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

OCTOBER 7, 2013

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) at 09-21-067-04 W4M on June 24, 2013. The 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-2013-33/NR), requesting the preparation of a Comprehensive Remedial Plan (CRP). This report summarizes the progress towards the realization of this plan and includes data collected up to September 30, 2013.

Summary of Activities to Date

Individual Plan Submission

As required by the EPO, the CRP includes the development, submission and implementation of several specific plans. The status of these plans is indicated below:

Table 1: Components of the Comprehensive Remedial Plan

Plan Name	Due Date	Submission Date	Approval Date	Implementation Start Date
Water Management Plan for Dewatering	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013
Water Body Monitoring Plan	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013
Erosion and Sedimentation Prevention Plan	September 26, 2013	September 26, 2013	September 27, 2013	September 27, 2013
Phase 2 Environmental Assessment Plan	October 15, 2013	October 6, 2013	Pending	Pending
Bitumen Emulsion Delineation and Containment Plan	October 6, 2013	October 6, 2013	Pending	Pending
Amphibian Salvage Plan	September 26, 2013	September 25, 2013	September 27, 2013	September 27, 2013

Plan Name	Due Date	Submission Date	Approval Date	Implementation Start Date
Fish and Fish Habitat Assessment Plan	September 26, 2013	September 25, 2013	September 27, 2013	September 27, 2013
Wetlands Impact Assessment Plan	September 30, 2013	September 30, 2013	Pending	Pending
Water Body Restoration Plan	November 30, 2013	Pending	Pending	Pending
Wildlife Management Plan	N/A	July 13, 2013	July 13, 2013	July 14, 2013
Waste Management Plan	N/A	July 4, 2013	July 4, 2013	July 5, 2013

Dewatering Activities

The water body has been divided in four basins as indicated on Figure 1. Basins 1, 2 and 3 are being dewatered while Basin 4 is being used for water storage. Three independent pumping systems have been set up to pump water out of Basins 1, 2 and 3. This configuration allows Canadian Natural to adjust pumping rates in the various basins and follows the specifications laid out in the approved Water Management Plan for Dewatering.

Pumping started on September 27, 2013. The volume of water pumped from each basin is presented in Appendix A. Between September 27 and 30, 2013, the pumping rates have increased steadily and the dewatering activities have taken place in accordance to the conditions specified in the Water Management Plan for Dewatering and in the Erosion and Sedimentation Prevention Plan.

Summary of Monitoring Data

In accordance with the Water Body Monitoring Plan, an extensive water quality and water quantity monitoring program was implemented on September 27, 2013. This program is specific to the dewatering phase of the CRP and complements the ongoing water quality monitoring implemented in June 2013.

Dewatering Water Quality

Water quality samples were collected every two hours from the pumping lines and/or discharge locations to ensure that water quality met the guidelines for discharge into the environment. Sampling locations are shown on Figure 1 and water quality results are presented in Appendix B.

Water from Basin 2 (the most affected by the bitumen emulsion FTS) has been directed through an activated carbon filtration system. To date, water quality has been within applicable guidelines at all discharge points.

Dewatering Water Quantity

Water quantity parameters were recorded, at a minimum, twice daily to document the progress of the dewatering operations and ensure the hydrology in the receiving environment was not affected by the dewatering operations. Monitoring locations are illustrated on Figure 2 and water quantity results are presented in Appendix C.

Since the start of the dewatering activities on September 27, 2013, water levels in the water body and its surrounding areas are fluctuating as anticipated. As of September 30, 2013, water levels in Basins 1, 2 and 3 decreased by 11 cm and increased by 4 cm in Basin 4.

Surface Water Quality

Water quality samples were collected daily from surface locations indicated on Figure 3 to ensure water quality in the receiving environment was not affected by the dewatering operations. Water quality results are presented in Appendix D.

To date, water quality from the water body and the downstream fen has been within freshwater aquatic life guidelines at all sampling locations.

Shallow Groundwater

Water quality samples were collected from shallow groundwater locations, as denoted on Figure 4. Water quality results are presented in Appendix D.

All samples met acceptable freshwater guidelines with the exception of four samples that indicated elevated levels of toluene. These samples were located in proximity to Basin 3. The sources of these concentrations are being investigated.

Conclusions

The implementation of the CRP started on September 27, 2013 upon approval by ESRD of specific components of the plan as indicated in Table 1.

The data collected as of September 30, 2013 indicate that the dewatering of the water body is taking place as planned with no adverse effects on the hydrology and water quality in the surrounding environment.

Monitoring will continue with the same intensity until completion of the dewatering phase.

