	1	8/20/2014 04:55 PM
o-Xylene	ND		46	µg/Kg-dry	1	8/20/2014 04:55 PM
Toluene	ND		46	µg/Kg-dry	1	8/20/2014 04:55 PM
Xylenes, Total	ND		140	µg/Kg-dry	1	8/20/2014 04:55 PM
Surr: 1,2-Dichloroethane-d4	*96.3*		*70-130*	*%REC*	1	8/20/2014 04:55 PM
Surr: 4-Bromofluorobenzene	*98.4*		*70-130*	*%REC*	1	8/20/2014 04:55 PM
Surr: Dibromofluoromethane	*93.8*		*70-130*	*%REC*	1	8/20/2014 04:55 PM
Surr: Toluene-d8	*98.1*		*70-130*	*%REC*	1	8/20/2014 04:55 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**18**		**0.050**	**% of sample**	1	8/20/2014 05:42 PM
OIL AND GREASE			**SW9071B**			Analyst: **ND**
Oil and Grease	ND		730	mg/Kg-dry	1	8/20/2014 09:00 AM
TOTAL REC PET HYDROCARBONS			**E1664**			Analyst: **ND**
Total Rec. Pet Hydrocarbons	ND		730	mg/Kg-dry	1	8/20/2014 03:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge Field Booster 25 Stockpile 8.18.14
Work Order: 1408987
Sample ID: 140818FB25 Stockpile 2
Lab ID: 1408987-02
Collection Date: 8/18/2014 05:00 PM
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**29**		**5.7**	**mg/Kg-dry**	1	8/20/2014 11:57 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260B**		Prep: SW5035 / 8/20/14	Analyst: **BG**
Benzene	ND		23	µg/Kg-dry	1	8/20/2014 05:21 PM
Ethylbenzene	ND		35	µg/Kg-dry	1	8/20/2014 05:21 PM
m,p-Xylene	ND		70	µg/Kg-dry	1	8/20/2014 05:21 PM
o-Xylene	ND		35	µg/Kg-dry	1	8/20/2014 05:21 PM
Toluene	ND		35	µg/Kg-dry	1	8/20/2014 05:21 PM
Xylenes, Total	ND		100	µg/Kg-dry	1	8/20/2014 05:21 PM
Surr: 1,2-Dichloroethane-d4	*96.2*		*70-130*	*%REC*	1	8/20/2014 05:21 PM
Surr: 4-Bromofluorobenzene	*99.5*		*70-130*	*%REC*	1	8/20/2014 05:21 PM
Surr: Dibromofluoromethane	*93.6*		*70-130*	*%REC*	1	8/20/2014 05:21 PM
Surr: Toluene-d8	*98.0*		*70-130*	*%REC*	1	8/20/2014 05:21 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**14**		**0.050**	**% of sample**	1	8/20/2014 05:42 PM
OIL AND GREASE			**SW9071B**			Analyst: **ND**
Oil and Grease	ND		700	mg/Kg-dry	1	8/20/2014 09:00 AM
TOTAL REC PET HYDROCARBONS			**E1664**			Analyst: **ND**
Total Rec. Pet Hydrocarbons	ND		700	mg/Kg-dry	1	8/20/2014 03:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company

QC BATCH REPORT

Work Order: 1408987

Project: Enbridge Field Booster 25 Stockpile 8.18.14

Batch ID: **61858** Instrument ID **GC8** Method: **PUBL-SW-141**

MBLK	Sample ID: **DBLKS1-61858-61858**				Units: **mg/Kg**			Analysis Date: **8/20/2014 10:40 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897624**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	ND	5.0								

LCS	Sample ID: **DLCSS1-61858-61858**				Units: **mg/Kg**			Analysis Date: **8/20/2014 11:06 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897625**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	168.1	5.0	160	0	105	70-120	0			

LCSD	Sample ID: **DLCSDS1-61858-61858**				Units: **mg/Kg**			Analysis Date: **8/21/2014 02:03 AM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897633**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	157.4	5.0	160	0	98.3	70-120	168.1	6.62	20	

The following samples were analyzed in this batch: 1408987-01A 1408987-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408987
Project: Enbridge Field Booster 25 Stockpile 8.18.14

QC BATCH REPORT

Batch ID: **61852** Instrument ID **VMS8** Method: **SW8260B**

MBLK Sample ID: **MBLK-61852-61852** Units: **µg/Kg** Analysis Date: **8/20/2014 04:13 PM**
Client ID: Run ID: **VMS8_140820A** SeqNo: **2898385** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	30								
Ethylbenzene	ND	30								
m,p-Xylene	ND	60								
o-Xylene	ND	30								
Toluene	ND	30								
Xylenes, Total	ND	90								
Surr: 1,2-Dichloroethane-d4	*978.5*	0	*1000*	0	*97.8*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*977.5*	0	*1000*	0	*97.8*	*70-130*	0			
Surr: Dibromofluoromethane	*964.5*	0	*1000*	0	*96.4*	*70-130*	0			
Surr: Toluene-d8	*923.5*	0	*1000*	0	*92.4*	*70-130*	0			

LCS Sample ID: **LCS-61852-61852** Units: **µg/Kg** Analysis Date: **8/20/2014 01:43 PM**
Client ID: Run ID: **VMS8_140820A** SeqNo: **2898377** Prep Date: **8/20/2014** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	1074	30	1000	0	107	75-125	0			
Ethylbenzene	1046	30	1000	0	105	75-125	0			
m,p-Xylene	2086	60	2000	0	104	80-125	0			
o-Xylene	1038	30	1000	0	104	75-125	0			
Toluene	1043	30	1000	0	104	70-125	0			
Xylenes, Total	3125	90	3000	0	104	75-125	0			
Surr: 1,2-Dichloroethane-d4	*963.5*	0	*1000*	0	*96.4*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*992*	0	*1000*	0	*99.2*	*70-130*	0			
Surr: Dibromofluoromethane	*982.5*	0	*1000*	0	*98.2*	*70-130*	0			
Surr: Toluene-d8	*964.5*	0	*1000*	0	*96.4*	*70-130*	0			

