MONTHLY UPDATE REPORT - PRIMROSE SOUTH 09-21-067-04 W4M

SEPTEMBER 23 TO OCTOBER 20, 2014

1 Introduction

The Canadian Natural Resources Limited Primrose South in situ oil sands project is located in the Cold Lake Air Weapons Range approximately 65 km north-northeast of Bonnyville, Alberta. Canadian Natural operations staff discovered a bitumen emulsion flow to surface (FTS) area at 09-21-067-04 W4M on June 24, 2013. The bitumen emulsion FTS area is beneath an unnamed water body within the Canadian Natural Primrose South production area.

On September 24, 2013, Alberta Environment and Sustainable Resource Development (ESRD) issued an Environmental Protection Order (EPO No. EPO-2013-33/NR), requesting the preparation of a Comprehensive Remedial Plan (CRP), as well as the preparation of a monthly progress report. This report addresses that requirement and summarizes the progress towards the realization of the CRP and includes data collected and reported between September 23 and October 20, 2014.

2 Summary of Activities to Date

2.1 Individual Plan Submissions

As required by the EPO, the CRP includes the development, submission, and implementation of several specific plans. The status of these plans as of October 20, 2014 is indicated in Table 1:

Table 1: Components of the Comprehensive Remedial Plan

Item	Plan Name	Due Date	Submission Date	Approval Date	Implementation Start Date	Completion Date	Section Discussed
1.	**Water Management Plan for Dewatering**	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013	October 22, 2013	Complete
2.	**Water Body Monitoring Plan**	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013	Ongoing	3.0
3.	**Erosion and Sedimentation Prevention Plan**	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013	Ongoing	3.4
4.	**Phase II Environmental Assessment Plan**	October 15, 2013	October 3, 2013	October 17, 2013	December 16, 2013	Ongoing	--
5.	**Bitumen Emulsion Delineation and Containment Plan**	October 6, 2013	Revised Plan December 22, 2013	February 7, 2014	November 27, 2013	Ongoing	3.5
6.	**Amphibian Salvage Plan**	September 26, 2013	September 25, 2013	September 27, 2013	September 27, 2013	October 22, 2013	Complete

Item	Plan Name	Due Date	Submission Date	Approval Date	Implementation Start Date	Completion Date	Section Discussed
7.	**Fish and Fish Habitat Assessment Plan**	September 26, 2013	September 25, 2013	September 27, 2013	September 27, 2013	October 30, 2013	Complete
8.	**Wetlands Impact Assessment Plan**	September 30, 2013	September 25, 2013	September 27, 2013	September 27, 2013	October 30, 2013	Complete
9.	**Water Body Restoration Plan**	November 30, 2013	Revised Plan March 27, 2014	March 27, 2014	March 27, 2014	Ongoing	2.2, 3
10.	**Wildlife Management Plan**	N/A	Revised Plan October 23, 2013	October 23, 2013	October 23, 2013	Ongoing	3.6
11.	**Waste Management Plan**	N/A	Revised Plan October 24, 2013	October 24, 2013	October 24, 2013	Ongoing	3.7

2.2 Water Management for Dewatering and Refilling

Activities related to dewatering and refilling were completed on June 22, 2014. No new information to report.

3 Water Body Monitoring

In accordance with the Water Body Restoration Plan (Table 1, Item 9), an extensive water quality and water quantity monitoring program was implemented on March 19, 2014. This program complements the ongoing water quality and quantity monitoring implemented in June 2013.

Details of the monitoring program are provided in the following subsections.

3.1 Water Quantity Monitoring

3.1.1 Basins 1, 3, and 4, Borrow Pit, and Downstream Fen

Staff gauge and water level monitoring locations are shown on Figures 1 and 2. Staff gauges are monitored monthly and readings for Basins 3 and 4 are in Appendix A1, and readings for the downstream fen and the borrow pit are in Appendix A2.

3.1.2 Containment Structure

Water that seeped across the containment wall was collected and pumped from inside the containment wall back into Basin 1 (Figure 3). In late September, automated sump pumps were installed in the recovery culverts placed within the collection swales. The pumps turn on and off depending on the height of the water in the culverts. Less than 1,000 m^3 of water is pumped daily from within the containment wall using this system.

3.2 Water Quality Monitoring

Water quality was compared to the *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (ESRD 2014a) and/or *Environmental Quality Guidelines for Alberta Surface Waters* (ESRD 2014b). Sampling locations are shown on Figure 4.

3.2.1 Basins 1, 3, and 4 and Downstream Fen

Water quality samples were collected from the surface water sampling sites in Basins 1, 3, and 4 and the downstream fen (Figure 4). The samples were tested to ensure that water quality in the water body was not being affected by ongoing operations at the site. Water quality results are provided in Appendix B.

- Laboratory analysis of water samples was carried out for benzene, toluene, ethylbenzene, and xylenes (BTEX); petroleum hydrocarbons (PHCs) fraction 1 (F1; C_6-C_{10}, excluding BTEX), fraction 2 (F2; $C_{>10}$-C_{16}), fraction 3 (F3; $C_{>16}$-C_{34}), and fraction 4 (F4; $C_{>34}$); polycyclic aromatic hydrocarbons (PAHs), chlorides; total suspended solids; and turbidity.

- All water quality results were within guidelines except toluene, which was found at one surface water location on two separate sampling dates and at six drive point wells sampled on the same date. These occurrences of toluene are believed to be from natural sources and unrelated to the FTS. The origin of the toluene detected in the fen is currently being investigated. Sample results are presented in Appendix B1-3.

- Approved as part of the EPO, no further water quality samples will be collected from the 9-21 water body until May 2015.

- From September 30 to October 10, 2014 sediment and benthic invertebrate samples were collected in the unnamed water body northeast of 9-21, Basin 4, Basin 3 and Basin 1 (Figure 1). This data will be used to determine benthic community health one year after the FTS event.

3.2.2 Containment Area, Containment Cells, and Potentially Impacted Water System

Water samples were collected from within the containment structure, from shallow wells in the Cells D discharge area, and from a system used to treat water stored in containment Cells C and D. Sample results are presented in Appendix B4-9.

- No BTEX, PHCs F1 to F4, PAHs, or routine parameters were detected at levels above guidelines in the shallow groundwater samples or soil samples collected from the discharge area.

- A total of 888 m^3 of water has been treated and released during the reporting period.

- On October 19, 2014, the Potentially Impacted Water (PIW) system was cleaned and is in the process of being decommissioned and removed from site. Any water that accumulates in Cells C and D for the remainder of 2014 will be disposed at the Tervita Lindbergh landfill.

3.3 Aquatic Surveillance

Daily monitoring for signs of bitumen emulsion (pellets or sheen) within Basins 1 and 3 of the water body is conducted and documented by Canadian Natural contractors. This monitoring is conducted by walking the shoreline of the water body and by boat on the water body. (Figure 5)

Sheen and bitumen pellets were observed intermittently during the reporting period. The source of the sheen and pellets was small amounts of material that were not cleaned from the water and sediment after the original bitumen emulsion release. All observed bitumen emulsion pellets and sheen were

collected, using absorbent material, and disposed in the onsite hazardous waste bin. Over the reporting period, less than 0.5 L of bitumen emulsion has been collected from Basins 1 and 3.

3.4 Erosion and Sedimentation Prevention

The refilling activities were completed in accordance with the conditions specified in Extension 4 of the Water Body Restoration Plan (Table 1, Item 9).

- The fen to the south of the water body showed no signs of erosion or channelization during water body refilling.

- The erosion and sediment control monitoring continues.

3.5 Bitumen Emulsion Containment

3.5.1 Permanent Containment of Bitumen Emulsion Seepage from Fissure

In early May 2014, the fissure containment structure (FCS) was approved. A Canadian Natural construction crew built the FCS between May 4 and June 30, 2014. Following discussion with Alberta Energy Regulator (AER) and ESRD, a revised design of the access pad was prepared and submitted to AER and ESRD for review and approval. Verbal approval to start construction was received and construction of the access pad over the FCS started on September 10, 2014. Construction is expected to be completed in late October or early November 2014.

3.6 Wildlife Management

Wildlife management activities between September 23 and October 20, 2014 involved maintaining amphibian pit fall traps surrounding decontamination Cell D and conducting daily inspections. Pitfall traps were marked and closed for winter on October 7, 2014.

During the reporting period, no wildlife mortality was noted within or around the water body.

3.7 Waste Management

Transportation of materials temporarily stored in lined containment Cells C and D to the Tervita Bonnyville landfill for disposal started in August 2014. All waste material in Cell D had been removed for disposal as of October 18, 2014. Cell D decommisioning activities will be starting soon. Transportation for disposal from Cell C is ongoing as the material is thawed and dewatered to meet landfill criteria. The PIW treatment system at cell D has been shut down and is currently being decommissioned; any fluids originating from Cells C or D will now be taken to the Tervita Lindbergh facility for disposal.

4 Conclusions

The work conducted at the 9-21 FTS site from September 23 to October 20, 2014 included:

- operating a PIW treatment system at containment Cell D and releasing treated water (now shut down and being decommissioned).
- transporting dewatered material from containment Cells C and D to the landfill for disposal
- removing water from within the containment area

- ongoing monitoring of water quality, discharge point erosion and sedimentation during construction activities
- collecting benthic invertebrates and sediment quality samples
- completing construction of the access pad over the fissure containment structures
- monitoring wildlife activity near the water body

Monitoring of Basins 1 and 3 indicates that there are no adverse impacts related to the bitumen emulsion release or refilling activities.

The work is progressing as planned and the objectives, as required by the EPO, are being achieved within the required time frame.

5 References

Alberta Environment and Sustainable Resource Development (ESRD). 2014a. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines, 2014 and Updates*. Final Draft. Land and Forestry Policy Branch, Policy Division. Edmonton, Alberta. May 23, 2014. http://esrd.alberta.ca/lands-forests/land-industrial/inspections-and-compliance/documents/AlbertaTier1Guidelines-May23-2014.pdf

Alberta Environment and Sustainable Resource Development (ESRD). 2014b. *Environmental Quality Guidelines for Alberta Surface Waters.* Water Policy Branch, Policy Division. Edmonton, Alberta. July 14, 2014. ISBN: 978-1-4601-1524-4. http://esrd.alberta.ca/water/education-guidelines/documents/EnvironmentalQualitySurfaceWaters-Jul14-2014.pdf

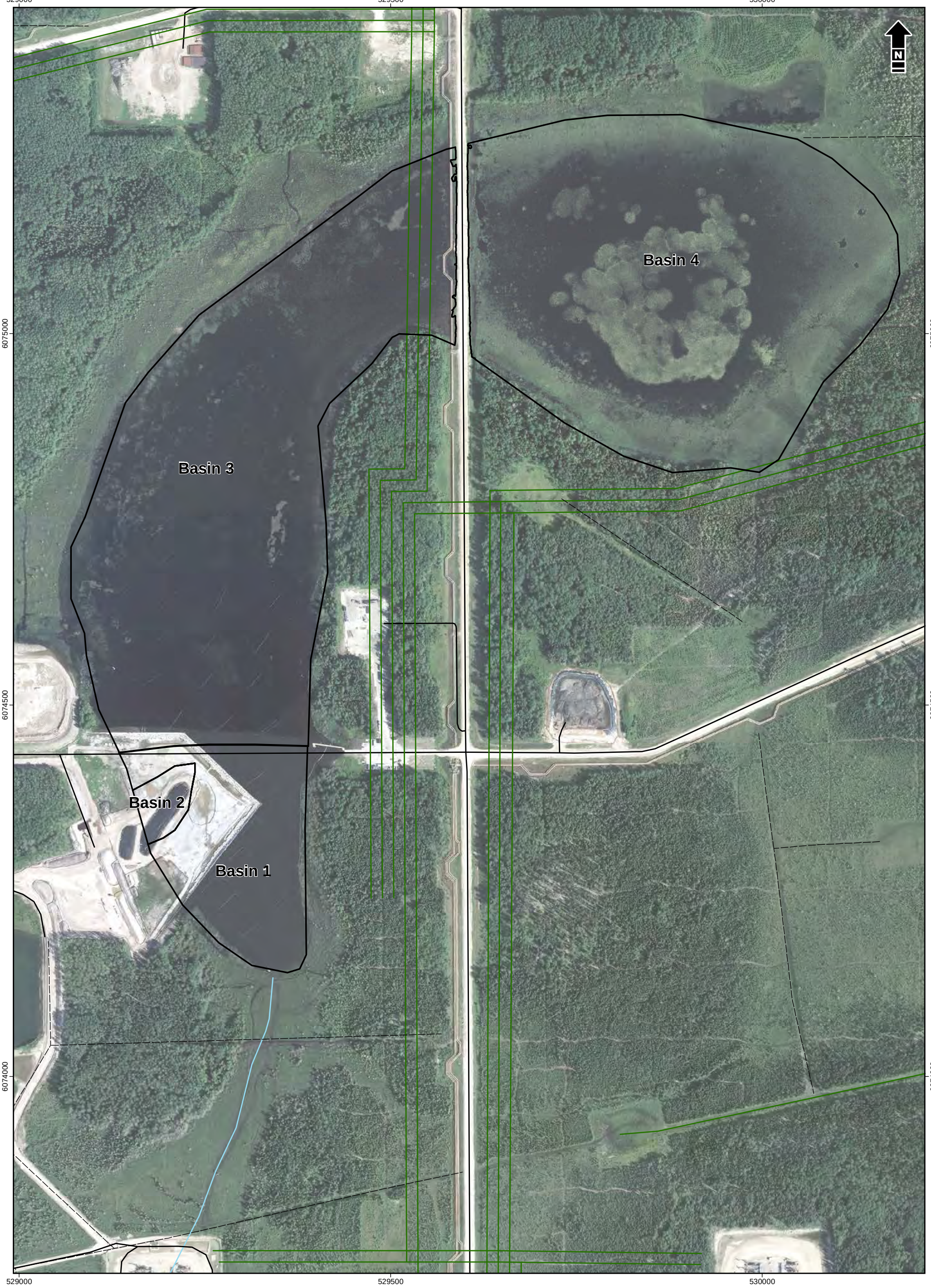
I:\CanadianNatural\8881\FiguresAndTables\SPL\2013\Report_MonthlySummary\2014\October\Public_9_21\Figure-1-9_21_Water_Body_Divisions.mxd

Easting (m)

529000 529500 530000

Northing (m)

6075000 6074500 6074000



Basin Boundary
Watercourse
Road
Cut Line
Pipeline

1:5,000

50 0 50 100 m

NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS © Government of Alberta and GeoBase® used under license. GDM midstream and transportation infrastructure data provided by IHS © 2014 used under license. Imagery (dated September 2014) obtained from Canadian Natural Resources Limited (2014).