528000 528250 528500 528750 529000 529250 529500 529750 530000 530250 530500 530750

6076250 6076000 6075750 6075500 6075250 6075000 6074750 6074500 6074250 6074000 6073750 6073500 6073250 6073000 6072750

N

Reserve Pump

Basin 4

Basin 3

13-DW31

13-DW32

13-DW10

13-DW20

Basin 1 & 2 Pumps

Basin 3 Pump

13-DW30

13-DW23

Basin 1

Basin 2

13-DW25

13-DW12

13-DW11

Borrow Pump

Twp. 67

Rg. 4
W4M

Basin Boundary
Watercourse
Aqua Dam
Discharge Line
Dewatering Program Facility
Dewatering Program Pump Facility
Compliance Monitoring Location
Discharge Outlet Monitoring Location
Filtration Monitoring Location

1:11,000
100 0 100
Metres
NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS used under license. Imagery obtained from client used under license (August 2010).

I:\Canadian\Natural\8881\FiguresAndTables\SPL\2013\Client\PublicReportUpdate\October12\Figure-1-Basin_and_Discharge_Sampling_Locations.mxd

Canadian Natural

Primrose 9-21-67-4 W4M

Basin and Discharge Sampling Locations

Date: 12 Oct 2013	Project: 8881-523	Technical: S. Toner	Reviewer: S. Toner	Drawn: R. Keller

Figure 1

520000 521000 522000 523000 524000 525000 526000 527000 528000 529000 530000

6077000
6076000
6075000
6074000
6073000
6072000

N

13-SG1
13-SG8
13-SG12
13-SG11
Unnamed Water Body
13-SG7
13-SG6
13-SG4
13-SG13
13-SG3
13-SG9
Wolf River
Ken Baker Road

Twp. 67

Rg. 5 W4M Rg. 4

Water Body
Watercourse
Direction of Flow
Staff Gauge Location

1:30,000
250 0 250
Meters
NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS and GeoBase used under license. Imagery obtained from a combination of client (August 2010) and Valtus (June 29, 1999 - September 13, 2009) used under license.

Canadian Natural

Primrose 9-21-67-4 W4M

Staff Gauge Locations

Date:	Project:	Technical:	Reviewer:	Drawn:
15 Oct 2013	8881-523	S. Toner	S. Toner	R. Keller

Disclaimer: Prepared solely for the use of Canadian Natural Ltd. as specified in the accompanying report. No representation of any kind is made to other parties with which Canadian Natural Ltd. has not entered into contract.

Figure 2

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520000 521000 522000 523000 524000 525000 526000 527000 528000 529000 530000

6077000
6076000
6075000
6074000
6073000
6072000

13-SW44
13-SW43
13-SW42
13-SW12
13-SW31
13-SW7
13-SW22
13-SW26
13-SW27
13-SW16
13-SW39

Wolf River
Unnamed Water Body
Ken Baker Road
Twp. 67
N

Rg. 5
W4M
Rg. 4

Water Body
Watercourse
Direction of Flow
Daily Surface Water Monitoring Location

1:30,000
250 0 250
Meters
NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS and GeoBase used under license. Imagery obtained from a combination of client (August 2010) and Valtus (June 29, 1999 - September 13, 2009) used under license.

I:\CanadianNatural\8881\Figures\And\Tables\SPL\2013\Client\Public\Report\Update\October12\Figure-3-Daily_Surface_Water_Monitoring_Locations.mxd