The following samples were analyzed in this batch: 1408987-01B 1408987-02B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408987
Project: Enbridge Field Booster 25 Stockpile 8.18.14

QC BATCH REPORT

Batch ID: **R146700** Instrument ID **O&G** Method: **SW9071B**

MBLK Sample ID: **MB-R146700-R146700** Units: **mg/Kg** Analysis Date: **8/20/2014 09:00 AM**
Client ID: Run ID: **O&G_140820D** SeqNo: **2898319** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	600								

LCS Sample ID: **LCS-R146700-R146700** Units: **mg/Kg** Analysis Date: **8/20/2014 09:00 AM**
Client ID: Run ID: **O&G_140820D** SeqNo: **2898320** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1340	600	1600	0	83.8	78-114	0			

MS Sample ID: **1408987-01A MS** Units: **mg/Kg** Analysis Date: **8/20/2014 09:00 AM**
Client ID: **140818FB25 Stockpile 1** Run ID: **O&G_140820D** SeqNo: **2898322** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1464	600	1600	272.1	74.5	75-125	0			S

MSD Sample ID: **1408987-01A MSD** Units: **mg/Kg** Analysis Date: **8/20/2014 09:00 AM**
Client ID: **140818FB25 Stockpile 1** Run ID: **O&G_140820D** SeqNo: **2898323** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1386	600	1600	272.1	69.6	75-125	1464	5.45	25	S

The following samples were analyzed in this batch: 1408987-01A 1408987-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408987
Project: Enbridge Field Booster 25 Stockpile 8.18.14

QC BATCH REPORT

Batch ID: **R146703** Instrument ID **O&G** Method: **E1664**

MBLK Sample ID: **MB-R146703-R146703** Units: **mg/Kg** Analysis Date: **8/20/2014 03:00 PM**
Client ID: Run ID: **O&G_140820C** SeqNo: **2898354** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	ND	600								

LCS Sample ID: **LCS-R146703-R146703** Units: **mg/Kg** Analysis Date: **8/20/2014 03:00 PM**
Client ID: Run ID: **O&G_140820C** SeqNo: **2898355** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	668	600	800	0	83.5	64-132	0			

MS Sample ID: **1408987-01A MS** Units: **mg/Kg** Analysis Date: **8/20/2014 03:00 PM**
Client ID: **140818FB25 Stockpile 1** Run ID: **O&G_140820C** SeqNo: **2898357** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	616.5	600	800	0	77.1	64-132	0			

MSD Sample ID: **1408987-01A MSD** Units: **mg/Kg** Analysis Date: **8/20/2014 03:00 PM**
Client ID: **140818FB25 Stockpile 1** Run ID: **O&G_140820C** SeqNo: **2898358** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	713.1	600	800	0	89.1	64-132	616.5	14.5	20	

The following samples were analyzed in this batch: 1408987-01A 1408987-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408987
Project: Enbridge Field Booster 25 Stockpile 8.18.14

QC BATCH REPORT

Batch ID: **R146731** Instrument ID **MOIST** Method: **A2540 G**

MBLK Sample ID: **WBLKS-R146731** Units: **% of sample** Analysis Date: **8/20/2014 05:42 PM**
Client ID: Run ID: **MOIST_140820C** SeqNo: **2898691** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	ND	0.050								

LCS Sample ID: **LCS-R146731** Units: **% of sample** Analysis Date: **8/20/2014 05:42 PM**
Client ID: Run ID: **MOIST_140820C** SeqNo: **2898690** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	100	0.050	100	0	100	99.5-100.5	0			

DUP Sample ID: **1408890-01A DUP** Units: **% of sample** Analysis Date: **8/20/2014 05:42 PM**
Client ID: Run ID: **MOIST_140820C** SeqNo: **2898686** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	9.38	0.050	0	0	0	0-0	9.32	0.642	20	

The following samples were analyzed in this batch: 1408987-01A 1408987-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408987

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: FIELD BOOSTER 2S

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 43427

COC ____ of ____

Project Manager: PEE

Project QC Contact: AAN

Sampled by: EJJ

Laboratory: ALS

	Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	TCLP Benzene (HOLD)	Total Number Of Containers
-1	1. 140818FB2S STOCKPILE 1	—	—	—	08/18/2014	17:00		X	X											1	1			1	1	4
-2	2. 140818FB2S STOCKPILE 2	—	—	—	08/18/2014	17:00		X	X											1	1			1	1	4
	3.																									
	4.																									
	5.																									
	6.																									
	7.																									
	8.																									
	9.																									
	10.																									

-1: ~~GRO~~ BTEX, TCLP Benzene HOLD; DRO, %Solids
-2: ~~GRO~~ BTEX, DRO, %Solids; TCLP Benzene (HOLD)

Rush!
ASAP TAT
No GRO
8/20/14

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
	(Y) N	8/18/14	1830	FedEx		
Relinquished By: FedEx	On Ice? Y N	Date 8/20/14	Time 0930	Received by:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

2.8°C

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

1408987

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

Project Number: 49161292

Project Name: Field Booster 2S

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 43426

Number of Containers/Preservative

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water:	Water:	Water:	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil: TPH 4 oz jar	Soil: Oil & Grease	Total Number Of Containers	
1. 140818 FB2S STOCKPILE 1	–	–	–	08/18/2014	17:00		X		X																			1	1	2	TPH & oil & grease
2. 140818 FB2S STOCKPILE 2	–	–	–	08/18/2014	17:00		X		X																			1	1	2	TPH & oil & grease
3.																															
4.																															
5.																															
6.																															
7.																															
8.																															
9.																															
10.																															

COC ____ of ____

Project Manager: REE

Project QC Contact: AAN

Sampled by: EJJ

Laboratory: ALS

RUSH
ASAP
TAT

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time
	Y N	8/18/14	18:30			
Relinquished By:	On Ice? Y N	Date	Time	Received by:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: ____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

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Ann Preston

From: James E. Taraldsen [JTaraldsen@barr.com]
Sent: Wednesday, August 20, 2014 10:46 AM
To: Ann Preston
Cc: Hans Wronka; Lynette M. Carney; Andrea A. Nord; Ryan E. Erickson
Subject: COC corrections for samples arriving today

Hi Ann,

You will be receiving samples this am in which the COC forms will need some clarification and changes. The scope of analysis for this project was evolving as we were collecting and shipping samples, so we need to make some adjustments.