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Primrose 09-21-067-04 W4M

9-21 Water Body Divisions

Date:	Project:	Technical:	Reviewer:	Drawn:
21 Oct 2014	8881-523	E. Henson	H. de Pennart	R. Keller

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Figure 1

I:\CanadianNatural\8881\FiguresAndTables\SPL\2013\Report_MonthlySummary\2014\October\Public_9_21\Figure-2-Staff_Gauge_and_Water_Level_Monitoring_Locations.mxd

Easting (m)

528500 529000 529500 530000 530500 531000 531500 532000

Northing (m)

6077500 6077000 6076500 6076000 6075500 6075000 6074500 6074000 6073500 6073000 6072500 6072000

N

Wolf River

Containment Cell D

Containment Cell E

13-SG8

13-SG12 13-SG11 Basin 4

9-21 Water Body

Basin 3

13-SG7

13-SG6

Containment Cell C

Basin 1

13-SG13

Borrow Pit

13-SG4

Decomissioned Containment Cell A and B

13-SG2

Old Borrow Area
Enforcement Order Approved Disturbance Area
Containment Cell
Water Body
Watercourse
Road
Cut Line
Pipeline
Containment Structure

Direction of Flow
Benthic/Sediment Sampling Location
Staff Gauge Location
Water Level Monitoring Location

1:17,500

180 0 180 360 m

NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS © Government of Alberta and GeoBase® used under license, GDM midstream and transportation infrastructure data provided by IHS © 2014 used under license. Site features provided through Matrix Solutions Inc. field efforts. Imagery (dated September 2014) obtained from Canadian Natural Resources Limited (2014).

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Primrose 09-21-067-04 W4M

Staff Gauge and Water Level Monitoring Locations

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Oct 2014	8881-523	E. Henson	H. de Pennart	R. Keller

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Figure 2

I:\CanadianNatural\8881\FiguresAndTables\SPL\2013\Report_MonthlySummary\2014\October\Public_9_21\Figure-3-Containment_Structure_Pump_Locations_and_Access_Pad_Construction_Progress_to_October_20_2014.mxd

Easting (m)

529050 529100 529150 529200 529250 529300

Northing (m)

6074550 6074500 6074450 6074400 6074350 6074300 6074250 6074200 6074150

N

50 100 150 200 250 300 350 400 450 500

- Geogrid
- Sand Bag Wall
- Swale
- Recovery Sump
- Enforcement Order Approved Disturbance Area
- Access Pad
- Collection Pit
- Access
- Fissure Liner
- Liner
- Berm
- Containment Structure
- Buried fissure
- Steam Pipe
- Water Collection Trench
- Discharge Line
- Floculation Netting
- Flow direction
- Culvert with Automated Pump
- Riser
- Containment Structure Station Location
- Generator
- Light Tower

1:1,250

10 0 10 20 m

NAD 1983 UTM Zone 12N

Reference: Site features provided through Matrix Solutions Inc. field efforts. Imagery (dated September 2014) obtained from Canadian Natural Resources Limited (2014).

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Primrose 09-21-067-04 W4M

Containment Structure Pump Locations and Access Pad Construction Progress to October 20, 2014

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Oct 2014	8881-523	E. Henson	H. de Pennart	R. Keller

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Figure 3

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Easting (m)

Northing (m)

Wolf River

Containment Cell D

PIW System

14-SW2

Containment Cell E

13-DP4

13-SW12

9-21 Water Body

13-DP3

13-DP2

13-SW31

13-DP7

14-SW3

Containment Cell C

13-DP5

14-SW1-P1

14-SW81 (See Note)

14-SW1-P2

13-SW22

14-SW1

13-SW46

Basin 1

13-DP6

Decomissioned Containment Cell A and B

13-SW26

Pad AC21

13-DP1

13-SW27

13-SW16

Old Borrow Area
Enforcement Order Approved Disturbance Area
Containment Cell
Water Body
Watercourse
Road
Cut Line
Pipeline
Containment Structure

Drivepoint Piezometer Sample Location
Surface Water Sample Location

Note: 14-SW81 sample taken from collected water inside sheet pile wall

1:17,500

180 0 180 360 m

NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS © Government of Alberta and GeoBase® used under license, GDM midstream and transportation infrastructure data provided by IHS © 2014 used under license. Site features provided through Matrix Solutions Inc. field efforts. Imagery (dated September 2014) obtained from Canadian Natural Resources Limited (2014).

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Primrose 09-21-067-04 W4M

Monitoring Plan Overview

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Oct 2014	8881-523	E. Henson	H. de Pennart	R. Keller

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Figure 4

I:\CanadianNatural\8881\FiguresAndTables\SPL\2013\Report_MonthlySummary\2014\October\Public_9_21\Figure-5-Aquatic_Surveillance_Site_Plan.mxd

Easting (m)

529000 529200 529400

6074600 6074400 6074200

Northing (m)

9-21 Water Body

Basin 1

50 100 150 200 250 300 350 400 450 500

N

Geogrid
Enforcement Order Approved Disturbance Area
Drilling Pad
Water Body
Access
Fissure Liner
Liner
Berm
Containment Structure
Buried fissure
Steam Pipe

Existing Silt Boom
Existing Sorb Boom
Bitumen Sheen Detected
Bitumen Detected
Containment Structure Station Location

Site features provided through Matrix Solutions Inc. field efforts. Imagery (dated September 2014) obtained from Canadian Natural Resources Limited (2014).

1:2,000 m
20 0 20 40
NAD 1983 UTM Zone 12N

Canadian Natural

Canadian Natural Resources Limited
Primrose 09-21-067-04 W4M

Aquatic Surveillance Site Plan

Date:	Project:	Technical:	Reviewer:	Drawn:
24 Oct 2014	8881-523	E. Henson	H. de Pennart	R. Keller

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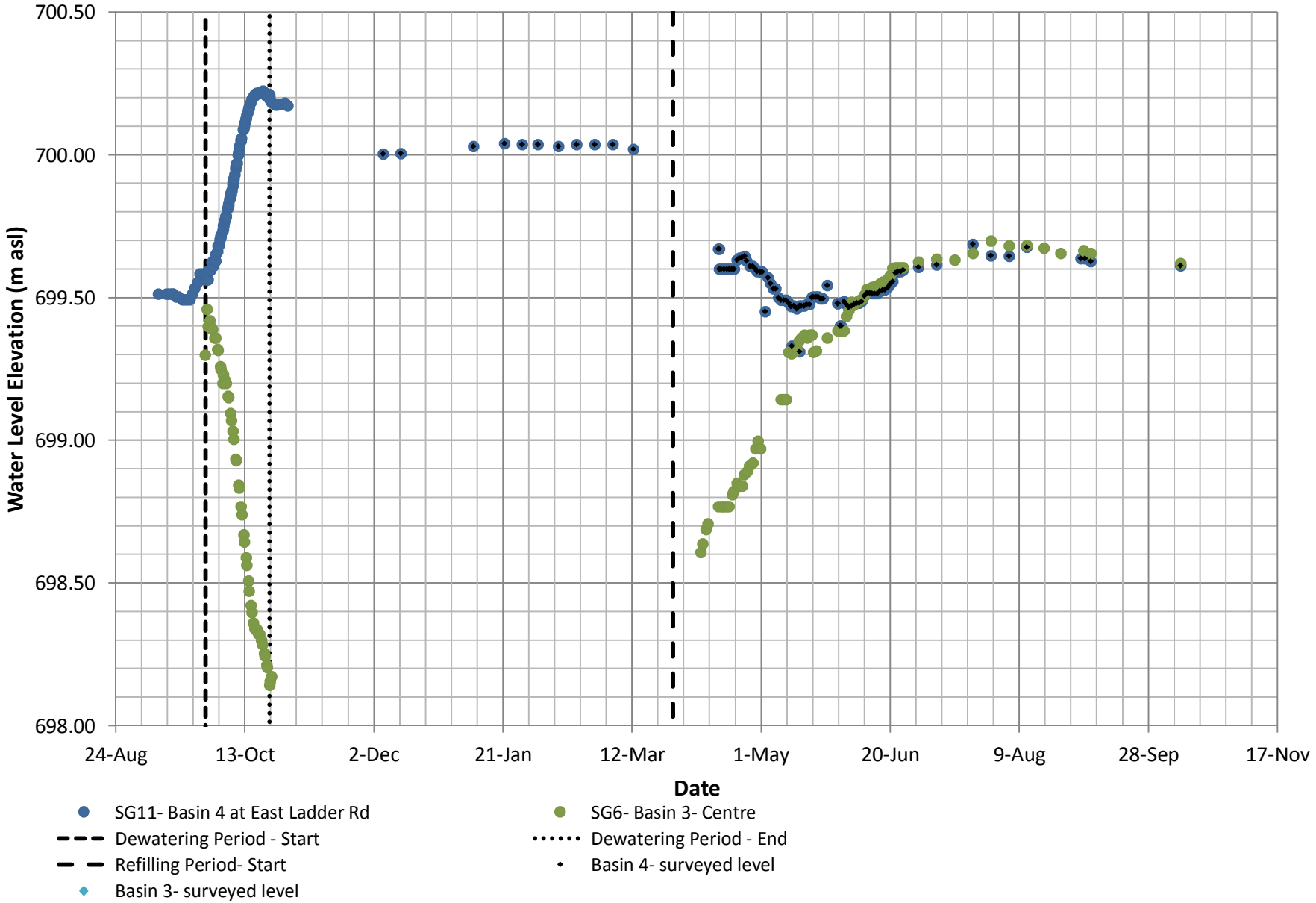
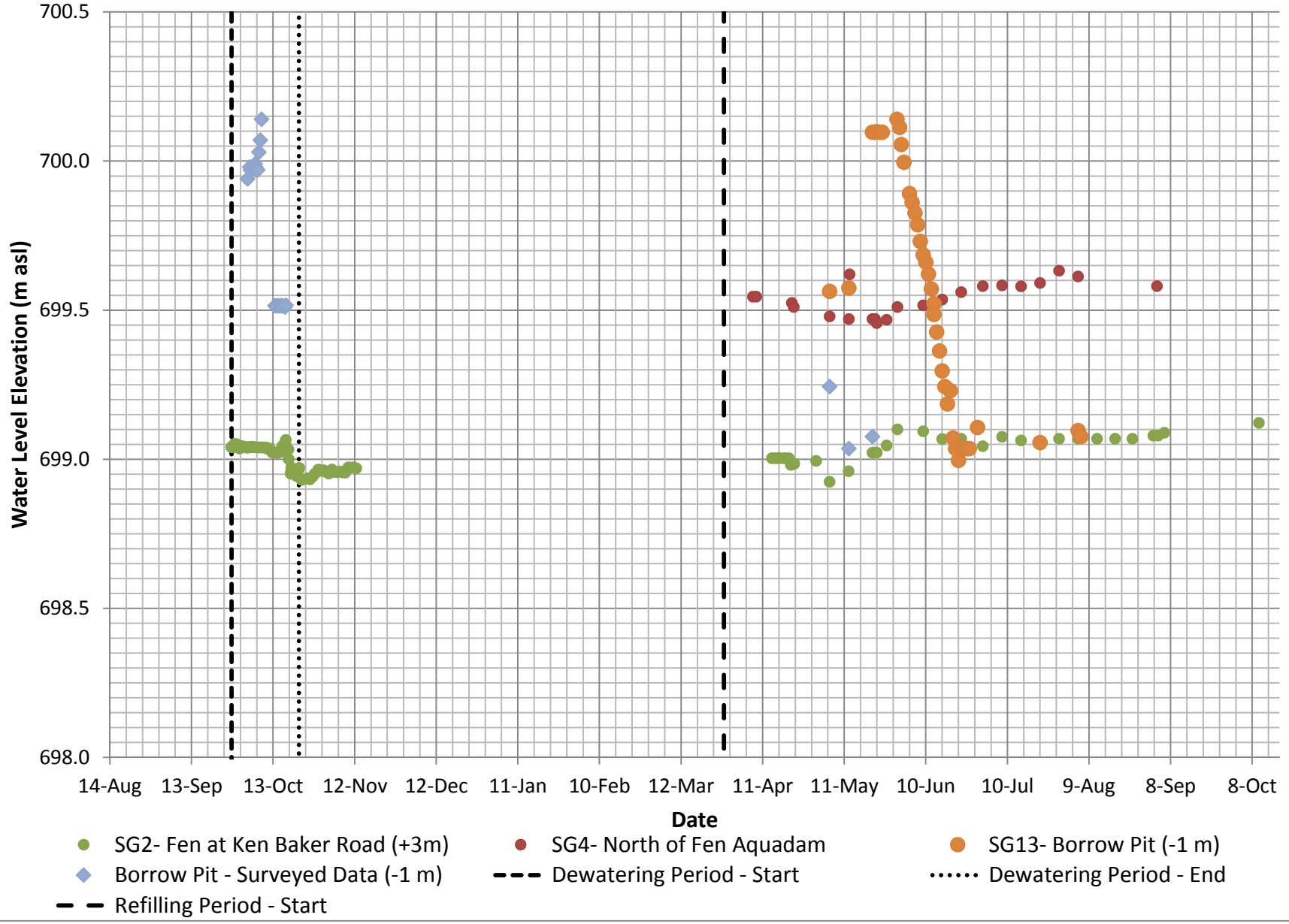
Figure 5