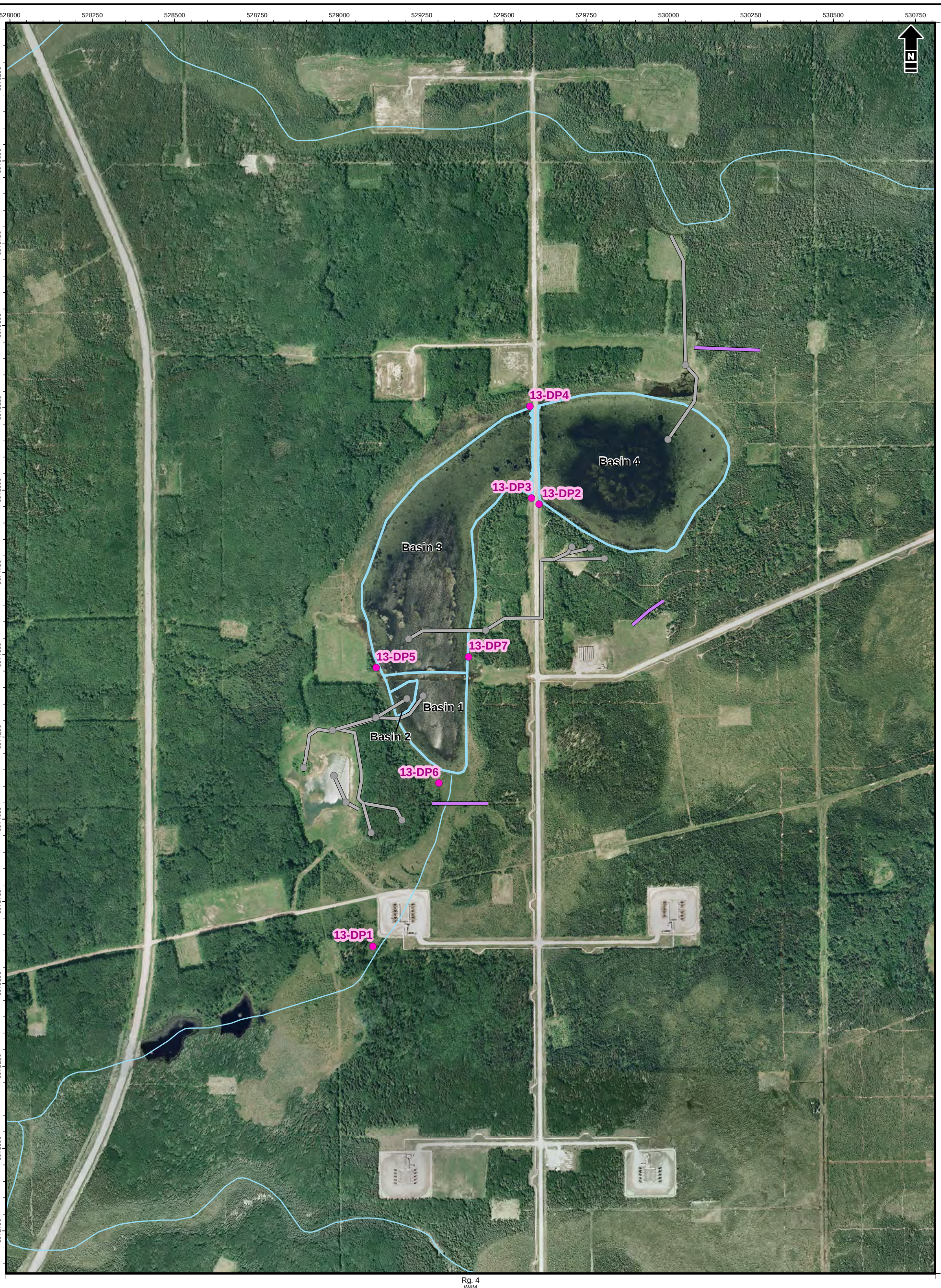
Canadian Natural

Primrose 9-21-67-4 W4M

Daily Surface Water Monitoring Locations Downstream of the 09-21 Water body and in the Wolf Lake River

Date:	Project:	Technical:	Reviewer:	Drawn:
15 Oct 2013	8881-523	S. Toner	S. Toner	R. Keller

Figure 3



Basin Boundary
Watercourse
Aqua Dam
Discharge Line
Drivepoint Piezometer Sample Location
Dewatering Program Facility

1:11,000
100 0 100
Metres
NAD 1983 UTM Zone 12N

Reference: Data obtained from AltaLIS used under license. Imagery obtained from client used under license (August 2010).

Canadian Natural

Primrose 9-21-67-4 W4M

Daily Drivepoint Piezometer Sample Locations

Date: 15 Oct 2013	Project: 8881-523	Technical: S. Toner	Reviewer: S. Toner	Drawn: R. Keller

Figure 4

I:\CanadianNatural\8881\FiguresAndTables\SPL\2013\Client\PublicReportUpdate\October12\Figure-4-Daily_Drivepoint_Piezometer_Sample_Locations.mxd

APPENDIX A
DEWATERING DATA

APPENDIX A

DAILY FLOW VOLUMES - DEWATERING PHASE

Canadian Natural Resources Limited

09-21-064-04 W4M

Date	Daily Total (m^3/day)	Cumulative Pumped (m^3)	Daily Total (m^3/day)	Cumulative Pumped (m^3)	Daily Total (m^3/day)	Cumulative Pumped (m^3)	Daily Volume from Water Body (m^3/day)	Cumulative Total from Water Body (m^3)
	Basin 1		Basin 2		Basin 3			
Design Rate:	**5,800**	-	**430**	-	**15,000**	-	**21,230**	
27-Sep-13	838	838	180	180	375	375	1,393	1,393
28-Sep-13	5,277	6,115	1,182	1,362	5,431	5,806	11,890	13,283
29-Sep-13	2,831	8,946	450	1,812	7,072	12,878	10,353	23,636
30-Sep-13	3,696	12,642	24	1,836	8,767	21,645	12,487	36,123

APPENDIX B

WATER QUALITY DATA – DISCHARGE POINTS

APPENDIX B1.