1. For COC number 43427, we would like to have a BTEX analysis and not GRO completed on Stockpile 1 and 2
2. Same for COC number 43416 (stockpile 3), and we would also a sample held for possible TCLP extraction and benzene analysis.
3. For COC number 43434, we would also like a sample held for possible TCLP extraction and benzene analysis.
4. For COC number 41256, the surface water sites will need BTEX analysis and not VOC analysis. Also, we will not need and TOC analysis for any of the sites. We would also like to add PAH analysis if possible. Please check to see if any extra sample bottles were sent which might be used for PAH analysis.

The SAP for this project requires analyses of all trip blanks and duplicates sent to you. We will need QC (duplicates , MS/MSD ect..) completed on native (spill samples) whenever possible. I am not sure if enough sample was collected with this set to meet this request, so just do the best you can. We also need sample results absolutely ASAP for all of these, and future samples. Sorry for all confusion, and please let Andrea or myself know if there are any other issues with this sample set. We will be sending out two more sample sets today with similar requirements. Thanks!

Jim

James E. Taraldsen

Data Quality Specialist
Duluth office: 218.529.7138
JTaraldsen@barr.com
www.barr.com

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **20-Aug-14 09:30**

Work Order: **1408987** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 20-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Soil

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	2.8 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/20/2014 12:43:06 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

25-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response IDW 8.20.14** Work Order: **14081068**

Dear Ryan,

ALS Environmental received 2 samples on 21-Aug-2014 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 13.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response IDW 8.20.14
Work Order: **14081068**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081068-01	140820 FB25-IDW-1	Solid		8/20/2014 11:20	8/21/2014 10:00	☐
14081068-02	140820 FB25-IDW-1 TCLP	Tclp Extract		8/20/2014 11:20	8/21/2014 10:00	☐

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response IDW 8.20.14
Work Order: 14081068

Case Narrative

Samples for the above noted Work Order were received on 08/21/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
No deviations or anomalies noted.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response IDW 8.20.14
WorkOrder: **14081068**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
% of sample	Percent of Sample
µg/L	Micrograms per Liter
mg/Kg-dry	Milligrams per Kilogram Dry Weight

ALS Group USA, Corp

Date: *25-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response IDW 8.20.14 **Work Order:** 14081068
Sample ID: 140820 FB25-IDW-1 **Lab ID:** 14081068-01
Collection Date: 8/20/2014 11:20 AM **Matrix:** SOLID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/22/14	Analyst: **CW**
DRO (C10-C28)	**4,300**		**120**	**mg/Kg-dry**	1	8/22/2014 06:46 PM
MOISTURE			**A2540 G**			Analyst: **RDM**
Moisture	**4.0**		**0.050**	**% of sample**	1	8/22/2014 09:09 AM
OIL AND GREASE			**E1664MM**			Analyst: **ND**
Oil and Grease	**21,000**		**52**	**mg/Kg-dry**	1	8/22/2014 10:00 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *25-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response IDW 8.20.14 **Work Order:** 14081068
Sample ID: 140820 FB25-IDW-1 TCLP **Lab ID:** 14081068-02
Collection Date: 8/20/2014 11:20 AM **Matrix:** TCLP EXTRACT

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TCLP VOLATILE ORGANICS			**SW8260B**		Leachate: SW1311 / 8/22/14 Prep: SW1311 / 8/22/14	Analyst: **RS**
Benzene	ND		20	µg/L	20	8/22/2014 11:33 AM
Surr: 1,2-Dichloroethane-d4	*87.4*		*70-130*	*%REC*	20	8/22/2014 11:33 AM
Surr: 4-Bromofluorobenzene	*102*		*70-130*	*%REC*	20	8/22/2014 11:33 AM
Surr: Dibromofluoromethane	*97.4*		*70-130*	*%REC*	20	8/22/2014 11:33 AM
Surr: Toluene-d8	*97.6*		*70-130*	*%REC*	20	8/22/2014 11:33 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 25-Aug-14

Client: Barr Engineering Company

QC BATCH REPORT

Work Order: 14081068

Project: Enbridge FB25 Release Response IDW 8.20.14

Batch ID: **61920** Instrument ID **GC8** Method: **PUBL-SW-141**

MBLK	Sample ID: **DBLKS1-61920-61920**			Units: **mg/Kg**			Analysis Date: **8/22/2014 05:54 PM**			
Client ID:	Run ID: **GC8_140822A**			SeqNo: **2900984**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	ND	5.0								

LCS	Sample ID: **DLCSS1-61920-61920**			Units: **mg/Kg**			Analysis Date: **8/22/2014 06:20 PM**			
Client ID:	Run ID: **GC8_140822A**			SeqNo: **2900985**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	167.6	5.0	160	0	105	70-120	0			

LCSD	Sample ID: **DLCSDS1-61920-61920**			Units: **mg/Kg**			Analysis Date: **8/22/2014 07:12 PM**			
Client ID:	Run ID: **GC8_140822A**			SeqNo: **2900987**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	171.3	5.0	160	0	107	70-120	167.6	2.19	20	

The following samples were analyzed in this batch: 14081068-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081068
Project: Enbridge FB25 Release Response IDW 8.20.14

QC BATCH REPORT

Batch ID: **R146827** Instrument ID **O&GMOD** Method: **E1664MM**

MBLK Sample ID: **MB-R146827-R146827** Units: **mg/Kg** Analysis Date: **8/22/2014 10:00 AM**
Client ID: Run ID: **O&GMOD_140822A** SeqNo: **2900285** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	50								

LCS Sample ID: **LCS-R146827-R146827** Units: **mg/Kg** Analysis Date: **8/22/2014 10:00 AM**
Client ID: Run ID: **O&GMOD_140822A** SeqNo: **2900286** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	3588	50	4000	0	89.7	50-150	0			