APPENDIX A
WATER LEVELS AND PUMP VOLUMES

Appendix A1: Water Levels at 9-21 Water Body



Appendix A2: Water Levels in the Downstream Fen and Borrow Pit



APPENDIX B
WATER QUALITY RESULTS SUMMARY

TABLE B1.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3 -N mg/L	NO_3+NO_2-N mg/L	Total Alkalinity mg/L	HCO_3 mg/L	Hardness mg/L	TDS mg/L	TSS mg/L	Turbidity NTU
Surface Water Samples																		
13-SW12	19-Mar-14	7.56	90	12	3	0.98	2.6	1.2	<1	<0.01	<0.01	<0.001	43	52	42	46	24	10
13-SW12	27-Mar-14	---	---	---	---	---	---	1.3	---	---	---	---	---	---	---	---	6.7	3.1
13-SW12	01-Apr-14	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	4	---
13-SW12	08-Apr-14	---	---	---	---	---	---	<1	---	---	---	---	---	---	---	---	37	27
13-SW12	15-Apr-14	---	---	---	---	---	---	2.3	---	---	---	---	---	---	---	---	40	14
13-SW12	22-Apr-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	37	15
13-SW12	29-Apr-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	7.3	1.8
13-SW12	22-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	<1.0	0.55
13-SW12	27-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	1.3	0.57
13-SW12	02-Jun-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	<1.0	0.66
13-SW12	09-Jun-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	1.3	0.55
13-SW12	16-Jun-14	---	---	---	---	---	---	1.4	---	---	---	---	---	---	---	---	17	4.2
13-SW12	23-Jun-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	3.3	2.1
13-SW12	01-Jul-14	---	---	---	---	---	---	<2.0	---	---	---	---	---	---	---	---	---	---
13-SW12	08-Jul-14	---	---	---	---	---	---	1.7	---	---	---	---	---	---	---	---	---	---
13-SW12	05-Aug-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	180	39
13-SW12	02-Sep-14	---	220	---	---	---	---	1.5	---	---	---	---	---	---	---	---	---	---
13-SW12	09-Oct-14	---	230	---	---	---	---	2.4	---	---	---	---	---	---	---	---	---	---
13-SW12a	06-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	20	5.7
13-SW12a	13-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	1.3	0.88
13-SW12a	20-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	3.3	1.1
13-SW12b	06-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	59	19
13-SW12b	13-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	170	9.5
13-SW12c	20-May-14	---	---	---	---	---	---	1.3	---	---	---	---	---	---	---	---	6.7	2.5
13-SW16	13-May-14	---	---	---	---	---	---	6.0	---	---	---	---	---	---	---	---	10	11
13-SW16	20-May-14	---	---	---	---	---	---	5.7	---	---	---	---	---	---	---	---	3.3	2.4
13-SW16	27-May-14	---	---	---	---	---	---	3.4	---	---	---	---	---	---	---	---	2	0.95
13-SW16	02-Jun-14	---	---	---	---	---	---	4.4	---	---	---	---	---	---	---	---	<1.0	1.1
13-SW16	09-Jun-14	---	---	---	---	---	---	3.5	---	---	---	---	---	---	---	---	2	0.81
13-SW16	16-Jun-14	---	---	---	---	---	---	7.4	---	---	---	---	---	---	---	---	10	3.5
13-SW16	23-Jun-14	---	---	---	---	---	---	7.5	---	---	---	---	---	---	---	---	66	7.6
13-SW16	01-Jul-14	---	---	---	---	---	---	8.4	---	---	---	---	---	---	---	---	---	---
13-SW16	08-Jul-14	---	---	---	---	---	---	5.3	---	---	---	---	---	---	---	---	---	---
13-SW16	15-Jul-14	---	---	---	---	---	---	5.4	---	---	---	---	---	---	---	---	---	---
13-SW16	22-Jul-14	---	---	---	---	---	---	5.7	---	---	---	---	---	---	---	---	9.3	7.1
13-SW16	29-Jul-14	---	---	---	---	---	---	7.1	---	---	---	---	---	---	---	---	10	6.2
13-SW16	05-Aug-14	---	---	---	---	---	---	5.5	---	---	---	---	---	---	---	---	7.3	8
13-SW16	12-Aug-14	---	130	---	---	---	---	5.9	---	---	---	---	---	---	---	---	---	---
ESRD Freshwater Aquatic Life*		**6.5-9.0^{pH}**	**NS**	**NS**	**NS**	**NS**	**NS**	**120^{LT}**	**H^{SO4}**	**Cl^{LT}**	**3^{LT}**	**NS**	**20^{Alk}**	**NS**	**NS**	**NS**	**narrative**	**narrative**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**100^{crop}**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**500^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**1000**	**NS**	**NS**	**NS**	**NS**	**1000**	**10**	**NS**	**100**	**NS**	**NS**	**NS**	**3000**	**NS**	**NS**

TABLE B1.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3 -N mg/L	NO_3+NO_2-N mg/L	Total Alkalinity mg/L	HCO_3 mg/L	Hardness mg/L	TDS mg/L	TSS mg/L	Turbidity NTU
Surface Water Samples																		
13-SW16	18-Aug-14	---	160	---	---	---	---	6.7	---	---	---	---	---	---	---	---	---	---
13-SW16	18-Aug-14	---	160	---	---	---	---	6.5	---	---	---	---	---	---	---	---	---	---
13-SW16	25-Aug-14	---	160	---	---	---	---	6.1	---	---	---	---	---	---	---	---	---	---
13-SW16	02-Sep-14	---	150	---	---	---	---	6.4	---	---	---	---	---	---	---	---	---	---
13-SW16	09-Oct-14	---	170	---	---	---	---	6.9	---	---	---	---	---	---	---	---	---	---
13-SW22	01-Apr-14	---	---	---	---	---	---	2.1	---	---	---	---	---	---	---	---	3.3	---
13-SW22	08-Apr-14	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	7.3	6.1
13-SW22	15-Apr-14	---	---	---	---	---	---	1.4	---	---	---	---	---	---	---	---	220	120
13-SW22	22-Apr-14	---	---	---	---	---	---	1.6	---	---	---	---	---	---	---	---	33	8.8
13-SW22	29-Apr-14	---	---	---	---	---	---	3.5	---	---	---	---	---	---	---	---	130	100
13-SW22	06-May-14	---	---	---	---	---	---	1.7	---	---	---	---	---	---	---	---	130	170
13-SW22	13-May-14	---	---	---	---	---	---	2.6	---	---	---	---	---	---	---	---	150	200
13-SW22	20-May-14	---	---	---	---	---	---	3.5	---	---	---	---	---	---	---	---	58	67
13-SW22	27-May-14	---	---	---	---	---	---	2.0	---	---	---	---	---	---	---	---	18	30
13-SW22	02-Jun-14	---	---	---	---	---	---	2.8	---	---	---	---	---	---	---	---	31	42
13-SW22	09-Jun-14	---	---	---	---	---	---	2.6	---	---	---	---	---	---	---	---	8.7	16
13-SW22	16-Jun-14	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	3.3	7.2
13-SW22	23-Jun-14	---	---	---	---	---	---	2	---	---	---	---	---	---	---	---	4	7.4
13-SW22	01-Jul-14	---	---	---	---	---	---	6.7	---	---	---	---	---	---	---	---	---	---
13-SW22	08-Jul-14	---	---	---	---	---	---	2	---	---	---	---	---	---	---	---	---	---
13-SW22	05-Aug-14	---	---	---	---	---	---	1.7	---	---	---	---	---	---	---	---	3.3	4.1
13-SW22	02-Sep-14	---	130	---	---	---	---	1.7	---	---	---	---	---	---	---	---	---	---
13-SW22	09-Oct-14	---	130	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	---	---
13-SW26	13-May-14	---	---	---	---	---	---	8.0	---	---	---	---	---	---	---	---	6	4.4
13-SW26	20-May-14	---	---	---	---	---	---	3.7	---	---	---	---	---	---	---	---	3.3	2.8
13-SW26	27-May-14	---	---	---	---	---	---	2.3	---	---	---	---	---	---	---	---	6.7	1.5
13-SW26	02-Jun-14	---	---	---	---	---	---	2.1	---	---	---	---	---	---	---	---	7.3	1.2
13-SW26	09-Jun-14	---	---	---	---	---	---	2.4	---	---	---	---	---	---	---	---	8.7	3.4
13-SW26	16-Jun-14	---	---	---	---	---	---	2.9	---	---	---	---	---	---	---	---	18	20
13-SW26	23-Jun-14	---	---	---	---	---	---	2.3	---	---	---	---	---	---	---	---	45	7.6
13-SW26	01-Jul-14	---	---	---	---	---	---	6.4	---	---	---	---	---	---	---	---	---	---
13-SW26	08-Jul-14	---	---	---	---	---	---	2.2	---	---	---	---	---	---	---	---	---	---
13-SW26	15-Jul-14	---	---	---	---	---	---	2.0	---	---	---	---	---	---	---	---	---	---
13-SW26 dup	15-Jul-14	---	---	---	---	---	---	2.2	---	---	---	---	---	---	---	---	---	---
13-SW26	22-Jul-14	---	---	---	---	---	---	1.6	---	---	---	---	---	---	---	---	15	14
13-SW26	29-Jul-14	---	---	---	---	---	---	1.4	---	---	---	---	---	---	---	---	12	12
13-SW26	05-Aug-14	---	---	---	---	---	---	2.5	---	---	---	---	---	---	---	---	120	17
13-SW26	12-Aug-14	---	220	---	---	---	---	2.3	---	---	---	---	---	---	---	---	---	---
13-SW26	18-Aug-14	---	250	---	---	---	---	2.4	---	---	---	---	---	---	---	---	---	---
13-SW26	25-Aug-14	---	280	---	---	---	---	1.5	---	---	---	---	---	---	---	---	---	---
13-SW26	02-Sep-14	---	310	---	---	---	---	1.9	---	---	---	---	---	---	---	---	---	---
13-SW26	09-Oct-14	---	410	---	---	---	---	2	---	---	---	---	---	---	---	---	---	---
ESRD Freshwater Aquatic Life*		**6.5-9.0^{pH}**	**NS**	**NS**	**NS**	**NS**	**NS**	**120^{LT}**	**H^{SO4}**	**Cl^{LT}**	**3^{LT}**	**NS**	**20^{Alk}**	**NS**	**NS**	**NS**	**narrative**	**narrative**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**100^{crop}**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**500^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**1000**	**NS**	**NS**	**NS**	**NS**	**1000**	**10**	**NS**	**100**	**NS**	**NS**	**NS**	**3000**	**NS**	**NS**

TABLE B1.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3 -N mg/L	NO_3+NO_2-N mg/L	Total Alkalinity mg/L	HCO_3 mg/L	Hardness mg/L	TDS mg/L	TSS mg/L	Turbidity NTU
Surface Water Samples																		
13-SW27	13-May-14	---	---	---	---	---	---	3.9	---	---	---	---	---	---	---	---	1.3	1.7
13-SW27	20-May-14	---	---	---	---	---	---	3.3	---	---	---	---	---	---	---	---	11	4.2
13-SW27	27-May-14	---	---	---	---	---	---	3.0	---	---	---	---	---	---	---	---	5.3	3.7
13-SW27	02-Jun-14	---	---	---	---	---	---	3.9	---	---	---	---	---	---	---	---	2.7	3.3
13-SW27	09-Jun-14	---	---	---	---	---	---	3.7	---	---	---	---	---	---	---	---	4	4.7
13-SW27	16-Jun-14	---	---	---	---	---	---	3.4	---	---	---	---	---	---	---	---	17	21
13-SW27	23-Jun-14	---	---	---	---	---	---	3.2	---	---	---	---	---	---	---	---	8	7.2
13-SW27	01-Jul-14	---	---	---	---	---	---	3.8	---	---	---	---	---	---	---	---	---	---
13-SW27	08-Jul-14	---	---	---	---	---	---	2.4	---	---	---	---	---	---	---	---	---	---
13-SW27	15-Jul-14	---	---	---	---	---	---	1.4	---	---	---	---	---	---	---	---	---	---
13-SW27	22-Jul-14	---	---	---	---	---	---	2.3	---	---	---	---	---	---	---	---	11	6.1
13-SW27	29-Jul-14	---	---	---	---	---	---	2.3	---	---	---	---	---	---	---	---	6.7	4
13-SW27	05-Aug-14	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	110	17
13-SW27	12-Aug-14	---	450	---	---	---	---	2.4	---	---	---	---	---	---	---	---	---	---
13-SW27	18-Aug-14	---	560	---	---	---	---	3.4	---	---	---	---	---	---	---	---	---	---
13-SW27	25-Aug-14	---	620	---	---	---	---	4.5	---	---	---	---	---	---	---	---	---	---
13-SW31	08-Apr-14	---	---	---	---	---	---	1.3	---	---	---	---	---	---	---	---	4.7	3.6
13-SW31	15-Apr-14	---	---	---	---	---	---	1.1	---	---	---	---	---	---	---	---	170	54
13-SW31 dup	15-Apr-14	---	---	---	---	---	---	1.1	---	---	---	---	---	---	---	---	420	130
13-SW31	22-Apr-14	---	---	---	---	---	---	3.3	---	---	---	---	---	---	---	---	100	34
13-SW31 dup	22-Apr-14	---	---	---	---	---	---	1.9	---	---	---	---	---	---	---	---	37	7.2
13-SW31	29-Apr-14	---	---	---	---	---	---	1.8	---	---	---	---	---	---	---	---	4.7	2.1
13-SW31 dup	29-Apr-14	---	---	---	---	---	---	1.1	---	---	---	---	---	---	---	---	6.0	1.4
13-SW31	06-May-14	---	---	---	---	---	---	1.9	---	---	---	---	---	---	---	---	140	180
13-SW31 dup	06-May-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	80	17
13-SW31	13-May-14	---	---	---	---	---	---	2.1	---	---	---	---	---	---	---	---	20	24
13-SW31 dup	13-May-14	---	---	---	---	---	---	7.9	---	---	---	---	---	---	---	---	25	13
13-SW31	20-May-14	---	---	---	---	---	---	3.6	---	---	---	---	---	---	---	---	33	69
13-SW31 dup	20-May-14	---	---	---	---	---	---	3.6	---	---	---	---	---	---	---	---	23	60
13-SW31	27-May-14	---	---	---	---	---	---	2.0	---	---	---	---	---	---	---	---	15	27
13-SW31 dup	27-May-14	---	---	---	---	---	---	21	---	---	---	---	---	---	---	---	1.3	0.55
13-SW31	02-Jun-14	---	---	---	---	---	---	2.6	---	---	---	---	---	---	---	---	28	46
13-SW31 dup	02-Jun-14	---	---	---	---	---	---	2.2	---	---	---	---	---	---	---	---	11	2.9
13-SW31	09-Jun-14	---	---	---	---	---	---	1.2	---	---	---	---	---	---	---	---	2	1.5
13-SW31 dup	09-Jun-14	---	---	---	---	---	---	2.6	---	---	---	---	---	---	---	---	11	18
13-SW31	16-Jun-14	---	---	---	---	---	---	1.6	---	---	---	---	---	---	---	---	1.3	7.9
13-SW31 dup	16-Jun-14	---	---	---	---	---	---	2.0	---	---	---	---	---	---	---	---	5.3	7.6
13-SW31	23-Jun-14	---	---	---	---	---	---	11.0	---	---	---	---	---	---	---	---	71	5.6
13-SW31 dup	23-Jun-14	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	2.7	1.6
13-SW31	01-Jul-14	---	---	---	---	---	---	2.9	---	---	---	---	---	---	---	---	---	---
13-SW31 dup	01-Jul-14	---	---	---	---	---	---	4.4	---	---	---	---	---	---	---	---	---	---
ESRD Freshwater Aquatic Life*		**6.5-9.0^{pH}**	**NS**	**NS**	**NS**	**NS**	**NS**	**120^{LT}**	**H^{SO4}**	**Cl^{LT}**	**3^{LT}**	**NS**	**20^{Alk}**	**NS**	**NS**	**NS**	**narrative**	**narrative**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**100^{crop}**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**500^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**1000**	**NS**	**NS**	**NS**	**NS**	**1000**	**10**	**NS**	**100**	**NS**	**NS**	**NS**	**3000**	**NS**	**NS**