WATER QUALITY RESULTS - PUMPED WATER

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Date	Sample time	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1[TT] C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Chloride mg/L	TSS mg/L
9-21 13-DW10	Pump from Basin 1	27-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	0.11	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	0.32	<0.1	<0.2	<0.2	1.2	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.1	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.0	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.1	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.1	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	28-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	0.29	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.11	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10 dup	Pump from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW11	E Overland discharge from Basin 1	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.1	---
9-21 13-DW11	E Overland discharge from Basin 1	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	0.27	<0.2	---	---
9-21 13-DW11	E Overland discharge from Basin 1	30-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW11	E Overland discharge from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW12	W Overland discharge from Basin 1	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.2	---
9-21 13-DW12	W Overland discharge from Basin 1	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW12	W Overland discharge from Basin 1	30-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW12	W Overland discharge from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.13	<0.2	<0.2	<2.0	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.1	<0.2	<0.2	<2.0	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.4	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.2	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.11	<0.2	<0.2	1.1	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	1.2	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	28-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.12	0.22	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	29-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	29-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	0.35	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	29-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW20	Pump from Basin 2	30-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW20	Pump from Basin 2	30-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
AENV Tier 1 Wildlife Water*				**0.076**	**4.25**	**2.77**	**0.18**	**46.4**	**42.6**	**69**	**36.4**	**NS**	**NS**

APPENDIX B1.

WATER QUALITY RESULTS - PUMPED WATER

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Date	Sample time	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 [TT] C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Chloride mg/L	TSS mg/L
9-21 13-DW21	Basin 2 Discharge Line before Filtration	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	0.12	0.11	<0.2	<0.2	<1.0	---
9-21 13-DW21	Basin 2 Discharge Line before Filtration	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	0.1	<0.2	<0.2	---	---
9-21 13-DW22	Basin 2 Discharge Line after Filtration	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	0.19	0.13	<0.2	<0.2	<1.0	---
9-21 13-DW22	Basin 2 Discharge Line after Filtration	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	0.29	<0.2	9.4	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	2.7	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	0.17	<0.1	<0.2	<0.2	1.3	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	28-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	29-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	29-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	29-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	30-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW23	Basin 2 Discharge Line after Carbon Treatment	30-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW25	E Overland Discharge from Basin 2	28-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW25	E Overland Discharge from Basin 2	28-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30	Pump from Basin 3 (South)	27-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW30 dup	Pump from Basin 3 (South)	28-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30 dup	Pump from Basin 3 (South)	28-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	0.13	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	28-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30 dup	Pump from Basin 3 (South)	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
AENV Tier 1 Wildlife Water*				**0.076**	**4.25**	**2.77**	**0.18**	**46.4**	**42.6**	**69**	**36.4**	**NS**	**NS**

APPENDIX B1.

WATER QUALITY RESULTS - PUMPED WATER

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Date	Sample time	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1[TT] C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Chloride mg/L	TSS mg/L
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	0.13	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	0.11	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30	Pump from Basin 3 (North)	30-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	29-Sep-13	19:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	29-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a dup	Pump from Basin 3 (North)	30-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	3:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	11:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	21:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW31	NW Overland Discharge from Basin 2	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	0.16	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW31	NW Overland Discharge from Basin 2	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW31	NW Overland Discharge from Basin 2	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW31	NW Overland Discharge from Basin 2	29-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW31	NW Overland Discharge from Basin 2	30-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	0.18	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	28-Sep-13	5:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
9-21 13-DW32	NE Overland Discharge from Basin 2	28-Sep-13	17:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	29-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	29-Sep-13	13:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	30-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	30-Sep-13	7:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-DW32	NE Overland Discharge from Basin 2	30-Sep-13	23:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Minimal Detection Limit				**0.0004**	**0.002**	**0.0004**	**0.004**	**0.1**	**0.1**	**0.2**	**0.2**	**2**	**1**
AENV Tier 1 Wildlife Water*				**0.076**	**4.25**	**2.77**	**0.18**	**46.4**	**42.6**	**69**	**36.4**	**NS**	**NS**

Notes:

- samples were only collected when the pumps were in operation

--- - not analyzed

NS - guideline not specified

* - Alberta Tier 1 Soils and Groundwater Remediation Guidelines - Surface Water Guidelines (AENV, 2010)

Italics - indicates values do not meet applicable guidelines

APPENDIX B2.

WATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Date	Sample Time	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Cl mg/L	TSS mg/L
9-21 13-DW10	Pump from Basin 1	28-Sep-13	13:00	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW10 dup	Pump from Basin 1	28-Sep-13	13:00	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)				0.0004	0.002	0.0004	0.004	0.1	0.1	0.2	0.2	0.002	1
Reliable Detection Limit (RDL)**				0.002	0.01	0.002	0.02	0.5	0.5	1	1	---	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	---	---
9-21 13-DW30	Pump from Basin 3 (South)	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30 dup	Pump from Basin 3 (South)	29-Sep-13	9:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)				0.0004	0.002	0.0004	0.004	0.1	0.1	0.2	0.2	0.002	1
Reliable Detection Limit (RDL)**				0.002	0.01	0.002	0.02	0.5	0.5	1	1	---	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	---	---
9-21 13-DW10	Pump from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	--	---
9-21 13-DW10 dup	Pump from Basin 1	30-Sep-13	15:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)				0.0004	0.002	0.0004	0.004	0.1	0.1	0.2	0.2	0.002	1
Reliable Detection Limit (RDL)**				0.002	0.01	0.002	0.02	0.5	0.5	1	1	---	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	---	---
9-21 13-DW30a	Pump from Basin 3 (North)	30-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DW30a dup	Pump from Basin 3 (North)	30-Sep-13	1:00	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)				0.0004	0.002	0.0004	0.004	0.1	0.1	0.2	0.2	0.002	1
Reliable Detection Limit (RDL)**				0.002	0.01	0.002	0.02	0.5	0.5	1	1	---	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	---	---

APPENDIX B3.

WATER QUALITY CONTROL SAMPLE 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} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Cl mg/L	TSS mg/L
Trip Blank	28-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
Trip Blank	28-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
Trip Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Trip Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Trip Blank	30-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Trip Blank	30-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Field Blank	28-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<2.0	---
Field Blank	28-Sep-13	<0.0004	<0.0020	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	<1.0	---
Field Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Field Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Field Blank	30-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Field Blank	30-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
Detection Limit (DL)		**0.0004**	**0.002**	**0.0004**	**0.004**	**0.1**	**0.1**	**0.2**	**0.2**	**1**	**1**

Notes:

--- - not analyzed

APPENDIX C
WATER LEVEL DATA

APPENDIX C

STAFF GAUGE LOG - DEWATERING PHASE

Canadian Natural Resources Limited

09-21-064-04 W4M

Date	Time	Date / Time	Field Reading (m)	Resulting Elevation (m asl)
13-SG1				
North of Basin 4 at East Ladder Road (Culvert)				
28-Sep-13	9:30	9/28/2013 9:30	0.04	696.081
28-Sep-13	15:30	9/28/2013 15:30	0.04	696.081
29-Sep-13	8:20	9/29/2013 8:20	0.018	696.059
29-Sep-13	11:15	9/29/2013 11:15	0	696.041
29-Sep-13	16:14	9/29/2013 16:14	0.018	696.059
30-Sep-13	12:15	9/30/2013 12:15	0	696.041
30-Sep-13	17:15	9/30/2013 17:15	0	696.041
13-SG2				
Ken Baker Rd.				
27-Sep-13	15:00	9/27/2013 15:00	0.27	696.041
28-Sep-13	9:30	9/28/2013 9:30	0.27	696.041
28-Sep-13	15:30	9/28/2013 15:30	0.27	696.041
28-Sep-13	19:00	9/28/2013 19:00	0.28	696.051
29-Sep-13	8:09	9/29/2013 8:09	0.273	696.044
29-Sep-13	10:50	9/29/2013 10:50	0.28	696.051
29-Sep-13	16:36	9/29/2013 16:36	0.269	696.04
30-Sep-13	10:00	9/30/2013 10:00	0.275	696.046
30-Sep-13	12:45	9/30/2013 12:45	0.268	696.039
30-Sep-13	16:45	9/30/2013 16:45	0.265	696.036
13-SG3				
Basin 1 - South AquaDam (downstream)				
28-Sep-13	9:30	9/28/2013 9:30	0.06	699.658
28-Sep-13	15:30	9/28/2013 15:30	0.06	699.658
29-Sep-13	8:55	9/29/2013 8:55	0.09	699.688
30-Sep-13	9:30	9/30/2013 9:30	0.08	699.678
30-Sep-13	10:23	9/30/2013 10:23	0.078	699.676
13-SG4				
Basin 1 - South AquaDam (upstream)				
28-Sep-13	9:30	9/28/2013 9:30	0.02	699.518
28-Sep-13	15:30	9/28/2013 15:30	0.02	699.518
29-Sep-13	9:00	9/29/2013 9:00	0	699.498
30-Sep-13	8:30	9/30/2013 8:30	0.017	699.515
30-Sep-13	10:30	9/30/2013 10:30	0.012	699.51
13-SG5				
Upstream Wolf River - West Ladder Road Culvert				
29-Sep-13	13:45	9/29/2013 13:45	0.691	673.884
30-Sep-13	13:19	9/30/2013 13:19	0.691	673.884
13-SG6				
Basin 3 at Water Intake				
27-Sep-13	15:00	9/27/2013 15:00	2.1	699.299
28-Sep-13	9:30	9/28/2013 9:30	2.26	699.459
28-Sep-13	15:30	9/28/2013 15:30	2.2	699.399
29-Sep-13	8:58	9/29/2013 8:58	2.22	699.419
29-Sep-13	17:11	9/29/2013 17:11	2.2	699.399
30-Sep-13	8:00	9/30/2013 8:00	2.19	699.389
30-Sep-13	10:04	9/30/2013 10:04	2.19	699.389