MS Sample ID: **1408880-01A MS** Units: **mg/Kg** Analysis Date: **8/22/2014 10:00 AM**
Client ID: Run ID: **O&GMOD_140822A** SeqNo: **2900289** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	4408	50	4640	97	92.9	50-150	0			

MSD Sample ID: **1408880-01A MSD** Units: **mg/Kg** Analysis Date: **8/22/2014 10:00 AM**
Client ID: Run ID: **O&GMOD_140822A** SeqNo: **2900290** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	4274	50	4651	97	89.8	50-150	4408	3.09	30	

The following samples were analyzed in this batch: 14081068-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081068
Project: Enbridge FB25 Release Response IDW 8.20.14

QC BATCH REPORT

Batch ID: **R146832** Instrument ID **MOIST** Method: **A2540 G**

MBLK Sample ID: **WBLKS-R146832** Units: **% of sample** Analysis Date: **8/22/2014 09:09 AM**
Client ID: Run ID: **MOIST_140822A** SeqNo: **2900329** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	ND	0.050								

LCS Sample ID: **LCS-R146832** Units: **% of sample** Analysis Date: **8/22/2014 09:09 AM**
Client ID: Run ID: **MOIST_140822A** SeqNo: **2900328** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	100	0.050	100	0	100	99.5-100.5	0			

DUP Sample ID: **14081106-01B DUP** Units: **% of sample** Analysis Date: **8/22/2014 09:09 AM**
Client ID: Run ID: **MOIST_140822A** SeqNo: **2900327** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	12.81	0.050	0	0	0	0-0	12.91	0.778	20	

The following samples were analyzed in this batch: 14081068-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408 1068

Chain of Custody

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49/61292.00 _ 001_100

Project Name: FB25 Release Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 40267

Project Manager: REE

Project QC Contact: JET/AAN

Sampled by: TJS

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix: IDW	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	Oil + Grease / TPH	Total Number Of Containers	
1. 140820 FB25 - IDW-1	-	-	-	08/20/2014	11:20			X	X															1	2	3	% Solids, Oil + Grease
2.																											
3.																											
4.																											
5.																											
6.																											
7.																											
8.																											IDW = Investigation
9.																											Derived Waste
10.																											

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
T Baker	Y N	8.20.14	1745	FEDEX		
Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
FEDEX	Y N	8/21/14	1000			

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 8753 9348 9983

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

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3 of 2

140810 68

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292.00* _001_100

Project Name: FB25 Release Response

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 40268

Project Manager: REE

Project QC Contact: JET/AAN

Sampled by: TTS

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix: IDW	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	TCLP Benzene	Total Number Of Containers	
1. 140820 FB25-IDW-1	-	-	-	08/20/2014	11:20			X	X										4	1				-		DRO, TCLP Benzene
2.																											
3.																										Rush TAT	
4.																											
5.																											
6.																											
7.																											
8.																										IDW = Investigation	
9.																										Derived Waste	
10.																											

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	Y (N)	8.20.14	1745	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	Date 8/21/14	Time 1000	Received by: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 8753 9348 9983

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

30°C

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ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **21-Aug-14 10:00**

Work Order: **14081068** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 21-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Solid

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/21/2014 12:06:20 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Shamrock Landfill

August 26, 2014

Alex Smith
Enbridge Pipelines Limited Partnership, LLC
Accounts Payable
1100 Louisiana Ave, Ste 3300
Houston, TX 77002

RE: CL14-0042 Crude contaminated soil - Field Booster 25

Dear Mr. Smith,

This agreement will confirm the price and length of service for disposal and /or transportation of your non-hazardous industrial material at our facility. This agreement is for the term of the Waste Approval granted by Shamrock Landfill and is for all services ordered and performance initiated within such period and does include the disposal surcharge fees which you are obligated to pay as of the date of this agreement. Shamrock Landfill may incur additional costs including but not limited to increases in state and local taxes. Shamrock Landfill may pass these costs on to the customer only after notification to the Customer. This agreement grants Shamrock Landfill the exclusive right to dispose of the referenced waste for the term of this agreement. This agreement shall automatically renew thereafter for an additional term of 24 months "Renewal Term" unless either party gives the other party written notification of termination at least 90 days prior to the termination of the then-existing term. Shamrock Landfill will notify the customer prior to the expiration of the agreement of any rate changes prior to the start of the Renewal Term.

Payment and terms are net thirty (30) days. Interest will be charged at a rate of 1 ½% per month (18% annually) on any unpaid balance 30 days after the date of the invoice. In the event Customer terminates this Agreement prior to its expiration other than as a result of a breach by Shamrock Landfill or Shamrock Landfill terminates this agreement for Customer's breach (including nonpayment) Customer agrees to pay to Shamrock Landfill as liquidated damages a sum calculated as follows: (1) if the remaining term under this agreement is six or more months Customer shall pay its average monthly charges multiplied by six: or (2) if the remaining term under this agreement is less than six months Customer shall pay its average monthly charge multiplied by the number of months remaining in the term. Customer expressly acknowledges that in the event of an unauthorized termination of this agreement the anticipated loss to Shamrock Landfill in such event is estimated to be the amount set forth in the foregoing liquidated damages provision and such estimated value is reasonable and is not imposed as a penalty.

These prices are based on an approved waste stream composition. In the event that a non-conforming waste is received, you will be notified of additional charges, when applicable.

To accept this agreement, please sign one copy and return it to our St. Paul, MN office at Shamrock Landfill, 251 Starkey St., St. Paul, MN 55107 or Via Fax at 651-223-8197 or email to jonp@shamrocklandfill.com.