TABLE B1.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3 -N mg/L	NO_3+NO_2-N mg/L	Total Alkalinity mg/L	HCO_3 mg/L	Hardness mg/L	TDS mg/L	TSS mg/L	Turbidity NTU
Surface Water Samples																		
13-SW31	08-Jul-14	---	---	---	---	---	---	1.6	---	---	---	---	---	---	---	---	---	---
13-SW31 dup	08-Jul-14	---	---	---	---	---	---	1.2	---	---	---	---	---	---	---	---	---	---
13-SW31	22-Jul-14	---	---	---	---	---	---	5.7	---	---	---	---	---	---	---	---	9.3	7.2
13-SW31	29-Jul-14	---	---	---	---	---	---	6.1	---	---	---	---	---	---	---	---	6	5.3
13-SW31	05-Aug-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	3.3	1.8
13-SW31	12-Aug-14	---	440	---	---	---	---	2.3	---	---	---	---	---	---	---	---	---	---
13-SW31	25-Aug-14	---	160	---	---	---	---	6.3	---	---	---	---	---	---	---	---	---	---
13-SW31	02-Sep-14	---	220	---	---	---	---	1.2	---	---	---	---	---	---	---	---	---	---
13-SW31	02-Sep-14	---	120	---	---	---	---	1.7	---	---	---	---	---	---	---	---	---	---
13-SW31	09-Oct-14	---	130	---	---	---	---	2.6	---	---	---	---	---	---	---	---	---	---
13-SW31	09-Oct-14	---	110	---	---	---	---	1.3	---	---	---	---	---	---	---	---	---	---
13-SW46	20-May-14	---	---	---	---	---	---	2.4	---	---	---	---	---	---	---	---	34	20
13-SW46	02-Jun-14	---	---	---	---	---	---	1.6	---	---	---	---	---	---	---	---	5.3	4.3
13-SW46	09-Jun-14	---	---	---	---	---	---	1.8	---	---	---	---	---	---	---	---	1.3	1.3
13-SW46	16-Jun-14	---	---	---	---	---	---	1.7	---	---	---	---	---	---	---	---	5.3	4.8
13-SW46	23-Jun-14	---	---	---	---	---	---	2.1	---	---	---	---	---	---	---	---	36	15
13-SW46	01-Jul-14	---	---	---	---	---	---	4.6	---	---	---	---	---	---	---	---	---	---
13-SW46	08-Jul-14	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---
Basin 3 Culvert	15-Jul-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	---	---
Basin 4 Culvert	15-Jul-14	---	---	---	---	---	---	<1.0	---	---	---	---	---	---	---	---	---	---
Containment Structure Samples																		
14-SW1-P1	01-Apr-14	---	---	---	---	---	---	46	---	---	---	---	---	---	---	---	21	---
14-SW1-P1	01-Apr-14	---	---	---	---	---	---	3.0	---	---	---	---	---	---	---	---	400	360
14-SW1-P1	29-Apr-14	---	---	---	---	---	---	3.2	---	---	---	---	---	---	---	---	350	510
14-SW1-P1	06-May-14	---	---	---	---	---	---	16	---	---	---	---	---	---	---	---	320	400
14-SW1-P1	13-May-14	---	---	---	---	---	---	1.3	---	---	---	---	---	---	---	---	54	82
14-SW1-P1	20-May-14	---	---	---	---	---	---	3.6	---	---	---	---	---	---	---	---	43	62
14-SW1-P1	27-May-14	---	---	---	---	---	---	2.0	---	---	---	---	---	---	---	---	14	18
14-SW1-P2	05-Apr-14	---	---	---	---	---	---	22	---	---	---	---	---	---	---	---	130	---
ESRD Freshwater Aquatic Life*		**6.5-9.0^{pH}**	**NS**	**NS**	**NS**	**NS**	**NS**	**120^{LT}**	**H^{SO4}**	**Cl^{LT}**	**3^{LT}**	**NS**	**20^{Alk}**	**NS**	**NS**	**NS**	**narrative**	**narrative**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**100^{crop}**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**500^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**1000**	**NS**	**NS**	**NS**	**NS**	**1000**	**10**	**NS**	**100**	**NS**	**NS**	**NS**	**3000**	**NS**	**NS**

TABLE B1.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3-N mg/L	NO_3+NO_2-N mg/L	Total Alkalinity mg/L	HCO_3 mg/L	Hardness mg/L	TDS mg/L	TSS mg/L	Turbidity NTU
Containment Structure Samples																		
14-SW81	02-Jun-14	---	---	---	---	---	---	2.6	---	---	---	---	---	---	---	---	24	39
14-SW81	09-Jun-14	---	---	---	---	---	---	2.4	---	---	---	---	---	---	---	---	450	1000
14-SW81	16-Jun-14	---	---	---	---	---	---	1.9	---	---	---	---	---	---	---	---	8	18
14-SW81	23-Jun-14	---	---	---	---	---	---	1.9	---	---	---	---	---	---	---	---	15	24
14-SW81	01-Jul-14	---	---	---	---	---	---	4.7	---	---	---	---	---	---	---	---	---	---
14-SW81	08-Jul-14	---	---	---	---	---	---	1.9	---	---	---	---	---	---	---	---	---	---
14-SW81	05-Aug-14	---	---	---	---	---	---	1.4	---	---	---	---	---	---	---	---	46	20
14-SW81	09-Oct-14	---	200	---	---	---	---	1.3	---	---	---	---	---	---	---	---	---	---
Minimal Detection Limit		**0.1**	**1**	**0.3**	**0.2**	**0.5**	**0.3**	**1**	**0.5**	**0.003**	**0.003**	**0.003**	**0.5**	**0.5**	**0.5**	**10**	**3**	**0.1**
ESRD Freshwater Aquatic Life*		**6.5-9.0^{pH}**	**NS**	**NS**	**NS**	**NS**	**NS**	**120^{LT}**	**H^{SO4}**	**Cl^{LT}**	**3^{LT}**	**NS**	**20^{Alk}**	**NS**	**NS**	**NS**	**narrative**	**narrative**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**100^{crop}**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**500^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**1000**	**NS**	**NS**	**NS**	**NS**	**1000**	**10**	**NS**	**100**	**NS**	**NS**	**NS**	**3000**	**NS**	**NS**

Notes:

--- - not analyzed

NS - not specified

crop - guideline level is crop dependent; criterion shown is most stringent value

H - dependent on hardness value

Cl - dependent on chloride value

pH - not to be altered by more than 0.5 units from background

LT - long-term exposure guideline; see applicable guidelines for further details

Alk - minimum value, unless natural conditions are less

SO4 - guideline level is hardness dependent; hardness values greater than 250 mg/L need to be determined based on site water

* - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - values do not meet applicable guidelines

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Surface Water Samples									
13-SW12	19-Mar-14	<0.0004	***0.0044***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	27-Mar-14	<0.0004	***0.0085***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	01-Apr-14	<0.0004	***0.0006***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	08-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	15-Apr-14	<0.0004	***0.0180***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	22-Apr-14	<0.0004	***0.0040***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12	29-Apr-14	<0.0004	***0.0140***	<0.0004	<0.0008	<0.1	<0.1	---	---
13-SW12	22-May-14	<0.00040	***0.00055***	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW12	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW12	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW12	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW12	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW12	23-Jun-14	<0.00040	***0.00130***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW12	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW12	08-Jul-14	<0.00040	***0.00170***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW12	05-Aug-14	<0.00040	***0.00380***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW12	02-Sep-14	<0.00040	***0.01100***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW12	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
13-SW12a	06-May-14	<0.0004	***0.0060***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW12a	13-May-14	<0.00040	***0.00120***	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW12a	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW12b	06-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW12b	13-May-14	<0.00040	***0.00096***	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW12c	20-May-14	<0.00040	0.00042	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Surface Water Samples									
13-SW16	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW16	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW16	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW16	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW16	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW16	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW16	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	15-Jul-14	<0.00040	***0.00068***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	22-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	29-Jul-14	<0.00040	***0.00064***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	05-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	12-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	18-Aug-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
13-SW16 dup	18-Aug-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
13-SW16	25-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW16	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
13-SW22	01-Apr-14	<0.0004	***0.00230***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW22	08-Apr-14	<0.0004	***0.00084***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW22	15-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW22	22-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW22	29-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	---	---
13-SW22	06-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW22	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW22	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW22	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW22	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW22	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW22	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW22	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW22	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW22	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW22	05-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW22	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW22	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Surface Water Samples									
13-SW26	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	0.23	<0.20
13-SW26	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW26	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW26	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW26	09-Jun-14	<0.00040	***0.00290***	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW26	16-Jun-14	<0.00040	***0.00100***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	23-Jun-14	<0.00040	***0.00150***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	01-Jul-14	<0.00040	***0.00670***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW26	08-Jul-14	<0.00040	***0.00500***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	15-Jul-14	<0.00040	***0.00450***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26 dup	15-Jul-14	<0.00040	***0.00370***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	22-Jul-14	<0.00040	***0.00130***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	29-Jul-14	<0.00040	***0.00120***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	05-Aug-14	<0.00040	***0.00190***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	12-Aug-14	<0.00040	***0.00320***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	18-Aug-14	<0.0004	***0.00540***	<0.0004	<0.0008	<0.10	<0.10	---	---
13-SW26	19-Aug-14	<0.0004	***0.00160***	<0.0004	<0.0008	<0.10	---	---	---
13-SW26	25-Aug-14	<0.00040	***0.00094***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	02-Sep-14	<0.00040	***0.00280***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW26	09-Oct-14	<0.0004	***0.00170***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-SW26	16-Oct-14	<0.0004	***0.01600***	<0.0004	<0.0008	<0.1	---	---	---
13-SW27	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW27	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW27	27-May-14	<0.00040	***0.00100***	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW27	02-Jun-14	<0.0004	***0.00140***	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW27	09-Jun-14	<0.00040	***0.00096***	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW27	16-Jun-14	<0.00040	***0.00100***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	23-Jun-14	<0.00040	***0.00270***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	01-Jul-14	<0.00040	***0.00210***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW27	08-Jul-14	<0.00040	***0.00170***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	15-Jul-14	<0.00040	***0.00250***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	22-Jul-14	<0.00040	***0.00170***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	29-Jul-14	<0.00040	***0.00270***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	05-Aug-14	<0.00040	***0.00110***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	12-Aug-14	<0.00040	***0.01100***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW27	18-Aug-14	<0.0004	***0.01600***	<0.0004	<0.0008	<0.10	<0.10	---	---
13-SW27	19-Aug-14	<0.0004	***0.00290***	<0.0004	<0.0008	<0.10	---	---	---
13-SW27	25-Aug-14	<0.00040	***0.04200***	<0.00040	<0.00080	<0.18	<0.18	---	---
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS[ST]**	**NS[ST]**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Surface Water Samples									
13-SW31	08-Apr-14	<0.0004	***0.0011***	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW31	15-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW31 dup	15-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW31	22-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW31 dup	22-Apr-14	<0.0004	0.00043	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
13-SW31	29-Apr-14	<0.0004	***0.0017***	<0.0004	<0.0008	<0.1	<0.1	---	---
13-SW31 dup	29-Apr-14	<0.0004	***0.0150***	<0.0004	<0.0008	<0.1	<0.1	---	---
13-SW31	06-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW31 dup	06-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	0.11	<0.20	<0.20
13-SW31	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW31 dup	13-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW31	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW31 dup	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW31	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW31 dup	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW31	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW31 dup	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW31	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW31 dup	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW31	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31 dup	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31 dup	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	<0.10	---	---
13-SW31 dup	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	0.11	<0.10	---	---
13-SW31	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31 dup	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	22-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	29-Jul-14	<0.00040	0.00042	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	05-Aug-14	<0.00040	***0.00520***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	12-Aug-14	<0.00040	***0.00710***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	25-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	02-Sep-14	<0.00040	***0.00110***	<0.00040	<0.00080	<0.10	0.13	---	---
13-SW31 dup	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW31	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
13-SW31 dup	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Surface Water Samples									
13-SW46	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
13-SW46	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
13-SW46	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
13-SW46	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW46	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
13-SW46	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	0.11	<0.10	---	---
13-SW46	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
Basin 3 Culvert	15-Jul-14	<0.00040	***0.00240***	<0.00040	<0.00080	<0.10	<0.10	---	---
Basin 4 Culvert	15-Jul-14	<0.00040	***0.00180***	<0.00040	<0.00080	<0.10	<0.10	---	---
Containment Structure Samples									
14-SW1-P1	01-Apr-14	<0.0004	0.00046	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
14-SW1-P1	22-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
14-SW1-P1	29-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	---	---
14-SW1-P1	06-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.20	<0.20
14-SW1-P1	13-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.1	<0.20	<0.20
14-SW1-P1	20-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-SW1-P1	27-May-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
14-SW1-P2	05-Apr-14	<0.0004	0.00050	<0.0004	<0.0008	<0.1	<0.1	<0.2	<0.2
14-SW81	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
14-SW81	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
14-SW81	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-SW81	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-SW81	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	0.2	---	---
14-SW81	08-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-SW81	05-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-SW81	09-Oct-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B2.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Minor Spill Sampling									
9-21 Dock Spill	11-Sep-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
Boat Motor Spill	22-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
Minimal Detection Limit		**0.0004**	**0.0004**	**0.0004**	**0.0008**	**0.1**	**0.1**	**0.2**	**0.2**
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NSST**	**NSST**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