APPENDIX C

STAFF GAUGE LOG - DEWATERING PHASE

Canadian Natural Resources Limited

09-21-064-04 W4M

Date	Time	Date / Time	Field Reading (m)	Resulting Elevation (m asl)
13-SG7				
Basin 4 - South AquaDam				
Date	**Time**	**Date / Time**	**Field Reading**	**Resulting**
27-Sep-13	15:00	9/27/2013 15:00	0	699.635
28-Sep-13	9:30	9/28/2013 9:30	0	699.635
28-Sep-13	15:30	9/28/2013 15:30	0	699.635
29-Sep-13	9:21	9/29/2013 9:21	0.04	699.675
29-Sep-13	16:52	9/29/2013 16:52	0.05	699.685
30-Sep-13	10:55	9/30/2013 10:55	0.051	699.686
30-Sep-13	18:15	9/30/2013 18:15	0.051	699.686
13-SG8				
Basin 4 - North AquaDam				
Date	**Time**	**Date / Time**	**Field Reading (m)**	**Resulting Elevation (m asl)**
27-Sep-13	15:00	9/27/2013 15:00	0.04	699.488
28-Sep-13	9:30	9/28/2013 9:30	0.055	699.503
28-Sep-13	15:30	9/28/2013 15:30	0.055	699.503
29-Sep-13	8:33	9/29/2013 8:33	0.06	699.508
29-Sep-13	16:27	9/29/2013 16:27	0.062	699.51
30-Sep-13	9:40	9/30/2013 9:40	0.09	699.538
30-Sep-13	18:00	9/30/2013 18:00	0.09	699.538
13-SG9				
Downstream Wolf River				
29-Sep-13	11:40	9/29/2013 11:40	0.659	657.989
30-Sep-13	14:15	9/30/2013 14:15	0.667	657.997
13-SG10				
Fen Discharge at Wolf River				
28-Sep-13	13:30	9/28/2013 13:30	0.089	666.94
28-Sep-13	12:00	9/28/2013 12:00	0.086	666.937
29-Sep-13	12:46	9/29/2013 12:46	0.086	666.937
30-Sep-13	14:38	9/30/2013 14:38	0.094	666.945
13-SG11				
Basin 4 at East Ladder Road				
27-Sep-13	14:00	9/27/2013 14:00	0.57	699.583
27-Sep-13	15:00	9/27/2013 15:00	0.55	699.563
28-Sep-13	9:30	9/28/2013 9:30	0.55	699.563
28-Sep-13	15:30	9/28/2013 15:30	0.55	699.563
28-Sep-13	17:00	9/28/2013 17:00	0.58	699.593
29-Sep-13	0:26	9/29/2013 0:26	0.58	699.593
29-Sep-13	8:15	9/29/2013 8:15	0.58	699.593
29-Sep-13	16:10	9/29/2013 16:10	0.581	699.594
30-Sep-13	6:08	9/30/2013 6:08	0.61	699.623
30-Sep-13	11:27	9/30/2013 11:27	0.613	699.626
30-Sep-13	12:00	9/30/2013 12:00	0.788	699.551
30-Sep-13	17:40	9/30/2013 17:40	0.771	699.534

APPENDIX C

STAFF GAUGE LOG - DEWATERING PHASE

Canadian Natural Resources Limited

09-21-064-04 W4M

Date	Time	Date / Time	Field Reading (m)	Resulting Elevation (m asl)
13-SG12				
Basin 3 at East Ladder Road				
27-Sep-13	14:00	9/27/2013 14:00	0.32	699.49
27-Sep-13	15:00	9/27/2013 15:00	0.32	699.49
28-Sep-13	9:30	9/28/2013 9:30	0.3	699.47
28-Sep-13	15:30	9/28/2013 15:30	0.3	699.47
28-Sep-13	17:00	9/28/2013 17:00	0.29	699.46
29-Sep-13	0:26	9/29/2013 0:26	0.28	699.45
29-Sep-13	8:16	9/29/2013 8:16	0.26	699.43
29-Sep-13	16:11	9/29/2013 16:11	0.261	699.431
30-Sep-13	6:08	9/30/2013 6:08	0.26	699.43
30-Sep-13	11:26	9/30/2013 11:26	0.228	699.398
30-Sep-13	17:45	9/30/2013 17:45	0.241	699.411

APPENDIX D

WATER QUALITY DATA – WATER BODY AND WATERCOURSES

APPENDIX D1.