Shamrock Landfill

Jon Pelheter

Customer ACCEPTED BY: (name, position) Alex Smith Environmental Analyst

DATE: 8-26-2014

WASTE APPROVAL Period: 8/26/2014 to 8/26/2016

SMS CLOQUET

REPORT NAME: **Tons Each Load By WSID**
DESCRIPTION: **Tonnage for EACH LOAD, grouped by customer**
DATE RANGE: **06/01/2014 to 09/09/2014**
PRINTED ON (DATE): **Tuesday, September 09, 2014**

ENB15

Enbridge Pipelines Limited Partnership,L
Enbridge Pipelines Superior Terminal
Superior WI 55720

LOAD #	MANIFEST	ARRIVED	WASTE STREAM	WASTE NAME	CELL	SPOT.	LIFT	TONS
22891 (A)	52082	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	22.08
22899 (A)	52081	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	25.71
22905 (A)	52080	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	15.84
22908 (A)	52079	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	21.28
22911 (A)	52078	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	14.38
22914 (A)	52077	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	21.32
22916 (A)	52076	8/27/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	17.08
22930 (A)	52075	8/28/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	19.69
22935 (A)	52074	8/28/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	26.99
22940 (A)	52073	8/28/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	25.39
22946 (A)	52072	8/28/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	18.93
22954 (A)	52071	8/28/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	21.75
22971 (A)	52069	8/29/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	25.36
22978 (A)	52070	8/29/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	22.77
23034 (A)	52068	9/2/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	23.36
23042 (A)	52067	9/2/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	22.04
23053 (A)	52066	9/2/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	23.47
23057 (A)	52065	9/2/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	22.32
23208 (A)	52010	9/5/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	0.81
23224 (A)	52013	9/5/2014	CL14-0042	Crude contaminated soil - Field Boo	2A	P44	1190	1.56

Total # of Loads: 20 **Total Tons: 392.13**

Grand Total (Tons): 392.13
Grand Total (Loads): 20

2626 Courtland Street
Duluth, MN 55806-1894
phone 218.722.3336
fax 218.727.7471
www.wlssd.com

WLSSD
Western Lake Superior Sanitary District

November 8, 2014

Alex Smith
Enbridge
1320 Grand Avenue
Superior, WI 54880

Re: WLSSD Discharge Approval (Enbridge – Field Booster 25)

Dear Mr. Smith:

Based on the analytical information provided on **8/22/2014**, the WLSSD approves the discharge of **Up to 25,000 gallons of water from Enbridge Superior Field Booster 25** provided there is no visual sign of the petroleum oil, grease or other petroleum related products. This contaminated water is to be disposed of at the WLSSD's main treatment facility, which is located at 2626 Courtland in Duluth.

This is a one time only approval for the waste described. It does not release **Enbridge** from any conditions/regulations set forth by the MPCA and/or any other agency that regulates the waste being discharged. In addition, this approval does not release **Enbridge or any consultant/contractor** involved from any subsequent liabilities associated with conducting this discharge.

Disposal during a significant rainstorm may be denied because of high flows. A copy of this letter of approval is to accompany each load and is to be disposed of and given to the process control operator. **Please attempt to discharge at our facility between 7:00 a.m. and 5:00 p.m. If you are unable to discharge at that time please call the procees control operator (218) 722-3336 ext. 301 with you estimated time of arrival.**

If there are any questions, please contact me at (218) 740-4815.

Sincerely,

Tim Tuominen
Chemist

22-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Release Response 8.19.14** Work Order: **1408986**

Dear Ryan,

ALS Environmental received 1 sample on 20-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 16.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.19.14
Work Order: **1408986**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1408986-01	140819FB25 WW-1	Water		8/19/2014 12:30	8/20/2014 09:30	☐

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.19.14
Work Order: 1408986

Case Narrative

Samples for the above noted Work Order were received on 08/20/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
Batch 61832 sample 1408986-01 for Wisconsin DRO had significant peaks or baseline rise outside the method defined chromatographic window.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 22-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.19.14
WorkOrder: **1408986**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *22-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Release Response 8.19.14
Work Order: 1408986
Sample ID: 140819FB25 WW-1
Lab ID: 1408986-01
Collection Date: 8/19/2014 12:30 PM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/20/14	Analyst: **CW**
DRO (C10-C28)	**11**		**0.20**	**mg/L**	2	8/21/2014 11:16 AM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	**11**		**5.0**	**µg/L**	5	8/21/2014 04:27 PM
Ethylbenzene	**8.4**		**5.0**	**µg/L**	5	8/21/2014 04:27 PM
m,p-Xylene	**43**		**10**	**µg/L**	5	8/21/2014 04:27 PM
o-Xylene	**21**		**5.0**	**µg/L**	5	8/21/2014 04:27 PM
Toluene	**33**		**5.0**	**µg/L**	5	8/21/2014 04:27 PM
Xylenes, Total	**64**		**15**	**µg/L**	5	8/21/2014 04:27 PM
Surr: 1,2-Dichloroethane-d4	*98.0*		*75-120*	*%REC*	5	8/21/2014 04:27 PM
Surr: 4-Bromofluorobenzene	*99.2*		*80-110*	*%REC*	5	8/21/2014 04:27 PM
Surr: Dibromofluoromethane	*94.2*		*85-115*	*%REC*	5	8/21/2014 04:27 PM
Surr: Toluene-d8	*99.2*		*85-110*	*%REC*	5	8/21/2014 04:27 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	**11**		**5.0**	**mg/L**	1	8/20/2014 09:30 AM
TOTAL REC PET HYDROCARBONS			**E1664A**			Analyst: **ND**
Total Rec. Pet Hydrocarbons	**9.1**		**2.0**	**mg/L**	1	8/20/2014 09:00 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

QC BATCH REPORT

Batch ID: **61832** Instrument ID **GC8** Method: **PUBL-SW-141**

MBLK	Sample ID: **DBLKW1-61832-61832**				Units: **mg/L**			Analysis Date: **8/20/2014 05:59 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897605**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	ND	0.10								

LCS	Sample ID: **DLCSW1-61832-61832**				Units: **mg/L**			Analysis Date: **8/20/2014 06:25 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897606**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	3.894	0.10	5	0	77.9	75-115	0			

LCSD	Sample ID: **DLCSDW1-61832-61832**				Units: **mg/L**			Analysis Date: **8/21/2014 05:52 AM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897622**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	3.907	0.10	5	0	78.1	75-115	3.894	0.335	20	

MS	Sample ID: **1408982-05C MS**				Units: **mg/L**			Analysis Date: **8/20/2014 06:50 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897607**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	37.08	1.0	50	0.1396	73.9	44-116	0			