--- - not analyzed

NS - guideline not specified

ST - see applicable guidelines for short-term exposure guideline

* - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - indicates values do not meet applicable guidelines

TABLE B3.

WATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
Surface Water Samples																								
13-SW12	19-Mar-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	27-Mar-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	01-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	08-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	15-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.065***	<0.20	0.065
13-SW12	22-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	29-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	0.19	<0.050	<0.050	<0.020	<0.20	0.19
13-SW12	22-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12a	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.035***	<0.20	0.035
13-SW12a	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12a	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12b	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.033***	<0.20	0.033
13-SW12b	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW12c	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	22-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	29-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	12-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	18-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16 dup	18-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	25-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW16	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
ESRD Freshwater Aquatic Life*		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B3.

WATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
Surface Water Samples																								
13-SW22	01-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	08-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	15-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	22-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	29-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.038***	<0.20	0.038
13-SW22	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW22	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26 dup	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	22-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	29-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	12-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	18-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	25-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW26	09-Oct-14	<0.15	<0.15	<0.30	<0.015	<0.013	<0.013	<0.013	<0.013	<0.076	<0.011	<0.076	<0.013	<0.011	<0.015	<0.076	<0.013	<0.15	<0.15	<0.076	<0.076	<0.030	<0.30	ND
ESRD Freshwater Aquatic Life*		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B3.

WATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
Surface Water Samples																								
13-SW27	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	22-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	29-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	12-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW27	18-Aug-14	<0.11	<0.11	<0.22	<0.011	<0.0095	<0.0095	<0.0095	<0.0095	<0.056	<0.0084	<0.056	<0.0095	<0.0084	<0.011	<0.056	<0.0095	<0.11	<0.11	<0.056	<0.056	<0.022	<0.22	ND
13-SW27	25-Aug-14	<0.17	<0.17	<0.33	<0.017	<0.014	<0.014	<0.014	<0.014	<0.083	<0.012	<0.083	<0.014	<0.012	<0.017	<0.083	<0.014	<0.17	<0.17	<0.083	<0.083	<0.033	<0.33	ND
13-SW31	08-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	15-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	15-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	22-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	22-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	29-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	29-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.038***	<0.20	0.038
13-SW31 dup	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.033***	<0.20	0.033
13-SW31	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	08-Jul-14	<0.12	<0.12	<0.24	<0.012	<0.010	<0.010	<0.010	<0.010	<0.060	<0.0089	<0.060	<0.010	<0.0089	<0.012	<0.060	<0.010	<0.12	<0.12	<0.060	<0.060	<0.024	<0.24	ND
13-SW31	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	22-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	29-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
ESRD Freshwater Aquatic Life*		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B3.

WATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
Surface Water Samples																								
13-SW31	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	12-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	25-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW31 dup	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-SW46	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Basin 3 Culvert	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Basin 4 Culvert	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Containment Structure Samples																								
14-SW1-P1	01-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P1	22-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P1	29-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P1	06-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.033***	<0.20	0.033
14-SW1-P1	13-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P1	20-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P1	27-May-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW1-P2	05-Apr-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	08-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-SW81	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Minor Spill Sampling																								
9-21 Dock Spill	11-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Boat Motor Spill	22-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Minimal Detection Limit		**0.1**	**0.1**	**0.2**	**0.01**	**0.0085**	**0.0085**	**0.0085**	**0.0085**	**0.05**	**0.0075**	**0.05**	**0.0085**	**0.0075**	**0.01**	**0.05**	**0.0085**	**0.1**	**0.1**	**0.05**	**0.05**	**0.02**	**0.2**	**-**
ESRD Freshwater Aquatic Life*		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

--- - not analyzed

NS - not specified

ND - not detected

* - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - indicates values do not meet applicable guidelines

TABLE B4.

WATER QUALITY RESULTS - ROUTINE WATER CHEMISTRY

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Cl mg/L	TSS mg/L	Turbidity NTU
Drive Point Samples				
13-DP1	15-Jul-14	3.1	---	---
13-DP1	29-Jul-14	4.8	64000	<0.10
13-DP1	05-Aug-14	4.8	26000	<0.10
13-DP1	12-Aug-14	4.3	---	---
13-DP1	18-Aug-14	8.0	---	---
13-DP1	25-Aug-14	4.2	---	---
13-DP1	02-Sep-14	4.1	---	---
13-DP1	09-Oct-14	4.5	---	---
13-DP2	01-Jul-14	3.0	---	---
13-DP2	09-Oct-14	1.1	---	---
13-DP3	01-Jul-14	5.0	---	---
13-DP3	09-Oct-14	1.6	---	---
13-DP4	01-Jul-14	8.9	---	---
13-DP4 dup	01-Jul-14	6.3	---	---
13-DP4	09-Oct-14	<1.0	---	---
13-DP4	09-Oct-14	<1.0	---	---
13-DP5	01-Jul-14	13	---	---
13-DP5	09-Oct-14	5	---	---
13-DP6	01-Jul-14	8.6	---	---
13-DP6	09-Oct-14	1.7	---	---
13-DP7	01-Jul-14	19	---	---
13-DP7	09-Oct-14	1.7	---	---
Minimal Detection Limit		**1**	**3**	**0.1**
Alberta Tier 1 - Natural Areas*		**230^{A}**	**NS**	**NS**
ESRD Freshwater Aquatic Life**		**120^{LT}**	**narrative**	**narrative**
ESRD Agriculture - Irrigation**		**100^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**NS**	**NS**

Notes:

NS - not specified

A - indicates guideline for Aquatic Life exposure pathway

crop - guideline level is crop dependent; criterion shown is most stringent value

LT - long-term exposure guideline; see applicable guidelines for further details

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - *Environmental Quality Guidelines for Alberta Surface Waters* (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines

TABLE B5.

WATER QUALITY RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Drive Point Samples									
13-DP1	15-Jul-14	<0.00040	***0.0300***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	29-Jul-14	<0.00040	***0.0080***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	05-Aug-14	<0.00040	***0.0100***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	12-Aug-14	<0.00040	***0.0087***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	18-Aug-14	<0.0004	***0.0210***	<0.0004	<0.0008	<0.10	<0.22	---	---
13-DP1	19-Aug-14	<0.0004	***0.0170***	<0.0004	<0.0008	<0.10	---	---	---
13-DP1	25-Aug-14	<0.00040	***0.0290***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	02-Sep-14	<0.00040	***0.0170***	<0.00040	<0.00080	<0.10	<0.10	---	---
13-DP1	09-Oct-14	<0.0004	***0.0041***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP2	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	0.12	---	---
13-DP2	09-Oct-14	<0.0004	***0.0150***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP3	01-Jul-14	<0.00040	***0.0041***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP3	09-Oct-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP4	01-Jul-14	<0.00040	***0.0310***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP4 dup	01-Jul-14	<0.00040	***0.0330***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP4	09-Oct-14	<0.0004	***0.0009***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP4 dup	09-Oct-14	<0.0004	***0.0010***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP5	01-Jul-14	<0.00040	***0.0053***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP5	09-Oct-14	<0.0004	***0.0015***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP6	01-Jul-14	<0.00040	<0.0020	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP6	09-Oct-14	<0.0004	***0.0016***	<0.0004	<0.0008	<0.1	<0.10	---	---
13-DP7	01-Jul-14	<0.00040	***0.0230***	<0.00040	<0.0040	<0.10	<0.10	---	---
13-DP7	09-Oct-14	<0.0004	***0.0089***	<0.0004	<0.0008	<0.1	<0.10	---	---
Minimal Detection Limit		**0.0004**	**0.0004**	**0.0004**	**0.0008**	**0.1**	**0.1**	**0.2**	**0.2**
Alberta Tier 1 - Coarse Grained Soils		**$0.005^{P,MAC}$**	**$0.024^{P,AO}$**	**$0.0024^{P,AO}$**	**$0.3^{P,AO}$**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**
ESRD Freshwater Aquatic Life*		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

NS - not specified

^{A} - indicates guideline for Aquatic Life exposure pathway

^{P} - indicates guideline for Potable Groundwater exposure pathway

^{AO} - aesthetic objective from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health Canada 2012)

^{MAC} - maximum acceptable concentration based on health effects from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health Canada 2012)

ST - see applicable guidelines for short-term exposure guideline

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines

TABLE B6.

WATER QUALITY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
Drive Point Samples																								
13-DP1	15-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	***0.037***	<0.20	0.037
13-DP1	29-Jul-14	<0.12	<0.12	<0.24	<0.012	<0.010	0.01	<0.010	<0.010	<0.06	<0.0089	<0.06	<0.010	<0.0089	0.023	<0.060	<0.010	<0.12	<0.12	<0.060	<0.060	<0.024	<0.24	0.033
13-DP1	05-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	0.013	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	0.013
13-DP1	12-Aug-14	<0.12	<0.12	<0.23	<0.012	<0.0099	<0.0099	<0.0099	<0.0099	<0.058	<0.0087	<0.058	<0.0099	<0.0087	<0.012	<0.058	<0.0099	<0.12	<0.12	<0.058	<0.058	<0.023	<0.23	ND
13-DP1	18-Aug-14	<0.15	<0.15	<0.29	<0.015	<0.012	0.015	<0.012	<0.012	<0.073	<0.011	<0.073	0.012	<0.011	0.026	<0.073	<0.012	<0.15	<0.15	<0.073	<0.073	<0.029	<0.29	0.053
13-DP1	25-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	0.015	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	0.015
13-DP1	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP1	09-Oct-14	<0.11	<0.11	<0.22	<0.011	<0.0092	<0.0092	<0.0092	<0.0092	<0.054	<0.0082	<0.054	<0.0092	<0.0082	0.023	<0.054	<0.0092	<0.11	<0.11	<0.054	<0.054	<0.022	<0.22	0.023
13-DP2	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.05	<0.0075	<0.05	<0.02	<0.0075	<0.01	<0.05	<0.0085	<0.1	<0.1	<0.05	<0.05	<0.02	<0.2	ND
13-DP2	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP3	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.05	<0.0075	<0.05	<0.02	<0.0075	<0.01	<0.05	<0.0085	<0.10	<0.10	<0.05	<0.05	<0.02	<0.2	ND
13-DP3	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP4	01-Jul-14	<0.10	<0.10	<0.20	<0.010	***0.037***	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	0.028	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	0.065
13-DP4 dup	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP4	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP4 dup	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP5	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.050	<0.050	<0.020	<0.0075	<0010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP5	09-Oct-14	<0.17	<0.17	<0.33	<0.017	<0.014	<0.014	<0.014	<0.014	<0.083	<0.013	<0.083	<0.014	<0.013	<0.017	<0.083	<0.014	<0.17	<0.17	<0.083	<0.083	<0.033	<0.33	ND
13-DP6	01-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP6	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
13-DP7	01-Jul-14	<0.1	<0.1	<0.2	<0.01	0.015	<0.0085	<0.0085	<0.0085	<0.05	<0.0075	<0.05	<0.020	<0.0075	<0.01	<0.05	<0.0085	<0.1	<0.10	<0.05	<0.05	<0.02	<0.2	0.015
13-DP7	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Minimal Detection Limit		**0.1**	**0.1**	**0.2**	**0.01**	**0.0085**	**0.0085**	**0.0085**	**0.0085**	**0.05**	**0.0075**	**0.05**	**0.0085**	**0.0075**	**0.01**	**0.05**	**0.0085**	**0.1**	**0.1**	**0.05**	**0.05**	**0.02**	**0.2**	**-**
Alberta Tier 1 - Coarse Grained S		**5.8[A]**	**46[A]**	**NS**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**NS**	**0.015[A]**	**NS**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**NS**	**NS**	**0.4[A]**	**0.025[A]**	**NS**	**0.01[P]**
ESRD Freshwater Aquatic Life*		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock*		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

--- - not analyzed

ND - not detected

NS - not specified

A - indicates guideline for Aquatic Life exposure pathway

P - indicates guideline for Potable Groundwater exposure pathway

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines

TABLE B7.