WATER QUALITY RESULTS - WATER BODIES AND WATERCOURSES

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Depth	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 [TT] C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Chloride mg/L	TSS mg/L
9-21 13-SW16	Downstream Fen Upstream of Ken Baker Road	---	24-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.1	<0.2	<0.2	---	---
9-21 13-SW16	Downstream Fen Upstream of Ken Baker Road	20	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW16 dup	Downstream Fen Upstream of Ken Baker Road	20	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW16	Downstream Fen Upstream of Ken Baker Road	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW26	Downstream Fen Upstream of Pad 21	10	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	---	---	---	---	---
9-21 13-SW26	Downstream Fen Upstream of Pad 21	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW7	Basin 1	50	25-Sep-13	0.00041	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW7	Basin 1	110	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW7 dup	Basin 1	110	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW7	Basin 1	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW7	Basin 1	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW22	Basin 1	50	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW22	Basin 1	100	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	0.23	<0.20	<1.0	---
9-21 13-SW22	Basin 1	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW22	Basin 1	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW23	Basin 1	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	0.14	<0.10	<0.20	<0.20	---	---
9-21 13-SW31	Basin 3	50	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW31	Basin 3	130	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW31	Basin 3	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW31	Basin 3	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW12	Basin 4	surface	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW12	Basin 4	depth	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW12	Basin 4	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW12 dup	Basin 4	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW12	Basin 4	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW42	Discharge Fen Upstream of Wolf River	---	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW42	Discharge Fen Upstream of Wolf River	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW46	NE Control Lake	---	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW47	Borrow Pit	---	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
AENV Freshwater Aquatic Life*				**0.370**	**0.002**	**0.09**	**0.2**	**NS**	**NS**	**NS**	**NS**	**120**	**NS**

APPENDIX D1.

WATER QUALITY RESULTS - WATER BODIES AND WATERCOURSES

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Depth	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1[TT] C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Chloride mg/L	TSS mg/L
9-21 13-DP1	Drive point southwest of Pad 21	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP1	Drive point southwest of Pad 21	175	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	---	---	---	---	---
9-21 13-DP2	Drive point SW of Basin 4	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP2	Drive point SW of Basin 4	191	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	---	---	---	---	---
9-21 13-DP3	Drive point S of Basin 3 near E Ladder Road	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP3	Drive point S of Basin 3 near E Ladder Road	87	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP4	Drive point N of Basin 3 near E Ladder Road	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP4	Drive point N of Basin 3 near E Ladder Road	75	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP5	Drive point W side of Basin 3	---	29-Sep-13	<0.0004	***0.22***	0.0006	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP5	Drive point W side of Basin 3	85	30-Sep-13	<0.00040	***0.15***	0.0005	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP6	Drive point S side of Basin 3	---	29-Sep-13	<0.0004	***0.0026***	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP6	Drive point S side of Basin 3	78	30-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP7	Drive point E side of Basin 3	---	29-Sep-13	<0.0004	***0.01***	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-DP7	Drive point E side of Basin 3	101	30-Sep-13	<0.00040	***0.0077***	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	---	---
Minimal Detection Limit				**0.0004**	**0.002**	**0.0004**	**0.004**	**0.1**	**0.1**	**0.2**	**0.2**	**1**	**1**
AENV Freshwater Aquatic Life*				**0.370**	**0.002**	**0.09**	**0.2**	**NS**	**NS**	**NS**	**NS**	**120**	**NS**

Notes:

--- - not analyzed

NS - guideline not specified

* - Alberta Environment Surface Water Quality Guidelines for use in Alberta (AENV, 1999)

Italics - indicates values do not meet applicable guidelines

APPENDIX D2.

WATER QUALITY RESULTS - WATER BODIES AND WATERCOURSES

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Depth	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[a]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	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L
9-21 13-SW7	Basin 1	50	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW7	Basin 1	110	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW7 dup	Basin 1	110	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW22	Basin 1	50	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW22	Basin 1	100	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW31	Basin 3	50	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW31	Basin 3	130	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW12	Basin 4	surface	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW12	Basin 4	depth	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW46	NE Control Lake	---	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW47	Borrow Pit	---	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
Minimal Detection Limit				**0.1**	**0.1**	**0.2**	**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**	**0.2**
AENV Freshwater Aquatic Life*				**5.8^**	**NS**	**4.4^**	**0.012^**	**0.018^**	**NS**	**NS**	**NS**	**0.015^**	**NS**	**NS**	**0.015^**	**3^**	**NS**	**1.1^**	**0.4^**	**0.025^**	**3.4^**

Notes:

--- - not analyzed

NS - not specified

* - Alberta Environment Surface Water Quality Guidelines for use in Alberta (AENV, 1999)

Italics - indicates values do not meet applicable guidelines

APPENDIX D3.

WATER QUALITY CONTROL SAMPLE RESULTS - DISSOLVED HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Depth cm	Sample Date	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylenes mg/L	F1 C_6-C_{10} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Cl mg/L	TSS mg/L
9-21 13-SW7	Basin 1	110	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW7 dup	Basin 1	110	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
Detection Limit (DL)				0.0004	0.0004	0.0004	0.0008	0.1	0.1	0.2	0.2	1	1
Reliable Detection Limit (RDL)**				0.002	0.002	0.002	0.004	0.5	0.5	1	1	5	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	Good	---
9-21 13-SW16	Downstream Fen Upstream of Ken Baker Road	20	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
9-21 13-SW16 dup	Downstream Fen Upstream of Ken Baker Road	20	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
Detection Limit (DL)				0.0004	0.0004	0.0004	0.0008	0.1	0.1	0.2	0.2	1	1
Reliable Detection Limit (RDL)**				0.002	0.002	0.002	0.004	0.5	0.5	1	1	5	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	Good	---
9-21 13-SW12	Basin 4	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
9-21 13-SW12 dup	Basin 4	---	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)				0.0004	0.0004	0.0004	0.0008	0.1	0.1	0.2	0.2	1	1
Reliable Detection Limit (RDL)**				0.002	0.002	0.002	0.004	0.5	0.5	1	1	---	---
Absolute Difference*				---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	---	---

Notes:

--- - not applicable

* - non-detectable concentrations are assessed at 95% of the detection limit

** - the reliable (reporting) detection limit (RDL) or practical detection limit (PDL) is defined as 5 times the DL

Good - evaluation indicates acceptable reproducibility

Poor - evaluation indicates poor reproducibility

APPENDIX D4.

WATER QUALITY CONTROL SAMPLE RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	Sample Location	Sample Depth	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[a]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	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L
		cm																			
9-21 13-SW7	Basin 1	110	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
9-21 13-SW7 dup	Basin 1	110	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
Detection Limit (DL)				0.1	0.1	0.2	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	0.2
Reliable Detection Limit (RDL)**				0.5	0.5	1	0.05	0.0425	0.0425	0.0425	0.0425	0.0375	0.0425	0.0375	0.05	0.25	0.0425	0.5	0.25	0.1	1
Absolute Difference*				---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Absolute Relative Percent Difference (RPD)*				---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Duplicate Sample Results Evaluation				Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

Notes:

--- - not applicable

* - non-detectable concentrations are assessed at 95% of the detection limit

** - the reliable (reporting) detection limit (RDL) or practical detection limit (PDL) is defined as 5 times the DL

Good - evaluation indicates acceptable reproducibility

Poor - evaluation indicates poor reproducibility

APPENDIX D5.

WATER QUALITY CONTROL SAMPLE 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} mg/L	F2 $C_{>10}$-C_{16} mg/L	F3 $C_{>16}$-C_{34} mg/L	F4 $C_{>34}$-C_{50} mg/L	Cl mg/L	TSS mg/L
Field Blank	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
Field Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Trip Blank	25-Sep-13	<0.00040	<0.0020	<0.00040	<0.0040	<0.1	<0.10	<0.20	<0.20	<1.0	---
Trip Blank	29-Sep-13	<0.0004	<0.002	<0.0004	<0.004	<0.1	<0.10	<0.20	<0.20	---	---
Detection Limit (DL)		**0.0004**	**0.0004**	**0.0004**	**0.0008**	**0.1**	**0.1**	**0.2**	**0.2**	**1**	**1**

Notes:

--- - not analyzed

APPENDIX D6.

WATER QUALITY CONTROL SAMPLE RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

Canadian Natural Resources Limited

09-21-064-04 W4M

Sample Point	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[a]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	Phenanthrene µg/L	Pyrene µg/L	Quinoline µg/L
Field Blank	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
Trip Blank	25-Sep-13	<0.10	<0.10	<0.20	<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	<0.20
Detection Limit (DL)		0.1	0.1	0.2	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	0.2

Notes:

--- - not analyzed