MSD	Sample ID: **1408982-05C MSD**				Units: **mg/L**			Analysis Date: **8/20/2014 07:16 PM**			
Client ID:	Run ID: **GC8_140820B**				SeqNo: **2897608**			Prep Date: **8/20/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
DRO (C10-C28)	31.52	1.0	50	0.1396	62.8	44-116	37.08	16.2	30	

The following samples were analyzed in this batch: 1408986-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408986
Project: Enbridge FB25 Release Response 8.19.14

QC BATCH REPORT

Batch ID: **R146705** Instrument ID **VMS6** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140821-R146705** Units: **µg/L** Analysis Date: **8/21/2014 03:34 PM**
Client ID: Run ID: **VMS6_140821A** SeqNo: **2898683** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*19.4*	0	*20*	0	*97*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.83*	0	*20*	0	*99.2*	*80-110*	0			
Surr: Dibromofluoromethane	*19.12*	0	*20*	0	*95.6*	*85-115*	0			
Surr: Toluene-d8	*19.43*	0	*20*	0	*97.2*	*85-110*	0			

LCS Sample ID: **VLCSW1-140821-R146705** Units: **µg/L** Analysis Date: **8/21/2014 02:16 PM**
Client ID: Run ID: **VMS6_140821A** SeqNo: **2898682** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.43	1.0	20	0	107	85-125	0			
Ethylbenzene	21.5	1.0	20	0	108	85-125	0			
m,p-Xylene	43.01	2.0	40	0	108	75-130	0			
o-Xylene	20.99	1.0	20	0	105	80-125	0			
Toluene	21.23	1.0	20	0	106	85-125	0			
Xylenes, Total	64	3.0	60	0	107	80-126	0			
Surr: 1,2-Dichloroethane-d4	*19.35*	0	*20*	0	*96.8*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*19.86*	0	*20*	0	*99.3*	*80-110*	0			
Surr: Dibromofluoromethane	*20.05*	0	*20*	0	*100*	*85-115*	0			
Surr: Toluene-d8	*19.77*	0	*20*	0	*98.8*	*85-110*	0			

The following samples were analyzed in this batch: 1408986-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408986
Project: Enbridge FB25 Release Response 8.19.14

QC BATCH REPORT

Batch ID: **R146628** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146628-R146628** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896705** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0								

LCS Sample ID: **LCS-R146628-R146628** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896706** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.1	5.0	40	0	95.2	78-114	0			

MS Sample ID: **1408944-02A MS** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896719** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	43.53	5.0	40	3.18	101	78-114	0			

DUP Sample ID: **1408944-04A DUP** Units: **mg/L** Analysis Date: **8/20/2014 09:30 AM**
Client ID: Run ID: **O&G_140820A** SeqNo: **2896721** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	2.82	5.0	0	0	0	0-0	2	0	18	J

The following samples were analyzed in this batch: 1408986-01D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 1408986
Project: Enbridge FB25 Release Response 8.19.14

QC BATCH REPORT

Batch ID: **R146662** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146662-R146662** Units: **mg/L** Analysis Date: **8/20/2014 09:00 AM**
Client ID: Run ID: **O&G_140820B** SeqNo: **2897125** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	ND	2.0								

LCS Sample ID: **LCS-R146662-R146662** Units: **mg/L** Analysis Date: **8/20/2014 09:00 AM**
Client ID: Run ID: **O&G_140820B** SeqNo: **2897126** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	17.4	2.0	20	0	87	64-132	0			

MS Sample ID: **1408944-02A MS** Units: **mg/L** Analysis Date: **8/20/2014 09:00 AM**
Client ID: Run ID: **O&G_140820B** SeqNo: **2897129** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	15.76	2.0	20	2.24	67.6	64-132	0			

The following samples were analyzed in this batch: 1408986-01D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408986

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Release Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43433

Project Manager: HAW

Project QC Contact: AAN

Sampled by: BJL2

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Oil & Grease	TPH	Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)		Total Number Of Containers	
1. 140819 FB25-GW-1	—	—	—	8/19/14	1230	X			X										X	X								2	2 OGG, TPH
2.																													
3.																													
4.																													Rush TAT
5.																													
6.																													
7.																													
8.																													
9.																													
10.																													

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	Y N	8/19/14	1620			
Relinquished By:	On Ice? Y N	Date	Time	Received by: [signature]	Date 8/20/14	Time 0930

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 2.8c

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

1408986

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: FB25 Release Response

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 43434

Project Manager: HAW

Project QC Contact: AAN

Sampled by: BJL2

Laboratory: ALS

	Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water: BTEX	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Total Number Of Containers	
-1	1. 140819 FB25 WW-1	—	—	—	8/19/14	~~DX~~ 1230	X			X								X	X	BTEX							4	DRO, BTEX
	2.																											hold TCLP Benzene
	3.																											
	4.																											Rush TAT
	5.																											
	6.																											
	7.																											
	8.																											
	9.																											
	10.																											

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice? (Y / N)	Date	Time	Received by:	Date	Time
Brad Jarvis	Y	8/19/14	1600			
Relinquished By:	On Ice? (Y / N)	Date	Time	Received by:	Date	Time
	Y N				8/21/14	0930

Samples Shipped VIA: ☐ Air Freight ☐ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: 282

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

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ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **20-Aug-14 09:30**

Work Order: **1408986** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 20-Aug-14 (Date) Reviewed by: Ann Preston (eSignature) 21-Aug-14 (Date)

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	2.8 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/20/2014 12:12:00 PM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

26-Aug-2014

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge FB25 Response Wastewater 8.21.14** Work Order: **14081141**

Dear Ryan,

ALS Environmental received 1 sample on 22-Aug-2014 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 14.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Ann Preston

Electronically approved by: Ann Preston

Ann Preston
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response Wastewater 8.21.14
Work Order: **14081141**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
14081141-01	140821 FB25-WW-2	Water		8/21/2014 09:30	8/22/2014 09:30	☐

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response Wastewater 8.21.14
Work Order: 14081141

Case Narrative

Samples for the above noted Work Order were received on 08/22/2014. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies noted.