WATER QUALITY RESULTS - PIW SAMPLES - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Matrix Sample Number	Cl mg/L	TSS mg/L	Turbidity NTU
Pre-Treatment					
14-PIW-PRE	28-Apr-14	08881140428001	52	260	460
14-PIW-PRE	30-Apr-14	08881140430003	43	7.3	100
14-PIW-PRE	08-May-14	08881140508001	24	92	170
14-PIW-PRE	02-Jun-14	08881140602010	13	140	160
Carbon and Clay Media Change June 7-8					
14-PIW-PRE	09-Jun-14	08881140609002	33	57	70
14-PIW-PRE	10-Jun-14	08881140610001	14	37	29
15-26 Pre-Treatment	16-Jun-14	08881140616501	25	---	---
15-26 Pre-Treatment	19-Jun-14	08881140619501	22	---	---
15-26 Pre-Treatment	21-Jun-14	08881140621501	17	---	---
15-26 Pre-Treatment	24-Jun-14	08881140624501	17	---	---
15-26 Pre-Treatment	26-Jun-14	08881140626501	18	---	---
15-26 Pre-Treatment	27-Jun-14	08881140627501	14	---	---
15-26 Pre-Treatment	29-Jun-14	08881140629501	8.3	---	---
15-26 Pre-Treatment	30-Jun-14	08881140630501	12	---	---
15-26 Pre-Treatment	01-Jul-14	08881140701501	12	---	---
15-26 Pre-Treatment	03-Jul-14	08881140703501	24	---	---
Second Self Cleaning Filter added August 15					
Second Self Cleaning Filter added into Operation August 23					
15-26 Pre-Treatment	04-Sep-14	08881140904507	11	---	---
Discharge					
14-PIW	08-May-14	08881140508002	30	100	170
14-PIW	20-May-14	08881140520001	30	43	44
14-PIW	27-May-14	08881140527001	<1	66	86
14-PIW	02-Jun-14	08881140602001	11	99	210
Carbon and Clay Media Change June 7-8					
14-PIW	09-Jun-14	08881140609001	39	12	41
14-PIW	10-Jun-14	08881140610002	22	23	30
14-PIW	25-Sep-14	08881140925506	36	---	---
15-26 14-SW20	03-Jun-14	08881140603003	1.2	6.7	2.5
Alberta Tier 1 - Natural Areas*			**230[A]**	**NS**	**NS**

TABLE B7.

WATER QUALITY RESULTS - PIW SAMPLES - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Matrix Sample Number	Cl mg/L	TSS mg/L	Turbidity NTU
Upstream Bag Filter					
15-26 U/S Bag Filter	16-Jun-14	08881140616502	26	---	---
15-26 U/S Bag Filter	19-Jun-14	08881140619502	20	---	---
15-26 U/S Bag Filter	21-Jun-14	08881140621502	20	---	---
15-26 U/S Bag Filter	24-Jun-14	08881140624502	21	---	---
15-26 U/S Bag Filter	26-Jun-14	08881140626502	18	---	---
15-26 U/S Bag Filter	27-Jun-14	08881140627502	16	---	---
15-26 U/S Bag Filter	29-Jun-14	08881140629502	14	---	---
15-26 U/S Bag Filter	30-Jun-14	08881140630502	11	---	---
15-26 U/S Bag Filter	01-Jul-14	08881140701502	14	---	---
15-26 U/S Bag Filter	03-Jul-14	08881140703502	20	---	---
Downstream Bag Filter					
15-26 D/S Bag Filter	16-Jun-14	08881140616503	24	---	---
15-26 D/S Bag Filter	19-Jun-14	08881140619503	20	---	---
15-26 D/S Bag Filter	21-Jun-14	08881140621503	19	---	---
15-26 D/S Bag Filter	24-Jun-14	08881140624503	18	---	---
15-26 D/S Bag Filter	26-Jun-14	08881140626503	17	---	---
15-26 D/S Bag Filter	27-Jun-14	08881140627503	15	---	---
15-26 D/S Bag Filter	29-Jun-14	08881140629503	7.5	---	---
15-26 D/S Bag Filter	30-Jun-14	08881140630503	9.8	---	---
15-26 D/S Bag Filter	01-Jul-14	08881140701503	14	---	---
15-26 D/S Bag Filter	03-Jul-14	08881140703503	17	---	---
Downstream Carbon Filter					
15-26 D/S Carbon Filter	16-Jun-14	08881140616505	57	---	---
15-26 D/S Carbon Filter	19-Jun-14	08881140619505	18	---	---
15-26 D/S Carbon Filter	21-Jun-14	08881140621505	18	---	---
15-26 D/S Carbon Filter	24-Jun-14	08881140624505	23	---	---
15-26 D/S Carbon Filter	26-Jun-14	08881140626505	13	---	---
15-26 D/S Carbon Filter	27-Jun-14	08881140627505	14	---	---
15-26 D/S Carbon Filter	29-Jun-14	08881140629505	6.2	---	---
15-26 D/S Carbon Filter	30-Jun-14	08881140630505	10	---	---
15-26 D/S Carbon Filter	01-Jul-14	08881140701505	14	---	---
15-26 D/S Carbon Filter	03-Jul-14	08881140703505	27	---	---
Alberta Tier 1 - Natural Areas*			**230[A]**	**NS**	**NS**

TABLE B7.

WATER QUALITY RESULTS - PIW SAMPLES - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Matrix Sample Number	Cl mg/L	TSS mg/L	Turbidity NTU
Downstream Clay Filter					
15-26 D/S Clay Filter	16-Jun-14	08881140616504	29	---	---
15-26 D/S Clay Filter	19-Jun-14	08881140619504	21	---	---
15-26 D/S Clay Filter	21-Jun-14	08881140621504	17	---	---
15-26 D/S Clay Filter	24-Jun-14	08881140624504	25	---	---
15-26 D/S Clay Filter	26-Jun-14	08881140626504	15	---	---
15-26 D/S Clay Filter	27-Jun-14	08881140627504	15	---	---
15-26 D/S Clay Filter	29-Jun-14	08881140629504	8.8	---	---
15-26 D/S Clay Filter	30-Jun-14	08881140630504	10	---	---
15-26 D/S Clay Filter	01-Jul-14	08881140701504	16	---	---
15-26 D/S Clay Filter	03-Jul-14	08881140703504	25	---	---
C-Ring Containment					
C Ring Containment	17-Jun-14	08881140617506	24	---	---
C Ring Containment	19-Jun-14	08881140619506	22	---	---
C Ring Containment	21-Jun-14	08881140621506	21	---	---
C Ring Containment	24-Jun-14	08881140624506	18	---	---
C Ring Containment	26-Jun-14	08881140626506	15	---	---
C Ring Containment	27-Jun-14	08881140627506	15	---	---
C Ring Containment	29-Jun-14	08881140629506	9.4	---	---
C Ring Containment	30-Jun-14	08881140630506	12	---	---
C Ring Containment	01-Jul-14	08881140701506	15	---	---
C Ring Containment	03-Jul-14	08881140703506	19	---	---
C Ring Containment	09-Jul-14	08881140709506	25	---	---
C Ring Containment	11-Jul-14	08881140711506	9.5	---	---
C Ring Containment	17-Jul-14	08881140717506	21	---	---
C Ring Containment	19-Jul-14	08881140719506	16	---	---
C Ring Containment	22-Jul-14	08881140722506	19	---	---
C Ring Containment	24-Jul-14	08881140724506	15	---	---
C Ring Containment	26-Jul-14	08881140726506	13	---	---
C Ring Containment	28-Jul-14	08881140728506	6.2	---	---
C Ring Containment	30-Jul-14	08881140730506	10	---	---
C Ring Containment	01-Aug-14	08881140801506	10	---	---
C Ring Containment	04-Aug-14	08881140804506	11	---	---
C Ring Containment	06-Aug-14	08881140806506	13	---	---
C Ring Containment	08-Aug-14	08881140808506	14	---	---
C Ring Containment	12-Aug-14	08881140812506	9.8	---	---
C Ring Containment	13-Aug-14	08881140813506	9	---	---
Alberta Tier 1 - Natural Areas*			**230[A]**	**NS**	**NS**

TABLE B7.

WATER QUALITY RESULTS - PIW SAMPLES - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Matrix Sample Number	Cl mg/L	TSS mg/L	Turbidity NTU
Second Self Cleaning Filter added August 15					
C Ring Containment	15-Aug-14	08881140815506	18	---	---
C Ring Containment	19-Aug-14	08881140819506	15	---	---
C Ring Containment	20-Aug-14	08881140820506	18	---	---
C Ring Containment	22-Aug-14	08881140822506	13	---	---
Second Self Cleaning Filter added into Operation August 23					
C Ring Containment	24-Aug-14	08881140824506	13	---	---
C Ring Containment	26-Aug-14	08881140826506	13	---	---
C Ring Containment	28-Aug-14	08881140828506	18	---	---
C Ring Containment	01-Sep-14	08881140901506	8.5	---	---
C Ring Containment	03-Sep-14	08881140903506	13	---	---
C Ring Containment	04-Sep-14	08881140904506	11	---	---
Clay and Carbon Filter Media Disposed of and Replaced September 7					
C Ring Containment	08-Sep-14	08881140908506	13	---	---
C Ring Containment	11-Sep-14	08881140911506	28	---	---
C Ring Containment	15-Sep-14	08881140915506	23	---	---
C Ring Containment	16-Sep-14	08881140916506	24	---	---
C Ring Containment	18-Sep-14	08881140918506	14	---	---
C Ring Containment	22-Sep-14	08881140922506	22	---	---
C Ring Containment	23-Sep-14	08881140923506	30	---	---
C Ring Containment	28-Sep-14	08881140928506	27	---	---
C Ring Containment	30-Sep-14	08881140930506	19	---	---
C Ring Containment	02-Oct-14	08881141002506	28	---	---
C Ring Containment	06-Oct-14	08881141006506	28	---	---
C Ring Containment	07-Oct-14	08881141007506	34	---	---
C Ring Containment	09-Oct-14	08881141009506	34	---	---
C Ring Containment	16-Oct-14	08881141016506	39	---	---
Minimal Detection Limit			**1**	**3**	**0.1**
Alberta Tier 1 - Natural Areas*			**230[A]**	**NS**	**NS**

Notes:

--- - not analyzed

NS - not specified

[A] - indicates guideline for Aquatic Life exposure pathway

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

Italics - values do not meet applicable guidelines

TABLE B8.

WATER QUALITY RESULTS - PIW SAMPLES - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Pre-Treatment									
14-PIW-PRE	28-Apr-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
14-PIW-PRE	30-Apr-14	<0.0004	0.002	0.00046	0.0023	<0.1	0.24	---	---
14-PIW-PRE	08-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	0.13	---	---
14-PIW-PRE	02-Jun-14	<0.0004	0.00075	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
Carbon and Clay Media Change June 7-8									
14-PIW-PRE	09-Jun-14	<0.0004	<0.0004	<0.0004	<0.0004	<0.1	<0.10	<0.20	<0.20
14-PIW-PRE	10-Jun-14	<0.00040	0.0018	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	16-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	0.21
15-26 Pre-Treatment	19-Jun-14	<0.00040	0.0036	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	21-Jun-14	<0.00040	0.0023	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	24-Jun-14	<0.00040	0.0029	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	26-Jun-14	<0.00040	0.0027	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	29-Jun-14	0.00058	0.0025	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 Pre-Treatment	01-Jul-14	<0.00040	0.0021	<0.00040	<0.004	<0.10	<0.10	0.32	<0.20
15-26 Pre-Treatment	03-Jul-14	<0.00040	0.0039	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
Second Self Cleaning Filter added August 15									
Second Self Cleaning Filter added into Operation August 23									
15-26 Pre-Treatment	04-Sep-14	<0.0004	***0.038***	<0.0004	<0.0008	<0.10	0.16	---	---
Discharge									
14-PIW	08-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	---	---
14-PIW	20-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.2	<0.2
14-PIW	27-May-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	0.18	1	<0.2
14-PIW	02-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
Carbon and Clay Media Change June 7-8									
14-PIW	09-Jun-14	<0.0004	0.00044	<0.0004	<0.0004	<0.1	0.32	0.37	<0.20
14-PIW	10-Jun-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.1	<0.10	<0.20	<0.20
14-PIW	25-Sep-14	<0.0004	0.0053	***0.0027***	0.017	0.16	<0.10	---	---
14-PIW	25-Sep-14	<0.0004	***0.0370***	***0.0420***	0.240	0.21	---	---	---
15-26 14-SW20	03-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	<0.20	<0.20
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**0.005^{P,MAC}**	**0.024^{P,AO}**	**0.0024^{P,AO}**	**0.3^{P,AO}**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**

TABLE B8.

WATER QUALITY RESULTS - PIW SAMPLES - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Upstream Bag Filter									
15-26 U/S Bag Filter	16-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	19-Jun-14	<0.00040	0.0033	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	21-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	24-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	26-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	0.15	0.22	<0.20
15-26 U/S Bag Filter	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	29-Jun-14	<0.00040	0.0024	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	01-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 U/S Bag Filter	03-Jul-14	<0.00040	0.0023	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
Downstream Bag Filter									
15-26 D/S Bag Filter	16-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	0.69	2.7	<0.20
15-26 D/S Bag Filter	19-Jun-14	<0.00040	0.0032	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	21-Jun-14	<0.00040	0.0024	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	24-Jun-14	<0.00040	0.0023	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	26-Jun-14	<0.00040	0.0021	<0.00040	<0.004	<0.10	0.1	<0.20	<0.20
15-26 D/S Bag Filter	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	29-Jun-14	<0.00040	0.0025	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	01-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Bag Filter	03-Jul-14	<0.00040	0.0027	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
Downstream Carbon Filter									
15-26 D/S Carbon Filter	16-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	0.35	<0.20
15-26 D/S Carbon Filter	19-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	21-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	24-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	26-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	29-Jun-14	0.00059	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	01-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Carbon Filter	03-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**0.005^{P,MAC}**	**0.024^{P,AO}**	**0.0024^{P,AO}**	**0.3^{P,AO}**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**

TABLE B8.

WATER QUALITY RESULTS - PIW SAMPLES - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Downstream Clay Filter									
15-26 D/S Clay Filter	16-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	0.2	<0.20	<0.20
15-26 D/S Clay Filter	19-Jun-14	<0.00040	0.0035	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	21-Jun-14	<0.00040	0.0028	<0.00040	<0.004	0.1	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	24-Jun-14	<0.00040	0.0022	<0.00040	<0.004	<0.1	0.11	<0.20	<0.20
15-26 D/S Clay Filter	26-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	0.11	<0.20	<0.20
15-26 D/S Clay Filter	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	29-Jun-14	<0.00040	0.0024	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	01-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
15-26 D/S Clay Filter	03-Jul-14	<0.00040	0.0023	<0.00040	<0.004	<0.10	<0.10	0.21	<0.20
C-Ring Containment									
C Ring Containment	17-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	0.22
C Ring Containment	19-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	21-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	24-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	26-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	27-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	29-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	30-Jun-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	0.29	<0.20
C Ring Containment	01-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	03-Jul-14	<0.00040	<0.002	<0.00040	<0.004	<0.10	<0.10	<0.20	<0.20
C Ring Containment	09-Jul-14	<0.00040	0.00069	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	11-Jul-14	<0.00040	0.00048	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	17-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	19-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	22-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	24-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	26-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	28-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	30-Jul-14	<0.00040	<0.0004	<0.00040	<0.0008	<0.10	<0.10	---	---
C Ring Containment	01-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	06-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	08-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	12-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	13-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**0.005^{P,MAC}**	**0.024^{P,AO}**	**0.0024^{P,AO}**	**0.3^{P,AO}**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**

TABLE B8.

WATER QUALITY RESULTS - PIW SAMPLES - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
Second Self Cleaning Filter added August 15									
C Ring Containment	15-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
C Ring Containment	19-Aug-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	20-Aug-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	22-Aug-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
Second Self Cleaning Filter added into Operation August 23									
C Ring Containment	24-Aug-14	<0.0004	0.0014	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	26-Aug-14	<0.0004	0.0016	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	28-Aug-14	<0.0004	0.0033	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	01-Sep-14	<0.0004	0.0029	<0.0004	<0.0008	<0.10	0.13	---	---
C Ring Containment	03-Sep-14	<0.0004	0.0093	<0.0004	<0.0008	<0.10	0.12	---	---
C Ring Containment	04-Sep-14	<0.0004	0.0092	<0.0004	<0.0008	<0.10	0.11	---	---
Clay and Carbon Filter Media Disposed of and Replaced September 7									
C Ring Containment	08-Sep-14	<0.0004	0.0082	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	11-Sep-14	<0.0004	0.00057	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	15-Sep-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	16-Sep-14	<0.0004	<0.0004	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	18-Sep-14	<0.0004	0.00076	<0.0004	<0.0008	<0.10	<0.10	---	---
C Ring Containment	22-Sep-14	<0.0004	0.0023	<0.0004	<0.0008	0.25	<0.10	---	---
C Ring Containment	23-Sep-14	<0.0004	0.0045	***0.0026***	0.017	0.27	<0.10	---	---
C Ring Containment	28-Sep-14	<0.0004	0.0089	0.00074	<0.005	0.19	0.14	---	---
C Ring Containment	30-Sep-14	<0.0004	0.0048	<0.0004	0.0046	<0.10	<0.10	---	---
C Ring Containment	02-Oct-14	<0.0004	0.0099	<0.0004	0.0014	0.16	0.11	---	---
C Ring Containment	06-Oct-14	<0.0004	0.005	<0.0004	<0.0008	0.33	<0.10	---	---
C Ring Containment	07-Oct-14	<0.0004	0.016	<0.0004	<0.0008	0.21	0.12	---	---
C Ring Containment	09-Oct-14	<0.0004	0.0036	<0.0004	<0.0008	0.12	0.11	---	---
C Ring Containment	16-Oct-14	<0.0004	0.018	0.00062	0.0084	0.58	0.32	---	---
Minimal Detection Limit		**0.0004**	**0.0004**	**0.0004**	**0.0008**	**0.1**	**0.1**	**0.2**	**0.2**
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**$0.005^{P,MAC}$**	**$0.024^{P,AO}$**	**$0.0024^{P,AO}$**	**$0.3^{P,AO}$**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**

Notes:

--- - not analyzed

NS - not specified

A - indicates guideline for Aquatic Life exposure pathway

P - indicates guideline for Potable Groundwater exposure pathway

AO - aesthetic objective from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health Canada 2012)

MAC - maximum acceptable concentration based on health effects from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health Canada

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

Italics - values do not meet applicable guidelines

TABLE B9.

WATER QUALITY RESULTS - PIW SAMPLES - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benz[a]anthracene[++] µg/L	Benzo[b+j]fluoranthene[‡] µg/L	Benzo[k]fluoranthene[‡] µg/L	Benzo[g,h,i]perylene[++] µg/L	Benzo[a]pyrene[++] µg/L	Chrysene[++] µg/L	Dibenz[a,h]anthracene[++] µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-c,d]pyrene[‡] µg/L	Naphthalene µg/L	Phenanthrene µg/L	Pyrene µg/L	Benzo[a]pyreneTPE[+++] µg/L
Pre-Treatment																		
14-PIW-PRE	28-Apr-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.51	<0.050	<0.020	ND
14-PIW-PRE	30-Apr-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	***59***	<0.050	<0.020	ND
14-PIW-PRE	08-May-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	0.012	0.061	<0.0085	0.57	0.10	***0.046****	ND
14-PIW-PRE	02-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Carbon and Clay Media Change June 7-8																		
14-PIW-PRE	09-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
14-PIW-PRE	10-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	16-Jun-14	<0.10	<0.10	<0.010	0.016	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	0.0016
15-26 Pre-Treatment	19-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	30-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 Pre-Treatment	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Second Self Cleaning Filter added August 15																		
Second Self Cleaning Filter added into Operation August 23																		
15-26 Pre-Treatment	04-Sep-14	0.1	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	0.0099	<0.0075	<0.010	0.13	<0.0085	0.16	0.20	***0.039***	0.0001
Discharge																		
14-PIW	08-May-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	***0.034****	ND
14-PIW	20-May-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.21	<0.050	<0.020	ND
14-PIW	27-May-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	***14***	<0.050	<0.020	ND
14-PIW	02-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.17	<0.050	<0.020	ND
Carbon and Clay Media Change June 7-8																		
14-PIW	09-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	***22***	<0.050	<0.020	ND
14-PIW	10-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
14-PIW	25-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.27	<0.050	<0.020	ND
15-26 14-SW20	03-Jun-14	<0.12	<0.12	<0.012	<0.010	<0.010	<0.010	<0.010	<0.0089	<0.010	<0.0089	<0.012	<0.060	<0.010	<0.12	<0.060	<0.024	ND
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8[A]**	**46[A]**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**0.015[A]**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**0.4[A]**	**0.025[A]**	**0.01[P]**

TABLE B9.

WATER QUALITY RESULTS - PIW SAMPLES - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benz[a]anthracene[++] µg/L	Benzo[b+j]fluoranthene[‡] µg/L	Benzo[k]fluoranthene[‡] µg/L	Benzo[g,h,i]perylene[++] µg/L	Benzo[a]pyrene[++] µg/L	Chrysene[++] µg/L	Dibenz[a,h]anthracene[++] µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-c,d]pyrene[‡] µg/L	Naphthalene µg/L	Phenanthrene µg/L	Pyrene µg/L	Benzo[a]pyreneTPE[+++] µg/L
Upstream Bag Filter																		
15-26 U/S Bag Filter	16-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.22	<0.050	<0.020	ND
15-26 U/S Bag Filter	19-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
15-26 U/S Bag Filter	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.17	<0.050	<0.020	ND
15-26 U/S Bag Filter	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.050	<0.020	ND
15-26 U/S Bag Filter	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.050	<0.020	ND
15-26 U/S Bag Filter	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 U/S Bag Filter	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 U/S Bag Filter	30-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 U/S Bag Filter	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.15	<0.050	<0.020	ND
15-26 U/S Bag Filter	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Downstream Bag Filter																		
15-26 D/S Bag Filter	16-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	1.00	<0.050	0.02	ND
15-26 D/S Bag Filter	19-Jun-14	<0.10	<0.10	***0.034***	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
15-26 D/S Bag Filter	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.31	0.051	<0.020	ND
15-26 D/S Bag Filter	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.19	<0.050	<0.020	ND
15-26 D/S Bag Filter	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.16	<0.050	<0.020	ND
15-26 D/S Bag Filter	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Bag Filter	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Bag Filter	30-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Bag Filter	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.2	<0.050	<0.020	ND
15-26 D/S Bag Filter	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Downstream Carbon Filter																		
15-26 D/S Carbon Filter	16-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	1.10	<0.050	<0.020	ND
15-26 D/S Carbon Filter	19-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	0.17	<0.050	<0.020	ND
15-26 D/S Carbon Filter	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.19	<0.050	<0.020	ND
15-26 D/S Carbon Filter	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.16	<0.050	<0.020	ND
15-26 D/S Carbon Filter	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.13	<0.050	<0.020	ND
15-26 D/S Carbon Filter	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.1	<0.050	<0.020	ND
15-26 D/S Carbon Filter	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Carbon Filter	30-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Carbon Filter	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Carbon Filter	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8[A]**	**46[A]**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**0.015[A]**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**0.4[A]**	**0.025[A]**	**0.01[P]**

TABLE B9.

WATER QUALITY RESULTS - PIW SAMPLES - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benz[a]anthracene[++] µg/L	Benzo[b+j]fluoranthene[‡] µg/L	Benzo[k]fluoranthene[‡] µg/L	Benzo[g,h,i]perylene[++] µg/L	Benzo[a]pyrene[++] µg/L	Chrysene[++] µg/L	Dibenz[a,h]anthracene[++] µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-c,d]pyrene[‡] µg/L	Naphthalene µg/L	Phenanthrene µg/L	Pyrene µg/L	Benzo[a]pyreneTPE[+++] µg/L
Downstream Clay Filter																		
15-26 D/S Clay Filter	16-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	1.10	<0.050	<0.020	ND
15-26 D/S Clay Filter	19-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	0.22	<0.050	<0.020	ND
15-26 D/S Clay Filter	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.3	<0.050	<0.020	ND
15-26 D/S Clay Filter	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.23	<0.050	<0.020	ND
15-26 D/S Clay Filter	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.18	<0.050	<0.020	ND
15-26 D/S Clay Filter	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
15-26 D/S Clay Filter	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
15-26 D/S Clay Filter	30-Jun-14	<0.10	<0.10	<0.010	0.017	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	0.0017
15-26 D/S Clay Filter	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.13	<0.050	<0.020	ND
15-26 D/S Clay Filter	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C-Ring Containment																		
C Ring Containment	17-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
C Ring Containment	19-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.015	<0.0075	<0.010	<0.050	<0.0085	0.10	<0.050	<0.020	ND
C Ring Containment	21-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.18	<0.050	<0.020	ND
C Ring Containment	24-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.17	<0.050	<0.020	ND
C Ring Containment	26-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.16	<0.050	<0.020	ND
C Ring Containment	27-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	0.10	<0.050	<0.020	ND
C Ring Containment	29-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	30-Jun-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.025	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	01-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	03-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.020	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	09-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.39	<0.050	<0.020	ND
C Ring Containment	11-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
C Ring Containment	17-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
C Ring Containment	19-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.050	<0.020	ND
C Ring Containment	22-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.050	<0.020	ND
C Ring Containment	24-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.16	<0.050	<0.020	ND
C Ring Containment	26-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	28-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.13	<0.050	<0.020	ND
C Ring Containment	30-Jul-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
C Ring Containment	01-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	04-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.19	<0.050	<0.020	ND
C Ring Containment	06-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	08-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.17	<0.050	<0.020	ND
C Ring Containment	12-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.15	<0.050	<0.020	ND
C Ring Containment	13-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.22	<0.050	<0.020	ND
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8[A]**	**46[A]**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**0.015[A]**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**0.4[A]**	**0.025[A]**	**0.01[P]**

TABLE B9.

WATER QUALITY RESULTS - PIW SAMPLES - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benz[a]anthracene++ µg/L	Benzo[b+j]fluoranthene‡ µg/L	Benzo[k]fluoranthene‡ µg/L	Benzo[g,h,i]perylene‡ µg/L	Benzo[a]pyrene++ µg/L	Chrysene++ µg/L	Dibenz[a,h]anthracene++ µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-c,d]pyrene‡ µg/L	Naphthalene µg/L	Phenanthrene µg/L	Pyrene µg/L	Benzo[a]pyreneTPE+++ µg/L
Second Self Cleaning Filter added August 15																		
C Ring Containment	15-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
C Ring Containment	19-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.050	ND
C Ring Containment	20-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.050	ND
C Ring Containment	22-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.050	ND
Second Self Cleaning Filter added into Operation August 23																		
C Ring Containment	24-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	26-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	28-Aug-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.13	<0.050	***0.04***	ND
C Ring Containment	01-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.12	<0.050	<0.020	ND
C Ring Containment	03-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.050	0.02	ND
C Ring Containment	04-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	0.056	0.024	ND
Clay and Carbon Filter Media Disposed of and Replaced September 7																		
C Ring Containment	08-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	0.051	<0.020	ND
C Ring Containment	11-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	15-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	16-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	0.024	ND
C Ring Containment	18-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	0.024	ND
C Ring Containment	22-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
C Ring Containment	23-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.24	0.055	<0.020	ND
C Ring Containment	28-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	0.0092	<0.0075	<0.010	<0.050	<0.0085	0.17	0.064	<0.020	0.000092
C Ring Containment	30-Sep-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.20	0.064	***0.027***	ND
C Ring Containment	02-Oct-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.15	<0.050	<0.020	ND
C Ring Containment	06-Oct-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
C Ring Containment	07-Oct-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.16	<0.050	<0.020	ND
C Ring Containment	09-Oct-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.14	<0.050	<0.020	ND
C Ring Containment	16-Oct-14	<0.10	<0.10	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.0075	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.050	<0.020	ND
Minimal Detection Limit		**0.1**	**0.1**	**0.01**	**0.0085**	**0.0085**	**0.0085**	**0.0085**	**0.0075**	**0.0085**	**0.0075**	**0.01**	**0.05**	**0.0085**	**0.1**	**0.05**	**0.02**	**-**
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8^{A}**	**46^{A}**	**0.012^{A}**	**0.018^{A}**	**0.48^{A}**	**0.48^{A}**	**0.17^{A}**	**0.015^{A}**	**1.4^{A}**	**0.26^{A}**	**0.04^{A}**	**3^{A}**	**0.21^{A}**	**1.1^{A}**	**0.4^{A}**	**0.025^{A}**	**0.01^{P}**

Notes:

ND - not detected

NS - not specified

^{A} - indicates guideline for Aquatic Life exposure pathway

^{P} - indicates guideline for Potable Groundwater exposure pathway

$^{++}$ - carcinogenic PAH compounds

$^{+++}$ - equivalent Benzo[a]pyrene concentrations calculated by Matrix Solutions are based on relative carcinogenic potency

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - concentration is determined to be suspect as pyrene was detected in all samples analyzed in Maxxam batch 7479418 (including blanks)

Italics - values do not meet applicable guidelines

TABLE B10.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Cl mg/L	TSS mg/L	Turbidity NTU
14-DP1	02-Jun-14	7.3	3500	3100
14-DP1	09-Jun-14	9.4	940	2000
14-DP1	16-Jun-14	7.4	1200	720
14-DP1	23-Jun-14	9.3	530	220
14-DP1	04-Aug-14	9.5	1600	610
14-DP1	02-Sep-14	13	---	---
14-DP1	09-Oct-14	15	---	---
14-DP2	02-Jun-14	8.7	2600	2200
14-DP2	09-Jun-14	9.6	2600	3000
14-DP2	16-Jun-14	8	1800	930
14-DP2	23-Jun-14	9.4	1100	420
14-DP2	14-Jul-14	11	---	---
14-DP2	04-Aug-14	12	140	38
14-DP2	02-Sep-14	13	---	---
14-DP2	09-Oct-14	24	---	---
14-DP3	02-Jun-14	11	1300	810
14-DP3	09-Jun-14	11	1400	920
14-DP3	16-Jun-14	9.2	980	440
14-DP3	23-Jun-14	8.9	390	210
14-DP3	14-Jul-14	8.2	---	---
14-DP3	04-Aug-14	10	1100	360
14-DP3	02-Sep-14	13	---	---
14-DP3	09-Oct-14	23	---	---
14-DP4	02-Jun-14	7.1	3700	2900
14-DP4	09-Jun-14	7.1	280	240
14-DP4	16-Jun-14	5	270	180
14-DP4	23-Jun-14	4.3	340	130
14-DP4	14-Jul-14	5.4	---	---
14-DP4	04-Aug-14	6.3	110	38
14-DP4	02-Sep-14	14	---	---
14-DP4	09-Oct-14	---	---	---
Alberta Tier 1 - Natural Areas*		**230[A]**	**NS**	**NS**
ESRD Freshwater Aquatic Life**		**120[LT]**	**narrative**	**narrative**
ESRD Agriculture - Irrigation**		**100[crop]**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**NS**	**NS**

TABLE B10.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - GENERAL PARAMETERS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Cl mg/L	TSS mg/L	Turbidity NTU
14-DP5	02-Jun-14	5.2	1300	460
14-DP5	09-Jun-14	3.9	370	130
14-DP5	16-Jun-14	2.7	430	130
14-DP5	23-Jun-14	2.2	150	46
14-DP5	14-Jul-14	3.8	---	---
14-DP5	04-Aug-14	4.4	4	2
14-DP5	02-Sep-14	12	---	---
14-DP5	09-Oct-14	10	---	---
14-DP6	02-Jun-14	7.8	550	250
14-DP6	09-Jun-14	5.7	190	110
14-DP6	16-Jun-14	4.3	140	33
14-DP6	23-Jun-14	2.5	55	15
14-DP6	14-Jul-14	2.6	---	---
14-DP6	04-Aug-14	2.8	18	3.1
14-DP6	02-Sep-14	11	---	---
14-DP6	09-Oct-14	8.7	---	---
14-DP7	14-Jul-14	8.8	---	---
14-DP7	02-Sep-14	11	---	---
14-DP7	09-Oct-14	---	---	---
Minimal Detection Limit		**1**	**3**	**0.1**
Alberta Tier 1 - Natural Areas*		**230^{A}**	**NS**	**NS**
ESRD Freshwater Aquatic Life**		**120^{LT}**	**narrative**	**narrative**
ESRD Agriculture - Irrigation**		**100^{crop}**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**NS**	**NS**

Notes:

NS - not specified

^{A} - indicates guideline for Aquatic Life exposure pathway

^{crop} - guideline level is crop dependent; criterion shown is most stringent value

^{LT} - long-term exposure guideline; see applicable guidelines for further details

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - *Environmental Quality Guidelines for Alberta Surface Waters* (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines

TABLE B11.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
14-DP1	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP1	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP1	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP1	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP1	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP1	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP1	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	<0.10	---	---
14-DP2	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP2	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP2	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	***0.13***	---	---
14-DP2	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP2	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	***0.13***	---	---
14-DP2	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP2	02-Sep-14	<0.00040	***0.0019***	<0.00040	<0.00080	<0.10	***0.15***	---	---
14-DP2	09-Oct-14	<0.0004	0.0057	<0.0004	<0.0008	<0.1	<0.10	---	---
14-DP3	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP3	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP3	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP3	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP3	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP3	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP3	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP3	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	---	---	---
14-DP4	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP4	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP4	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP4	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP4	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP4	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP4	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP4	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	<0.10	---	---
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**0.005^{P,MAC}**	**0.024^{P,AO}**	**0.0024^{P,AO}**	**0.3^{P,AO}**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**
ESRD Freshwater Aquatic Life**		**0.04**	**0.0005**	**0.09**	**0.03**	**NSST**	**NSST**	**NS**	**NS**
ESRD Agriculture - Irrigation**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B11.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} - BTEX mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L
14-DP5	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP5	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP5	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP5	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP5	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP5	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP5	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP5	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	<0.10	---	---
14-DP6	02-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP6	09-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.1	<0.10	<0.20	<0.20
14-DP6	16-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP6	23-Jun-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP6	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP6	04-Aug-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP6	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP6	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	<0.10	---	---
14-DP7	14-Jul-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP7	02-Sep-14	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	---	---
14-DP7	09-Oct-14	<0.0004	<0.00040	<0.0004	<0.0008	<0.1	<0.10	---	---
Minimal Detection Limit		**0.0004**	**0.0004**	**0.0004**	**0.0008**	**0.1**	**0.1**	**0.2**	**0.2**
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**$0.005^{P,MAC}$**	**$0.024^{P,AO}$**	**$0.0024^{P,AO}$**	**$0.3^{P,AO}$**	**2.2^{P}**	**1.1^{P}**	**NS**	**NS**
ESRD Freshwater Aquatic Life**		**0.04**	**0.0005**	**0.09**	**0.03**	**NS^{ST}**	**NS^{ST}**	**NS**	**NS**
ESRD Agriculture - Irrigation**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**0.024**	**0.0024**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

NS - not specified

^{A} - indicates guideline for Aquatic Life exposure pathway

^{P} - indicates guideline for Potable Groundwater exposure pathway

^{AO} - aesthetic objective from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health Canada 2012)

^{MAC} - maximum acceptable concentration based on health effects from *Guidelines for Canadian Drinking Water Quality-Summary Table* (Health C

ST - see applicable guidelines for short-term exposure guideline

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines

TABLE B12.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
14-DP1	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP1	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP1	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP1	23-Jun-14	<0.10	<0.10	<0.21	<0.010	<0.0089	<0.0089	<0.0089	<0.0089	<0.052	<0.0078	<0.052	<0.0089	<0.0078	<0.010	<0.052	<0.0089	<0.10	<0.10	<0.052	<0.052	<0.021	<0.21	ND
14-DP1	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP1	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP1	09-Oct-14	<0.15	<0.15	<0.29	<0.015	<0.013	<0.013	<0.013	<0.013	<0.074	<0.011	<0.074	<0.013	<0.011	<0.015	<0.074	<0.013	<0.15	<0.15	<0.074	<0.074	<0.029	<0.29	ND
14-DP2	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	0.011	<0.0075	0.023	<0.050	<0.0085	<0.10	<0.10	<0.050	0.086	<0.020	0.46	0.58
14-DP2	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP2	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP2	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP2	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	0.11	<0.10	<0.050	<0.050	<0.020	<0.20	0.11
14-DP2	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP2	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP2	09-Oct-14	<0.13	<0.13	<0.26	<0.013	<0.011	<0.011	<0.011	<0.011	<0.064	<0.0096	<0.064	<0.011	<0.0096	<0.013	<0.064	<0.011	<0.13	<0.13	<0.064	<0.064	<0.026	<0.26	ND
14-DP3	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP3	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP3	16-Jun-14	<0.15	<0.15	<0.29	<0.015	<0.013	<0.013	<0.013	<0.013	<0.074	<0.011	<0.074	<0.013	<0.011	<0.015	<0.074	<0.013	<0.15	<0.15	<0.074	<0.074	<0.029	<0.29	ND
14-DP3	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP3	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP3	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP3	02-Sep-14	<0.16	<0.16	<0.32	<0.016	<0.014	<0.014	<0.014	<0.014	<0.081	<0.012	<0.081	<0.014	<0.012	<0.016	<0.081	<0.014	<0.16	<0.16	<0.081	<0.081	<0.032	<0.32	ND
14-DP3	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP4	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP5	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8[A]**	**46[A]**	**NS**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**NS**	**0.015[A]**	**NS**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**NS**	**NS**	**0.4[A]**	**0.025[A]**	**NS**	**0.01[P]**
ESRD Freshwater Aquatic Life**		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

TABLE B12.

WATER QUALITY RESULTS - GROUNDWATER SAMPLES IN PIW DISCHARGE AREA - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Monitoring Well	Sample Date	Acenaphthene µg/L	Acenaphthylene µg/L	Acridine µg/L	Anthracene µg/L	Benz[a]anthracene µg/L	Benzo[b+j]fluoranthene µg/L	Benzo[k]fluoranthene µg/L	Benzo[g,h,i]perylene µg/L	Benzo[c]phenanthrene µg/L	Benzo[a]pyrene µg/L	Benzo[e]pyrene µg/L	Chrysene µg/L	Dibenz[a,h]anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno[1,2,3-cd]pyrene µg/L	Naphthalene µg/L	2-Methylnaphthalene µg/L	Perylene µg/L	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L	TOTAL PAH µg/L
14-DP6	02-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	09-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	16-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	23-Jun-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	04-Aug-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP6	09-Oct-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP7	14-Jul-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
14-DP7	02-Sep-14	<0.10	<0.10	<0.20	<0.010	<0.0085	<0.0085	<0.0085	<0.0085	<0.050	<0.0075	<0.050	<0.0085	<0.0075	<0.010	<0.050	<0.0085	<0.10	<0.10	<0.050	<0.050	<0.020	<0.20	ND
Minimal Detection Limit		**0.1**	**0.1**	**0.2**	**0.01**	**0.0085**	**0.0085**	**0.0085**	**0.0085**	**0.05**	**0.0075**	**0.05**	**0.0085**	**0.0075**	**0.01**	**0.05**	**0.0085**	**0.1**	**0.1**	**0.05**	**0.05**	**0.02**	**0.2**	**-**
Alberta Tier 1 - Coarse Grained Soils - Natural Areas*		**5.8[A]**	**46[A]**	**NS**	**0.012[A]**	**0.018[A]**	**0.48[A]**	**0.48[A]**	**0.17[A]**	**NS**	**0.015[A]**	**NS**	**1.4[A]**	**0.26[A]**	**0.04[A]**	**3[A]**	**0.21[A]**	**1.1[A]**	**NS**	**NS**	**0.4[A]**	**0.025[A]**	**NS**	**0.01[P]**
ESRD Freshwater Aquatic Life**		**5.8**	**NS**	**4.4**	**0.012**	**0.018**	**NS**	**NS**	**NS**	**NS**	**0.015**	**NS**	**NS**	**NS**	**0.04**	**3**	**NS**	**1**	**NS**	**NS**	**0.4**	**0.025**	**3.4**	**NS**
ESRD Agriculture - Irrigation**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
ESRD Agriculture - Livestock**		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Notes:

--- - not analyzed

ND - not detected

NS - not specified

[A] - indicates guideline for Aquatic Life exposure pathway

[P] - indicates guideline for Potable Groundwater exposure pathway

* - *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV 2010)

** - Environmental Quality Guidelines for Alberta Surface Waters (ESRD 2014)

Italics - values do not meet applicable ESRD guidelines