Extractable Organics :
No deviations or anomalies noted.

Wet Chemistry:
No deviations or anomalies noted.

ALS Group USA, Corp

Date: 26-Aug-14

Client: Barr Engineering Company
Project: Enbridge FB25 Response Wastewater 8.21.14
WorkOrder: **14081141**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group USA, Corp

Date: *26-Aug-14*

Client: Barr Engineering Company
Project: Enbridge FB25 Response Wastewater 8.21.14 **Work Order:** 14081141
Sample ID: 140821 FB25-WW-2 **Lab ID:** 14081141-01
Collection Date: 8/21/2014 09:30 AM **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID			**PUBL-SW-141**		Prep: PUBL-SW-141 / 8/22/14	Analyst: **IT**
DRO (C10-C28)	**59**		**1.0**	**mg/L**	10	8/25/2014 12:01 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260**			Analyst: **BG**
Benzene	**360**		**5.0**	**µg/L**	5	8/22/2014 04:37 PM
Ethylbenzene	**36**		**5.0**	**µg/L**	5	8/22/2014 04:37 PM
m,p-Xylene	**220**		**10**	**µg/L**	5	8/22/2014 04:37 PM
o-Xylene	**160**		**5.0**	**µg/L**	5	8/22/2014 04:37 PM
Toluene	**100**		**5.0**	**µg/L**	5	8/22/2014 04:37 PM
Xylenes, Total	**380**		**15**	**µg/L**	5	8/22/2014 04:37 PM
Surr: 1,2-Dichloroethane-d4	*95.6*		*75-120*	*%REC*	5	8/22/2014 04:37 PM
Surr: 4-Bromofluorobenzene	*104*		*80-110*	*%REC*	5	8/22/2014 04:37 PM
Surr: Dibromofluoromethane	*92.8*		*85-115*	*%REC*	5	8/22/2014 04:37 PM
Surr: Toluene-d8	*98.0*		*85-110*	*%REC*	5	8/22/2014 04:37 PM
OIL AND GREASE			**E1664A**			Analyst: **ND**
Oil and Grease	**330**		**5.0**	**mg/L**	1	8/25/2014 09:00 AM
TOTAL REC PET HYDROCARBONS			**E1664A**			Analyst: **ND**
Total Rec. Pet Hydrocarbons	**210**		**2.0**	**mg/L**	1	8/25/2014 09:00 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

QC BATCH REPORT

Batch ID: **61944** Instrument ID **GC8** Method: **PUBL-SW-141**

MBLK	Sample ID: **DBLKW1-61944-61944**				Units: **mg/L**			Analysis Date: **8/22/2014 07:37 PM**			
Client ID:	Run ID: **GC8_140822A**				SeqNo: **2901006**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
DRO (C10-C28)	ND	0.10									

LCS	Sample ID: **DLCSW1-61944-61944**				Units: **mg/L**			Analysis Date: **8/22/2014 08:03 PM**			
Client ID:	Run ID: **GC8_140822A**				SeqNo: **2901007**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
DRO (C10-C28)	4.182	0.10	5	0	83.6	75-115	0				

LCSD	Sample ID: **DLCSDW1-61944-61944**				Units: **mg/L**			Analysis Date: **8/22/2014 09:20 PM**			
Client ID:	Run ID: **GC8_140822A**				SeqNo: **2901010**			Prep Date: **8/22/2014**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
DRO (C10-C28)	4.271	0.10	5	0	85.4	75-115	4.182	2.11	20		

The following samples were analyzed in this batch: 14081141-01C

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081141
Project: Enbridge FB25 Response Wastewater 8.21.14

QC BATCH REPORT

Batch ID: **R146813** Instrument ID **VMS5** Method: **SW8260**

MBLK Sample ID: **VBLKW1-140822-R146813** Units: **µg/L** Analysis Date: **8/22/2014 03:46 PM**
Client ID: Run ID: **VMS5_140822A** SeqNo: **2902094** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	ND	1.0								
Ethylbenzene	ND	1.0								
m,p-Xylene	ND	2.0								
o-Xylene	ND	1.0								
Toluene	ND	1.0								
Xylenes, Total	ND	3.0								
Surr: 1,2-Dichloroethane-d4	*18.95*	0	*20*	0	*94.8*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.04*	0	*20*	0	*100*	*80-110*	0			
Surr: Dibromofluoromethane	*19.17*	0	*20*	0	*95.8*	*85-115*	0			
Surr: Toluene-d8	*19.3*	0	*20*	0	*96.5*	*85-110*	0			

LCS Sample ID: **VLCSW1-140822-R146813** Units: **µg/L** Analysis Date: **8/22/2014 02:29 PM**
Client ID: Run ID: **VMS5_140822A** SeqNo: **2902093** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	21.51	1.0	20	0	108	85-125	0			
Ethylbenzene	21.27	1.0	20	0	106	85-125	0			
m,p-Xylene	42.13	2.0	40	0	105	75-130	0			
o-Xylene	20.96	1.0	20	0	105	80-125	0			
Toluene	20.43	1.0	20	0	102	85-125	0			
Xylenes, Total	63.09	3.0	60	0	105	80-126	0			
Surr: 1,2-Dichloroethane-d4	*18.98*	0	*20*	0	*94.9*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.64*	0	*20*	0	*103*	*80-110*	0			
Surr: Dibromofluoromethane	*19.18*	0	*20*	0	*95.9*	*85-115*	0			
Surr: Toluene-d8	*19.8*	0	*20*	0	*99*	*85-110*	0			

MS Sample ID: **14081026-01A MS** Units: **µg/L** Analysis Date: **8/23/2014 12:27 PM**
Client ID: Run ID: **VMS5_140822A** SeqNo: **2902098** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.89	1.0	20	0	104	85-125	0			
Ethylbenzene	21.56	1.0	20	0	108	85-125	0			
m,p-Xylene	46.93	2.0	40	0.17	117	75-130	0			
o-Xylene	21.28	1.0	20	0	106	80-125	0			
Toluene	20.18	1.0	20	0	101	85-125	0			
Xylenes, Total	68.21	3.0	60	0	114	80-126	0			
Surr: 1,2-Dichloroethane-d4	*18.75*	0	*20*	0	*93.8*	*75-120*	0			
Surr: 4-Bromofluorobenzene	*20.72*	0	*20*	0	*104*	*80-110*	0			
Surr: Dibromofluoromethane	*18.79*	0	*20*	0	*94*	*85-115*	0			
Surr: Toluene-d8	*19.75*	0	*20*	0	*98.8*	*85-110*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081141
Project: Enbridge FB25 Response Wastewater 8.21.14

QC BATCH REPORT

Batch ID: **R146813** Instrument ID **VMS5** Method: **SW8260**

MSD	Sample ID: **14081026-01A MSD**				Units: **µg/L**			Analysis Date: **8/23/2014 12:53 PM**		
Client ID:	Run ID: **VMS5_140822A**				SeqNo: **2902099**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.02	1.0	20	0	100	85-125	20.89	4.25	30	
Ethylbenzene	20.92	1.0	20	0	105	85-125	21.56	3.01	30	
m,p-Xylene	42.52	2.0	40	0.17	106	75-130	46.93	9.86	30	
o-Xylene	20.46	1.0	20	0	102	80-125	21.28	3.93	30	
Toluene	19.45	1.0	20	0	97.2	85-125	20.18	3.68	30	
Xylenes, Total	62.98	3.0	60	0	105	80-126	68.21	7.97	30	
Surr: 1,2-Dichloroethane-d4	*18.85*	0	*20*	0	*94.2*	*75-120*	18.75	*0.532*	*30*	
Surr: 4-Bromofluorobenzene	*20.48*	0	*20*	0	*102*	*80-110*	20.72	*1.17*	*30*	
Surr: Dibromofluoromethane	*19.38*	0	*20*	0	*96.9*	*85-115*	18.79	*3.09*	*30*	
Surr: Toluene-d8	*19.62*	0	*20*	0	*98.1*	*85-110*	19.75	*0.66*	*30*	

The following samples were analyzed in this batch: 14081141-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081141
Project: Enbridge FB25 Response Wastewater 8.21.14

QC BATCH REPORT

Batch ID: **R146920** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146920-R146920** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825A** SeqNo: **2902641** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1.1	5.0								J

LCS Sample ID: **LCS-R146920-R146920** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825A** SeqNo: **2902642** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	32.2	5.0	40	0	80.5	78-114	0			

MS Sample ID: **14081215-02A MS** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825A** SeqNo: **2902651** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.88	5.0	40	0.82	97.6	78-114	0			

DUP Sample ID: **14081215-04A DUP** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825A** SeqNo: **2902653** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	ND	5.0	0	0	0	0-0	1.29	0	18	

The following samples were analyzed in this batch: 14081141-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 14081141
Project: Enbridge FB25 Response Wastewater 8.21.14

QC BATCH REPORT

Batch ID: **R146962** Instrument ID **O&G** Method: **E1664A**

MBLK Sample ID: **MB-R146962-R146962** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825C** SeqNo: **2903814** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	ND	2.0								

LCS Sample ID: **LCS-R146962-R146962** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825C** SeqNo: **2903815** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	15.6	2.0	20	0	78	64-132	0			

MS Sample ID: **14081215-02A MS** Units: **mg/L** Analysis Date: **8/25/2014 09:00 AM**
Client ID: Run ID: **O&G_140825C** SeqNo: **2903818** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Rec. Pet Hydrocarbons	18.75	2.0	20	0.59	90.8	64-132	0			

The following samples were analyzed in this batch: 14081141-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1408 1141

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: Enbridge FB25 - Waste Water

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 40272

Project Manager: REE

Project QC Contact: AAN

Sampled by: REE

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative — Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4	Soil: VOCs (tared MeOH) #1	GRO BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	TCLP Benzene (HOLD)	Total Number Of Containers	
1. 140821 FB25-WW-2				08/21/14	930	X		X											X	X				X	6	DRO, BTEX (ASAP TAT) TCLP BENZENE (HOLD)
2.																										
3.																										
4.																										
5.																										
6.																										
7.																										
8.																										
9.																										
10.																										

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

	On Ice?	Date	Time		Date	Time
Relinquished By:	(Y) N	8.21.14	1630	Received by: FEDEX		
Relinquished By: FEDEX	Y N	8/22/14	0930	Received by:		

Samples Shipped VIA: ☐ Air Freight ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161292

Project Name: Enbridge FB25 - Waste Water

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 40273

Project Manager: REE

Project QC Contact: AAN

Sampled by: REE

Laboratory: ALS

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Water: VOCs (HCl) #1	Water: SVOCs (unpreserved) #2	Water: Dissolved Metals (HNO_3)	Water: Total Metals (HNO_3)	Water: General (unpreserved) #3	Water: Diesel Range Organics (HCl)	Water: Nutrients (H_2SO_4) #4	Water:	Water:	Water:	Soil: VOCs (tared MeOH) #1	Soil: GRO, BTEX (tared MeOH) #1	Soil: DRO (tared unpreserved)	Soil: Metals (unpreserved)	Soil: SVOCs (unpreserved) #2	Soil: % Solids (plastic vial, unpres.)	Soil: TPH	Soil: OIL & GREASE	Total Number Of Containers	
1. 140821 FB25 - WW - 2	—			08/21/14	930	X			X																		X	X		TPH OIL & GREASE
2.																															
3.																															3-day TAT
4.																															
5.																															
6.																															
7.																															
8.																															
9.																															
10.																															

Number of Containers/Preservative

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	Y N	8.21.14	1630	FEDEX		
Relinquished By: FEDEX	On Ice? Y N	Date 8/22/14	Time 0930	Received By: [signature]	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number: [illegible]

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG- MN** Date/Time Received: **22-Aug-14 09:30**

Work Order: **14081141** Received by: **KRW**

Checklist completed by Keith Wierenga eSignature 22-Aug-14 Date Reviewed by: Ann Preston eSignature 22-Aug-14 Date

Matrices: Water

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	4.4 C		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/22/2014 11:17:47 AM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction: