Hamlet of Arviat Water Licence
2010 Annual Report

NWB Licence # 3AM-ARV1015

Prepared By:

Nuna Burnside Engineering and Environmental Ltd.
PO Box 879 Building 764, Fred Coman Way Iqaluit NU X0A 0H0
and
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Prepared for:

Hamlet of Arviat

December 2010

File No: N-O157460

Hamlet of Arviat Water Licence
2010 Annual Report
NWB Licence # 3AM-ARV1015

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1.0 Introduction

At the request of the Hamlet of Arviat, Nuna Burnside Engineering and Environmental Ltd. (Nuna Burnside) has prepared this Annual Report as required by Water License 3AM-ARV1015, issued August 23, 2010 (Appendix A). The information is compiled pursuant to the requirements of Part B, Item 3 of the water licence. The report includes the Nunavut Water Board Annual Report Form (Appendix B).

1.1 Project Background

The Hamlet of Arviat is located within the Kivalliq Region, Nunavut, at general latitude 61°6'N and general longitude 94°3'W (Figure 1). The Community is located approximately 225 km south of Rankin Inlet and 265 km north of Churchill Manitoba.

The Hamlet of Arviat, Water and Waste Disposal license 3AM-ARV1015 includes activities for municipal water intake, sewage disposal and waste disposal activities (Figure 2). As part of these activities the following facilities are operated:

- Wolf River Water Supply Intake
- Sewage Disposal Facility
- Solid Waste Management Facility.

Photographs of the facilities are provided in Appendix C.

2.0 Summary of Water and Waste Disposal Activities

2.1 Water Use

The Hamlet of Arviat currently receives water from the Wolf River water supply located 8.0 km southwest of the Hamlet (Figure 3). A pump house located beside Wolf River pumps from the river seasonally to fill the community's two water reservoirs. Water from the reservoirs is pumped into water trucks and distributed to the community. Currently water is treated by chlorine injection when water is pumped into trucks.

The Hamlet records its water usage monthly by measuring the amount of water pumped from reservoirs at the truck fill station. From January 2010 to December 2010, the annual consumption was 74,299 m^3. This does not exceed the allowable amount of 86,000 m^3 per year, as stated in the license. Water use data provided by the Hamlet is included in Appendix D.

2.2 Waste Disposal Activities

2.2.1 Sewage Collection and Disposal

Sewage collection is provided by the Hamlet. Each building has a sewage holding tank that is pumped out by the Hamlet's sewage pump out truck as needed. Pump out sewage is treated at the community sewage lagoon located approximately 2.8 km southeast of the Hamlet.

The sewage disposal facility consists of a sewage lagoon and a wetland treatment area. The lagoon discharges into the wetland at a slow continuous rate during the growing season to make room for the following year's sewage. The sewage travels through the wetland treatment area and eventually discharges into Hudson Bay.

The volume of sewage disposed of from the Hamlet roughly corresponds to the annual water use of the Hamlet. Therefore approximately 74,299 m^3 of sewage is estimated to have been discharged into the sewage lagoon in 2010. There have been no issues with the sewage lagoon in 2010.

2.2.2 Solid Waste Management Facility

The Hamlet of Arviat Solid Waste Management Facility consists of the following components:

- Landfill (also referred to as the Municipal Solid Waste Disposal Area)

- Bulky Metals Waste Area located north of the fill area
- Hazardous Waste Storage Area (currently next to the Hamlet garage).

Solid waste in the community is collected by a garbage compactor truck and deposited in the community landfill located 2.8 km south-east of the community. A bulky waste area is used to dispose of vehicles, heavy equipment, 45 gallon drums and other metal wastes. Material not confirmed to be acceptable for the landfill or the Bulky Metals area, are stored in the Hazardous Waste Storage area. This includes drums of waste oil, anti-freeze, paint and old car batteries.

The current landfill is approaching its useful life. In September 2008, Nuna Burnside was retained by the Hamlet to evaluate potential locations for a new municipal solid waste management facility. A location for a new solid waste management facility was selected detailed design was completed in 2009. The Hamlet has not yet approved the nature and location of a new facility.

3.0 Revisions to Spill Contingency Plan and/or Abandonment and Restoration Plan

Abandonment and Restoration Plans have been prepared as part of the conditions of the new licence. Details are included in the following reports:

- Sewage Lagoons Abandonment and Restoration Plan, Hamlet of Arviat, Nunavut. Nuna Burnside Engineering and Environmental Ltd, December 2010

- Solid Waste Management Facility Abandonment and Restoration Plan, Hamlet of Arviat, Nunavut. Nuna Burnside Engineering and Environmental Ltd, December 2010.

4.0 Monitoring Program

The monitoring program outlined in the water license includes specific requirements regarding sampling locations, sampling frequency, parameters to be analyzed and effluent quality. Since the new licence (3AM-ARV1015) was issued in August 2010. There is no data for the new locations prior to this date. All data was collected according to the new licence where possible.

The monitoring locations below are shown in Figures 3 to 7 and the requirements as provided in the licence are summarized in Table 1.

Table 1 Monitoring Program Stations for Water License 3AM-ARV1015

Station	Description	Frequency	Analysis Requirements
ARV-1	Raw water supply at the Wolf River Water Supply prior to treatment	Monthly and annual	Measure and record in cubic metres of water pumped from station
ARV-2	ARV-2a Sampling of effluent discharge from the Final Discharge Point of the Solid Waste Disposal Facility ARV-2b Sampling of effluent from the discharge point of the New Solid Waste Disposal Facility	Water Quality	
		Monthly from May to August, Inclusive	• BOD • Faecal Coliforms • pH • Conductivity • Total Suspended Solids • Ammonia Nitrogen • Nitrate-Nitrite • Total Phenols • Sulphate • Oil and Grease (visual) • Sodium • Potassium • Magnesium • Calcium • Total Arsenic • Total Cadmium • Total Copper • Total Chromium • Total Iron • Total Lead • Total Mercury • Total Nickel • Total Zinc
		Biotoxicity	
		Annually	• Acute toxicity test: Rainbow Trout • Acute toxicity test: Daphnia magna
ARV-3	Raw sewage at truck offload point	Monthly and annual	Measure and record in cubic metres the raw sewage offloaded from trucks
ARV-4	Sampling of Effluent Discharge from Final Discharge Point of the Sewage Disposal Facilities	Water Quality: Monthly from May to August, Inclusive Biotoxicity: Annually	Same as ARV-2

Station	Description	Frequency	Analysis Requirements
ARV-5	Sampling of discharge from the Bulky Metal Waste Area	Monthly during periods of observed flow	Same water quality parameters as ARV-2
ARV-6	Sampling of Discharge from the Hazardous Waste Storage Area	Monthly during periods of observed flow	Same water quality parameters as ARV-2
ARV-7	Water level in Wolf River	Monthly during periods of open water	Water level measurements
ARV-8	Water level in Sewage Disposal Facility lagoon	Monthly during thawed conditions	Water level measurements
ARV-9	Sewage Sludge removed from the Sewage Disposal Facility	Monthly	Record monthly and annual volumes of sludge (m^3) removed
ARV-10	Sampling of Effluent from the Final Discharge Point of the Hydrocarbon Impacted Soil Storage and Treatment Facility	To be determined	To be determined
ARV-11	Sampling of Effluent from discharge from dewatering contaminated soil areas	To be determined	To be determined

5.0 Monitoring Results

5.1 Water Supply Facility

Water use records for the Hamlet are collected by digitally measuring the amount of water pumped into the water delivery trucks. Water use data for 2009 and 2010 is provided in Appendix D.

A water level was taken on September 8, 2010 based off a benchmark located on the pumphouse. This benchmark (ARV-7) has been identified as the location from which Hamlet staff will survey water levels at the water intake during periods of open water in the future according to the NWB licence. The elevation of ARV-7 is 10.89 masl. The water levels recorded at Wolf River (ARV-7) in 2010 are included in Table 2.

Table 2 Wolf River Water Levels (ARV-7)

Date	Water Level (metres below benchmark)	Water Level (meters above sea level)
Sept 8, 2010	2.36	8.53

Although water sampling of the raw water intake is not required in the NWB licence, samples were taken upstream and downstream of the intake (Figure 3). The sample results are provided in Table E-1, Appendix E. There were no water quality issues identified that would indicate an impact from pumping.

5.2 Solid Waste Management Facility

5.2.1 Solid Waste Disposal Site (Landfill)

Sampling of discharge from the landfill (ARV-2) was completed in July, August and September (Appendix E). The results were compared to the CCME Water Quality Guidelines for Protection of Aquatic Life in freshwater systems (Appendix F). Parameters in exceedance are summarized in Table 3.

Table 3 Sample Results for Parameters in Exceedance at ARV-2

Parameter	CCME Standard	July	August	September
Iron (mg/L)	0.300	0.936	0.516	0.529
Copper (mg/L)	0.004	0.007	0.0013	0.00149
Lead (mg/L)	0.007	0.028	0.000153	0.000145
Zinc (mg/L)	0.03	0.077	0.0203	0.016

Parameter	CCME Standard	July	August	September
Phenols (mg/L)	0.004	0.005	<0.001	0.002

Acute toxicity samples were collected at ARV-2 in September 2010 and tested for Rainbow Trout and Daphnia magna. The testing resulted in 100% mortality for the Rainbow Trout and 0 % mortality for the Daphnia magna. A copy of the report is included in Appendix D.

5.2.2 Bulky Metals Waste Area

Sampling of water at the Bulky Metals Area was completed in September and November 2010. Sample locations are provided in Figure 6. Sample BW-1 was collected from surface water accumulated near the contaminated soil piles. Samples ARV-5 and ARV-5-2 were collected from seepage accumulated in the test pits excavated south of the site.

The current licence required sampling of discharge from the bulky waste area (ARV-5) during periods of observed flow. There was no observed flow at the site during sampling events in September and November 2010.

Soil sampling was also completed in September 2010. Samples were taken from the suspected contaminated soil piles on site and analysed for metals, petroleum hydrocarbons, BTEX, PAHs, phenols and PCBs. Samples from the contaminated soil piles exceeded the CCME guidelines for petroleum hydrocarbons F2 (C>10-C16) and F3 (C>16-C34).

5.2.3 Hazardous Waste Storage Area

The current NWB licence requires monthly water quality sampling of discharge from the Hazardous Waste Storage Area during periods of observed flow (ARV-6). During the site visits in September and November 2010 there was no flow, thus samples were not collected.

Samples of stained soil located under waste oil drums were collected in September 2010 and analyzed for hydrocarbons, PAHs and VOCs. All three samples exceeded the CCME soil quality standards for petroleum hydrocarbons F3 and F4.

Laboratory results for all sampling completed in 2010 are provided in Tables E-2 to E-5, Appendix E.

5.3 Sewage Disposal Facility

The volume of raw sewage discharged at the truck offload point (ARV-3) is not recorded by the Hamlet but can be assumed to be similar to the monthly water use in the community. A summary of monthly sewage volumes estimated based on the water use of the community is provided in Table 4.

Table 4 Estimated Volume of Sewage Discharge into Lagoon (ARV-3)

Month	Volume of Sewage Discharge into Lagoon (m^3)
January	6062.29
February	5716.55
March	6406.87
April	5778.08
May	5995.22
June	5979.41
July	6318.16
August	6762.34
September	6351.10
October	6419.23
November	6045.78
December	6463.74
Total	74,299

Sampling at the discharge of the sewage lagoon (ARV-4) was completed in July, August, September and November. The results were compared to the Nunavut Water Board Effluent Quality Limits and CCME Water Quality Guidelines for Protection of Aquatic Life in freshwater systems (Appendix F). Table 5 summarizes the results for parameters included as effluent quality limits (Part D, Item 2) of the licence.

Table 5 ARV-4 Sample Results

Parameter	NWB Effluent Quality Limits	July	August*	September	November
Total Suspended Solids (mg/L)	100	104	91.1	169	368
$BOD_{(5)}$ (mg/L)	80	98	40	65	30

Parameter	NWB Effluent Quality Limits	July	August*	September	November
Fecal Coliforms (CFU/100mL)	10000	13100	110000 MPU/100mL	2100 MPU/100 mL	5
Oil and Grease (mg/L)	No visible sheen	21	6.7	1.3	-
pH	6 - 9	7.68	7.43	8.12	7.92

* Note August sampling was completed on September 1, 2010 due to delay in arrival of sample bottles.

Acute toxicity samples were collected in September 2010 and tested for Rainbow Trout and Daphnia magna. The testing resulted in 100% mortality for the Rainbow Trout and 0 % mortality for the Daphnia magna. A copy of the report is included in Appendix E.

Additional sampling was also completed within the wetland treatment area and the old sewage lagoons. Sample locations are provided in Figure 4. All sample results are included in Tables E-6 to E-8, Appendix E.

The water level at the Sewage Disposal Facility lagoon was measured in September and November based from a benchmark point identified as ARV-8. The benchmark ARV-8 has an elevation of 14.18 metres above sea level. Table 6 provides the water levels recorded at ARV-8.

Table 6 Sewage Lagoon Water Levels (ARV-8)

Date	Water Level (metres below benchmark)	Water Level (meters above sea level)
Sept 9, 2010	1.75	12.43
Nov 12, 2010	2.80*	11.38

* November water level taken when part of lagoon covered with ice

No sludge has been removed from the lagoon since it was commissioned in 2005. There was no sludge removed from the lagoon in 2010.

Table 7 Sewage Sludge Removal Records (ARV-9)

Year	Volume of Sludge Removed (m^3)
2010	0

6.0 INAC Inspection Report

The most recent inspection report from INAC was dated September 3, 2010. The report identified several concerns that were out of compliance. A copy of the report is included in Appendix G. A response letter to INAC on behalf of the Hamlet addressing the comments is included in Appendix H.

7.0 Plan of Compliance

A Plan of Compliance as recommended by the NWB has been prepared and submitted to the NWB in December 2010. The Plan includes the work required to bring the Hamlet into compliance with the requirements of the licence.

Efforts to address compliance issues in 2010 included the submission of the following documents prepared by Nuna Burnside, outlining the compliance related work conducted in 2010.

- Wolf River Water Intake Impact Assessment
- Sewage Disposal Facility Report
- Old Sewage Lagoons Abandonment and Restoration Plan
- Solid Waste Management Report
- Solid Waste Management Facility Abandonment and Restoration Plan
- Environmental Monitoring and Quality Assurance and Quality Control Plan, and
- Addendum: Environmental Emergency Contingency Plan.

After approval of these reports updates to the Operation and Maintenance Plans for the Water Intake Facility, the Sewage Disposal Facility and Solid Waste Management Facility are recommended.

8.0 References

Addendum: Environmental Emergency Contingency Plan, Nuna Burnside Engineering and Environmental, December 2010.

Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, Canadian Council of Ministers of the Environment, Winnipeg. May 1, 2001, Revised January 2008.

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Summary Table, Updated September, 2007. In: Canadian Environmental Quality Guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table, Updated September, 2007. In: Canadian Environmental Quality Guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Environmental Monitoring and Quality Assurance and Quality Control Plan, Nuna Burnside Engineering and Environmental, December 2010.

Hamlet of Arviat Water License 3AM-ARV1015. Gjoa Haven, Nunavut. Nunavut Water Board. 23 Aug 2010.

Indian and Northern Affairs Canada, Inspection Report, Arviat, September 3, 2010.

Old Sewage Lagoons Abandonment and Restoration Plan, Nuna Burnside Engineering and Environmental, December 2010.

Sewage Disposal Facility Report, Nuna Burnside Engineering and Environmental, December 2010.

Solid Waste Management Report, Nuna Burnside Engineering and Environmental, December 2010.

Solid Waste Management Facility Abandonment and Restoration Plan, Nuna Burnside Engineering and Environmental, December 2010.

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Wolf River Water Intake Impact Assessment, Nuna Burnside Engineering and Environmental, December 2010.

Respectfully Submitted:

Stephanie Charity, P.Geo.

December 24, 2010
Date

Jim Walls, P.Geo.

December 24, 2010
Date

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Figures

Map Reference:
Map Art Publishing

KEY MAP OF
NORTH EASTERN CANADA

FIGURE 1 - SITE LOCATION MAP

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT

2010 ANNUAL REPORT

December, 2010
Project Number: N-O15746

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 SL .dwg

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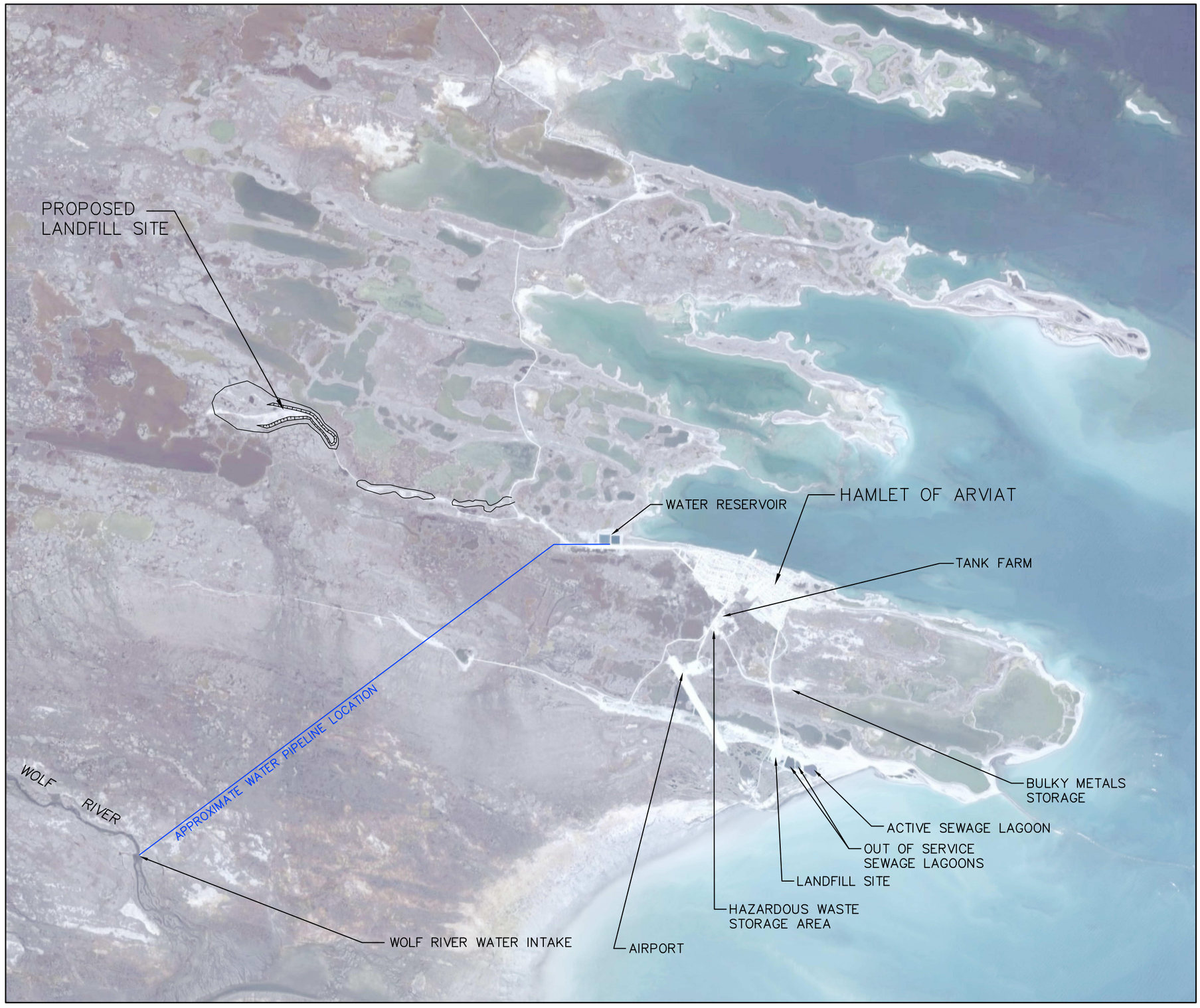

FIGURE 2

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT
2010 ANNUAL REPORT

COMMUNITY PLAN

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Background colour satellite image obtained from Google Earth Pro.

Map Source:
Background physical features obtained from the National Topographic Database Website.

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December, 2010
Project Number: N-O15746

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

BURNSIDE

N-O15746 ANNUAL REPORT 2010 CP.dwg

Plot Time: Dec 22, 2010 - 10:57am

FIGURE 3

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT
2010 ANNUAL REPORT

WOLF RIVER WATER INTAKE

LEGEND

- WATER SAMPLE LOCATION
- WATER ELEVATION BENCHMARK
- WATER FLOW DIRECTION

Satellite Image Source:
Background colour satellite image obtained from Google Earth Pro. © Google Earth Pro: Image © 2010 DigitalGlobe, Photo Date: July, 2006

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Project Number: N-O15746

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 WOLF RIVER SAMPLE LOCATIONS.dwg

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FIGURE 4

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT
2010 ANNUAL REPORT

SEWAGE DISPOSAL FACILITY

LEGEND

- WATER SAMPLE LOCATION
- TEST PIT LOCATION
- SLUDGE SAMPLE LOCATION
- MONITORING STATION
- WETLAND TREATMENT AREA
- FLOW DIRECTION

Satellite Image Source:
Quickbird Satellite Image ©Digital Globe Inc., Date 2008

Map Source:
Background physical features obtained from the National Topographic Database Website.

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Project Number: N-O15746

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 SEWAGE SAMPLING LOCATIONS.dwg

Plot Time: Dec 22, 2010 - 11:18am

FIGURE 5

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT

2010 ANNUAL REPORT

SOLID WASTE MANAGEMENT FACILITY - LANDFILL

LEGEND

- WATER SAMPLE LOCATION
- TEST PIT LOCATION
- CONTAMINANT ATTENUATION ZONE

Satellite Image Source:
Quickbird Satellite Image ©Digital Globe Inc., Date 2008

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December, 2010
Project Number: N-O157460

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 LANDFILL SAMPLE LOCATIONS.dwg

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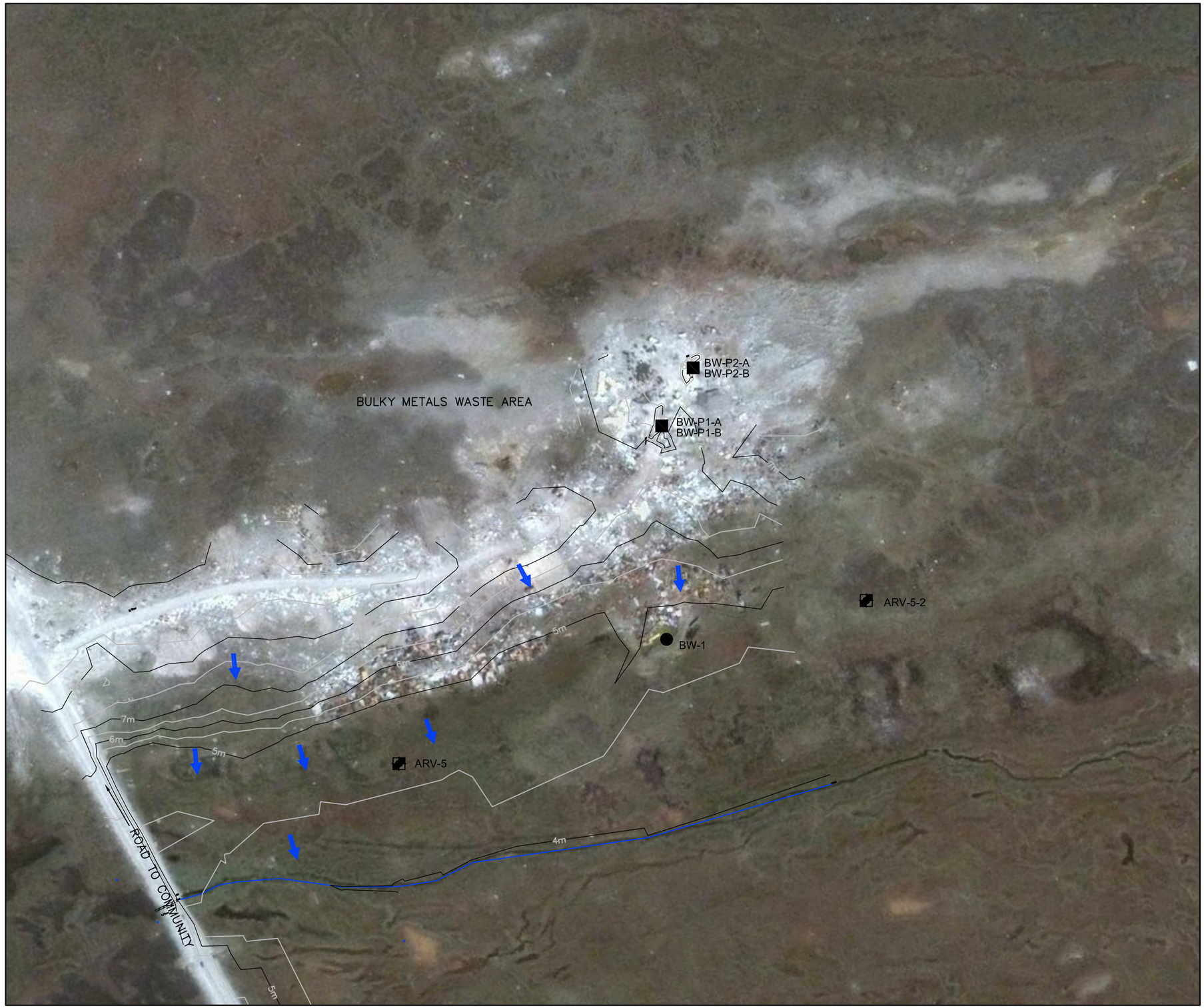

FIGURE 6

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT

2010 ANNUAL REPORT

SOLID WASTE MANAGEMENT FACILITY - BULKY WASTE AREA

LEGEND

- WATER QUALITY SAMPLE LOCATION
- TEST PIT LOCATION WITH WATER QUALITY SAMPLE
- SOIL SAMPLE LOCATION
- SURFACE WATER FLOW DIRECTION
- 10m — GROUND SURFACE CONTOUR *(Survey by Burnside, September 2010)*

Satellite Image Source:
Quickbird Satellite Image ©Digital Globe Inc., Date 2008

N

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Metres

1:2,000
December, 2010
Project Number: N-O157460

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 BULKY METALS SAMPLE LOCATIONS.dwg

Plot Time: Dec 17, 2010 - 4:40pm

FIGURE 7

HAMLET OF ARVIAT
HAMLET OF ARVIAT, NUNAVUT
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SOLID WASTE MANAGEMENT FACILITY - HAZARDOUS WASTE STORAGE AREA

LEGEND

- SOIL SAMPLE LOCATION
- SURFACE WATER DRAINAGE FLOW DIRECTION

Satellite Image Source:
Quickbird Satellite Image ©Digital Globe Inc., Date 2008

N

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Metres

1:750
December, 2010
Project Number: N-O157460

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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N-O15746 ANNUAL REPORT 2010 HAZARDOUS WASTE AREA.dwg

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Appendix A
Nunavut Water Board Licence
3AM-ARV1015

NUNAVUT WATER BOARD

WATER LICENCE NO: 3AM-ARV1015

Hamlet of Arviat, Nunavut

NUNAVUT WATER BOARD

LICENCE NO: 3AM-ARV1015

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NUNAVUT WATER BOARD

WATER LICENCE No. 3AM-ARV1015

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

HAMLET OF ARVIAT
(Licensee or Applicant)

ARVIAT, NUNAVUT X0C 0E0
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence:

Licence Number/Type:	3AM-ARV1015 TYPE "A"
Water Management Area:	NUNAVUT 06
Location:	ARVIAT, KIVALLIQ REGION, NUNAVUT LATITUDE: 61° 06' 30" N, LONGITUDE: 94° 03' 31" W
Classification:	MUNICIPAL UNDERTAKING
Purpose:	DIRECT USE OF WATER AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	EIGHTY-SIX THOUSAND (86,000) CUBIC METRES PER ANNUM
Date of Licence Issuance:	AUGUST 23, 2010
Expiry of Licence:	AUGUST 31, 2015

This Licence, issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

Thomas Kabloona,
Nunavut Water Board
Chair

APPROVED BY:

Minister of Indian and Northern Affairs Canada

DATE LICENCE APPROVED: _____

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. SCOPE

a. This Licence allows for the use of Water and disposal of Waste including operation of a Water Supply Facility, Solid Waste Disposal Facility, Hazardous Waste Storage Area, Bulky Metals Area, and Sewage Disposal Facility; as well as construction and operation of a New Solid Waste Disposal Facility and/or Hydrocarbon Impacted Soil Storage and Treatment Facility, upon approval by the Board, by the Hamlet of Arviat, Nunavut for a municipal undertaking (Latitude 61° 06' 30" N and Longitude 94° 03' 31" W);

b. This Licence is issued subject to conditions contained herein with respect to the taking of Water and the depositing of Waste of any type in any Waters or in any place under any conditions where such Waste or any other Waste that results from the deposits of such Waste may enter any Waters. Whenever new regulations are made or existing regulations are amended by the Governor in Council under the Act, or other statutes imposing more stringent conditions relating to the quantity, type or manner under which any such Waste may be so deposited, this Licence shall be deemed to be subject to such requirements; and

c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with all applicable legislation, guidelines and directives.

2. DEFINITIONS

In this Licence, these definitions apply and changes may be made at the discretion of the Board.

"Act" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"Amendment" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence and/or modifications inconsistent with the terms of the set terms and conditions of the Licence;

"Analyst" means an Analyst designated by the Minister under Section 85 (1) of the Act;

"Applicant" means the Licensee;

"Appurtenant undertaking" means an undertaking in relation to which a use of Waters or a deposit of Waste is permitted by a licence issued by the Board;

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement*;

"Bulky Metals Area" comprises the area and associated structures designed to contain bulky metal waste as described in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009;

"Effluent" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant;

"Engineer" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2* and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"Final Discharge Point" in respect of an Effluent, means an identifiable discharge point of a facility beyond which the operator of the facility no longer exercises control over the quality of the Effluent;

"Freeboard" means the vertical distance between water line and the designed maximum operating height on the crest of a dam or dyke's upstream slope;

"Geotechnical Engineer" means a professional engineer registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists and whose principal field of specialization is with the engineering properties of earth materials in dealing with man-made structures and earthworks that will be built on a site. These can include shallow and deep foundations, retaining walls, dams, and embankments;

"Grab Sample" means a single Water or wastewater sample taken at a time and place representative of the total discharge;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Hazardous Waste" means waste classified as "hazardous" by Nunavut Territorial or Federal legislation, or as "dangerous goods" under the *Transportation of Dangerous Goods Act*;

"Hazardous Waste Storage Area" comprises the area and associated structures designed to contain Hazardous Waste as described in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009;

"Hydrocarbon Impacted Soil Storage and Treatment Facility" means an area designed to treat Petroleum Hydrocarbon-Impacted Soil, as referred to in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009;

"Inspector" means an Inspector designated by the Minister under Section 85 (1) of the Act;

"Licensee" means the holder of this Licence;

"Modification" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion, and changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"Monitoring Program" means a monitoring program established to collect data on surface Water and groundwater quality, Waste and Waste deposition, to assess impacts to the freshwater aquatic environment of an appurtenant undertaking;

"New Solid Waste Disposal Facility" comprises the area and associated structures designed to contain solid waste as referred to in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009;

"Nunavut Land Claims Agreement" (NLCA) means the *"Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*", including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"Petroleum Hydrocarbon Impacted Soil" means soil in which the primary petroleum product present, as determined by laboratory analysis consistent with that described in the *Canada-Wide Standards for Petroleum Hydrocarbons in Soil*, generally consists of fuel oil, diesel fuel, gasoline and/or jet fuel;

"Sewage" means all Toilet Wastes and Greywater;

"Sewage Disposal Facilities" comprises the area, including wetland and engineered lagoon designed to contain Sewage as described in the Application for Water Licence filed by the Applicant on September 2, 2003, and illustrated in Arviat Sewage Lagoon drawings prepared by FSC Architects and Engineers for Government of Nunavut, Job No. 507-340, FSC Project No. 2003-0440-003, Submission for Tender July 11th, 2003;

"Sewage Sludge" means the semi-solid Sewage material which settles at the bottom of the Sewage lagoon;

"Solid Waste Disposal Facilities" comprises the area and associated structures designed to contain solid waste as described in the Application for Water Licence filed by the Applicant on September 2, 2003;

"Toilet Wastes" means all human excreta and associated products, but does not include Greywater;

"Waste" means, as defined in section 4 of the Act, any substance that, by itself or in combination with other substances found in Water, would have the effect of altering the quality of any Water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any Water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"**Waste Disposal Facilities**" means all facilities designated for the disposal of Waste including the Sewage Disposal Facilities, Solid Waste Disposal Facilities, Hazardous Waste Storage Area, Bulky Metals Area, and upon approval by the Board, New Solid Waste Disposal Facility, and/or Hydrocarbon Impacted Soil Storage and Treatment Facility, as described in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009;

"Water" means water as defined in section 4 of the Act;

"Water Supply Facilities" comprises the area and associated intake infrastructure at the Wolf River Water Supply, as described in the Application for Water Licence Renewal filed by the Applicant on January 5, 2009 and illustrated in Arviat Water Supply Filtration Upgrade drawings prepared by Dillon Consulting for Government of Nunavut Public Works and Services, Issued for Tender, April 2008, Project No. 078254; Figure 4 – Hamlet of Arviat Water Licence Submission Wolf River Water Intake drawing prepared by Nuna Burnside, December 2008, Project Number N-O15746;

"Work Plan" refers to the electronic document (letter) from Jim Walls, P.Geo., Nuna Burnside Engineering and Environmental Ltd., to Bryan Purdy, Government of Nunavut Community Government Services, Re: Work Plan to Address INAC, DFO, and NWB Licence Compliance Issues GN File 08-3025 Hamlet of Arviat, Nunavut File No. N-0 15746.1, dated June 23, 2010.

3. ENFORCEMENT

a. Failure to comply with this Licence will be a violation of the Act, subjecting the Licensee to the enforcement measures and the penalties provided for in the Act.

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the Act.

c. For the purpose of enforcing this Licence and with respect to the use of Water and deposit or discharge of Waste by the Licensee, Inspectors appointed under the Act, hold all powers, privileges and protections that are conferred upon them by the Act or by other applicable law.

PART B: GENERAL CONDITIONS

1. This Licence incorporates a previously issued Type B licence, NWB3ARV0308, to the Hamlet of Arviat, which allowed for the use of water and disposal of waste.

2. In the event of a conflict between the previously issued Type B licences and this Type A Licence, the condition of this Type A Licence prevails.

3. The Licensee shall file an annual report with the Board for review, no later than March 31st

of the year following the calendar year being reported, which shall contain the following information collected during that period:

a. Tabular summaries of all data generated under the Monitoring Program;
b. The monthly and annual quantities of freshwater obtained from all sources;
c. The monthly and annual quantities of Wastes removed for disposal from Water Supply Facilities and Waste Disposal Facilities;
d. A summary of modifications and/or major maintenance work carried out on Water Supply Facilities and Waste Disposal Facilities including all associated structures and facilities;
e. A list of unauthorized discharges and summary of follow-up actions taken;
f. Any revisions to approved plans and manuals as required by Part B, Item 12, submitted in the form of an addendum;
g. A summary of the status of implementation of the Work Plan, including an indication of the status of the funding required to carry out the Work Plan and an estimated timeframe for receipt of the necessary funding;
h. A fiscal update of the Licensee's funding commitments associated with all facilities governed by this Licence including all associated structures and facilities for the upcoming year and identifying shortfalls in such funding commitments for the previous year;
i. A summary of abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
j. A summary of any studies, reports and plans requested by the Board that relate to Waste disposal, Water use or reclamation, and a brief description of any future studies planned; and
k. Any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.

4. The Licensee shall comply with the Monitoring Program described in this Licence and any Amendments to the Monitoring Program as may be made from time to time, pursuant to the conditions of this Licence.

5. The Monitoring Program and compliance dates specified in the Licence may be modified at the discretion of the Board.

6. Metres, devices or other such methods used for measuring the volumes of Water used and Waste discharged, shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

7. The Licensee shall, within ninety (90) days after the first visit by the Inspector following approval of this Licence, post the necessary signs, to identify the stations of the Monitoring Program. All signage postings shall be in Inuktitut and English.

8. The Licensee shall, for all plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a plan if necessary to

achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the plan.

9. In the event that a plan is not found acceptable to the Board, the Licensee shall, within thirty (30) days of notification by the Board, provide a revised version to the Board, for approval in writing.

10. The Licensee shall, for all plans submitted under this Licence, implement the plan as approved by the Board in writing.

11. Every plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a plan where appropriate.

12. The Licensee shall review the plans and manuals referred to in this Licence as required by changes in operation and/or technology and revise accordingly. Revisions to the plans or manuals are to be submitted in the form of an addendum to be included with the annual report required by Part B, Item 3, complete with a revisions list detailing where significant content changes are made.

13. The Licensee shall ensure a copy of this Licence is maintained at the municipal office and at the site of operation at all times.

14. Any communication with respect to this Licence shall be made in writing to the attention of:

Manager of Licensing
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nunavutwaterboard.org

15. Any notice made to an Inspector shall be made in writing to the attention of:

Water Resources Officer
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

16. The Licensee shall submit one (1) paper copy and one (1) electronic copy of all reports, studies, and plans to the Board or as otherwise requested by the Board. Reports or studies submitted to the Board by the Licensee shall include an executive summary in English and

Inuktitut.

17. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the Board, is received by the Board and maintain on file a copy of the acknowledgment of receipt issued by the Manager of Licensing.

18. This Licence is assignable as provided for in Section 44 of the Act.

19. The expiry or cancellation of this Licence does not relieve the Licensee from any obligation imposed by the Licence, or any other regulatory requirement.

20. The Licensee shall file a Water Licence Renewal Application with the Board no later than September 1, 2014.

PART C: CONDITIONS APPLYING TO WATER USE AND MANAGEMENT

1. The Licensee shall obtain all freshwater from Wolf River at Monitoring Program Station ARV-1 as otherwise approved by the Board in writing.

2. The annual quantity of water used for all purposes shall not exceed eighty-six thousand (86, 000) cubic metres per annum, or as otherwise approved by the Board in writing.

3. The Licensee shall equip all water intake hoses with a screen of an appropriate mesh size to ensure that fish are not entrained and shall withdraw Water at a rate such that fish do not become impinged on the screen.

4. The Licensee shall submit to the Board for approval in writing by December 31, 2010, as-built drawings stamped and signed by an Engineer confirming compliance with the DFO guideline "Freshwater Intake End of Pipe Fish Screen Guideline". The drawings shall include information regarding the operating capacity of the pump used and the intake screen size.

5. The Licensee shall not remove any material from below the ordinary high water mark of any Water body.

6. The Licensee shall not cause erosion to the banks of any body of Water and shall provide necessary controls to prevent such erosion.

7. Sediment and erosion control measures shall be implemented prior to and maintained during construction and operation to prevent entry of sediment into Water.

8. The Licensee shall submit to the Board for review by December 31, 2010, the Water balance assessment for Wolf River and an assessment of the potential effects of drawdown of Wolf River on the aquatic environment. The assessment shall include recommended mitigation measures and an implementation schedule.

9. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL AND MANAGEMENT

1. The Licensee shall direct all Sewage to the Sewage Disposal Facility.

2. All Effluent discharged from the Sewage Disposal Facilities at Monitoring Program Station ARV-4 shall not exceed the following Effluent quality limits, or as otherwise approved by the Board in writing:

Parameter	Maximum Concentration of any Grab Sample
Fecal Coliform	1×10^4 CFU/dl
BOD_5	80 mg/l
Total Suspended Solids	100 mg/l
Oil and Grease	No visible sheen
pH	Between 6 and 9

3. A Freeboard limit of 1.0 metre, or as recommended by a qualified Geotechnical Engineer and as approved by the Board in writing, shall be maintained at all dams, dyke or structures intended to contain, withhold, divert or retain Water or Wastes.

4. The Licensee shall provide at least ten (10) days notification to an Inspector, prior to initiating any planned discharges from any Waste Disposal Facility.

5. The Licensee shall submit to the Board for approval in writing by December 31, 2010, a Sewage Disposal Facility Report. The Report shall include:

   a. As-built drawings and design plans of the Sewage Disposal Facility (including the lagoon and wetland) signed and stamped by an Engineer;
   b. A preliminary discharge and wetland hydrology assessment;
   c. The results of an inspection by a Geotechnical Engineer of the Sewage Disposal Facility lagoon including its berms and an evaluation of the impact of sewage seepage through the lagoon berms on the environment;
   d. An evaluation of the long term impacts of the Sewage Disposal Facility on the environment;
   e. A Sludge Management Plan that addresses sludge assessment and disposal methods. The Plan shall be incorporated in to the Sewage Disposal Facility Operations and Maintenance Manual referred to in Part F Item 1b;
   f. Recommended measures to optimize the Sewage Disposal Facility; and
   g. A schedule for implementing recommended measures.

6. The Licensee shall, prior to commissioning of the New Solid Waste Disposal Facility, or as otherwise approved by the Board in writing:

a. Dispose of and contain all non-Hazardous, non-bulky metal, solid Waste at the Solid Waste Disposal Facility;
b. Dispose of and contain all bulky metal Waste at the Bulky Metals Area; and
c. Segregate and securely store all hazardous materials and Hazardous Waste within the Hazardous Waste Storage Area in a manner as to prevent the deposit of deleterious substances into any Water, until such a time that the materials have been removed for proper disposal at a licensed facility.

7. The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, styrofoam, asbestos or painted wood to prevent the deposition of Waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding Waters, or as otherwise approved by the Board in writing.

8. The Licensee shall maintain records of all Waste removed from site and records of confirmation of proper disposal of removed Waste. These records shall be made available to an Inspector upon request.

9. The Licensee shall store and contain all Petroleum Hydrocarbon Impacted Soil in a manner as to prevent the deposit of deleterious substances into any Water.

10. The Licensee shall submit to the Board for approval in writing, at least sixty (60) days prior to the commissioning of a Hydrocarbon Impacted Soil Storage and Treatment Facility, a Hydrocarbon Impacted Soil Storage and Treatment Facility Management Plan including proposed Effluent quality limits for Monitoring Program Station ARV-10.

11. The Licensee shall dispose of all Effluent from contaminated soil areas and the Hydrocarbon Impacted Soil Storage and Treatment Facility, that exceed Effluent quality limits approved by the Board in Part D Item 14 (c) and Part D Item 10 respectively, off site at a licensed hazardous waste facility, or as otherwise approved by the Board in writing.

12. The discharge locations for all treated Effluents from the Hydrocarbon Impacted Soil Storage and Treatment Facility and contaminated soil areas shall be located at a minimum of thirty one (31) metres from the ordinary high water mark of any Water body and where direct or indirect flow into a Water body is not possible and no additional impacts are created.

13. The Licensee shall, prior to the removal of any treated soil from the Hydrocarbon Impacted Soil Storage and Treatment Facility, obtain written documentation from the Government of Nunavut Environmental Protection Service, confirming that the soils have been treated in accordance with the Government of Nunavut's "*Environmental Guideline for Contaminated Site Remediation, 2009"* for its intended use.

14. The Licensee shall submit to the Board for approval in writing by December 31, 2010, a Solid Waste Management Report. The Report shall include:

a. As-built drawings of the Solid Waste Disposal Facility, Hazardous Waste Storage Area, and Bulky Metals Area, signed and stamped by an Engineer;
b. Capacity assessment of the Solid Waste Disposal Facility;
c. An inventory and assessment of contaminated soil and water at the Solid Waste Disposal Facility, Bulky Metals Area, and Hazardous Waste Storage Area, and a plan for the treatment and disposal of contaminated soil and water including proposed Effluent quality limits for Monitoring Program Station ARV-11;
d. Recommendations for Water and wastewater containment, treatment, and drainage control. This Plan shall be incorporated into the Solid Waste Disposal Facility Operations and Maintenance Plan referred to in Part F Item 2d.
e. Recommended measures to optimize solid waste management; and
f. A schedule for implementing recommended measures.

15. Licensee shall implement measures to ensure hazardous materials and/or leachate from the Waste Disposal Facilities does not enter Water.

16. Licensee shall, annually between the months of June and September, undertake a geotechnical inspection to be carried out by a Geotechnical Engineer that takes into account all facilities intended to contain, withhold, divert or retain Water or Wastes. The inspection shall be conducted in accordance with the Canadian Dam Safety Guidelines, where applicable.

17. The Licensee shall, within sixty (60) days of completion of the geotechnical inspection referred to in Part D, Item 16, submit to the Board for review, the Geotechnical Engineer's inspection Report. The Licensee shall include a cover letter outlining an implementation plan to address the recommendations of the Geotechnical Engineer.

18. The Licensee shall maintain and operate all Water Supply Facilities and Waste Disposal Facilities in such a manner as to prevent structural failure.

PART E: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION

1. The Licensee shall, at least sixty (60) days prior to construction of the New Solid Waste Disposal Facility and/or the Hydrocarbon Impacted Soil Storage and Treatment Facility, or any dams, dykes or structures intended to contain, withhold, divert or retain Water or Wastes, submit to the Board, for approval in writing, final design Plans and construction drawings signed and stamped by an Engineer.

2. The Licensee shall obtained approval from the Board in writing prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain Water or Wastes.

3. The Licensee may, without written approval from the Board, carry out Modifications provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

a. The Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications to include:
   i. A description of the facilities and/or works to be constructed;
   ii. The proposed location of the structure(s);
   iii. Identification of any potential impacts to the receiving environment;
   iv. A description of any monitoring required, including sampling locations, parameters measured and frequencies of sampling;
   v. Schedule for construction;
   vi. Drawings of engineered structures signed and stamped by an Engineer; and
   vii. Proposed sediment and erosion control measures.
b. The proposed Modifications do not place the Licensee in contravention of the Licence or the Act;
c. The Board has not, within sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
d. The Board has not rejected the proposed Modifications;

4. Modifications for which any of the conditions referred to above have not been met can be carried out only with approval from the Board in writing.

5. The Licensee shall provide as-built plans and drawings of the construction and/or Modifications referred to in Part E of this Licence within ninety (90) days of completion of the Construction or Modification. These plans and drawings shall be signed and stamped by an Engineer.

PART F: CONDITIONS APPLYING TO OPERATIONS AND MAINTENACE

1. The Licensee shall, within sixty (60) days following Board approval of the Sewage Disposal Facility Report referred to in Part D, Item 5, submit to the Board, for approval in writing, a revision to the Plan entitled "Sewage Treatment Facility Operation and Maintenance (O&M) Plan, Hamlet of Arviat" May 2009, revised May 2010, to address the following:

   a. Requirements of the Licence;
   b. Sludge Management Plan referred to in Part D Item 5e; and
   c. Results of the Sewage Disposal Facility Report referred to in Part D Item 5.

2. The Licensee shall, within sixty (60) days following Board approval of the Solid Waste Disposal Facility Report referred to in Part D Item 14, submit to the Board, for approval in writing, a revision to the Plan entitled "Solid Waste Management Facility Operation and Maintenance (O&M) Plan, Hamlet of Arviat" January 2009, revised May 2010, to address the following:

   a. Requirements of the Licence;
   b. Bulky Waste Management Plan;

c. Hazardous Waste Management Plan including Hazardous Waste containment and segregation measures, and procedures for the movement of Hazardous Waste;
d. Recommendations for Water and wastewater containment, treatment, and drainage control as referred to in Part D Item 14(d); and
e. Results of the Solid Waste Disposal Facility Report referred to in Part D Item 14.

3. The Licensee shall, at least three (3) months prior to commissioning the New Solid Waste Disposal Facility and/or Hydrocarbon Impacted Soil Storage and Treatment Facility, submit to the Board, for approval in writing, a revised Solid Waste Management Facility Operations and Maintenance (O&M) Plan referred to in Part F Item 2 to address the New Solid Waste Disposal Facility and/or Hydrocarbon Impacted Soil Storage and Treatment Facility.

4. The Licensee shall, in preparation of the revised plan referred to in Part F, Item 3, consult Environment Canada for guidance related to Petroleum Hydrocarbon Impacted Soils storage and treatment facility design, siting, operation, monitoring, sampling and analytical methods, decommissioning and closure, as well as record keeping and reporting.

5. The Licensee shall, by December 31, 2010, submit to the Board for review, an Addendum to the approved Plan entitled "Environmental Emergency Contingency Plan, Hamlet of Arviat" May 2009, revised May 2010, to address reviewers' comments including the following:

   a. Procedures for the movement of Hazardous Waste;
   b. Contact information for the Government of Nunavut Department of Environment Manager of Pollution; and
   c. Detailed information regarding clean-up methods/procedures for spills on Water or ice.

6. If, during the period of this Licence, an unauthorized discharge of Waste and or Effluent occurs, or if such discharge is foreseeable, the Licensee shall:

   a. Employ as required, the approved Environmental Emergency Contingency Plan referred to in Part F Item 5;
   b. Report the incident immediately via the 24-Hour Spill Reporting Line (867) 920-8130 and to the Inspector at (867) 975-4295; and
   c. For each spill occurrence, submit a detailed report to the Inspector, no later than thirty (30) days after initially reporting the event, which includes the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain, clean up and restore the spill site.

PART G: CONDITIONS APPLYING TO ABANDONMENT, RESTORATION AND CLOSURE

1. The Licensee shall, by December 31, 2010, submit to the Board, for review, an interim Abandonment and Restoration Plan for the Solid Waste Disposal Facility, Bulky Metals Area, Hazardous Waste Storage Area and any contaminated sites identified in the Solid Waste Management Report referred to in Part D Item 14 (c). The Plan shall incorporate, where applicable, the appropriate sections described in Part G Item 3.

2. The Licensee shall, by December 31, 2010, submit to the Board, for approval in writing, a Final Abandonment and Restoration Plan for the two abandoned sewage lagoons. The Plan shall incorporate, where applicable, the appropriate sections described in Part G Item 3.

3. The Licensee shall, at least six (6) months prior to abandoning any facilities or upon submission of final design drawings for the construction of new facilities to replace existing ones, submit to the Board, for approval in writing, a Final Abandonment and Restoration Plan for the facilities being decommissioned. The Plan shall incorporate, where applicable, information on the following:

    a. Water intake facilities;
    b. The water treatment and waste disposal sites and facilities;
    c. Former dump sites;
    d. Petroleum and chemical storage areas;
    e. Any site affected by waste spills;
    f. Leachate prevention;
    g. An implementation and completion schedule;
    h. Maps delineating all disturbed areas, and site facilities;
    i. Consideration of altered drainage patterns;
    j. Type and source of cover materials;
    k. Future area use;
    l. Hazardous Wastes; and
    m. A proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

4. The Licensee shall carry out progressive reclamation of any Water Supply Facilities and Waste Disposal Facilities no longer required for the Licensee's operations.

5. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

6. The Licensee shall, prior to the use of reclaimed soils that have been contaminated by hydrocarbons, or soils referred to in Part D, Item 14(c), consult with the Government of Nunavut, Department of Environment and obtain written confirmation that the soil meets

the objectives as outlined in the Government of Nunavut's *Environmental Guideline for Contaminated Site Remediation*, March 2009 (Revised).

7. The Licensee shall complete the restoration work within the time schedule specified in an approved Abandonment and Restoration Plan, or as subsequently revised and approved by the Board in writing.

8. The Licensee shall complete all restoration work prior to the expiry of this Licence.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall maintain Monitoring Program Stations at the following locations:

Station Number	Description	Frequency	Status
ARV-1	Raw water supply at Wolf River prior to treatment.	Monthly	Active (Volume)
ARV-2a	Effluent from the discharge point of the Solid Waste Disposal Facility.	Quality Monthly during the months of May to August and prior to discharge of accumulated impacted water. Acute Toxicity Annually	Active (Quality and Acute Toxicity)
ARV-2b	Effluent from the discharge point of the New Solid Waste Disposal Facility.	Quality Monthly during the months of May to August and prior to discharge of accumulated impacted water. Acute Toxicity Annually	Active (Quality and Acute Toxicity)
ARV-3	Raw Sewage at truck offload point.	Monthly	Not active

ARV-4	Effluent from the discharge point of the Sewage Disposal Facility (end of Wetland).	Quality Monthly during the months of May to August. Acute Toxicity Annually	Active (Quality and Acute Toxicity)
ARV-5	Discharge from the Bulky Metal Waste Area.	Monthly during periods of observed flow.	New (Quality)
ARV-6	Discharge from the Hazardous Waste Storage Area.	Monthly during periods of observed flow.	New (Quality)
ARV-7	Water level in Wolf River.	Monthly during periods of open water.	New (Water level)
ARV-8	Water level in Sewage Disposal Facility lagoon.	Monthly during thawed conditions.	New (Sewage level)
ARV-9	Sewage Sludge removed from the Sewage Disposal Facility.	Monthly	New (Volume)
ARV-10	Effluent from the Final Discharge Point of the Hydrocarbon Impacted Soil Storage and Treatment Facility	To be determined in accordance with Part D Item 10	New (To be determined in accordance with Part D Item 10)
ARV-11	Effluent discharge from dewatering contaminated soil areas.	To be determined in accordance with Part D Item 14 (c)	New (To be determined in accordance with Part D Item 14 (c))

2. The Licensee shall, by December 31, 2010, maintain a water level Monitoring Program Station (ARV-7) at Wolf River.

3. The Licensee shall, by December 31, 2010, maintain a lagoon level Monitoring Program Station (ARV-8) at the Sewage Disposal Facility.

4. The Licensee shall provide the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) of all locations where sources of Water are utilized for all purposes and at all Monitoring Program Stations.

5. The Licensee shall confirm the locations and GPS coordinates for all Monitoring Program Stations referred to in Part H Item 1 with an Inspector.

6. The Licensee shall determine the locations and GPS coordinates of any additional Monitoring Program Stations required for any new Waste Disposal Facilities with an Inspector.

7. The Licensee shall measure and record in cubic metres, the monthly and annual quantities of Water extracted for all purposes at Monitoring Program Station ARV-1.

8. The Licensee shall carry out, at a minimum, weekly inspections at Monitoring Program Stations ARV-2a, ARV-5, ARV-6, and Station ARV-2b upon commissioning of the New Solid Waste Disposal Facility, from May to August inclusive, to identify Effluent or Water flow in order to fulfill the monitoring requirements of Part H, Item 9. A record of inspections shall be retained and made available to an Inspector upon request.

9. The Licensee shall sample monthly at Monitoring Program Stations ARV-2a, ARV-4, ARV-5, ARV-6, and Station ARV-2b upon commissioning of the New Solid Waste Disposal Facility, during the months of May to August, inclusive. Samples shall be analyzed for the following parameters:

BOD_5	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate – Nitrite	Oil and Grease (visual)
Total Phenols	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	Total Phosphorous

10. The Licensee shall conduct the following acute toxicity tests at Monitoring Program Stations ARV-2a and ARV-4, and Station ARV-2b upon commissioning of the New Solid Waste Disposal Facility, once annually between June and September, approximately mid-way through the discharge period:

    a. Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout (Reference Method EPS 1/RM/13), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time
    b. Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna (Reference Method EPS 1/RM/14), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time.

11. The Licensee shall, when flow volumes at Monitoring Program Stations ARV- 2a, ARV-2b and ARV-4 are not sufficient to conduct the tests required by Part H Item 10, collect samples upstream where adequate flow volume exists.

12. The Licensee shall record water elevation monthly, during open water at Monitoring Program Station ARV-7.

13. The Licensee shall record water elevations monthly during thawed conditions at Monitoring Program Station ARV-8.

14. The Licensee shall measure and record in cubic metres the monthly and annual quantities of Sewage sludge removed from the Sewage Disposal Facility at Monitoring Program Station ARV-9.

15. The Licensee shall submit to the Board for review, by December 31, 2010 a revision to the approved Plan entitled "Environmental Monitoring Program and Quality Assurance/Quality Control (QA/QC) Plan, Hamlet of Arviat" May 2009, revised May 2010, to address the following:

    a. All monitoring requirements listed under Part H of the Licence;
    b. A covering letter from an accredited laboratory confirming acceptance of the Quality Assurance/ Quality Control (QA/QC) Plan for analyses to be performed under this Licence as required under Part H, Item 17.

16. The Licensee shall, at least six (60) days prior to commissioning the New Solid Waste Disposal Facility and/or Hydrocarbon Impacted Soil Storage and Treatment Facility, submit to the Board, for approval in writing, a revision to the Environmental Monitoring Program and Quality Assurance/Quality Control (QA/QC) Plan, referred to in Part H Item 15, to address the New Solid Waste Disposal Facility and/or Hydrocarbon Impacted Soil Storage and Treatment Facility.

17. The Licensee shall annually review the QA/QC Plan referred to in Part H, Item 15 and modify it as necessary. The revised QA/QC Plan shall be submitted to the Board for review, accompanied by a current approval letter from an accredited lab and shall meet the standards as set out in Part H, Item 20 and Part H, Item 21 of the Licence.

18. The Licensee shall measure and record the volume of all contaminated soil, from all locations entering the Hydrocarbon Impacted Soil Storage and Treatment Facility.

19. The Licensee shall assess and record the concentration of Petroleum Hydrocarbon Impacted Soil entering any Hydrocarbon Impacted Soil Storage and Treatment Facility from all sources, as per the CCME *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, User Guide, January 2008*.

20. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board.

21. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

22. The Licensee shall include all of the data and information required by the Monitoring Program in the Licensee's Annual Report, as required per Part B, Item 3(a) or as otherwise requested by an Inspector.

23. Modifications to the Monitoring Program may be made only upon written request and subsequent approval of the Board in writing.

BURNSIDE
An Aboriginal Owned Company

Appendix B
Annual Monitoring Report Form

NWB Annual Report **Year being reported:** 2010

License No: 3AM-ARV1015 **Issued Date:** August 23, 2010
Expiry Date: August 31, 2015

Project Name: Arviat Water Use and Waste Disposal

Licensee: Hamlet of Arviat

Mailing Address:
The Hamlet of Arviat
P.O. Box 119
Arviat, Nunavut
X0C 0E0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):
Nuna Burnside Engineering and Environmental Ltd.
Consulting firm retained by CGS on behalf of the Hamlet of Arviat

General Background Information on the Project (*optional):
See attached report

License Requirements: the licensee must provide the following information in accordance with
Part B Item 3

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Wolf River

Water Quantity:	
86,000	Quantity Allowable Domestic (cu.m)
74,299	Actual Quantity Used Domestic (cu.m)
	Quantity Allowable Drilling (cu.m)
	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal
- [x] Solid Waste Disposal
- [x] Sewage
- [ ] Drill Waste
- [ ] Greywater
- [x] Hazardous
- [ ] Other:

Additional Details:
See attached report

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)
Date of Spill:
Date of Notification to an Inspector:
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

Revisions to the Spill Contingency Plan

Other: (see additional details)

Additional Details:
A Spill Contingency Plan has been submitted by Nuna Burnside, as part of Environmental Emergency Contingency Plan for Hamlet of Arviat and revised May 2010.

Revisions to the Abandonment and Restoration Plan

Other: (see additional details)

Additional Details:
Abandonment and Restoration Plans for the landfill and old sewage lagoons have been prepared and submitted to the NWB.

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Details described below

Additional Details:
Wolf River Water Intake - 61°04'33.10" N, 94°12"03.96 W

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the license are deposited;

Details described below

Additional Details:
Landfill - 61°05'17.33" N, 94°03"10.75 W
Sewage Lagoon - 61°05' 12.51" N, 94°02' 44.61" W

Results of any additional sampling and/or analysis that was requested by an Inspector

Additional sampling requested by an Inspector or the Board (See below)

Additional Details: (date of request, analysis of results, data attached, etc)

Additional sampling was requested by the Board. Sampling results are provided in attached report.

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

Inspection Report received by the Licensee (Date):

Additional Details: (Dates of Report, Follow-up by the Licensee)

INAC Inspection Report received by Licensee on September 29, 2010.
Response letter dated Dec 22, 2010 included in attached report.

Any additional comments or information for the Board to consider

See attached report

Date Submitted:	December 31, 2010	
Submitted/Prepared by:	Jim Walls, P.Geo., Nuna Burnside Engineering and Environmental Ltd.	
Contact Information:	**Tel:**	519-941-5331
	Fax:	519-941-8120
	email:	jim.walls@nunaburnside.com

GPS Coordinates for water sources utilized

Source Description	Latitude			Longitude		
	° Deg	' Min	" Sec	° Deg	' Min	" Sec
Wolf River Water Intake	61	4	33.1	94	12	3.96

GPS Locations of areas of waste disposal

Location Description (type)	Latitude			Longitude		
	° Deg	' Min	" Sec	° Deg	' Min	" Sec
Sewage Lagoon	61	5	12.51	94	2	44.61
Landfill	61	5	17.33	94	3	10.75
Bulky Metals Waste Area	61	5	45.22	94	3	0.79
Hazardous Waste Storage	61	6	7.86	94	4	5.18

GPS Locations of Monitoring Stations

Location Description (type)	Latitude			Longitude		
	° Deg	' Min	" Sec	° Deg	' Min	" Sec
ARV-1	61	4	33.30	94	12	4.24
ARV-2A	61	5	16.79	94	3	20.61
ARV-3	61	5	13.90	94	2	48.67
ARV-4	61	5	9.97	94	2	46.74
ARV-5	61	5	43.00	94	2	56.18
ARV-6	61	6	8.01	94	4	6.12
ARV-7	61	4	33.01	94	12	4.62
ARV-8	61	5	13.90	94	2	48.67
ARV-9	61	5	13.90	94	2	48.67
ARV-10	n/a			n/a		
ARV-11	n/a			n/a		

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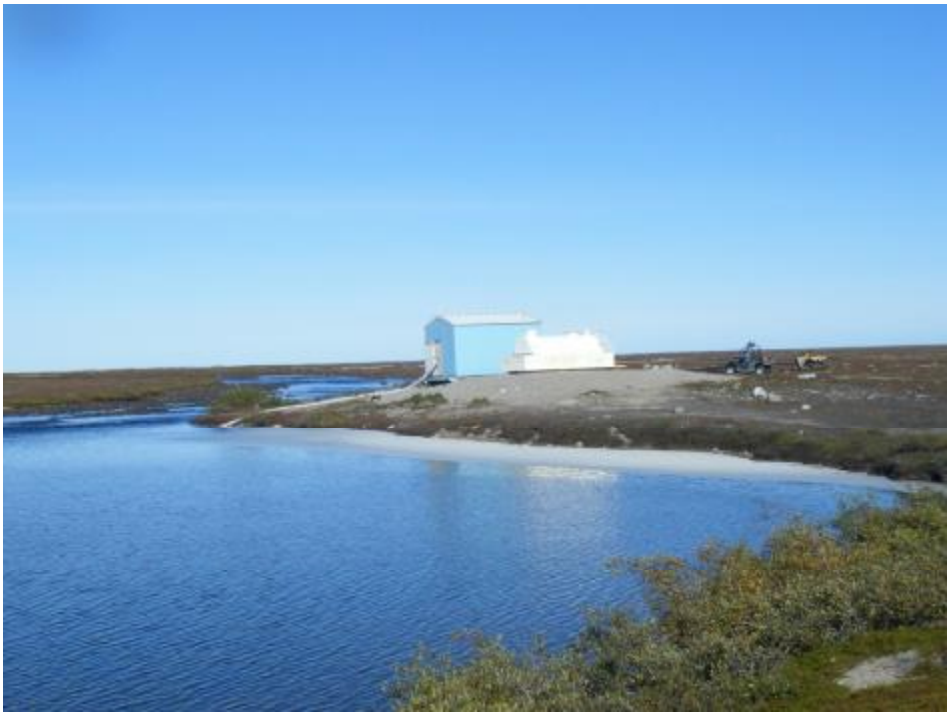
Appendix C
Photographs

Water Supply Facility



Station Number: ARV-1 Date: 9/8/2010
Description: Raw water supply at Wolf River prior to treatment
Notes: Record volume of flow pumped from intake (ARV-1)

Station Number: ARV-7 Date: 9/8/2010
Description: Water level in Wolf River
Notes: Survey water level from SE corner of pumphouse (Benchmark)

Solid Waste Disposal Facility

Description: Discharge point of landfill. Date: 7/26/2010

Station Number: ARV-2a Date: 7/26/2010
Description: Effluent from discharge point of the Solid Waste Disposal Facility
Notes: Water quality sample taken in front of culvert.

Solid Waste Disposal Facility – Landfill Date: 9/11/2010
Description: Looking south across fill area at front of landfill

Solid Waste Disposal Facility – Landfill Date: 9/11/2010
Description: Filled and covered area of landfill.

Solid Waste Disposal Facility – Bulky Metals Waste Area
Description: Old fuel tanks and contaminated soil piles. Date: 9/8/2010

Station Number: ARV-5 Date: 9/8/2010
Description: Discharge from Bulky Metal Waste Area
Notes: Water quality sample (BW-1)

Solid Waste Disposal Facility – Hazardous Waste Storage Area
Description: Waste oil drums stored next to Hamlet garage. Date: 9/9/2010

Description: Stained soil at Hazardous Waste Storage Area, Date: 9/9/2010
Notes: Soil samples HW-1, HW-2 and HW-3 taken from area.

Sewage Disposal Facility

Station Number: Station ARV-3 Date: 9/10/2010
Description: Raw sewage at truck off load point.

Station Number: ARV-8 Date: 9/10/2010
Description: Benchmark used to survey water level in Sewage Disposal Facility lagoon

Sewage Disposal Facility – Sewage lagoon Date: 9/10/2010
Description: Looking north at spillway into sewage lagoon

Station Number: ARV-4 Date: 9/10/2010
Description: Sampling location for effluent from the discharge point of the Sewage Disposal Facility

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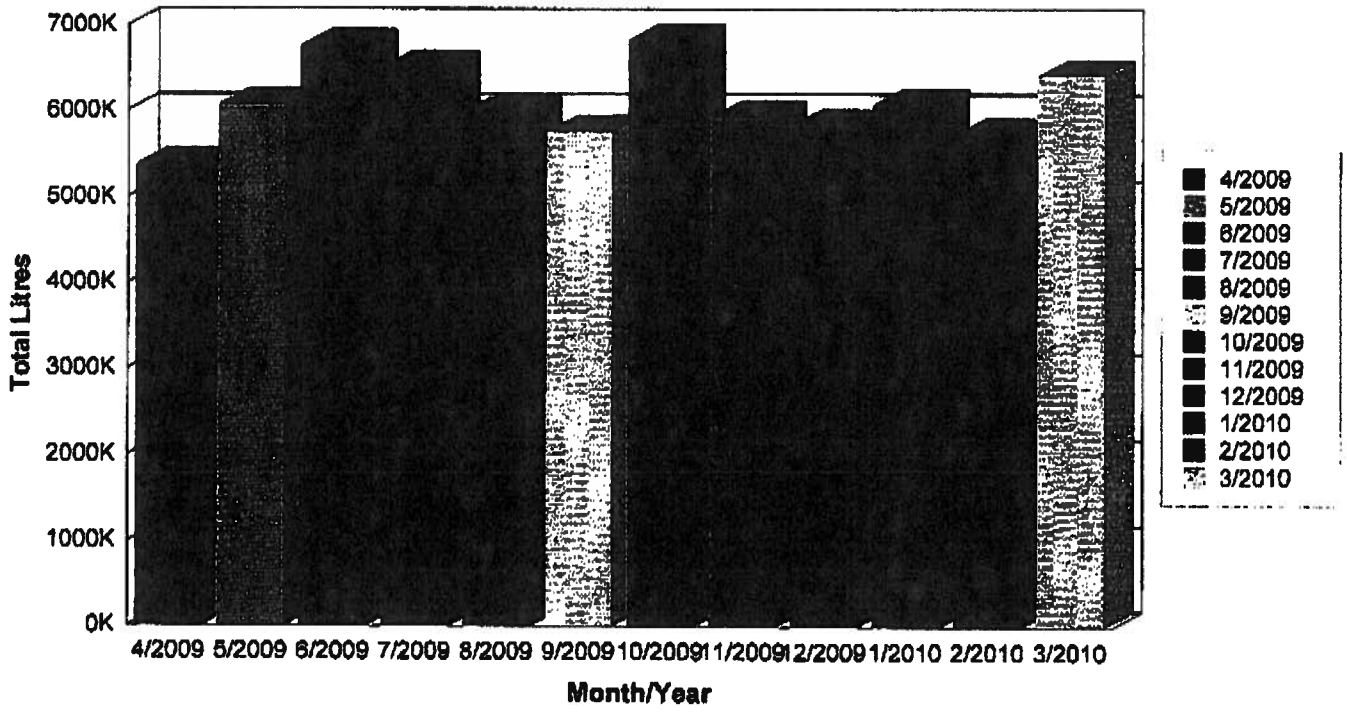
Appendix D
Water Use Reports

Delivery Summary By Month and Year

Printed on: Nov 12 2010 @ 1:39:37PM
Page: 1 of 1

Date Range From:Apr-01-2009 To: Mar-31-2010

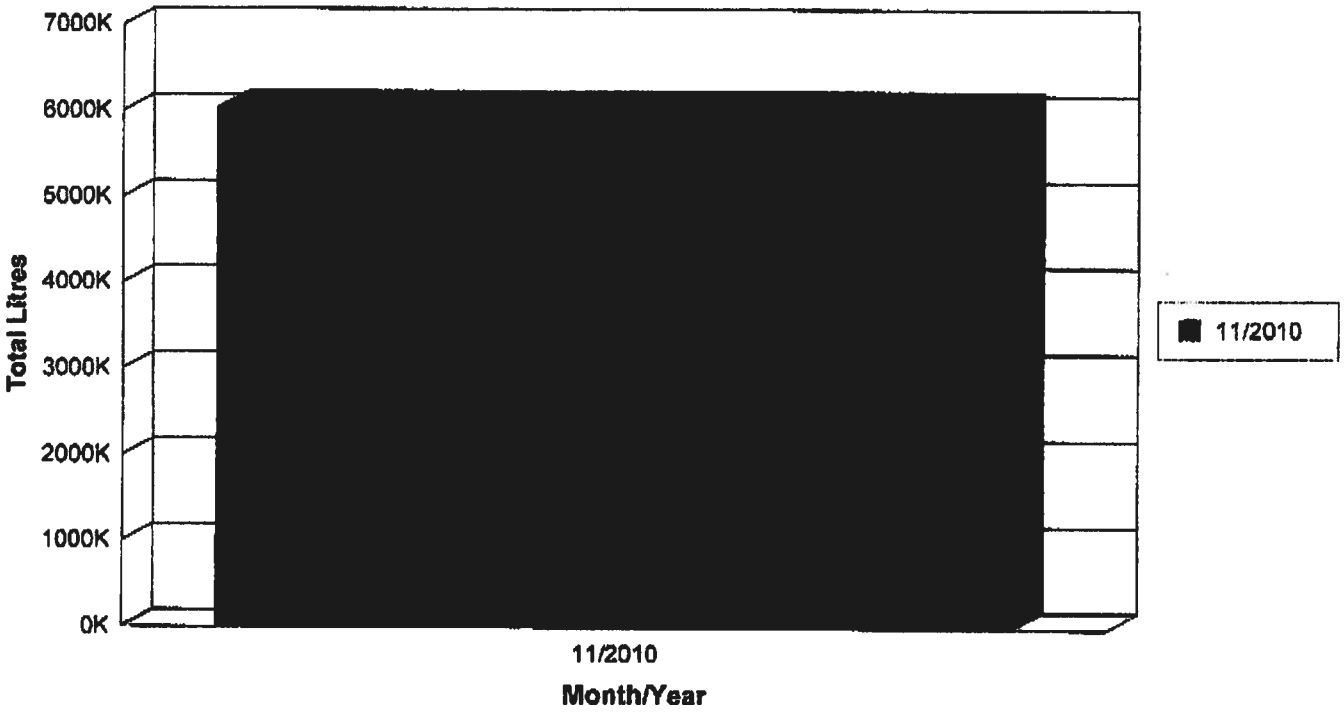


Month / Year	09/10 Litres Delivered	2010/11
April 2009	5,372,241.30	2010 — 5,778,808.40
May 2009	6,065,792.90	- 2010 - 5,995,218.90
June 2009	6,754,762.60	- 2010 - 5,979,411.50
July 2009	6,505,955.20	- 2010 - 6,318,159.30
August 2009	5,981,373.20	- 2010 - 6,762,343.00
September 2009	5,750,235.70	- 2010 - 6,351,097.80
October 2009	6,819,554.60	- 2010 - 6,419,234.39
November 2009	5,914,646.60	
December 2009	5,819,816.50	
January 2010	6,062,290.70	
February 2010	5,716,551.20	
March 2010	6,406,867.80	
Grand Total:	**73,170,088.30**	

Delivery Summary By Month and Year

Printed on: Jan 04 2011 @ 11:34:15AM
Page: 1 of 1

Date Range From:Nov-01-2010 To: Nov-30-2010

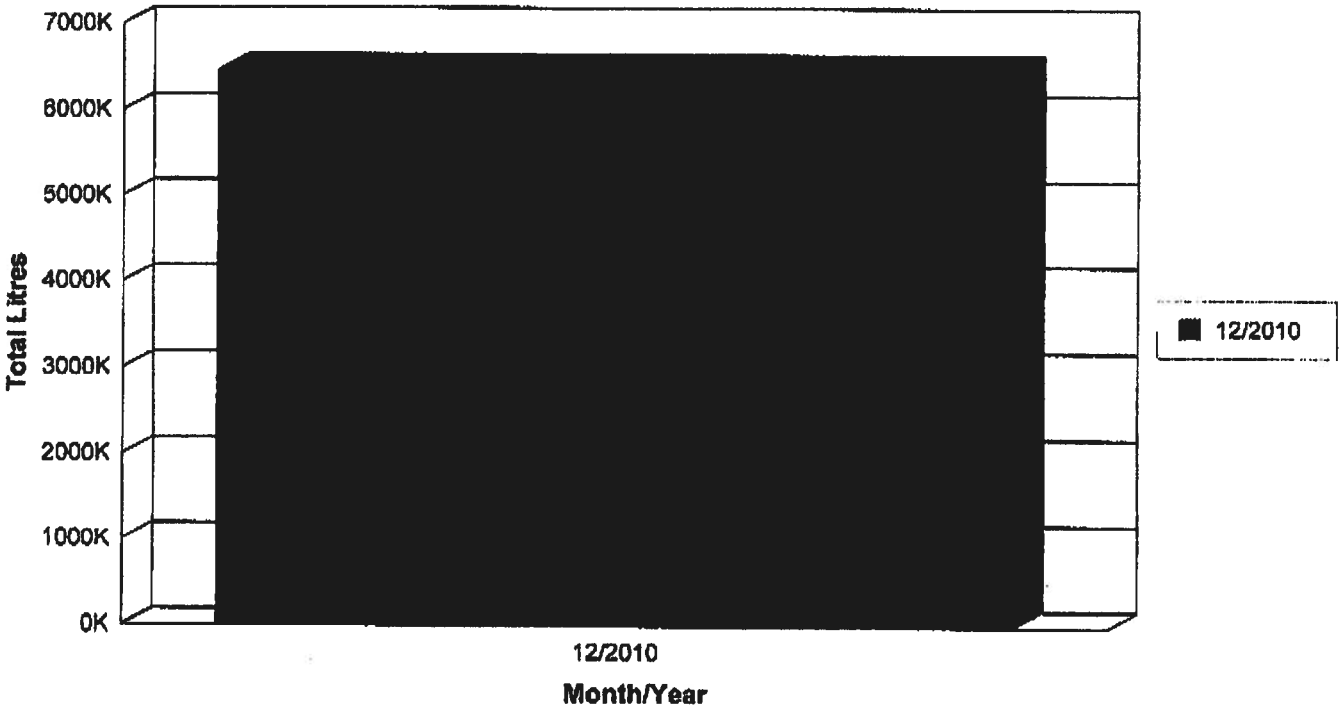


Month / Year	Litres Delivered
November 2010	6,045,784.90
Grand Total:	**6,045,784.90**

Delivery Summary By Month and Year

Printed on: Jan 04 2011 @ 11:34:37AM
Page: 1 of 1

Date Range From:Dec-01-2010 To: Dec-31-2010



Month / Year	Litres Delivered
December 2010	6,463,738.90
Grand Total:	**6,463,738.90**

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Appendix E
Sampling Results and Certificates of Analysis

Table E-1 Water Quality Sampling Results - Wolf River

Parameter	Unit	Detection Limits	Canadian Drinking Water Quality Standards	Wolf River Water Intake	
				9/8/2010 WI-Up	9/8/2010 WI-Down
Colour	TCU	5	15*	8	9
Electrical Conductivity	S/cm	2	-	76	76
pH	N/A	-	6.5-8.5	6.84	6.86
Turbidity	NTU	0.5	1	0.7	0.6
Alkalinity (as CaCO3)	mg/L	5	-	7	7
Bicarbonate (as CaCO3)	mg/L	5	-	7	7
Total Hardness (as CaCO3)	mg/L	10	200*	16	15
Ammonia as N	mg/L	0.02	-	<0.02	0.11
Nitrate as N	mg/L	0.05	45	<0.05	<0.05
Nitrite as N	mg/L	0.05	3.2	<0.05	<0.05
Calcium	mg/L	0.05	-	3.5	3.38
Chloride	mg/L	0.1	250*	16.6	16.7
Fluoride	mg/L	0.05	1.5	<0.05	<0.05
Magnesium	mg/L	0.05	-	1.67	1.66
Orthophosphate as P	mg/L	0.1	-	<0.1	<0.1
Potassium	mg/L	0.05	-	0.76	0.74
Reactive Silica	mg/L	0.05	-	<0.05	<0.05
Sodium	mg/L	0.05	200*	7.57	7.54
Sulphate	mg/L	0.1	500*	3.1	3.16
Total Dissolved Solids	mg/L	20	500*	46	46
Total Organic Carbon	mg/L	0.5	-	5	5
Total Phosphorus	mg/L	0.05	-	<0.05	<0.05
Aluminum	mg/L	0.004	0.1	0.008	0.007
Arsenic	mg/L	0.003	0.025	<0.003	<0.003
Barium	mg/L	0.002	1	0.005	0.006
Boron	mg/L	0.01	5	<0.010	<0.010
Cadmium	mg/L	0.002	0.005	<0.002	<0.002
Chromium Total	mg/L	0.003	0.05	<0.003	<0.003
Copper	mg/L	0.003	1.0*	<0.003	<0.003
Iron	mg/L	0.01	0.3*	0.043	0.038
Lead	mg/L	0.002	0.01	<0.002	<0.002
Manganese	mg/L	0.002	0.05*	0.008	0.008
Mercury	mg/L	0.0001	0.001	-	-
Molybdenum	mg/L	0.002	-	<0.002	<0.002
Nickel	mg/L	0.003	-	<0.003	<0.003
Selenium	mg/L	0.004	0.01	<0.004	<0.004
Silver	mg/L	0.002	-	<0.002	<0.002
Strontium	mg/L	0.005	-	0.027	0.026
Thallium	mg/L	0.006	-	<0.006	<0.006
Titanium	mg/L	0.002	-	<0.002	<0.002
Uranium	mg/L	0.002	0.02	<0.002	<0.002
Vanadium	mg/L	0.002	-	<0.002	<0.002
Zinc	mg/L	0.005	5.0*	<0.005	<0.005

Guidelines: Canadian Drinking Water Quality Standards, Health Canada

* Aesthetic Objective

- indicates that there is no guideline for drinking water

Table E-2 Summary of Water Quality Analysis - Landfill

Parameter	Unit	Detection Limits	CCME Guidelines*	ARV-2	ARV-2	ARV-2
				7/23/2010	9/1/2010	9/10/2010
Colour	TCU	5		102	-	-
Electrical Conductivity	S/cm	2		2010	2520	2630
pH	N/A	-		8.07	8.11	8.21
Turbidity	NTU	0.5		8.1	-	-
Total Suspended Solids	mg/L	10		14	<5.0	8
Alkalinity (as CaCO3)	mg/L	5		440	-	-
Bicarbonate (as CaCO3)	mg/L	5		440	-	-
Total Hardness (as CaCO3)	mg/L	10		783	-	-
Ammonia as N	mg/L	0.02		11	12.9	13.3
Nitrate as N	mg/L	0.05		<0.05	<0.25	<0.25
Nitrite as N	mg/L	0.05		<0.05	<0.25	<0.25
Calcium	mg/L	0.05		248	244	230
Chloride	mg/L	0.1		244	-	-
Fluoride	mg/L	0.05		<0.05	-	-
Magnesium	mg/L	0.05		39.7	43	49
Orthophosphate as P	mg/L	0.1		0.33	-	-
Potassium	mg/L	0.05		44.7	43.9	44
Reactive Silica	mg/L	0.05		9.17	-	-
Sodium	mg/L	0.05		178	228	243
Sulphate	mg/L	0.1		539	461	475
Total Dissolved Solids	mg/L	20		1570	-	-
Total Organic Carbon	mg/L	0.5		52	-	-
Total Phosphorus	mg/L	0.05		0.64	0.62	0.56
$BOD_{(5)}$	mg/L	1		13	6.4	<6.0
Fecal Coliform	MPN/100ml	3		-	430	38
Escherichia coli	MPN/100ml	3		-	-	-
Aluminum	mg/L	0.004	0.1	0.02	0.0219	0.0095
Arsenic	mg/L	0.003	0.005	0.005	0.00468	0.00482
Barium	mg/L	0.002		0.05	0.0471	0.0458
Boron	mg/L	0.01		1.22	1.49	1.34
Cadmium	mg/L	0.002	0.00054-0.00004[1]	<0.002	<0.00001	<0.00010
Chromium Total	mg/L	0.003		0.013	<0.001	<0.0010
Chromium VI	mg/L	0.005	0.001	<0.005	-	-
Cobalt	mg/L	-		-	0.00051	0.00051
Copper	mg/L	0.003	0.002-0.004[1]	**0.007**	0.00129	0.00149
Iron	mg/L	0.01	0.30	**0.936**	**0.516**	**0.529**
Lead	mg/L	0.002	0.001-0.007[1]	**0.028**	0.000153	0.000145
Manganese	mg/L	0.002		0.983	0.663	0.599
Mercury	mg/L	0.0001	0.000026	<0.0001	<0.00005	<0.000050
Molybdenum	mg/L	0.002	0.073	<0.002	0.00039	0.00036
Nickel	mg/L	0.003	0.025-0.15[1]	0.004	0.0024	<0.0020
Selenium	mg/L	0.004	0.001	<0.004	<0.001	<0.0010
Silver	mg/L	0.002	0.0001	<0.002	<0.0001	<0.00010
Strontium	mg/L	0.005		1.68	1.53	1.66
Thallium	mg/L	0.006	0.0008	<0.006	<0.0001	<0.00010
Titanium	mg/L	0.002		0.01	0.00166	0.00299
Uranium	mg/L	0.002		<0.002	0.00064	0.00063
Vanadium	mg/L	0.002		<0.002	0.00071	0.00061
Zinc	mg/L	0.005	0.03	**0.077**	0.0203	0.016
Phenols	mg/L	0.001	0.004	**0.005**	<0.001	0.002
Total Oil and Grease	mg/L	0.5		5.2	2.4	<1.0

B LD - indicates exceedence of CCME standards

* CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

[1] Value depends on water hardness, see CCME Guidelines

TNTC - indicates Too Numerous To Count

Table E-2 Summary of Water Quality Analysis - Landfill

Parameter	Unit	Detection Limits	CCME Guidelines*	LF-1	LF-2	LF-3	ARV-2
				9/9/2010	9/9/2010	9/9/2010	11/1/2010
Colour	TCU	5		30	55	49	-
Electrical Conductivity	S/cm	2		1750	2040	2070	-
pH	N/A	-		7.9	8.03	8.27	-
Turbidity	NTU	0.5		0.9	3.3	1.6	-
Total Suspended Solids	mg/L	10		288	21	<10	-
Alkalinity (as CaCO3)	mg/L	5		252	322	263	-
Bicarbonate (as CaCO3)	mg/L	5		252	322	263	-
Total Hardness (as CaCO3)	mg/L	10		808	735	599	-
Ammonia as N	mg/L	0.02		<0.02	1.23	0.26	-
Nitrate as N	mg/L	0.05		<0.05	0.81	<0.05	-
Nitrite as N	mg/L	0.05		-	-	-	-
Calcium	mg/L	0.05		283	225	169	-
Chloride	mg/L	0.1		114	267	334	-
Fluoride	mg/L	0.05		<0.05	<0.05	<0.05	-
Magnesium	mg/L	0.05		24.5	42.1	43.1	-
Orthophosphate as P	mg/L	0.1		<0.1	<0.1	<0.1	-
Potassium	mg/L	0.05		20.8	30.6	37.5	-
Reactive Silica	mg/L	0.05		15.9	8.84	9.34	-
Sodium	mg/L	0.05		82.5	171	204	-
Sulphate	mg/L	0.1		650	518	469	-
Total Dissolved Solids	mg/L	20		1440	1520	1450	-
Total Organic Carbon	mg/L	0.5		36.5	25.8	26.5	-
Total Phosphorus	mg/L	0.05		1.57	0.34	0.2	-
BOD $_{(5)}$	mg/L	1		27.4	6.0	2.6	34
Fecal Coliform	MPN/100ml	3		23	9	4	TNTC
Escherichia coli	MPN/100ml	3		-	-	-	TNTC
Aluminum	mg/L	0.004	0.1	<0.004	0.006	0.004	-
Arsenic	mg/L	0.003	0.005	<0.003	0.003	0.003	-
Barium	mg/L	0.002		0.045	0.041	0.035	-
Boron	mg/L	0.01		0.736	0.805	0.773	-
Cadmium	mg/L	0.002	0.00054-0.00004[1]	<0.002	<0.002	<0.002	-
Chromium Total	mg/L	0.003		<0.003	0.006	0.006	-
Chromium VI	mg/L	0.005	0.001	<0.005	<0.005	<0.005	-
Cobalt	mg/L	-		-	-	-	-
Copper	mg/L	0.003	0.002-0.004[1]	<0.003	<0.003	<0.003	-
Iron	mg/L	0.01	0.30	<0.01	0.074	0.02	-
Lead	mg/L	0.002	0.001-0.007[1]	<0.002	<0.002	<0.002	-
Manganese	mg/L	0.002		0.045	0.216	0.226	-
Mercury	mg/L	0.0001	0.000026	<0.0001	<0.0001	<0.0001	-
Molybdenum	mg/L	0.002	0.073	<0.002	<0.002	<0.002	-
Nickel	mg/L	0.003	0.025-0.15[1]	<0.003	0.003	<0.003	-
Selenium	mg/L	0.004	0.001	<0.004	<0.004	<0.004	-
Silver	mg/L	0.002	0.0001	<0.002	<0.002	<0.002	-
Strontium	mg/L	0.005		2.54	1.71	1.31	-
Thallium	mg/L	0.006	0.0008	<0.006	<0.006	<0.006	-
Titanium	mg/L	0.002		0.008	0.007	0.006	-
Uranium	mg/L	0.002		<0.002	<0.002	<0.002	-
Vanadium	mg/L	0.002		<0.002	<0.002	<0.002	-
Zinc	mg/L	0.005	0.03	0.007	0.013	0.009	-
Phenols	mg/L	0.001	0.004	-	0.002	0.001	-
Total Oil and Grease	mg/L	0.5		-	-	-	-

B LD - indicates exceedence of CCME standards

* CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

[1] Value depends on water hardness, see CCME Guidelines

TNTC - indicates Too Numerous To Count

Table E-2 Summary of Water Quality Analysis - Landfill

Parameter	Unit	Reported Detection Limits	CCME Standards - Fresh Water*	ARV-2 9/10/2010
Petroleum Hydrocarbon F1 - F4 in Water (With PAHs)				
C6 - C10 (F1)	g/L	25		<25
C6 - C10 (F1 minus BTEX)	g/L	25		<25
C>10 - C16 (F2)	g/L	100		<100
C>10 - C16 (F2 minus Naphthalene)	g/L	100		<100
C6 - C16 (F1 F2)	g/L	100		<100
C>16 - C34 (F3)	g/L	100		<100
C>16 - C34 (F3 minus PAHs)	g/L	100		<100
C>34 - C50 (F4)	g/L	100		<100
C>16 - C50 (F3 F4)	g/L	100		<100
Gravimetric Heavy Hydrocarbons	g/L	500		NA
PAHs in Water				
Naphthalene	g/L	0.12		<0.12
Acenaphthylene	g/L	0.11		<0.11
Acenaphthene	g/L	0.10	5.8	<0.10
Fluorene	g/L	0.09	3	<0.09
Phenanthrene	g/L	0.10	0.4	<0.10
Anthracene	g/L	0.07		<0.07
Fluoranthene	g/L	0.12	0.04	<0.12
Pyrene	g/L	0.12	0.025	<0.12
Benzo(a)anthracene	g/L	0.08	0.018	<0.08
Chrysene	g/L	0.05		<0.05
Benzo(b)fluoranthene	g/L	0.05		<0.05
Benzo(k)fluoranthene	g/L	0.06		<0.06
Benzo(a)pyrene	g/L	0.01	0.015	<0.01
Indeno(1,2,3-cd)pyrene	g/L	0.03		<0.03
Dibenzo(a,h)anthracene	g/L	0.09		<0.09
Benzo(g,h,i)perylene	g/L	0.06		<0.06
2-and 1-methyl Napthalene	g/L	0.20	1.1	<0.20
Chrysene-d12	%			98
Volatile rganic Compounds in Water (V C s)				
Dichlorodifluoromethane	g/L	0.80		<0.80
Chloromethane	g/L	1.60		<1.60
Vinyl Chloride	g/L	0.68		<0.68
Bromomethane	g/L	0.80		<0.80
Chloroethane	g/L	0.80		<0.80
Trichlorofluoromethane	g/L	1.60		<1.60
Acetone	g/L	4.0		<4.0
1,1 Dichloroethylene	g/L	1.20		<1.20
Methylene Chloride	g/L	1.20		<1.20
trans- 1,2-dichloroethylene	g/L	0.80		<0.80
Methyl tert-butyl ether	g/L	0.80		<0.80
1,1-Dichloroethane	g/L	1.20		<1.20
Methyl Ethyl Ketone	g/L	4.0		<4.0
cis- 1,2-Dichloroethylene	g/L	0.80		<0.80
Chloroform	g/L	0.80	1.8	<0.80
1,2 - Dichloroethane	g/L	0.80	100	<0.80
1,1,1-Trichloroethane	g/L	1.20		<1.20
Carbon Tetrachloride	g/L	0.80		<0.80
Benzene	g/L	0.80		<0.80
1,2-Dichloropropane	g/L	0.80		<0.80
Trichloroethylene	g/L	0.80		<0.80
Bromodichloromethane	g/L	0.80		<0.80
cis-1,3-Dichloropropene	ug/L	0.80		<0.80
Methyl Isobutyl Ketone	g/L	4.0		<4.0
trans-1,3-Dichloropropene	g/L	1.20		<1.20
1,1,2-Trichloroethane	g/L	0.80		<0.80
Toluene	g/L	0.80		<0.80
2-Hexanone	g/L	1.20		<1.20
Dibromochloromethane	g/L	0.40		<0.40
Ethylene Dibromide	g/L	0.80		<0.80
Tetrachloroethylene	g/L	0.80		<0.80
1,1,1,2-Tetrachloroethane	g/L	0.40		<0.40
Chlorobenzene	g/L	0.40		<0.40
Ethylbenzene	g/L	0.40		<0.40
m p-Xylene	g/L	0.80		<0.80
Bromoform	g/L	0.40		<0.40
Styrene	g/L	0.40		<0.40
1,1,2,2-Tetrachloroethane	g/L	0.40		<0.40
o-Xylene	g/L	0.40		<0.40
1,3-Dichlorobenzene	g/L	0.40	150	<0.40
1,4-Dichlorobenzene	g/L	0.40	26	<0.40
1,2-Dichlorobenzene	g/L	0.40	0.7	<0.40
1,2,4-Trichlorobenzene	g/L	1.20	24	<1.20
1,3-Dichloropropene (Cis Trans)	g/L	1.20		<1.20
Xylene Mixture (Total)	g/L	0.80		<0.80
n-Hexane	g/L	0.80		<0.80
Toluene-d8	% Recovery			99
4-Bromofluorobenzene	% Recovery			92

CCME - Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

Table E-3 Summary of Water Quality Analysis
Bulky Metals Area

Parameter	Unit	Reported Detection Limits (Sept)	Reported Detection Limits (Nov)	CCME Guidelines*	BW-1	ARV-5	ARV-5-2
					9/9/2010	11/2/2010	11/2/2010
Petroleum Hydrocarbon F1 - F4 in Water (With PAHs)							
C6 - C10 (F1)	g/L	25	25		<25	<25	<25
C6 - C10 (F1 minus BTEX)	g/L	25	25		<25	<25	<25
C>10 - C16 (F2)	g/L	100	100		<100	<100	<100
C>10 - C16 (F2 minus Naphthalene)	g/L	100	100		<100	<100	<100
C6 - C16 (F1 F2)	g/L	100	100		<100	<100	<100
C>16 - C34 (F3)	g/L	100	100		<100	<100	<100
C>16 - C34 (F3 minus PAHs)	g/L	100	100		<100	<100	<100
C>34 - C50 (F4)	g/L	100	100		<100	<100	<100
C>16 - C50 (F3 F4)	g/L	100	100		<100	<100	<100
Gravimetric Heavy Hydrocarbons	g/L	500	500		NA	NA	NA
PAHs in Water							
Naphthalene	g/L	0.12	0.12		<0.12	-	-
Acenaphthylene	g/L	0.11	0.11		<0.11	-	-
Acenaphthene	g/L	0.10	0.10	5.8	<0.10	-	-
Fluorene	g/L	0.09	0.09	3	<0.09	-	-
Phenanthrene	g/L	0.10	0.10	0.4	<0.10	-	-
Anthracene	g/L	0.07	0.07		<0.07	-	-
Fluoranthene	g/L	0.12	0.12	0.04	<0.12	-	-
Pyrene	g/L	0.12	0.12	0.025	<0.12	-	-
Benzo(a)anthracene	g/L	0.08	0.08	0.018	<0.08	-	-
Chrysene	g/L	0.05	0.05		<0.05	-	-
Benzo(b)fluoranthene	g/L	0.05	0.05		<0.05	-	-
Benzo(k)fluoranthene	g/L	0.06	0.06		<0.06	-	-
Benzo(a)pyrene	g/L	0.01	0.01	0.015	<0.01	-	-
Indeno(1,2,3-cd)pyrene	g/L	0.03	0.03		<0.03	-	-
Dibenzo(a,h)anthracene	g/L	0.09	0.09		<0.09	-	-
Benzo(g,h,i)perylene	g/L	0.06	0.06		<0.06	-	-
2-and 1-methyl Napthalene	g/L	0.20	0.20	1.1	<0.20	-	-
Chrysene-d12	%				97	-	-
Volatile rganic Compounds in Water (V C s)							
1,1 Dichloroethylene	g/L	0.30	0.60		<0.30	<0.60	<3.00
1,1,1,2-Tetrachloroethane	g/L	0.10	0.20		<0.10	<0.20	<1.00
1,1,1-Trichloroethane	g/L	0.30	0.60		<0.30	<0.60	<3.00
1,1,2,2-Tetrachloroethane	g/L	0.10	0.20		<0.10	<0.20	<1.00
1,1,2-Trichloroethane	g/L	0.20	0.40		<0.20	<0.40	<2.00
1,1-Dichloroethane	g/L	0.30	0.60		<0.30	<0.60	<3.00
1,2 - Dichloroethane	g/L	0.20	0.40	100	<0.20	<0.40	<2.00
1,2,4-Trichlorobenzene	g/L	0.30	0.60	24	<0.30	<0.60	<3.00
1,2-Dichlorobenzene	g/L	0.10	0.20	0.7	<0.10	<0.20	<1.00
1,2-Dichloropropane	g/L	0.20	0.40		<0.20	<0.40	<2.00
1,3-Dichlorobenzene	g/L	0.10	0.20	150	<0.10	<0.20	<1.00
1,3-Dichloropropene (Cis Trans)	g/L	0.30	0.60		<0.30	<0.60	<3.00
1,4-Dichlorobenzene	g/L	0.10	0.20	26	<0.10	<0.20	<1.00
2-Hexanone	g/L	0.30	0.60		<0.30	<0.60	<3.00
4-Bromofluorobenzene	% Recovery				92	89	85
Acetone	g/L	1.0	10.0		<1.0	<2.0	<10.0
Benzene	g/L	0.20	0.40	370	<0.20	<0.40	<2.00
Bromodichloromethane	g/L	0.20	0.40		<0.20	<0.40	<2.00
Bromoform	g/L	0.10	0.20		<0.10	<0.20	<1.00
Bromomethane	g/L	0.20	0.40		<0.20	<0.40	<2.00
Carbon Tetrachloride	g/L	0.20	0.40		<0.20	<0.40	<2.00
Chlorobenzene	g/L	0.10	0.20		<0.10	<0.20	<1.00
Chloroethane	g/L	0.20	0.40		<0.20	<0.40	<2.00
Chloroform	g/L	0.20	0.40	1.8	<0.20	<0.40	<2.00
Chloromethane	g/L	0.40	0.80		<0.40	<0.80	<4.00
cis- 1,2-Dichloroethylene	g/L	0.20	0.40		<0.20	<0.40	<2.00
cis-1,3-Dichloropropene	ug/L	0.20	0.40		<0.20	<0.40	<2.00
Dibromochloromethane	g/L	0.10	0.20		<0.10	<0.20	<1.00
Dichlorodifluoromethane	g/L	0.20	0.40		20	<0.40	<2.00
Ethylbenzene	g/L	0.10	0.20		<0.10	<0.20	<1.00
Ethylene Dibromide	g/L	0.20	0.40		<0.20	<0.40	<2.00
m p-Xylene	g/L	0.20	0.40		<0.20	<0.40	<2.00
Methyl Ethyl Ketone	g/L	1.0	10.0		<1.0	<2.0	<10.0
Methyl Isobutyl Ketone	g/L	1.0	10.0		<1.0	<2.0	<10.0
Methyl tert-butyl ether	g/L	0.20	0.40		<0.20	<0.40	<2.00
Methylene Chloride	g/L	0.30	0.60		<0.30	<0.60	<3.00
n-Hexane	g/L	0.20	0.40		<0.20	<0.40	<2.00
o-Xylene	g/L	0.10	0.20		<0.10	<0.20	<1.00
Styrene	g/L	0.10	0.20		<0.10	<0.20	<1.00
Tetrachloroethylene	g/L	0.20	0.40		<0.20	<0.40	<2.00
Toluene	g/L	0.20	0.40		<0.20	<0.40	<2.00
Toluene-d8	% Recovery				100	76	74
trans- 1,2-dichloroethylene	g/L	0.20	0.40		<0.20	<0.40	<2.00
trans-1,3-Dichloropropene	g/L	0.30	0.60		<0.30	<0.60	<3.00
Trichloroethylene	g/L	0.20	0.40		<0.20	<0.40	<2.00
Trichlorofluoromethane	g/L	0.40	0.80		17	<0.80	<4.00
Vinyl Chloride	g/L	0.17	0.34		<0.17	<0.34	<1.70
Xylene Mixture (Total)	g/L	0.20	0.40		<0.20	<0.40	<2.00

* CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

B LD - indicates exceedence of CCME standards

Table E-3 Summary of Water Quality Analysis
Bulky Metals Area

Parameter	Unit	Reported Detection Limits	CCME Guidelines*	ARV-5	ARV-5-2
				11/2/2010	11/2/2010
Colour	TCU	5		113	1050
Electrical Conductivity	S/cm	2		1200	9230
pH	N/A	-		6.61	6.31
Turbidity	NTU	0.5		369	239
Alkalinity (as CaCO3)	mg/L	5		47	118
Bicarbonate (as CaCO3)	mg/L	5		47	118
Total Hardness (as CaCO3)	mg/L	10		248	1460
Ammonia as N	mg/L	0.02		<0.02	20.8
Nitrate as N	mg/L	0.05		<0.05	<0.05
Nitrite as N	mg/L	0.05		<0.05	<0.05
Calcium	mg/L	0.05		45.5	106
Chloride	mg/L	0.1		340	3110
Fluoride	mg/L	0.05		<0.05	<0.05
Magnesium	mg/L	0.05		32.7	290
Orthophosphate as P	mg/L	0.1		<0.1	<1.00
Potassium	mg/L	0.05		7.66	57.1
Reactive Silica	mg/L	0.05		13.8	31.8
Sodium	mg/L	0.05		160	1640
Sulphate	mg/L	0.1		55.9	636
Total Dissolved Solids	mg/L	20		816	5930
Total Organic Carbon	mg/L	0.5		53.6	240
Total Phosphorus	mg/L	0.05		0.87	2.42
Aluminum	mg/L	0.004	0.1	**3.92**	**6.13**
Arsenic	mg/L	0.003	0.005	**0.008**	**0.012**
Barium	mg/L	0.002		**0.073**	**0.074**
Boron	mg/L	0.01		**0.045**	**0.769**
Cadmium	mg/L	0.002	0.00054-0.00004[1]	<0.002	**0.003**
Chromium Total	mg/L	0.003		0.01	0.111
Copper	mg/L	0.003	0.002-0.004[1]	0.01	0.039
Iron	mg/L	0.01	0.3	**5.85**	**131.0**
Lead	mg/L	0.002	0.001-0.007[1]	**0.008**	**0.01**
Manganese	mg/L	0.002		0.49	0.831
Mercury	mg/L	0.0001	0.000026	<0.0001	<0.0001
Molybdenum	mg/L	0.002	0.073	<0.002	0.003
Nickel	mg/L	0.003	0.025-0.15[1]	0.012	0.049
Selenium	mg/L	0.004	0.001	<0.004	<0.004
Silver	mg/L	0.002	0.0001	<0.002	<0.002
Strontium	mg/L	0.005		0.408	1.5
Thallium	mg/L	0.006	0.0008	<0.006	<0.006
Titanium	mg/L	0.002		0.114	0.132
Uranium	mg/L	0.002		<0.002	0.004
Vanadium	mg/L	0.002		0.022	0.056
Zinc	mg/L	0.005	0.03	**0.068**	**0.079**

* CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

B LD - indicates exceedence of CCME standards

Table E-4 Summary of Analysis - Soil Samples at Bulky Waste Area

Parameter	Unit	Reported Detection Limit	CCME Guidelines	BW-P1-A	BW-P1-B	BW-P2-A	BW-P2-B
				9/9/2010	9/9/2010	9/9/2010	9/9/2010
Metals							
Antimony	g/g	0.8		<0.8	<0.8	<0.8	<0.8
Arsenic	g/g	1	12	3	1	2	1
Barium	g/g	2	2000	26	35	31	31
Beryllium	g/g	0.5		<0.5	<0.5	<0.5	<0.5
Boron	g/g	5		<5	<5	<5	<5
Cadmium	g/g	0.5	22	<0.5	<0.5	<0.5	<0.5
Chromium	g/g	2	87	11	15	13	12
Cobalt	g/g	0.5		2.7	3.9	3.2	3.2
Copper	g/g	1	91	11	10	18	9
Lead	g/g	1	600	4	4	9	5
Molybdenum	g/g	0.5		0.7	<0.5	0.6	<0.5
Nickel	g/g	1	50	6	9	8	7
Selenium	g/g	0.4	2.9	<0.4	<0.4	<0.4	<0.4
Silver	g/g	0.2		<0.2	<0.2	<0.2	<0.2
Thallium	g/g	0.4	1	<0.4	<0.4	<0.4	<0.4
Uranium	ug/g	0.5	300	1.2	1.4	1	1.3
Vanadium	g/g	1	130	14	18	14	16
Zinc	g/g	5	360	25	34	54	20
Petroleum Hydrocarbons and BTE							
Benzene	g/g	0.002	0.03	<0.002	<0.002	<0.002	<0.002
Toluene	g/g	0.002	0.37	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	g/g	0.002	0.082	<0.002	<0.002	<0.002	<0.002
m p-Xylene	g/g	0.002		<0.002	<0.002	<0.002	<0.002
o-Xylene	g/g	0.002		<0.002	<0.002	<0.002	<0.002
Xylene Mixture (Total)	g/g	0.002	11	<0.002	<0.002	<0.002	<0.002
Toluene-d8	% Recovery			113	106	112	94
4-Bromofluorobenzene	% Recovery			115	103	109	122
C6 - C10 (F1)	g/g	5	320	<5	11	<5	<5
C6 - C10 (F1 minus BTEX)	g/g	5		<5	11	<5	<5
C>10 - C16 (F2)	g/g	10	260	**1200**	**3400**	240	130
C>10 - C16 (F2 minus Naphthalene)	g/g	10		1200	3400	240	130
C>16 - C34 (F3)	g/g	50	1700	430	**1800**	**9100**	130
C>16 - C34 (F3 minus PAHs)	g/g	50		430	1800	9100	130
C>34 - C50 (F4)	g/g	50	3300	<50	<50	730	79
Moisture Content	%	0.1		7.2	8.4	4.2	3
PAHs							
Naphthalene	g/g	0.03	22	<0.03	0.04	0.04	<0.03
Acenaphthylene	g/g	0.02		<0.02	0.04	<0.02	<0.02
Acenaphthene	g/g	0.03		<0.03	0.03	<0.03	<0.03
Fluorene	g/g	0.02		0.02	0.15	<0.02	<0.02
Phenanthrene	g/g	0.02		<0.02	0.03	<0.02	<0.02
Anthracene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Fluoranthene	g/g	0.02		<0.02	0.03	<0.02	<0.02
Pyrene	g/g	0.02		0.02	0.06	0.03	<0.02
Benzo(a)anthracene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Chrysene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Benzo(b)fluoranthene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	g/g	0.02	0.7	<0.02	<0.02	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Dibenz(a,h)anthracene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
Benzo(g,h,i)perylene	g/g	0.02		<0.02	<0.02	<0.02	<0.02
2-and 1-methyl Naphthalene	g/g	0.05		<0.05	<0.05	<0.05	<0.05
Chrysene-d12	%			79	89	100	93
ther Parameters							
Phenols, Total	mg/kg	1	3.8	<1	<1	<1	<1
PCBs	g/g	0.1	33	<0.1	<0.1	<0.1	<0.1
Decachlorobiphenyl	%			97	120	80	90

Guidelines Used

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Industrial Land Use, Coarse Grained

Canada-Wide Standard for Petroleum Hydrocarbonds in Soil, CCME 2008-2009

Table E-5 Summary of Soil Analysis - Hazardous Waste Storage Area

Parameter	Unit	Reported Detection Limit	CCME Guidelines	HW-1	HW-2	HW-3
				9/10/2010	9/10/2010	9/10/2010
Metals						
Antimony	g/g	0.8		<0.8	<0.8	<0.8
Arsenic	g/g	1	12	2	4	2
Barium	g/g	2	2000	22	23	21
Beryllium	g/g	0.5		<0.5	<0.5	<0.5
Boron	g/g	5		<5	<5	<5
Cadmium	g/g	0.5	22	<0.5	<0.5	<0.5
Chromium	g/g	2	87	8	15	9
Cobalt	g/g	0.5		2.4	2.7	2.4
Copper	g/g	1	91	7	6	9
Lead	g/g	1	600	4	3	3
Molybdenum	g/g	0.5		<0.5	1	0.5
Nickel	g/g	1	50	5	7	5
Selenium	g/g	0.4	2.9	<0.4	<0.4	<0.4
Silver	g/g	0.2		<0.2	<0.2	<0.2
Thallium	g/g	0.4	1	<0.4	<0.4	<0.4
Uranium	ug/g	0.5	300	0.9	0.9	1.2
Vanadium	g/g	1	130	12	13	14
Zinc	g/g	5	360	159	125	31
Petroleum Hydrocarbons and BTE						
Benzene	g/g	0.002	0.03	<0.002	<0.002	<0.002
Toluene	g/g	0.002	0.37	<0.002	<0.002	<0.002
Ethylbenzene	g/g	0.002	0.082	<0.002	<0.002	<0.002
m p-Xylene	g/g	0.002		<0.002	<0.002	<0.002
o-Xylene	g/g	0.002		<0.002	<0.002	<0.002
Xylene Mixture (Total)	g/g	0.002	11	<0.002	<0.002	<0.002
Toluene-d8	% Recovery			100	113	99
4-Bromofluorobenzene	% Recovery			120	104	113
C6 - C10 (F1)	g/g	5	320	<5	<5	<5
C6 - C10 (F1 minus BTEX)	g/g	5		<5	<5	<5
C>10 - C16 (F2)	g/g	10	260	<10	<10	<10
C>10 - C16 (F2 minus Naphthalene)	g/g	10		<10	<10	<10
C>16 - C34 (F3)	g/g	50	1700	**26000**	**32000**	**24000**
C>16 - C34 (F3 minus PAHs)	g/g	50		26000	32000	24000
C>34 - C50 (F4)	g/g	50	3300	**4800**	**6000**	**4400**
Moisture Content	%	0.1		7.5	2.2	6.3
PAHs						
Naphthalene	g/g	0.03	22	0.03	<0.03	0.05
Acenaphthylene	g/g	0.02		<0.02	<0.02	<0.02
Acenaphthene	g/g	0.03		<0.03	<0.03	<0.03
Fluorene	g/g	0.02		<0.02	<0.02	<0.02
Phenanthrene	g/g	0.02		<0.02	<0.02	<0.02
Anthracene	g/g	0.02		<0.02	<0.02	<0.02
Fluoranthene	g/g	0.02		0.02	<0.02	<0.02
Pyrene	g/g	0.02		0.04	0.02	0.03
Benzo(a)anthracene	g/g	0.02		0.21	0.11	0.14
Chrysene	g/g	0.02		0.11	0.07	0.1
Benzo(b)fluoranthene	g/g	0.02		0.07	0.05	0.04
Benzo(k)fluoranthene	g/g	0.02		0.02	<0.02	0.02
Benzo(a)pyrene	g/g	0.02	0.7	0.13	0.09	0.07
Indeno(1,2,3-cd)pyrene	g/g	0.02		0.05	0.03	0.03
Dibenz(a,h)anthracene	g/g	0.02		<0.02	<0.02	<0.02
Benzo(g,h,i)perylene	g/g	0.02		0.08	0.05	0.04
2-and 1-methyl Naphthalene	g/g	0.05		0.05	<0.05	<0.05
Chrysene-d12	%			89	95	89
ther Parameters						
Phenols, Total	mg/kg	1	3.8	<1	<1	<1
PCBs	g/g	0.1	33	<0.1	<0.1	<0.1
Decachlorobiphenyl	%			63	82	89

Guidelines Used

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Industrial Land Use, Coarse Grained

Table E-6 Summary of Water Quality Analysis
Sewage Lagoon and Wetland

Parameter	Unit	CCME Standards (Fresh water)	NWB Effluent Quality Limits (ARV-4)	7/23/2010 ARV-4	9/1/2010 ARV-4	9/10/2010 SL-1	9/10/2010 ARV-4
Colour	TCU			266	-	208	-
Electrical Conductivity	S/cm			827	1130	737	1020
pH	N/A		6 - 9	7.68	7.43	7.9	8.12
Turbidity	NTU			38	-	23	-
Total Suspended Solids	mg/L		100	**104**	91.1	**156**	**169**
Alkalinity (as CaCO3)	mg/L			305	-	253	-
Bicarbonate (as CaCO3)	mg/L			305	-	253	-
Total Hardness (as CaCO3)	mg/L			41	-	30	-
Ammonia as N	mg/L			72.1	47.9	49.7	28.2
Nitrate as N	mg/L			<0.05	<0.25	<0.05	1.23
Nitrite as N	mg/L			<0.05	<0.25	<0.05	0.284
Calcium	mg/L			8.57	14.3	7.1	22.7
Chloride	mg/L			71.2	-	55.8	-
Fluoride	mg/L			<0.05	-	0.42	-
Magnesium	mg/L			4.83	9.17	2.96	14.4
Orthophosphate as P	mg/L			6.89	-	<0.1	-
Potassium	mg/L			19.7	23.3	17.9	24.7
Reactive Silica	mg/L			11.2	-	14.7	-
Sodium	mg/L			61.3	98.4	54.3	116
Sulphate	mg/L			0.98	9.3	11.1	6.99
Total Dissolved Solids	mg/L			322	-	298	-
Total Organic Carbon	mg/L			157	-	113	-
Total Phosphorus	mg/L			6.63	6.53	7.23	5.81
BOD (5)	mg/L		80	**98**	40	**420**	65
Fecal Coliforms	CFU/100ml		10000	**13100**	-	-	-
	MPN/100ml			**-**	110000	15000	2100
Escherichia coli	CFU/100ml			17700	-	-	-
	MPN/100ml			-	-	-	-
Aluminum	mg/L	0.1		**1.9**	**0.366**	**0.256**	**0.325**
Arsenic	mg/L	0.005		**0.02**	**0.0128**	<0.003	**0.0107**
Barium	mg/L			0.723	0.0424	0.006	0.0349
Boron	mg/L			0.223	0.22	0.162	0.254
Cadmium	mg/L	0.00054-0.00004[1]		<0.002	0.000138	<0.002	<0.00010
Chromium Total	mg/L			0.015	0.0012	<0.003	0.0018
Chromium VI	mg/L	0.001		<0.005	-	-	-
Cobalt	mg/L			-	0.0025	-	0.00229
Copper	mg/L	0.002-0.004[1]		**0.246**	**0.0547**	0.067	0.0394
Iron	mg/L	0.30		**56.4**	**8.09**	**0.455**	**5.9**
Lead	mg/L	0.001-0.007[1]		**0.057**	0.00202	<0.002	0.00152
Manganese	mg/L			1.65	0.428	0.047	0.349
Mercury	mg/L	0.000026		<0.0001	<0.00005	<0.0001	<0.000050
Molybdenum	mg/L	0.073		<0.002	0.0021	<0.002	0.0008
Nickel	mg/L	0.025-0.15[1]		0.018	0.0078	0.004	0.0088
Selenium	mg/L	0.001		<0.004	<0.001	<0.004	<0.0010
Silver	mg/L	0.0001		<0.002	**0.00035**	<0.002	**0.00025**
Strontium	mg/L			0.561	0.128	0.022	0.323
Thallium	mg/L	0.0008		<0.006	<0.0001	<0.006	<0.00010
Titanium	mg/L			0.016	0.0205	0.005	0.0196
Uranium	mg/L			<0.002	0.00041	<0.002	0.00044
Vanadium	mg/L			0.02	0.00707	<0.002	0.0047
Zinc	mg/L	0.03		**0.226**	**0.0462**	**0.06**	0.0241
Phenols	mg/L	0.004		**0.187**	**0.075**	**-**	<0.01
Total Oil and Grease	mg/L		No visible sheen	21	6.7	-	1.3

B LD - indicates exceedence of CCME standards

B LD and shaded- indicates exceedence of NWB licence requirements

CCME - Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

[1] Value depends on water hardness, see CCME Guidelines

For reporting detection limits refer to Certificates of Analysis

Table E-6 Summary of Water Quality Analysis
Sewage Lagoon and Wetland

Parameter	Unit	CCME Standards (Fresh water)	NWB Effluent Quality Limits (ARV-4)	9/9/2010 SL-WET-4	9/9/2010 SL-WET-1	9/9/2010 SL-WET-2	9/9/2010 SL-WET-3	11/2/2010 ARV-4
Colour	TCU			209	107	100	131	-
Electrical Conductivity	S/cm			1030	793	1020	957	2510
pH	N/A		6 - 9	8.18	7.89	7.82	7.84	7.92
Turbidity	NTU			20	3.1	4.1	5.2	-
Total Suspended Solids	mg/L		100	78	44	<10	<10	**368**
Alkalinity (as CaCO3)	mg/L			306	193	186	200	-
Bicarbonate (as CaCO3)	mg/L			306	193	186	200	-
Total Hardness (as CaCO3)	mg/L			70	75	118	134	-
Ammonia as N	mg/L			71.9	36.5	25.7	18.3	-
Nitrate as N	mg/L			0.4	1	0.3	0.39	-
Nitrite as N	mg/L			-	-	-	-	-
Calcium	mg/L			12	15.9	20.9	24.4	-
Chloride	mg/L			140	120	204	186	-
Fluoride	mg/L			0.5	<0.05	<0.05	<0.05	-
Magnesium	mg/L			9.76	8.66	15.9	17.7	-
Orthophosphate as P	mg/L			2.33	1.53	1.71	0.55	-
Potassium	mg/L			21.7	15.6	14.8	14.7	-
Reactive Silica	mg/L			14.2	12.3	11.4	8.67	-
Sodium	mg/L			94.2	75.5	111	110	-
Sulphate	mg/L			11.5	18.4	37.3	26.6	-
Total Dissolved Solids	mg/L			436	368	496	484	-
Total Organic Carbon	mg/L			61.4	28.3	21	22.7	-
Total Phosphorus	mg/L			4.54	0.98	1.56	1.45	-
BOD (5)	mg/L		80	20	9.0	21.2	5.6	30
Fecal Coliforms	CFU/100ml		10000	-	-	-	-	5
	MPN/100ml			9300	15	4	9	-
Escherichia coli	CFU/100ml			-	-	-	-	14
	MPN/100ml			4300	15	4	9	-
Aluminum	mg/L	0.1		**0.143**	0.059	0.033	0.054	-
Arsenic	mg/L	0.005		**0.011**	**0.007**	0.005	**0.006**	-
Barium	mg/L			0.015	0.006	0.007	0.009	-
Boron	mg/L			0.23	0.179	0.176	0.162	-
Cadmium	mg/L	0.00054-0.00004[1]		<0.002	<0.002	<0.002	<0.002	-
Chromium Total	mg/L			0.007	0.008	0.006	0.005	-
Chromium VI	mg/L	0.001		-	-	-	-	-
Cobalt	mg/L			-	-	-	-	-
Copper	mg/L	0.002-0.004[1]		0.007	0.012	0.006	0.005	-
Iron	mg/L	0.30		**2.55**	**0.503**	**1.41**	**1.28**	-
Lead	mg/L	0.001-0.007[1]		<0.002	<0.002	<0.002	<0.002	-
Manganese	mg/L			0.274	0.226	0.412	0.461	-
Mercury	mg/L	0.000026		<0.0001	<0.0001	<0.0001	<0.0001	-
Molybdenum	mg/L	0.073		<0.002	<0.002	<0.002	<0.002	-
Nickel	mg/L	0.025-0.15[1]		0.006	0.004	0.003	0.005	-
Selenium	mg/L	0.001		<0.004	<0.004	<0.004	<0.004	-
Silver	mg/L	0.0001		<0.002	<0.002	<0.002	<0.002	-
Strontium	mg/L			0.111	0.142	0.237	0.214	-
Thallium	mg/L	0.0008		<0.006	<0.006	<0.006	<0.006	-
Titanium	mg/L			0.005	0.003	0.002	0.003	-
Uranium	mg/L			<0.002	<0.002	<0.002	<0.002	-
Vanadium	mg/L			0.006	0.004	0.003	0.003	-
Zinc	mg/L	0.03		0.022	0.007	<0.005	<0.005	-
Phenols	mg/L	0.004		-	-	-	-	-
Total Oil and Grease	mg/L		No visible sheen	-	-	-	-	-

B LD - indicates exceedence of CCME standards

B LD and shaded- indicates exceedence of NWB licence requirements

CCME - Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

[1] Value depends on water hardness, see CCME Guidelines

For reporting detection limits refer to Certificates of Analysis

Table E-7 Summary of Analysis - Sewage Lagoon Sludge

Parameter	Unit	Reported Detection Limits	Guideline	Active Lagoon	Id Lagoon 1	Id Lagoon 2
			CCME Industrial*	9/10/2010	9/9/2010	9/9/2010
Antimony	g/g	0.8		2.10	1.40	2.80
Arsenic	g/g	1	12	1.00	3.00	3.00
Barium	g/g	2	2000	56	140.00	89.00
Beryllium	g/g	0.5		<0.5	<0.5	<0.5
Boron	g/g	5		<5	10.00	12.00
Boron (Hot Water Extractable)	g/g	0.1		0.88	2.62	3.96
Cadmium	g/g	0.5	22	<0.5	1.60	1.10
Chromium	g/g	2	87	14.00	19	17
Cobalt	g/g	0.5		2.60	3.90	4.40
Copper	g/g	1	91	**171**	**273**	**251**
Lead	g/g	1	600	9.00	45.00	20.00
Molybdenum	g/g	0.5		1.20	2.80	3.30
Nickel	g/g	1	50	9.00	13.00	13.00
Selenium	g/g	0.4	2.9	**3.0**	2.50	1.80
Silver	g/g	0.2		2.70	5.80	4.80
Thallium	g/g	0.4	1	<0.4	<0.4	<0.4
Uranium	ug/g	0.5	300	0.90	1.10	1.60
Vanadium	g/g	1	130	13	13.0	18.0
Zinc	g/g	5	360	242	**533**	**369**
Chromium, Hexavalent	g/g	0.2	1.4	<0.2	<0.2	<0.2
Cyanide, Free	g/g	0.05	8	<0.05	<0.05	<0.05
Mercury	g/g	0.01	50	0.31	1.00	0.41
Electrical Conductivity (2:1)	mS/cm	0.002		0.79	0.70	1.56
Sodium Adsorption Ratio (2:1)	N/A	N/A		2.38	1.63	1.70
pH, 2:1 CaCl2 Extraction	pH Units			5.51	6.36	6.09
Chloride (2:1)	g/g	2		94	83	161
Nitrate Nitrite	g/g	1		<1	<1	<1

* Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Industrial Land Use, Subsurface, Fine Grained

Table E-8 Summary of Water Quality Analysis - Abandoned Sewage Lagoons

Parameter	Unit	Detection Limits	CCME Standards (Fresh water)	9/10/2010 Id Sewage Lagoon 1	9/10/2010 Id Sewage Lagoon 2
Colour	TCU	5		110	86
Electrical Conductivity	S/cm	2		523	324
pH	N/A	-		7.95	7.73
Turbidity	NTU	0.5		6.7	4.7
Total Suspended Solids	mg/L	10		<10	<10
Alkalinity (as CaCO3)	mg/L	5		161	83
Bicarbonate (as CaCO3)	mg/L	5		161	83
Total Hardness (as CaCO3)	mg/L	10		81	52
Ammonia as N	mg/L	0.02		20.9	7.64
Nitrate as N	mg/L	0.05		<0.05	0.67
Nitrite as N	mg/L	0.05		<0.05	0.12
Calcium	mg/L	0.05		19.3	12.5
Chloride	mg/L	0.1		60.9	38.6
Fluoride	mg/L	0.05		0.21	0.15
Magnesium	mg/L	0.05		7.91	4.99
Orthophosphate as P	mg/L	0.1		<0.1	<0.1
Potassium	mg/L	0.05		12.1	8.48
Reactive Silica	mg/L	0.05		9.25	7.02
Sodium	mg/L	0.05		47.3	29.9
Sulphate	mg/L	0.1		11.2	10.3
Total Dissolved Solids	mg/L	20		294	200
Total Organic Carbon	mg/L	0.5		28.7	23.9
Total Phosphorus	mg/L	0.05		1.96	1.93
Aluminum	mg/L	0.004	0.1	**0.142**	**0.234**
Arsenic	mg/L	0.003	0.005	0.004	<0.003
Barium	mg/L	0.002		0.011	0.007
Boron	mg/L	0.01		0.108	0.082
Cadmium	mg/L	0.002	0.00054-0.00004[1]	<0.002	<0.002
Chromium Total	mg/L	0.003		<0.003	<0.003
Copper	mg/L	0.003	0.002-0.004[1]	0.009	0.067
Iron	mg/L	0.01	0.30	**2.15**	**1.31**
Lead	mg/L	0.002	0.001-0.007[1]	<0.002	<0.002
Manganese	mg/L	0.002		0.266	0.052
Mercury	mg/L	0.0001	0.000026	<0.0001	<0.0001
Molybdenum	mg/L	0.002	0.073	<0.002	<0.002
Nickel	mg/L	0.003	0.025-0.15[1]	<0.003	<0.003
Selenium	mg/L	0.004	0.001	<0.004	<0.004
Silver	mg/L	0.002	0.0001	<0.002	<0.002
Strontium	mg/L	0.005		0.107	0.057
Thallium	mg/L	0.006	0.0008	<0.006	<0.006
Titanium	mg/L	0.002		0.003	0.004
Uranium	mg/L	0.002		<0.002	<0.002
Vanadium	mg/L	0.002		<0.002	<0.002
Zinc	mg/L	0.005	0.03	0.006	0.013

B LD - indicates exceedence of CCME standards

CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

[1] Value depends on water hardness, see CCME Guidelines

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 10T421969

PROJECT NO: Arviat

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Jim Walls

Microbiological Analysis (water)

DATE SAMPLED: Jul 23, 2010 | DATE RECEIVED: Jul 24, 2010 | DATE REPORTED: Aug 04, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-4 1889491
Escherichia coli	CFU/1mL*	1	1	17700
Total Coliforms	CFU/1mL*	1	1	TNTC
Fecal Coliform	CFU/1mL*	1	1	13100
Heterotrophic Plate Count	CFU/mL		10	TNTC

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard: Refers to SDWA -Schedule 23

1889491 * The bacteria counts refer to a 1 mL sample aliquot diluted to 100 mL prior to filtration and incubation. A larger aliquot resulted in an overgrown plates.

Certified By: Elizabeth Rolokowska

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Certificate of Analysis

AGAT WORK ORDER: 10T421969
PROJECT NO: Arviat

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Jim Walls

Oil and Grease water

DATE SAMPLED: Jul 23, 2010 | DATE RECEIVED: Jul 24, 2010 | DATE REPORTED: Aug 04, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-2 1889489	ARV-4 1889491
Oil and Grease (animal/vegetable)	mg/L		0.5	5.2	19
Oil and Grease (mineral) in water	mg/L		0.5	<0.5	1.5
Oil and Grease (Total) in water	mg/L		0.5	5.2	21

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By: Jordy Takewaki

AGAT Laboratories

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AGAT WORK ORDER: 10T421969
PROJECT NO: Arviat

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Jim Walls

BURNSIDE - Water Quality Assessment BOD, TSS, Phenols Cr VI

DATE SAMPLED: Jul 23, 2010 | DATE RECEIVED: Jul 24, 2010 | DATE REPORTED: Aug 04, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-2 1889489	ARV-4 1889491
Aluminum	mg/L		0.004	0.020	1.90
Arsenic	mg/L		0.003	0.005	0.020
Barium	mg/L		0.002	0.050	0.723
Boron	mg/L		0.010	1.22	0.223
Cadmium	mg/L		0.002	<0.002	<0.002
Calcium	mg/L		0.05	248	8.57
Chromium	mg/L		0.003	0.013	0.015
Copper	mg/L		0.003	0.007	0.246
Iron	mg/L		0.010	0.936	56.4
Potassium	mg/L		0.05	44.7	19.7
Magnesium	mg/L		0.05	39.7	4.83
Mercury	mg/L		0.0001	<0.0001	<0.0001
Manganese	mg/L		0.002	0.983	1.65
Molybdenum	mg/L		0.002	<0.002	<0.002
Sodium	mg/L		0.05	178	61.3
Nickel	mg/L		0.003	0.004	0.018
Total Phosphorus	mg/L		0.05	0.64	6.63
Lead	mg/L		0.002	0.028	0.057
Selenium	mg/L		0.004	<0.004	<0.004
Silver	mg/L		0.002	<0.002	<0.002
Strontium	mg/L		0.005	1.68	0.561
Thallium	mg/L		0.006	<0.006	<0.006
Titanium	mg/L		0.002	0.010	0.016
Uranium	mg/L		0.002	<0.002	<0.002
Vanadium	mg/L		0.002	<0.002	0.020
Zinc	mg/L		0.005	0.077	0.226
Fluoride	mg/L		0.05	<0.05	<0.05
Chloride	mg/L		0.10	244	71.2
Nitrite as N	mg/L		0.05	<0.05	<0.05
Ortho phosphate as P	mg/L		0.10	0.33	6.89
Bromide	mg/L		0.05	1.87	<0.05
Nitrate as N	mg/L		0.05	<0.05	<0.05
Sulphate	mg/L		0.10	539	0.98

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 10T421969
PROJECT NO: Arviat

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Jim Walls

BURNSIDE - Water Quality Assessment BOD, TSS, Phenols Cr VI

DATE SAMPLED: Jul 23, 2010 | DATE RECEIVED: Jul 24, 2010 | DATE REPORTED: Aug 04, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-2 1889489	ARV-4 1889491
pH	pH Units		NA	8.07	7.68
Ammonia as N	mg/L		0.02	11.0	72.1
Total Organic Carbon	mg/L		0.5	52.0	157
Electrical Conductivity	uS/cm		2	2010	827
Total Dissolved Solids	mg/L		20	1570	322
Saturation pH				6.36	7.76
% Difference/ Ion Balance			0.1	3.0	5.9
Total Hardness (as CaCO3)	mg/L		10	783	41
Langlier Index				1.71	-0.08
Carbonate (as CaCO3)	mg/L		5	<5	<5
Bicarbonate (as CaCO3)	mg/L		5	440	305
Turbidity	NTU		0.5	8.1	38
Alkalinity (as CaCO3)	mg/L		5	440	305
Hydroxide (as CaCO3)	mg/L		5	<5	<5
Reactive Silica	mg/L		0.05	9.17	11.2
Colour	TCU		5	102	266
BOD (5)	mg/L		5	13	98
Total Suspended Solids	mg/L		10	14	104
Phenols	mg/L		0.001	0.005	0.187
Chromium VI	mg/L		0.005	<0.005	<0.005

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 10T421969

PROJECT NO: Arviat

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CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Jim Walls

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANAL SIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1889491	ARV-4	SDWA -Schedule 23	Microbiological Analysis (water)	Escherichia coli	1	17700
1889491	ARV-4	SDWA -Schedule 23	Microbiological Analysis (water)	Fecal Coliform	1	13100

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1 2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 10T434776
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

BURNSIDE - Water Quality Assessment

DATE SAMPLED: Sep 08, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 21, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	WI-Up 1987361	WI-Down 1987362
Aluminum	mg/L		0.004	0.008	0.007
Arsenic	mg/L		0.003	<0.003	<0.003
Barium	mg/L		0.002	0.005	0.006
Boron	mg/L		0.010	<0.010	<0.010
Cadmium	mg/L		0.002	<0.002	<0.002
Calcium	mg/L		0.05	3.50	3.38
Chromium	mg/L		0.003	<0.003	<0.003
Copper	mg/L		0.003	<0.003	<0.003
Iron	mg/L		0.010	0.043	0.038
Potassium	mg/L		0.05	0.76	0.74
Magnesium	mg/L		0.05	1.67	1.66
Manganese	mg/L		0.002	0.008	0.008
Molybdenum	mg/L		0.002	<0.002	<0.002
Sodium	mg/L		0.05	7.57	7.54
Nickel	mg/L		0.003	<0.003	<0.003
Total Phosphorus	mg/L		0.05	<0.05	<0.05
Lead	mg/L		0.002	<0.002	<0.002
Selenium	mg/L		0.004	<0.004	<0.004
Silver	mg/L		0.002	<0.002	<0.002
Strontium	mg/L		0.005	0.027	0.026
Thallium	mg/L		0.006	<0.006	<0.006
Titanium	mg/L		0.002	<0.002	<0.002
Uranium	mg/L		0.002	<0.002	<0.002
Vanadium	mg/L		0.002	<0.002	<0.002
Zinc	mg/L		0.005	<0.005	<0.005
Fluoride	mg/L		0.05	<0.05	<0.05
Chloride	mg/L		0.10	16.6	16.7
Nitrite as N	mg/L		0.05	<0.05	<0.05
Ortho phosphate as P	mg/L		0.10	<0.10	<0.10
Bromide	mg/L		0.05	<0.05	<0.05
Nitrate as N	mg/L		0.05	<0.05	<0.05
Sulphate	mg/L		0.10	3.10	3.16
pH	pH Units		NA	6.84	6.86

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 10T434776
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

BURNSIDE - Water Quality Assessment

DATE SAMPLED: Sep 08, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 21, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	WI-Up 1987361	WI-Down 1987362
Ammonia as N	mg/L		0.02	<0.02	0.11
Total Organic Carbon	mg/L		0.5	5.0	5.0
Electrical Conductivity	uS/cm		2	76	76
Total Dissolved Solids	mg/L		20	46	46
Saturation pH				9.66	9.67
% Difference/ Ion Balance			0.1	0.9	1.3
Total Hardness (as CaCO3)	mg/L		10	16	15
Langlier Index				-2.82	-2.81
Carbonate (as CaCO3)	mg/L		5	<5	<5
Bicarbonate (as CaCO3)	mg/L		5	7	7
Turbidity	NTU		0.5	0.7	0.6
Alkalinity (as CaCO3)	mg/L		5	7	7
Hydroxide (as CaCO3)	mg/L		5	<5	<5
Reactive Silica	mg/L		0.05	<0.05	<0.05
Colour	TCU		5	8	9

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

R.J. BURNSIDE

ATTN: STEPHANIE CHARITY / JIM WALLS

292 SPEEDVALE AVE., WEST
UNIT #7
GUELPH ON N1H 1C4

Report Date: 14-SEP-10 13:45 (MT)
Version: FINAL

Lab Work Order #: L927467 **Date Received:** 02-SEP-10

Project P.O. #: NOT SUBMITTED
Job Reference: N-015746
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

Paul Nicolas
Account Manager

Manitoba Technology Centre Ltd.
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Phone: +1 204 255 9720 Fax: +1 204 255 9721 www.alsglobal.com
A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L927467-1 ARV-2 Sampled By: CLIENT on 01-SEP-10 @ 15:45 Matrix: WATER							
Physical Tests							
Conductivity	2520		0.40	umhos/cm		03-SEP-10	R1459503
pH	8.11		0.10	pH units		03-SEP-10	R1459503
Total Suspended Solids	<5.0		5.0	mg/L		08-SEP-10	R1461947
Anions and Nutrients							
Ammonia as N	12.9		0.050	mg/L		14-SEP-10	R1465344
Nitrate and Nitrite as N	<0.35		0.35	mg/L		07-SEP-10	
Nitrate-N	<0.25		0.25	mg/L		03-SEP-10	R1459992
Nitrite-N	<0.25		0.25	mg/L		03-SEP-10	R1459992
Sulfate	461		2.5	mg/L		03-SEP-10	R1459992
Bacteriological Tests							
Fecal Coliforms	430		3	MPN/100mL		06-SEP-10	R1459728
Total Metals							
Aluminum (Al)-Total	0.0219		0.0050	mg/L	07-SEP-10	07-SEP-10	R1460846
Antimony (Sb)-Total	0.00405		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Arsenic (As)-Total	0.00468		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Barium (Ba)-Total	0.0471		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Boron (B)-Total	1.49		0.010	mg/L	07-SEP-10	07-SEP-10	R1460846
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	07-SEP-10	07-SEP-10	R1460846
Calcium (Ca)-Total	244		0.10	mg/L	07-SEP-10	07-SEP-10	R1460846
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Cobalt (Co)-Total	0.00051		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Copper (Cu)-Total	0.00129		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Iron (Fe)-Total	0.516		0.020	mg/L	07-SEP-10	07-SEP-10	R1460846
Lead (Pb)-Total	0.000153		0.000090	mg/L	07-SEP-10	07-SEP-10	R1460846
Lithium (Li)-Total	0.0363		0.0020	mg/L	07-SEP-10	07-SEP-10	R1460846
Magnesium (Mg)-Total	43.0		0.010	mg/L	07-SEP-10	07-SEP-10	R1460846
Manganese (Mn)-Total	0.663		0.00030	mg/L	07-SEP-10	07-SEP-10	R1460846
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	03-SEP-10	03-SEP-10	R1459886
Molybdenum (Mo)-Total	0.00039		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Nickel (Ni)-Total	0.0024		0.0020	mg/L	07-SEP-10	07-SEP-10	R1460846
Phosphorus (P)-Total	0.62		0.20	mg/L	07-SEP-10	07-SEP-10	R1460846
Potassium (K)-Total	43.9		0.020	mg/L	07-SEP-10	07-SEP-10	R1460846
Rubidium (Rb)-Total	0.0411		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Selenium (Se)-Total	<0.0010		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Silicon (Si)-Total	5.34		0.050	mg/L	07-SEP-10	07-SEP-10	R1460846
Silver (Ag)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Sodium (Na)-Total	228		0.030	mg/L	07-SEP-10	07-SEP-10	R1460846
Strontium (Sr)-Total	1.53		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L927467-1 ARV-2 Sampled By: CLIENT on 01-SEP-10 @ 15:45 Matrix: WATER							
Total Metals							
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Thorium (Th)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Tin (Sn)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Titanium (Ti)-Total	0.00166		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Tungsten (W)-Total	<0.0010		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Uranium (U)-Total	0.00064		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Vanadium (V)-Total	0.00071		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Zinc (Zn)-Total	0.0203		0.0050	mg/L	07-SEP-10	07-SEP-10	R1460846
Zirconium (Zr)-Total	0.00047		0.00040	mg/L	07-SEP-10	07-SEP-10	R1460846
Aggregate Organics							
Biochemical Oxygen Demand	6.4		1.0	mg/L	03-SEP-10	08-SEP-10	R1460687
Total Oil and Grease	2.4	DLM	2.0	mg/L	10-SEP-10	10-SEP-10	R1459975
Phenols (4AAP)	<0.0010		0.0010	mg/L	08-SEP-10	08-SEP-10	R1461126
L927467-2 ARV-4 Sampled By: CLIENT on 01-SEP-10 @ 15:45 Matrix: WATER							
Physical Tests							
Conductivity	1130		0.40	umhos/cm		03-SEP-10	R1459503
pH	7.43		0.10	pH units		03-SEP-10	R1459503
Total Suspended Solids	91.1		5.0	mg/L		08-SEP-10	R1461947
Anions and Nutrients							
Ammonia as N	47.9		0.050	mg/L		14-SEP-10	R1465344
Nitrate and Nitrite as N	<0.35		0.35	mg/L		07-SEP-10	
Nitrate-N	<0.25		0.25	mg/L		03-SEP-10	R1459992
Nitrite-N	<0.25		0.25	mg/L		03-SEP-10	R1459992
Sulfate	9.3		2.5	mg/L		03-SEP-10	R1459992
Bacteriological Tests							
Fecal Coliforms	110000		3	MPN/100mL		06-SEP-10	R1459728
Total Metals							
Aluminum (Al)-Total	0.366		0.0050	mg/L	07-SEP-10	07-SEP-10	R1460846
Antimony (Sb)-Total	0.00038		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Arsenic (As)-Total	0.0128		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Barium (Ba)-Total	0.0424		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Bismuth (Bi)-Total	0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Boron (B)-Total	0.220		0.010	mg/L	07-SEP-10	07-SEP-10	R1460846
Cadmium (Cd)-Total	0.000138		0.000010	mg/L	07-SEP-10	07-SEP-10	R1460846
Calcium (Ca)-Total	14.3		0.10	mg/L	07-SEP-10	07-SEP-10	R1460846
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Chromium (Cr)-Total	0.0012		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Cobalt (Co)-Total	0.00250		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Copper (Cu)-Total	0.0547		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L927467-2 ARV-4 Sampled By: CLIENT on 01-SEP-10 @ 15:45 Matrix: WATER							
Total Metals							
Iron (Fe)-Total	8.09		0.020	mg/L	07-SEP-10	07-SEP-10	R1460846
Lead (Pb)-Total	0.00202		0.000090	mg/L	07-SEP-10	07-SEP-10	R1460846
Lithium (Li)-Total	0.0108		0.0020	mg/L	07-SEP-10	07-SEP-10	R1460846
Magnesium (Mg)-Total	9.17		0.010	mg/L	07-SEP-10	07-SEP-10	R1460846
Manganese (Mn)-Total	0.428		0.00030	mg/L	07-SEP-10	07-SEP-10	R1460846
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	03-SEP-10	03-SEP-10	R1459886
Molybdenum (Mo)-Total	0.00210		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Nickel (Ni)-Total	0.0078		0.0020	mg/L	07-SEP-10	07-SEP-10	R1460846
Phosphorus (P)-Total	6.53		0.20	mg/L	07-SEP-10	07-SEP-10	R1460846
Potassium (K)-Total	23.3		0.020	mg/L	07-SEP-10	07-SEP-10	R1460846
Rubidium (Rb)-Total	0.0255		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Selenium (Se)-Total	<0.0010		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Silicon (Si)-Total	6.52		0.050	mg/L	07-SEP-10	07-SEP-10	R1460846
Silver (Ag)-Total	0.00035		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Sodium (Na)-Total	98.4		0.030	mg/L	07-SEP-10	07-SEP-10	R1460846
Strontium (Sr)-Total	0.128		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Thorium (Th)-Total	0.00024		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Tin (Sn)-Total	0.00083		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Titanium (Ti)-Total	0.0205		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Tungsten (W)-Total	<0.0010		0.0010	mg/L	07-SEP-10	07-SEP-10	R1460846
Uranium (U)-Total	0.00041		0.00010	mg/L	07-SEP-10	07-SEP-10	R1460846
Vanadium (V)-Total	0.00707		0.00020	mg/L	07-SEP-10	07-SEP-10	R1460846
Zinc (Zn)-Total	0.0462		0.0050	mg/L	07-SEP-10	07-SEP-10	R1460846
Zirconium (Zr)-Total	0.00122		0.00040	mg/L	07-SEP-10	07-SEP-10	R1460846
Aggregate Organics							
Biochemical Oxygen Demand	40.0		6.0	mg/L	03-SEP-10	08-SEP-10	R1460687
Total Oil and Grease	6.7	DLM	2.0	mg/L	10-SEP-10	10-SEP-10	R1459975
Phenols (4AAP)	0.0750		0.0010	mg/L	08-SEP-10	08-SEP-10	R1461126

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS5-IC-WP	Water	Anions scan (IC)	EPA 300.1 IC
This analysis is carried out using procedures adapted from EPA Method 300.1 "Determination of Inorganic Anions in Drinking Water by Ion Chromatography".			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
The sample is incubated for 5 days at 20 degrees Celcius. Comparison of dissolved oxygen content at the beginning and end of incubation provides a measure of biochemical oxygen demand. If carbonaceous BOD is requested, TCMP is added to the sample to chemically inhibit nitrogenous oxygen demand. If soluble BOD is requested, the sample is filtered prior to analysis. Surface waters have a DL of 1 mg/L. Effluents are diluted according to their history and will have a sample DL of 6 mg/L or greater, depending on the dilutions used.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
FC-MPN-WP	Water	Fecal Coliform	APHA 9221A-C
The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. The results of examination of replicate tubes and dilutions of a sample are reported after confirmations specific to total coliform, fecal coliform and E. coli are performed. Results are reported in MPN/100 mL for water and MPN/gram for food and solid samples.			
HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0
Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.			
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	U.S. EPA 200.8-TL
Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S EPA Method 200.8 for analyis of metals by inductively coupled-mass spectrometery.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia - Colourimeric using Salicylate-nitroprusside and hypochlorite, in an alkaline phosphate buffer.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
OGG-IR-WP	Water	Total Oil and Grease	APHA METHOD 5520C
PH-WP	Water	pH	APHA 4500H
pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
PHENOLS-4AAP-WT	Water	Phenols (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540
The residue retained by a prepared 1.5 um Whatman 934-AH glass microfibre filter dried at 105 degrees C.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L927467 Report Date: 14-SEP-10

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS5-IC-WP	**Water**							
Batch R1459992								
WG1162747-3 DUP		**L927364-1**						
Nitrite-N		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-SEP-10
Nitrate-N		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-SEP-10
Sulfate		43.3	43.2		mg/L	0.33	20	03-SEP-10
WG1162747-2 LCS								
Nitrite-N			101		%		85-115	03-SEP-10
Nitrate-N			101		%		85-115	03-SEP-10
Sulfate			100		%		85-115	03-SEP-10
WG1162747-1 MB								
Nitrite-N			<0.050		mg/L		0.05	03-SEP-10
Nitrate-N			<0.050		mg/L		0.05	03-SEP-10
Sulfate			<0.50		mg/L		0.5	03-SEP-10
WG1162747-4 MS		**L927364-1**						
Nitrite-N			97		%		75-125	03-SEP-10
Nitrate-N			100		%		75-125	03-SEP-10
Sulfate			97		%		75-125	03-SEP-10
BOD-WP	**Water**							
Batch R1460687								
WG1161260-3 DUP		**L927297-1**						
Biochemical Oxygen Demand		770	710	J	mg/L	60	1200	08-SEP-10
WG1161260-4 DUP		**L927511-3**						
Biochemical Oxygen Demand		9.0	8.4	J	mg/L	0.6	24	08-SEP-10
WG1161260-5 DUP		**L927668-1**						
Biochemical Oxygen Demand		19.4	18.8	J	mg/L	0.6	24	08-SEP-10
WG1161260-6 DUP		**L927970-1**						
Biochemical Oxygen Demand		31.7	31.4	J	mg/L	0.3	24	08-SEP-10
WG1161260-2 IRM		**61-GG**						
Biochemical Oxygen Demand			89		%		85-115	08-SEP-10
WG1161260-1 MB								
Biochemical Oxygen Demand			<1.0		mg/L		1	08-SEP-10
EC-WP	**Water**							
Batch R1459503								
WG1161444-2 CCV								
Conductivity			101		%		95-105	03-SEP-10
WG1161444-1 CVS								
Conductivity			99		%		90-110	03-SEP-10
WG1161444-7 DUP		**L927685-14**						

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WP	**Water**							
Batch R1459503								
WG1161444-7 DUP		**L927685-14**						
Conductivity		653	653		umhos/cm	0.032	10	03-SEP-10
WG1161444-8 DUP		**L927692-6**						
Conductivity		31.2	31.1		umhos/cm	0.26	10	03-SEP-10
WG1161444-9 DUP		**L927813-1**						
Conductivity		11300	11200		umhos/cm	0.25	10	03-SEP-10
HG-T-CVAF-WP	**Water**							
Batch R1459886								
WG1162671-3 DUP		**L926625-3**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-10
WG1162671-5 DUP		**L927426-1**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-10
WG1162671-2 LCS								
Mercury (Hg)-Total			97		%		63-138	03-SEP-10
Mercury (Hg)-Total			97		%		63-138	03-SEP-10
WG1162671-1 MB								
Mercury (Hg)-Total			<0.000050		mg/L		0.00005	03-SEP-10
Mercury (Hg)-Total			<0.000050		mg/L		0.00005	03-SEP-10
WG1162671-4 MS		**L926625-3**						
Mercury (Hg)-Total			103		%		70-130	03-SEP-10
Mercury (Hg)-Total			103		%		70-130	03-SEP-10
WG1162671-6 MS		**L927426-1**						
Mercury (Hg)-Total			100		%		70-130	03-SEP-10
Mercury (Hg)-Total			100		%		70-130	03-SEP-10
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1163405-3 CCV								
Aluminum (Al)-Total			95		%		90-110	07-SEP-10
Antimony (Sb)-Total			100		%		90-110	07-SEP-10
Arsenic (As)-Total			100		%		90-110	07-SEP-10
Barium (Ba)-Total			104		%		90-110	07-SEP-10
Beryllium (Be)-Total			106		%		90-110	07-SEP-10
Bismuth (Bi)-Total			102		%		90-110	07-SEP-10
Boron (B)-Total			102		%		90-110	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1163405-3 CCV								
Cadmium (Cd)-Total			101		%		90-110	07-SEP-10
Calcium (Ca)-Total			101		%		90-110	07-SEP-10
Cesium (Cs)-Total			101		%		90-110	07-SEP-10
Chromium (Cr)-Total			96		%		90-110	07-SEP-10
Cobalt (Co)-Total			98		%		90-110	07-SEP-10
Copper (Cu)-Total			98		%		90-110	07-SEP-10
Iron (Fe)-Total			96		%		90-110	07-SEP-10
Lead (Pb)-Total			103		%		90-110	07-SEP-10
Lithium (Li)-Total			107		%		90-110	07-SEP-10
Magnesium (Mg)-Total			100		%		90-110	07-SEP-10
Manganese (Mn)-Total			97		%		90-110	07-SEP-10
Molybdenum (Mo)-Total			100		%		90-110	07-SEP-10
Nickel (Ni)-Total			101		%		90-110	07-SEP-10
Phosphorus (P)-Total			98		%		90-110	07-SEP-10
Potassium (K)-Total			99		%		90-110	07-SEP-10
Rubidium (Rb)-Total			99		%		90-110	07-SEP-10
Selenium (Se)-Total			100		%		90-110	07-SEP-10
Silicon (Si)-Total			96		%		90-110	07-SEP-10
Silver (Ag)-Total			102		%		90-110	07-SEP-10
Sodium (Na)-Total			102		%		90-110	07-SEP-10
Strontium (Sr)-Total			98		%		90-110	07-SEP-10
Tellurium (Te)-Total			101		%		90-110	07-SEP-10
Thallium (Tl)-Total			102		%		90-110	07-SEP-10
Thorium (Th)-Total			103		%		63-138	07-SEP-10
Tin (Sn)-Total			100		%		90-110	07-SEP-10
Titanium (Ti)-Total			98		%		90-110	07-SEP-10
Tungsten (W)-Total			98		%		90-110	07-SEP-10
Uranium (U)-Total			102		%		90-110	07-SEP-10
Vanadium (V)-Total			96		%		90-110	07-SEP-10
Zinc (Zn)-Total			98		%		90-110	07-SEP-10
Zirconium (Zr)-Total			100		%		90-110	07-SEP-10
WG1163405-1 CVS								
Aluminum (Al)-Total			96		%		63-138	07-SEP-10
Antimony (Sb)-Total			99		%		63-138	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1163405-1 CVS								
Arsenic (As)-Total			98		%		63-138	07-SEP-10
Barium (Ba)-Total			99		%		63-138	07-SEP-10
Beryllium (Be)-Total			91		%		63-138	07-SEP-10
Bismuth (Bi)-Total			95		%		63-138	07-SEP-10
Boron (B)-Total			93		%		63-138	07-SEP-10
Cadmium (Cd)-Total			96		%		63-138	07-SEP-10
Calcium (Ca)-Total			101		%		63-138	07-SEP-10
Cesium (Cs)-Total			95		%		63-138	07-SEP-10
Chromium (Cr)-Total			94		%		63-138	07-SEP-10
Cobalt (Co)-Total			98		%		63-138	07-SEP-10
Copper (Cu)-Total			97		%		63-138	07-SEP-10
Iron (Fe)-Total			97		%		63-138	07-SEP-10
Lead (Pb)-Total			99		%		63-138	07-SEP-10
Lithium (Li)-Total			88		%		63-138	07-SEP-10
Magnesium (Mg)-Total			100		%		63-138	07-SEP-10
Manganese (Mn)-Total			98		%		63-138	07-SEP-10
Molybdenum (Mo)-Total			96		%		63-138	07-SEP-10
Nickel (Ni)-Total			97		%		63-138	07-SEP-10
Phosphorus (P)-Total			94		%		63-138	07-SEP-10
Potassium (K)-Total			100		%		63-138	07-SEP-10
Rubidium (Rb)-Total			95		%		63-138	07-SEP-10
Selenium (Se)-Total			98		%		63-138	07-SEP-10
Silicon (Si)-Total			94		%		63-138	07-SEP-10
Silver (Ag)-Total			93		%		63-138	07-SEP-10
Sodium (Na)-Total			100		%		63-138	07-SEP-10
Strontium (Sr)-Total			96		%		63-138	07-SEP-10
Tellurium (Te)-Total			98		%		63-138	07-SEP-10
Thallium (Tl)-Total			95		%		63-138	07-SEP-10
Thorium (Th)-Total			101		%		63-138	07-SEP-10
Tin (Sn)-Total			96		%		63-138	07-SEP-10
Titanium (Ti)-Total			97		%		63-138	07-SEP-10
Tungsten (W)-Total			98		%		63-138	07-SEP-10
Uranium (U)-Total			97		%		63-138	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1163405-1 CVS								
Vanadium (V)-Total			94		%		63-138	07-SEP-10
Zinc (Zn)-Total			100		%		63-138	07-SEP-10
Zirconium (Zr)-Total			95		%		63-138	07-SEP-10
WG1163405-2 CVS								
Aluminum (Al)-Total			98		%		63-138	07-SEP-10
Antimony (Sb)-Total			104		%		63-138	07-SEP-10
Arsenic (As)-Total			98		%		63-138	07-SEP-10
Barium (Ba)-Total			102		%		63-138	07-SEP-10
Beryllium (Be)-Total			92		%		63-138	07-SEP-10
Bismuth (Bi)-Total			103		%		63-138	07-SEP-10
Boron (B)-Total			96		%		63-138	07-SEP-10
Cadmium (Cd)-Total			100		%		63-138	07-SEP-10
Calcium (Ca)-Total			99		%		63-138	07-SEP-10
Cesium (Cs)-Total			102		%		63-138	07-SEP-10
Chromium (Cr)-Total			96		%		63-138	07-SEP-10
Cobalt (Co)-Total			99		%		63-138	07-SEP-10
Copper (Cu)-Total			96		%		63-138	07-SEP-10
Iron (Fe)-Total			98		%		63-138	07-SEP-10
Lead (Pb)-Total			102		%		63-138	07-SEP-10
Lithium (Li)-Total			94		%		63-138	07-SEP-10
Magnesium (Mg)-Total			98		%		63-138	07-SEP-10
Manganese (Mn)-Total			101		%		63-138	07-SEP-10
Molybdenum (Mo)-Total			101		%		63-138	07-SEP-10
Nickel (Ni)-Total			101		%		63-138	07-SEP-10
Phosphorus (P)-Total			95		%		63-138	07-SEP-10
Potassium (K)-Total			98		%		63-138	07-SEP-10
Rubidium (Rb)-Total			101		%		63-138	07-SEP-10
Selenium (Se)-Total			97		%		63-138	07-SEP-10
Silicon (Si)-Total			100		%		63-138	07-SEP-10
Silver (Ag)-Total			101		%		63-138	07-SEP-10
Sodium (Na)-Total			101		%		63-138	07-SEP-10
Strontium (Sr)-Total			101		%		63-138	07-SEP-10
Tellurium (Te)-Total			100		%		63-138	07-SEP-10
Thallium (Tl)-Total			101		%		63-138	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1163405-2 CVS								
Thorium (Th)-Total			103		%		63-138	07-SEP-10
Tin (Sn)-Total			101		%		63-138	07-SEP-10
Titanium (Ti)-Total			97		%		63-138	07-SEP-10
Tungsten (W)-Total			103		%		63-138	07-SEP-10
Uranium (U)-Total			99		%		63-138	07-SEP-10
Vanadium (V)-Total			103		%		63-138	07-SEP-10
Zinc (Zn)-Total			98		%		63-138	07-SEP-10
Zirconium (Zr)-Total			104		%		63-138	07-SEP-10
WG1162471-4 DUP		**WG1162471-3**						
Aluminum (Al)-Total		0.285	0.542	G	mg/L	62	20	07-SEP-10
Antimony (Sb)-Total		0.00024	0.00024	J	mg/L	0.00001	0.0008	07-SEP-10
Arsenic (As)-Total		0.00460	0.00470		mg/L	2.3	20	07-SEP-10
Barium (Ba)-Total		0.0423	0.0438		mg/L	3.5	20	07-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Bismuth (Bi)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Boron (B)-Total		0.100	0.098	J	mg/L	0.002	0.04	07-SEP-10
Cadmium (Cd)-Total		0.000044	0.000047	J	mg/L	0.000003	0.00004	07-SEP-10
Calcium (Ca)-Total		66.8	66.5		mg/L	0.45	20	07-SEP-10
Cesium (Cs)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-10
Chromium (Cr)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-10
Cobalt (Co)-Total		0.00052	0.00060	J	mg/L	0.00008	0.0008	07-SEP-10
Copper (Cu)-Total		0.00267	0.00294		mg/L	9.7	20	07-SEP-10
Iron (Fe)-Total		0.391	0.666	G	mg/L	52	20	07-SEP-10
Lead (Pb)-Total		0.000421	0.000497	J	mg/L	0.000076	0.00036	07-SEP-10
Lithium (Li)-Total		0.0329	0.0322		mg/L	2.3	20	07-SEP-10
Magnesium (Mg)-Total		19.1	19.0		mg/L	0.27	20	07-SEP-10
Manganese (Mn)-Total		0.157	0.152		mg/L	3.4	20	07-SEP-10
Molybdenum (Mo)-Total		0.00349	0.00385		mg/L	9.8	20	07-SEP-10
Nickel (Ni)-Total		0.0053	0.0056	J	mg/L	0.0003	0.008	07-SEP-10
Phosphorus (P)-Total		0.58	0.59	J	mg/L	0.01	0.8	07-SEP-10
Potassium (K)-Total		7.52	7.46		mg/L	0.72	20	07-SEP-10
Rubidium (Rb)-Total		0.00319	0.00393	G	mg/L	21	20	07-SEP-10
Selenium (Se)-Total		0.0012	0.0013	J	mg/L	0.0000	0.004	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1162471-4 DUP		**WG1162471-3**						
Silicon (Si)-Total		12.0	13.0		mg/L	8.0	20	07-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-10
Sodium (Na)-Total		27.8	28.2		mg/L	1.4	20	07-SEP-10
Strontium (Sr)-Total		0.257	0.262		mg/L	1.9	20	07-SEP-10
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-10
Thorium (Th)-Total		<0.00010	0.00016	RPD-NA	mg/L	N/A	26	07-SEP-10
Tin (Sn)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Titanium (Ti)-Total		0.00894	0.0152	G	mg/L	52	20	07-SEP-10
Tungsten (W)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-10
Uranium (U)-Total		0.00309	0.00328		mg/L	6.1	20	07-SEP-10
Vanadium (V)-Total		0.00428	0.00531	G	mg/L	22	20	07-SEP-10
Zinc (Zn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	07-SEP-10
Zirconium (Zr)-Total		0.00055	0.00073	J	mg/L	0.00018	0.0016	07-SEP-10
WG1162471-6 DUP		**WG1162471-5**						
Aluminum (Al)-Total		0.460	0.468		mg/L	1.8	20	07-SEP-10
Antimony (Sb)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Arsenic (As)-Total		0.00112	0.00109	J	mg/L	0.00003	0.0008	07-SEP-10
Barium (Ba)-Total		0.0135	0.0135		mg/L	0.45	20	07-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Bismuth (Bi)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	07-SEP-10
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-10
Calcium (Ca)-Total		12.0	12.1		mg/L	1.0	20	07-SEP-10
Cesium (Cs)-Total		0.00012	0.00012	J	mg/L	0.00000	0.0004	07-SEP-10
Chromium (Cr)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-10
Cobalt (Co)-Total		0.00021	0.00021	J	mg/L	0.00000	0.0008	07-SEP-10
Copper (Cu)-Total		0.00166	0.00160	J	mg/L	0.00006	0.0008	07-SEP-10
Iron (Fe)-Total		0.460	0.480		mg/L	4.3	20	07-SEP-10
Lead (Pb)-Total		0.000439	0.000433	J	mg/L	0.000006	0.00036	07-SEP-10
Lithium (Li)-Total		0.0036	0.0027	J	mg/L	0.0009	0.008	07-SEP-10
Magnesium (Mg)-Total		3.81	3.88		mg/L	1.9	20	07-SEP-10
Manganese (Mn)-Total		0.0215	0.0214		mg/L	0.55	20	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1162471-6 DUP		**WG1162471-5**						
Molybdenum (Mo)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Nickel (Ni)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-10
Phosphorus (P)-Total		<0.20	<0.20	RPD-NA	mg/L	N/A	20	07-SEP-10
Potassium (K)-Total		1.03	1.04		mg/L	0.61	20	07-SEP-10
Rubidium (Rb)-Total		0.00231	0.00236		mg/L	2.0	20	07-SEP-10
Selenium (Se)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-10
Silicon (Si)-Total		3.08	2.97		mg/L	3.6	20	07-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-10
Sodium (Na)-Total		2.53	2.62		mg/L	3.3	20	07-SEP-10
Strontium (Sr)-Total		0.0257	0.0251		mg/L	2.1	20	07-SEP-10
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-10
Thorium (Th)-Total		0.00013	0.00013	J	mg/L	0.00000	0.0004	07-SEP-10
Tin (Sn)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-10
Titanium (Ti)-Total		0.0155	0.0154		mg/L	0.56	20	07-SEP-10
Tungsten (W)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-10
Uranium (U)-Total		0.00016	0.00016	J	mg/L	0.00000	0.0004	07-SEP-10
Vanadium (V)-Total		0.00163	0.00160	J	mg/L	0.00003	0.0008	07-SEP-10
Zinc (Zn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	07-SEP-10
Zirconium (Zr)-Total		0.00050	0.00042	J	mg/L	0.00008	0.0016	07-SEP-10
WG1162471-2 LCS								
Aluminum (Al)-Total			109		%		80-120	07-SEP-10
Antimony (Sb)-Total			111		%		80-120	07-SEP-10
Arsenic (As)-Total			107		%		80-120	07-SEP-10
Barium (Ba)-Total			106		%		80-120	07-SEP-10
Beryllium (Be)-Total			93		%		80-120	07-SEP-10
Bismuth (Bi)-Total			109		%		80-120	07-SEP-10
Boron (B)-Total			90		%		80-120	07-SEP-10
Cadmium (Cd)-Total			104		%		80-120	07-SEP-10
Calcium (Ca)-Total			106		%		80-120	07-SEP-10
Cesium (Cs)-Total			102		%		80-120	07-SEP-10
Chromium (Cr)-Total			107		%		80-120	07-SEP-10
Cobalt (Co)-Total			108		%		80-120	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1162471-2 LCS								
Copper (Cu)-Total			103		%		80-120	07-SEP-10
Iron (Fe)-Total			104		%		80-120	07-SEP-10
Lead (Pb)-Total			107		%		80-120	07-SEP-10
Lithium (Li)-Total			89		%		80-120	07-SEP-10
Magnesium (Mg)-Total			110		%		80-120	07-SEP-10
Manganese (Mn)-Total			102		%		80-120	07-SEP-10
Molybdenum (Mo)-Total			108		%		80-120	07-SEP-10
Nickel (Ni)-Total			105		%		80-120	07-SEP-10
Phosphorus (P)-Total			107		%		80-120	07-SEP-10
Potassium (K)-Total			107		%		80-120	07-SEP-10
Rubidium (Rb)-Total			104		%		80-120	07-SEP-10
Selenium (Se)-Total			104		%		80-120	07-SEP-10
Silicon (Si)-Total			116		%		80-120	07-SEP-10
Silver (Ag)-Total			105		%		80-120	07-SEP-10
Sodium (Na)-Total			117		%		80-120	07-SEP-10
Strontium (Sr)-Total			104		%		80-120	07-SEP-10
Tellurium (Te)-Total			111		%		80-120	07-SEP-10
Thallium (Tl)-Total			107		%		80-120	07-SEP-10
Thorium (Th)-Total			110		%		63-138	07-SEP-10
Tin (Sn)-Total			108		%		80-120	07-SEP-10
Titanium (Ti)-Total			106		%		80-120	07-SEP-10
Tungsten (W)-Total			106		%		80-120	07-SEP-10
Uranium (U)-Total			105		%		80-120	07-SEP-10
Vanadium (V)-Total			107		%		80-120	07-SEP-10
Zinc (Zn)-Total			104		%		80-120	07-SEP-10
Zirconium (Zr)-Total			105		%		80-120	07-SEP-10
WG1162471-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	07-SEP-10
Antimony (Sb)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Arsenic (As)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Barium (Ba)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Beryllium (Be)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Boron (B)-Total			<0.010		mg/L		0.01	07-SEP-10

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1460846								
WG1162471-1 MB								
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	07-SEP-10
Calcium (Ca)-Total			<0.10		mg/L		0.1	07-SEP-10
Cesium (Cs)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Chromium (Cr)-Total			<0.0010		mg/L		0.001	07-SEP-10
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Copper (Cu)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Iron (Fe)-Total			<0.020		mg/L		0.02	07-SEP-10
Lead (Pb)-Total			<0.000090		mg/L		0.00009	07-SEP-10
Lithium (Li)-Total			<0.0020		mg/L		0.002	07-SEP-10
Magnesium (Mg)-Total			<0.010		mg/L		0.01	07-SEP-10
Manganese (Mn)-Total			<0.00030		mg/L		0.0003	07-SEP-10
Molybdenum (Mo)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Nickel (Ni)-Total			<0.0020		mg/L		0.002	07-SEP-10
Phosphorus (P)-Total			<0.20		mg/L		0.2	07-SEP-10
Potassium (K)-Total			<0.020		mg/L		0.02	07-SEP-10
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Selenium (Se)-Total			<0.0010		mg/L		0.001	07-SEP-10
Silicon (Si)-Total			<0.050		mg/L		0.05	07-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Sodium (Na)-Total			<0.030		mg/L		0.03	07-SEP-10
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Thorium (Th)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Tin (Sn)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Titanium (Ti)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Tungsten (W)-Total			<0.0010		mg/L		0.001	07-SEP-10
Uranium (U)-Total			<0.00010		mg/L		0.0001	07-SEP-10
Vanadium (V)-Total			<0.00020		mg/L		0.0002	07-SEP-10
Zinc (Zn)-Total			<0.0050		mg/L		0.005	07-SEP-10
Zirconium (Zr)-Total			<0.00040		mg/L		0.0004	07-SEP-10
NH3-COL-WP	**Water**							

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-COL-WP	**Water**							
Batch R1465344								
WG1166440-3 CCV								
Ammonia as N			98		%		63-138	13-SEP-10
WG1166440-4 DUP		**L927646-8**						
Ammonia as N		0.147	0.148	J	mg/L	0.001	0.2	13-SEP-10
WG1166440-2 LCS								
Ammonia as N			96		%		85-115	13-SEP-10
WG1166440-1 MB								
Ammonia as N			<0.050		mg/L		0.05	13-SEP-10
OGG-IR-WP	**Water**							
Batch R1459975								
WG1162820-2 CCV								
Total Oil and Grease			101		%		85-115	07-SEP-10
WG1162820-4 CCV								
Total Oil and Grease			101		%		85-115	10-SEP-10
WG1162820-1 CVS								
Total Oil and Grease			99		%		85-115	07-SEP-10
WG1162820-3 CVS								
Total Oil and Grease			99		%		85-115	10-SEP-10
WG1162818-2 LCS								
Total Oil and Grease			99		%		70-130	07-SEP-10
WG1162818-1 MB								
Total Oil and Grease			<1.0		mg/L		1	07-SEP-10
PH-WP	**Water**							
Batch R1459503								
WG1161444-4 CCV								
pH			101		%		90-110	03-SEP-10
WG1161444-3 CVS								
pH			100		%		99-101	03-SEP-10
WG1161444-10 DUP		**L927664-4**						
pH		7.43	7.44		pH units	0.15	5	03-SEP-10
WG1161444-7 DUP		**L927685-14**						
pH		8.14	8.15		pH units	0.074	5	03-SEP-10
WG1161444-8 DUP		**L927692-6**						
pH		4.53	4.53		pH units	0.11	5	03-SEP-10
WG1161444-9 DUP		**L927813-1**						
pH		7.86	7.73		pH units	1.6	5	03-SEP-10
PHENOLS-4AAP-WT	**Water**							

Quality Control Report

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	**Water**							
Batch R1461126								
WG1163413-4 CVS								
Phenols (4AAP)			103		%		85-115	08-SEP-10
WG1163413-3 DUP		**L927296-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	08-SEP-10
WG1163413-5 DUP		**L927689-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	08-SEP-10
WG1163413-2 LCS								
Phenols (4AAP)			105		%		85-115	08-SEP-10
WG1163413-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	08-SEP-10
SOLIDS-TOTSUS-WP	**Water**							
Batch R1461947								
WG1163252-2 CVS								
Total Suspended Solids			106		%		85-115	08-SEP-10
WG1163252-10 DUP		**L927970-1**						
Total Suspended Solids		37.0	38.0	J	mg/L	1.0	20	08-SEP-10
WG1163252-11 DUP		**L927979-4**						
Total Suspended Solids		6.0	5.8	J	mg/L	0.2	20	08-SEP-10
WG1163252-12 DUP		**L928750-1**						
Total Suspended Solids		250	245		mg/L	2.0	20	08-SEP-10
WG1163252-5 DUP		**L927692-6**						
Total Suspended Solids		<5.0	<5.0	RPD-NA	mg/L	N/A	20	08-SEP-10
WG1163252-7 DUP		**L927726-1**						
Total Suspended Solids		131	139		mg/L	5.9	20	08-SEP-10
WG1163252-8 DUP		**L927817-3**						
Total Suspended Solids		56.7	53.3		mg/L	6.1	20	08-SEP-10
WG1163252-9 DUP		**L927854-1**						
Total Suspended Solids		33.3	35.6	J	mg/L	2.2	20	08-SEP-10
WG1163252-1 MB								
Total Suspended Solids			<5.0		mg/L		5	08-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	01-SEP-10 15:45	03-SEP-10 11:35	0.25	44	hours	EHTR-FM
	2	01-SEP-10 15:45	03-SEP-10 11:35	0.25	44	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L927467 were received on 02-SEP-10 11:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

R.J. BURNSIDE
ATTN: Stephanie Charity
292 SPEEDVALE AVE., WEST
UNIT #7
GUELPH ON N1H 1C4
Phone: 519-823-4995

Date Received: 14-SEP-10
Report Date: 21-SEP-10 09:07 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L930982
Project P.O. #: NOT SUBMITTED
Job Reference: N-0157460
Legal Site Desc:
C of C Numbers:

Paul Nicolas
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L930982-1 LF-1 Sampled By: SC on 09-SEP-10 @ 11:50 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	23		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	27.4		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-2 LF-2 Sampled By: SC on 09-SEP-10 @ 12:05 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	9		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	6.0		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-3 LF-3 Sampled By: SC on 09-SEP-10 @ 13:43 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	4		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	2.6		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-4 SL-WET-1 Sampled By: SC on 09-SEP-10 @ 14:45 Matrix: WATER							
Bacteriological Tests							
Escherichia Coli	15		3	MPN/100mL		17-SEP-10	R1470963
Fecal Coliforms	15		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	9.0		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-5 SL-WET-2 Sampled By: SC on 09-SEP-10 @ 14:25 Matrix: WATER							
Bacteriological Tests							
Escherichia Coli	4		3	MPN/100mL		17-SEP-10	R1470963
Fecal Coliforms	4		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	21.2		6.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-6 SL-WET-3 Sampled By: SC on 09-SEP-10 @ 15:10 Matrix: WATER							
Bacteriological Tests							
Escherichia Coli	9		3	MPN/100mL		17-SEP-10	R1470963
Fecal Coliforms	9		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	5.6		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932
L930982-7 SL-WET-4 Sampled By: SC on 09-SEP-10 @ 15:45 Matrix: WATER							
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L930982-7 SL-WET-4 Sampled By: SC on 09-SEP-10 @ 15:45 Matrix: WATER							
Bacteriological Tests							
Escherichia Coli	4300		3	MPN/100mL		17-SEP-10	R1470963
Fecal Coliforms	9300		3	MPN/100mL		17-SEP-10	R1470963
Aggregate Organics							
Biochemical Oxygen Demand	20.0		1.0	mg/L	15-SEP-10	20-SEP-10	R1471932

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
EHR	Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B

The sample is incubated for 5 days at 20 degrees Celcius. Comparison of dissolved oxygen content at the beginning and end of incubation provides a measure of biochemical oxygen demand. If carbonaceous BOD is requested, TCMP is added to the sample to chemically inhibit nitrogenous oxygen demand. If soluble BOD is requested, the sample is filtered prior to analysis. Surface waters have a DL of 1 mg/L. Effluents are diluted according to their history and will have a sample DL of 6 mg/L or greater, depending on the dilutions used.

EC-MPN-WP	Water	Escherichia Coli	APHA 9221A-C

The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. The results of examination of replicate tubes and dilutions of a sample are reported after confirmations specific to total coliform, fecal coliform and E. coli are performed. Results are reported in MPN/100 mL for water
and MPN/gram for food and solid samples.

FC-MPN-WP	Water	Fecal Coliform	APHA 9221A-C

The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. The results of examination of replicate tubes and dilutions of a sample are reported after confirmations specific to total coliform, fecal coliform and E. coli are performed. Results are reported in MPN/100 mL for water and MPN/gram for food and solid samples.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L930982 Report Date: 21-SEP-10

Client: R.J. BURNSIDE
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: Stephanie Charity

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-WP	**Water**							
Batch R1471932								
WG1166992-3 DUP		**L930797-1**						
Biochemical Oxygen Demand		9.2	9.2	J	mg/L	0.0	24	20-SEP-10
WG1166992-4 DUP		**L931066-10**						
Biochemical Oxygen Demand		1.7	1.5	J	mg/L	0.2	4	20-SEP-10
WG1166992-5 DUP		**L931186-1**						
Biochemical Oxygen Demand		28.4	24.8	J	mg/L	3.6	24	20-SEP-10
WG1166992-6 DUP		**L931320-4**						
Biochemical Oxygen Demand		11.4	12.6		mg/L	10	20	20-SEP-10
WG1166992-2 IRM		**61-GG**						
Biochemical Oxygen Demand			86		%		85-115	20-SEP-10
WG1166992-1 MB								
Biochemical Oxygen Demand			<1.0		mg/L		1	20-SEP-10

Quality Control Report

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Bacteriological Tests							
Escherichia Coli							
	4	09-SEP-10 14:45	14-SEP-10 12:13	48	117	hours	EHTR
	5	09-SEP-10 14:25	14-SEP-10 12:13	48	118	hours	EHTR
	6	09-SEP-10 15:10	14-SEP-10 12:13	48	117	hours	EHTR
	7	09-SEP-10 15:45	14-SEP-10 12:13	48	116	hours	EHTR
Fecal Coliform							
	1	09-SEP-10 11:50	14-SEP-10 12:13	48	120	hours	EHTR
	2	09-SEP-10 12:05	14-SEP-10 12:13	48	120	hours	EHTR
	3	09-SEP-10 13:43	14-SEP-10 12:13	48	119	hours	EHTR
	4	09-SEP-10 14:45	14-SEP-10 12:13	48	117	hours	EHTR
	5	09-SEP-10 14:25	14-SEP-10 12:13	48	118	hours	EHTR
	6	09-SEP-10 15:10	14-SEP-10 12:13	48	117	hours	EHTR
	7	09-SEP-10 15:45	14-SEP-10 12:13	48	116	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)							
	1	09-SEP-10 11:50	15-SEP-10 08:07	48	140	hours	EHTR
	2	09-SEP-10 12:05	15-SEP-10 08:07	48	140	hours	EHTR
	3	09-SEP-10 13:43	15-SEP-10 08:07	48	138	hours	EHTR
	4	09-SEP-10 14:45	15-SEP-10 08:07	48	137	hours	EHTR
	5	09-SEP-10 14:25	15-SEP-10 08:07	48	138	hours	EHTR
	6	09-SEP-10 15:10	15-SEP-10 08:07	48	137	hours	EHTR
	7	09-SEP-10 15:45	15-SEP-10 08:07	48	136	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L930982 were received on 14-SEP-10 08:35.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

R.J. BURNSIDE & ASSOCIATES LTD
ATTN: STEPHANIE CHARITY / JIM WALLS
292 SPEEDVALE AVE., WEST
UNIT #7
GUELPH ON N1H 1C4
Phone: 519-823-4995

Date Received: 13-SEP-10
Report Date: 22-SEP-10 15:38 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L930600
Project P.O. #: NOT SUBMITTED
Job Reference: N-015746
Legal Site Desc:
C of C Numbers:

Paul Nicolas
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L930600-1 ARV-2							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 11:35							
Matrix: WASTE WATER							
Nitrate + Nitrite							
Anions scan (IC)							
Nitrite-N	<0.25		0.25	mg/L		14-SEP-10	R1467253
Nitrate-N	<0.25		0.25	mg/L		14-SEP-10	R1467253
Sulfate	475		2.5	mg/L		14-SEP-10	R1467253
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.35		0.35	mg/L		15-SEP-10	
Miscellaneous Parameters							
Ammonia as N	13.3		0.050	mg/L		21-SEP-10	R1473786
Biochemical Oxygen Demand	<6.0		6.0	mg/L	13-SEP-10	18-SEP-10	R1470801
Conductivity	2630		0.40	umhos/cm		13-SEP-10	R1465201
Fecal Coliforms	38		3	MPN/100mL		16-SEP-10	R1470203
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	17-SEP-10	17-SEP-10	R1473006
Phenols (4AAP)	0.0020		0.0010	mg/L	15-SEP-10	15-SEP-10	R1467205
Total Oil and Grease	<1.0		1.0	mg/L	16-SEP-10	17-SEP-10	R1470248
Total Suspended Solids	8.0		5.0	mg/L		16-SEP-10	R1469793
pH	8.21		0.10	pH units		13-SEP-10	R1465201
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0095		0.0050	mg/L	14-SEP-10	14-SEP-10	R1466569
Antimony (Sb)-Total	0.00410		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Arsenic (As)-Total	0.00482		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Barium (Ba)-Total	0.0458		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Boron (B)-Total	1.34		0.010	mg/L	14-SEP-10	14-SEP-10	R1466569
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	14-SEP-10	14-SEP-10	R1466569
Calcium (Ca)-Total	230		0.10	mg/L	14-SEP-10	14-SEP-10	R1466569
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569
Cobalt (Co)-Total	0.00051		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Copper (Cu)-Total	0.00149		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Iron (Fe)-Total	0.529		0.020	mg/L	14-SEP-10	14-SEP-10	R1466569
Lead (Pb)-Total	0.000145		0.000090	mg/L	14-SEP-10	14-SEP-10	R1466569
Lithium (Li)-Total	0.0318		0.0020	mg/L	14-SEP-10	14-SEP-10	R1466569
Magnesium (Mg)-Total	49.0		0.010	mg/L	14-SEP-10	14-SEP-10	R1466569
Manganese (Mn)-Total	0.599		0.00030	mg/L	14-SEP-10	14-SEP-10	R1466569
Molybdenum (Mo)-Total	0.00036		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	14-SEP-10	14-SEP-10	R1466569
Phosphorus (P)-Total	0.56		0.20	mg/L	14-SEP-10	14-SEP-10	R1466569
Potassium (K)-Total	44.0		0.020	mg/L	14-SEP-10	14-SEP-10	R1466569
Rubidium (Rb)-Total	0.0375		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Selenium (Se)-Total	<0.0010		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569
Silicon (Si)-Total	4.79		0.050	mg/L	14-SEP-10	14-SEP-10	R1466569
Silver (Ag)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Sodium (Na)-Total	243		0.030	mg/L	14-SEP-10	14-SEP-10	R1466569
Strontium (Sr)-Total	1.66		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Thorium (Th)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Tin (Sn)-Total	0.00022		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Titanium (Ti)-Total	0.00299		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Tungsten (W)-Total	<0.0010		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L930600-1 ARV-2							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 11:35							
Matrix: WASTE WATER							
Total Metals by ICP-MS							
Uranium (U)-Total	0.00063		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Vanadium (V)-Total	0.00061		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Zinc (Zn)-Total	0.0160		0.0050	mg/L	14-SEP-10	14-SEP-10	R1466569
Zirconium (Zr)-Total	0.00043		0.00040	mg/L	14-SEP-10	14-SEP-10	R1466569
L930600-2 ARV-4							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 11:15							
Matrix: WASTE WATER							
Nitrate + Nitrite							
Anions scan (IC)							
Nitrite-N	0.284		0.050	mg/L		14-SEP-10	R1467253
Nitrate-N	1.23		0.050	mg/L		14-SEP-10	R1467253
Sulfate	6.99		0.50	mg/L		14-SEP-10	R1467253
Nitrate+Nitrite							
Nitrate and Nitrite as N	1.51		0.071	mg/L		15-SEP-10	
Miscellaneous Parameters							
Ammonia as N	28.2		0.050	mg/L		21-SEP-10	R1473786
Biochemical Oxygen Demand	65.0		6.0	mg/L	13-SEP-10	18-SEP-10	R1470801
Conductivity	1020		0.40	umhos/cm		13-SEP-10	R1465201
Fecal Coliforms	2100		3	MPN/100mL		16-SEP-10	R1470203
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	17-SEP-10	17-SEP-10	R1473006
Phenols (4AAP)	<0.01	DLM	0.010	mg/L	15-SEP-10	15-SEP-10	R1467205
Total Oil and Grease	1.3		1.0	mg/L	16-SEP-10	17-SEP-10	R1470248
Total Suspended Solids	169		5.0	mg/L		16-SEP-10	R1469793
pH	8.12		0.10	pH units		13-SEP-10	R1465201
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.325		0.0050	mg/L	14-SEP-10	14-SEP-10	R1466569
Antimony (Sb)-Total	0.00033		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Arsenic (As)-Total	0.0107		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Barium (Ba)-Total	0.0349		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Boron (B)-Total	0.254		0.010	mg/L	14-SEP-10	14-SEP-10	R1466569
Cadmium (Cd)-Total	0.000092		0.000010	mg/L	14-SEP-10	14-SEP-10	R1466569
Calcium (Ca)-Total	22.7		0.10	mg/L	14-SEP-10	14-SEP-10	R1466569
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Chromium (Cr)-Total	0.0018		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569
Cobalt (Co)-Total	0.00229		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Copper (Cu)-Total	0.0394		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Iron (Fe)-Total	5.90		0.020	mg/L	14-SEP-10	14-SEP-10	R1466569
Lead (Pb)-Total	0.00152		0.000090	mg/L	14-SEP-10	14-SEP-10	R1466569
Lithium (Li)-Total	0.0067		0.0020	mg/L	14-SEP-10	14-SEP-10	R1466569
Magnesium (Mg)-Total	14.4		0.010	mg/L	14-SEP-10	14-SEP-10	R1466569
Manganese (Mn)-Total	0.349		0.00030	mg/L	14-SEP-10	14-SEP-10	R1466569
Molybdenum (Mo)-Total	0.00080		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Nickel (Ni)-Total	0.0088		0.0020	mg/L	14-SEP-10	14-SEP-10	R1466569
Phosphorus (P)-Total	5.81		0.20	mg/L	14-SEP-10	14-SEP-10	R1466569
Potassium (K)-Total	24.7		0.020	mg/L	14-SEP-10	14-SEP-10	R1466569
Rubidium (Rb)-Total	0.0279		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Selenium (Se)-Total	<0.0010		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569
Silicon (Si)-Total	6.32		0.050	mg/L	14-SEP-10	14-SEP-10	R1466569

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L930600-2 ARV-4							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 11:15							
Matrix: WASTE WATER							
Total Metals by ICP-MS							
Silver (Ag)-Total	0.00025		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Sodium (Na)-Total	116		0.030	mg/L	14-SEP-10	14-SEP-10	R1466569
Strontium (Sr)-Total	0.323		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Thorium (Th)-Total	0.00032		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Tin (Sn)-Total	0.00082		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Titanium (Ti)-Total	0.0196		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Tungsten (W)-Total	<0.0010		0.0010	mg/L	14-SEP-10	14-SEP-10	R1466569
Uranium (U)-Total	0.00044		0.00010	mg/L	14-SEP-10	14-SEP-10	R1466569
Vanadium (V)-Total	0.00470		0.00020	mg/L	14-SEP-10	14-SEP-10	R1466569
Zinc (Zn)-Total	0.0241		0.0050	mg/L	14-SEP-10	14-SEP-10	R1466569
Zirconium (Zr)-Total	0.00199		0.00040	mg/L	14-SEP-10	14-SEP-10	R1466569
L930600-3 OLD LAGOON 1							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 14:45							
Matrix: WASTE WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	7.2		6.0	mg/L	13-SEP-10	18-SEP-10	R1470801
Fecal Coliforms	1500		3	MPN/100mL		16-SEP-10	R1470183
L930600-4 OLD LAGOON 2							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 14:30							
Matrix: WASTE WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	<6.0		6.0	mg/L	13-SEP-10	18-SEP-10	R1470801
Fecal Coliforms	<3		3	MPN/100mL		16-SEP-10	R1470183
L930600-5 SL-1							
Sampled By: STEPHANIE CHARITY on 10-SEP-10 @ 15:00							
Matrix: WASTE WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	420		6.0	mg/L	13-SEP-10	18-SEP-10	R1470801
Fecal Coliforms	15000		3	MPN/100mL		16-SEP-10	R1470183

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Numbe	Client ID	Qualifier	Description
L930600-1	ARV-2	EHR	Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS5-IC-WP	Water	Anions scan (IC)	EPA 300.1 IC
This analysis is carried out using procedures adapted from EPA Method 300.1 "Determination of Inorganic Anions in Drinking Water by Ion Chromatography".			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
The sample is incubated for 5 days at 20 degrees Celcius. Comparison of dissolved oxygen content at the beginning and end of incubation provides a measure of biochemical oxygen demand. If carbonaceous BOD is requested, TCMP is added to the sample to chemically inhibit nitrogenous oxygen demand. If soluble BOD is requested, the sample is filtered prior to analysis. Surface waters have a DL of 1 mg/L. Effluents are diluted according to their history and will have a sample DL of 6 mg/L or greater, depending on the dilutions used.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
FC-MPN-WP	Water	Fecal Coliform	APHA 9221A-C
The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. The results of examination of replicate tubes and dilutions of a sample are reported after confirmations specific to total coliform, fecal coliform and E. coli are performed. Results are reported in MPN/100 mL for water and MPN/gram for food and solid samples.			
HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0
Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.			
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	U.S. EPA 200.8-TL
Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S EPA Method 200.8 for analyis of metals by inductively coupled-mass spectrometery.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia - Colourimeric using Salicylate-nitroprusside and hypochlorite, in an alkaline phosphate buffer.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
OGG-IR-WP	Water	Total Oil and Grease	APHA METHOD 5520C
PH-WP	Water	pH	APHA 4500H
pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
PHENOLS-4AAP-WT	Water	Phenols (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540
The residue retained by a prepared 1.5 um Whatman 934-AH glass microfibre filter dried at 105 degrees C.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L930600 Report Date: 22-SEP-10

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS5-IC-WP	**Water**							
Batch R1467253								
WG1167410-2 LCS								
Nitrite-N			102		%		85-115	14-SEP-10
Nitrate-N			100		%		85-115	14-SEP-10
Sulfate			103		%		85-115	14-SEP-10
WG1167410-1 MB								
Nitrite-N			<0.050		mg/L		0.05	14-SEP-10
Nitrate-N			<0.050		mg/L		0.05	14-SEP-10
Sulfate			<0.50		mg/L		0.5	14-SEP-10
BOD-WP	**Water**							
Batch R1470801								
WG1166054-3 DUP		**L930513-4**						
Biochemical Oxygen Demand		6.6	6.0	J	mg/L	0.6	24	18-SEP-10
WG1166054-4 DUP		**L930684-1**						
Biochemical Oxygen Demand		1.3	1.2	J	mg/L	0.1	4	18-SEP-10
WG1166054-2 IRM		**61-GG**						
Biochemical Oxygen Demand			101		%		85-115	18-SEP-10
WG1166054-1 MB								
Biochemical Oxygen Demand			<1.0		mg/L		1	18-SEP-10
EC-WP	**Water**							
Batch R1465201								
WG1166356-2 CCV								
Conductivity			102		%		95-105	13-SEP-10
WG1166356-1 CVS								
Conductivity			100		%		90-110	13-SEP-10
WG1166356-7 DUP		**L930522-6**						
Conductivity		795	795		umhos/cm	0.038	10	13-SEP-10
WG1166356-8 DUP		**L930527-2**						
Conductivity		250	250		umhos/cm	0.040	10	13-SEP-10
HG-T-CVAF-WP	**Water**							
Batch R1473006								
WG1170553-3 DUP		**L930527-1**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1170553-5 DUP		**L931485-1**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1170553-7 DUP		**L931706-2**						

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAF-WP	**Water**							
Batch R1473006								
WG1170553-7 DUP		**L931706-2**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1170553-9 DUP		**L932322-2**						
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
Mercury (Hg)-Total		N/A	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1170553-2 LCS								
Mercury (Hg)-Total			107		%		63-138	17-SEP-10
Mercury (Hg)-Total			107		%		63-138	17-SEP-10
WG1170553-1 MB								
Mercury (Hg)-Total			<0.000050		mg/L		0.00005	17-SEP-10
Mercury (Hg)-Total			<0.000050		mg/L		0.00005	17-SEP-10
WG1170553-10 MS		**L932322-2**						
Mercury (Hg)-Total			103		%		70-130	17-SEP-10
Mercury (Hg)-Total			103		%		70-130	17-SEP-10
WG1170553-4 MS		**L930527-1**						
Mercury (Hg)-Total			101		%		70-130	17-SEP-10
Mercury (Hg)-Total			101		%		70-130	17-SEP-10
WG1170553-6 MS		**L931485-1**						
Mercury (Hg)-Total			107		%		70-130	17-SEP-10
Mercury (Hg)-Total			107		%		70-130	17-SEP-10
WG1170553-8 MS		**L931706-2**						
Mercury (Hg)-Total			101		%		70-130	17-SEP-10
Mercury (Hg)-Total			101		%		70-130	17-SEP-10
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1167022-3 CCV								
Aluminum (Al)-Total			94		%		90-110	14-SEP-10
Antimony (Sb)-Total			101		%		90-110	14-SEP-10
Arsenic (As)-Total			101		%		90-110	14-SEP-10
Barium (Ba)-Total			101		%		90-110	14-SEP-10
Beryllium (Be)-Total			100		%		90-110	14-SEP-10
Bismuth (Bi)-Total			101		%		90-110	14-SEP-10
Boron (B)-Total			96		%		90-110	14-SEP-10
Cadmium (Cd)-Total			103		%		90-110	14-SEP-10
Calcium (Ca)-Total			98		%		90-110	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1167022-3 CCV								
Cesium (Cs)-Total			99		%		90-110	14-SEP-10
Chromium (Cr)-Total			99		%		90-110	14-SEP-10
Cobalt (Co)-Total			98		%		90-110	14-SEP-10
Copper (Cu)-Total			98		%		90-110	14-SEP-10
Iron (Fe)-Total			96		%		90-110	14-SEP-10
Lead (Pb)-Total			101		%		90-110	14-SEP-10
Lithium (Li)-Total			98		%		90-110	14-SEP-10
Magnesium (Mg)-Total			99		%		90-110	14-SEP-10
Manganese (Mn)-Total			97		%		90-110	14-SEP-10
Molybdenum (Mo)-Total			104		%		90-110	14-SEP-10
Nickel (Ni)-Total			98		%		90-110	14-SEP-10
Phosphorus (P)-Total			95		%		90-110	14-SEP-10
Potassium (K)-Total			100		%		90-110	14-SEP-10
Rubidium (Rb)-Total			101		%		90-110	14-SEP-10
Selenium (Se)-Total			101		%		90-110	14-SEP-10
Silicon (Si)-Total			99		%		90-110	14-SEP-10
Silver (Ag)-Total			107		%		90-110	14-SEP-10
Sodium (Na)-Total			99		%		90-110	14-SEP-10
Strontium (Sr)-Total			99		%		90-110	14-SEP-10
Tellurium (Te)-Total			103		%		90-110	14-SEP-10
Thallium (Tl)-Total			99		%		90-110	14-SEP-10
Thorium (Th)-Total			101		%		63-138	14-SEP-10
Tin (Sn)-Total			102		%		90-110	14-SEP-10
Titanium (Ti)-Total			101		%		90-110	14-SEP-10
Tungsten (W)-Total			101		%		90-110	14-SEP-10
Uranium (U)-Total			99		%		90-110	14-SEP-10
Vanadium (V)-Total			99		%		90-110	14-SEP-10
Zinc (Zn)-Total			99		%		90-110	14-SEP-10
Zirconium (Zr)-Total			100		%		90-110	14-SEP-10
WG1167022-1 CVS								
Aluminum (Al)-Total			93		%		63-138	14-SEP-10
Antimony (Sb)-Total			98		%		63-138	14-SEP-10
Arsenic (As)-Total			101		%		63-138	14-SEP-10
Barium (Ba)-Total			99		%		63-138	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1167022-1 CVS								
Beryllium (Be)-Total			98		%		63-138	14-SEP-10
Bismuth (Bi)-Total			99		%		63-138	14-SEP-10
Boron (B)-Total			98		%		63-138	14-SEP-10
Cadmium (Cd)-Total			102		%		63-138	14-SEP-10
Calcium (Ca)-Total			100		%		63-138	14-SEP-10
Cesium (Cs)-Total			98		%		63-138	14-SEP-10
Chromium (Cr)-Total			94		%		63-138	14-SEP-10
Cobalt (Co)-Total			98		%		63-138	14-SEP-10
Copper (Cu)-Total			101		%		63-138	14-SEP-10
Iron (Fe)-Total			96		%		63-138	14-SEP-10
Lead (Pb)-Total			98		%		63-138	14-SEP-10
Lithium (Li)-Total			93		%		63-138	14-SEP-10
Magnesium (Mg)-Total			98		%		63-138	14-SEP-10
Manganese (Mn)-Total			94		%		63-138	14-SEP-10
Molybdenum (Mo)-Total			103		%		63-138	14-SEP-10
Nickel (Ni)-Total			99		%		63-138	14-SEP-10
Phosphorus (P)-Total			100		%		63-138	14-SEP-10
Potassium (K)-Total			100		%		63-138	14-SEP-10
Rubidium (Rb)-Total			99		%		63-138	14-SEP-10
Selenium (Se)-Total			98		%		63-138	14-SEP-10
Silicon (Si)-Total			101		%		63-138	14-SEP-10
Silver (Ag)-Total			99		%		63-138	14-SEP-10
Sodium (Na)-Total			97		%		63-138	14-SEP-10
Strontium (Sr)-Total			95		%		63-138	14-SEP-10
Tellurium (Te)-Total			100		%		63-138	14-SEP-10
Thallium (Tl)-Total			96		%		63-138	14-SEP-10
Thorium (Th)-Total			103		%		63-138	14-SEP-10
Tin (Sn)-Total			101		%		63-138	14-SEP-10
Titanium (Ti)-Total			103		%		63-138	14-SEP-10
Tungsten (W)-Total			99		%		63-138	14-SEP-10
Uranium (U)-Total			94		%		63-138	14-SEP-10
Vanadium (V)-Total			97		%		63-138	14-SEP-10
Zinc (Zn)-Total			100		%		63-138	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1167022-1 CVS								
Zirconium (Zr)-Total			99		%		63-138	14-SEP-10
WG1167022-2 CVS								
Aluminum (Al)-Total			99		%		63-138	14-SEP-10
Antimony (Sb)-Total			102		%		63-138	14-SEP-10
Arsenic (As)-Total			101		%		63-138	14-SEP-10
Barium (Ba)-Total			101		%		63-138	14-SEP-10
Beryllium (Be)-Total			99		%		63-138	14-SEP-10
Bismuth (Bi)-Total			104		%		63-138	14-SEP-10
Boron (B)-Total			101		%		63-138	14-SEP-10
Cadmium (Cd)-Total			107		%		63-138	14-SEP-10
Calcium (Ca)-Total			101		%		63-138	14-SEP-10
Cesium (Cs)-Total			101		%		63-138	14-SEP-10
Chromium (Cr)-Total			100		%		63-138	14-SEP-10
Cobalt (Co)-Total			100		%		63-138	14-SEP-10
Copper (Cu)-Total			98		%		63-138	14-SEP-10
Iron (Fe)-Total			100		%		63-138	14-SEP-10
Lead (Pb)-Total			101		%		63-138	14-SEP-10
Lithium (Li)-Total			98		%		63-138	14-SEP-10
Magnesium (Mg)-Total			98		%		63-138	14-SEP-10
Manganese (Mn)-Total			101		%		63-138	14-SEP-10
Molybdenum (Mo)-Total			110		%		63-138	14-SEP-10
Nickel (Ni)-Total			96		%		63-138	14-SEP-10
Phosphorus (P)-Total			96		%		63-138	14-SEP-10
Potassium (K)-Total			100		%		63-138	14-SEP-10
Rubidium (Rb)-Total			107		%		63-138	14-SEP-10
Selenium (Se)-Total			98		%		63-138	14-SEP-10
Silicon (Si)-Total			104		%		63-138	14-SEP-10
Silver (Ag)-Total			108		%		63-138	14-SEP-10
Sodium (Na)-Total			97		%		63-138	14-SEP-10
Strontium (Sr)-Total			102		%		63-138	14-SEP-10
Tellurium (Te)-Total			101		%		63-138	14-SEP-10
Thallium (Tl)-Total			101		%		63-138	14-SEP-10
Thorium (Th)-Total			102		%		63-138	14-SEP-10
Tin (Sn)-Total			109		%		63-138	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1167022-2 CVS								
Titanium (Ti)-Total			103		%		63-138	14-SEP-10
Tungsten (W)-Total			105		%		63-138	14-SEP-10
Uranium (U)-Total			100		%		63-138	14-SEP-10
Vanadium (V)-Total			104		%		63-138	14-SEP-10
Zinc (Zn)-Total			98		%		63-138	14-SEP-10
Zirconium (Zr)-Total			110		%		63-138	14-SEP-10
WG1166404-4 DUP		**WG1166404-3**						
Aluminum (Al)-Total		0.0205	0.0206	J	mg/L	0.0001	0.02	14-SEP-10
Antimony (Sb)-Total		0.0108	0.0107		mg/L	1.1	20	14-SEP-10
Arsenic (As)-Total		1.07	1.05		mg/L	1.7	20	14-SEP-10
Barium (Ba)-Total		0.0320	0.0320		mg/L	0.24	20	14-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Bismuth (Bi)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Boron (B)-Total		0.051	0.046	J	mg/L	0.005	0.04	14-SEP-10
Cadmium (Cd)-Total		0.000010	<0.000010	RPD-NA	mg/L	N/A	20	14-SEP-10
Calcium (Ca)-Total		59.6	60.1		mg/L	0.84	20	14-SEP-10
Cesium (Cs)-Total		0.00020	0.00021	J	mg/L	0.00001	0.0004	14-SEP-10
Chromium (Cr)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-SEP-10
Cobalt (Co)-Total		0.00064	0.00058	J	mg/L	0.00007	0.0008	14-SEP-10
Copper (Cu)-Total		0.0276	0.0279		mg/L	0.92	20	14-SEP-10
Iron (Fe)-Total		0.393	0.392		mg/L	0.34	20	14-SEP-10
Lead (Pb)-Total		0.000701	0.000701	J	mg/L	0.000000	0.00036	14-SEP-10
Lithium (Li)-Total		0.0289	0.0264		mg/L	8.9	20	14-SEP-10
Magnesium (Mg)-Total		30.3	28.9		mg/L	4.6	20	14-SEP-10
Manganese (Mn)-Total		0.0587	0.0576		mg/L	1.9	20	14-SEP-10
Molybdenum (Mo)-Total		0.00090	0.00086	J	mg/L	0.00004	0.0008	14-SEP-10
Nickel (Ni)-Total		0.0156	0.0142	J	mg/L	0.0014	0.008	14-SEP-10
Phosphorus (P)-Total		<0.20	<0.20	RPD-NA	mg/L	N/A	20	14-SEP-10
Potassium (K)-Total		6.14	5.81		mg/L	5.6	20	14-SEP-10
Rubidium (Rb)-Total		0.00688	0.00699		mg/L	1.5	20	14-SEP-10
Selenium (Se)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-SEP-10
Silicon (Si)-Total		4.13	4.07		mg/L	1.5	20	14-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1166404-4 DUP		**WG1166404-3**						
Sodium (Na)-Total		44.3	43.7		mg/L	1.4	20	14-SEP-10
Strontium (Sr)-Total		0.680	0.666		mg/L	2.0	20	14-SEP-10
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-SEP-10
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	26	14-SEP-10
Tin (Sn)-Total		0.00092	0.00093	J	mg/L	0.00001	0.0008	14-SEP-10
Titanium (Ti)-Total		0.00096	0.00107	J	mg/L	0.00011	0.0008	14-SEP-10
Tungsten (W)-Total		0.0016	0.0016	J	mg/L	0.0000	0.004	14-SEP-10
Uranium (U)-Total		0.00017	0.00017	J	mg/L	0.00000	0.0004	14-SEP-10
Vanadium (V)-Total		0.00092	0.00087	J	mg/L	0.00005	0.0008	14-SEP-10
Zinc (Zn)-Total		0.0172	0.0158	J	mg/L	0.0014	0.02	14-SEP-10
Zirconium (Zr)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	14-SEP-10
WG1166404-6 DUP		**WG1166404-5**						
Aluminum (Al)-Total		1.93	1.98		mg/L	2.6	20	14-SEP-10
Antimony (Sb)-Total		0.0410	0.0411		mg/L	0.18	20	14-SEP-10
Arsenic (As)-Total		0.377	0.386		mg/L	2.4	20	14-SEP-10
Barium (Ba)-Total		0.126	0.126		mg/L	0.083	20	14-SEP-10
Beryllium (Be)-Total		0.00021	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Bismuth (Bi)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Boron (B)-Total		0.216	0.210		mg/L	3.1	20	14-SEP-10
Cadmium (Cd)-Total		0.000041	0.000038	J	mg/L	0.000003	0.00004	14-SEP-10
Calcium (Ca)-Total		377	383		mg/L	1.6	20	14-SEP-10
Cesium (Cs)-Total		0.00442	0.00438		mg/L	0.86	20	14-SEP-10
Chromium (Cr)-Total		0.0078	0.0080	J	mg/L	0.0002	0.004	14-SEP-10
Cobalt (Co)-Total		0.00894	0.00871		mg/L	2.5	20	14-SEP-10
Copper (Cu)-Total		0.00937	0.00952		mg/L	1.6	20	14-SEP-10
Iron (Fe)-Total		3.53	3.53		mg/L	0.015	20	14-SEP-10
Lead (Pb)-Total		0.000627	0.000622	J	mg/L	0.000005	0.00036	14-SEP-10
Lithium (Li)-Total		0.203	0.200		mg/L	1.6	20	14-SEP-10
Magnesium (Mg)-Total		107	108		mg/L	0.93	20	14-SEP-10
Manganese (Mn)-Total		0.341	0.346		mg/L	1.5	20	14-SEP-10
Molybdenum (Mo)-Total		0.00307	0.00314		mg/L	2.2	20	14-SEP-10
Nickel (Ni)-Total		0.0867	0.0873		mg/L	0.69	20	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1166404-6 DUP		**WG1166404-5**						
Phosphorus (P)-Total		<0.20	<0.20	RPD-NA	mg/L	N/A	20	14-SEP-10
Potassium (K)-Total		11.3	11.8		mg/L	4.3	20	14-SEP-10
Rubidium (Rb)-Total		0.0172	0.0169		mg/L	1.3	20	14-SEP-10
Selenium (Se)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-SEP-10
Silicon (Si)-Total		6.16	6.36		mg/L	3.2	20	14-SEP-10
Silver (Ag)-Total		0.00047	0.00051	J	mg/L	0.00005	0.0004	14-SEP-10
Sodium (Na)-Total		334	351		mg/L	5.0	20	14-SEP-10
Strontium (Sr)-Total		8.43	8.59		mg/L	1.9	20	14-SEP-10
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-SEP-10
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	26	14-SEP-10
Tin (Sn)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-SEP-10
Titanium (Ti)-Total		0.0751	0.0774		mg/L	3.0	20	14-SEP-10
Tungsten (W)-Total		0.0205	0.0205		mg/L	0.020	20	14-SEP-10
Uranium (U)-Total		0.00132	0.00129		mg/L	2.2	20	14-SEP-10
Vanadium (V)-Total		0.00660	0.00655		mg/L	0.76	20	14-SEP-10
Zinc (Zn)-Total		0.0898	0.0881		mg/L	1.9	20	14-SEP-10
Zirconium (Zr)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	14-SEP-10
WG1166404-2 LCS								
Aluminum (Al)-Total			96		%		80-120	14-SEP-10
Antimony (Sb)-Total			104		%		80-120	14-SEP-10
Arsenic (As)-Total			105		%		80-120	14-SEP-10
Barium (Ba)-Total			103		%		80-120	14-SEP-10
Beryllium (Be)-Total			101		%		80-120	14-SEP-10
Bismuth (Bi)-Total			101		%		80-120	14-SEP-10
Boron (B)-Total			100		%		80-120	14-SEP-10
Cadmium (Cd)-Total			101		%		80-120	14-SEP-10
Calcium (Ca)-Total			92		%		80-120	14-SEP-10
Cesium (Cs)-Total			99		%		80-120	14-SEP-10
Chromium (Cr)-Total			100		%		80-120	14-SEP-10
Cobalt (Co)-Total			101		%		80-120	14-SEP-10
Copper (Cu)-Total			100		%		80-120	14-SEP-10
Iron (Fe)-Total			96		%		80-120	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1166404-2 LCS								
Lead (Pb)-Total			98		%		80-120	14-SEP-10
Lithium (Li)-Total			83		%		80-120	14-SEP-10
Magnesium (Mg)-Total			90		%		80-120	14-SEP-10
Manganese (Mn)-Total			93		%		80-120	14-SEP-10
Molybdenum (Mo)-Total			101		%		80-120	14-SEP-10
Nickel (Ni)-Total			96		%		80-120	14-SEP-10
Phosphorus (P)-Total			99		%		80-120	14-SEP-10
Potassium (K)-Total			90		%		80-120	14-SEP-10
Rubidium (Rb)-Total			96		%		80-120	14-SEP-10
Selenium (Se)-Total			100		%		80-120	14-SEP-10
Silicon (Si)-Total			107		%		80-120	14-SEP-10
Silver (Ag)-Total			105		%		80-120	14-SEP-10
Sodium (Na)-Total			91		%		80-120	14-SEP-10
Strontium (Sr)-Total			92		%		80-120	14-SEP-10
Tellurium (Te)-Total			105		%		80-120	14-SEP-10
Thallium (Tl)-Total			99		%		80-120	14-SEP-10
Thorium (Th)-Total			94		%		63-138	14-SEP-10
Tin (Sn)-Total			104		%		80-120	14-SEP-10
Titanium (Ti)-Total			102		%		80-120	14-SEP-10
Tungsten (W)-Total			100		%		80-120	14-SEP-10
Uranium (U)-Total			86		%		80-120	14-SEP-10
Vanadium (V)-Total			101		%		80-120	14-SEP-10
Zinc (Zn)-Total			98		%		80-120	14-SEP-10
Zirconium (Zr)-Total			94		%		80-120	14-SEP-10
WG1166404-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	14-SEP-10
Antimony (Sb)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Arsenic (As)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Barium (Ba)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Beryllium (Be)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Boron (B)-Total			<0.010		mg/L		0.01	14-SEP-10
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	14-SEP-10
Calcium (Ca)-Total			<0.10		mg/L		0.1	14-SEP-10

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	**Water**							
Batch R1466569								
WG1166404-1 MB								
Cesium (Cs)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Chromium (Cr)-Total			<0.0010		mg/L		0.001	14-SEP-10
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Copper (Cu)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Iron (Fe)-Total			<0.020		mg/L		0.02	14-SEP-10
Lead (Pb)-Total			<0.000090		mg/L		0.00009	14-SEP-10
Lithium (Li)-Total			<0.0020		mg/L		0.002	14-SEP-10
Magnesium (Mg)-Total			<0.010		mg/L		0.01	14-SEP-10
Manganese (Mn)-Total			<0.00030		mg/L		0.0003	14-SEP-10
Molybdenum (Mo)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Nickel (Ni)-Total			<0.0020		mg/L		0.002	14-SEP-10
Phosphorus (P)-Total			<0.20		mg/L		0.2	14-SEP-10
Potassium (K)-Total			<0.020		mg/L		0.02	14-SEP-10
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Selenium (Se)-Total			<0.0010		mg/L		0.001	14-SEP-10
Silicon (Si)-Total			<0.050		mg/L		0.05	14-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Sodium (Na)-Total			<0.030		mg/L		0.03	14-SEP-10
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Thorium (Th)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Tin (Sn)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Titanium (Ti)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Tungsten (W)-Total			<0.0010		mg/L		0.001	14-SEP-10
Uranium (U)-Total			<0.00010		mg/L		0.0001	14-SEP-10
Vanadium (V)-Total			<0.00020		mg/L		0.0002	14-SEP-10
Zinc (Zn)-Total			<0.0050		mg/L		0.005	14-SEP-10
Zirconium (Zr)-Total			<0.00040		mg/L		0.0004	14-SEP-10
NH3-COL-WP	**Water**							
Batch R1473786								
WG1171030-3 CCV								
Ammonia as N			101		%		63-138	21-SEP-10
WG1171030-4 DUP		**L933910-3**						

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-COL-WP	**Water**							
Batch R1473786								
WG1171030-4 DUP		**L933910-3**						
Ammonia as N		2.37	2.37		mg/L	0.24	20	21-SEP-10
WG1171030-2 LCS								
Ammonia as N			97		%		85-115	21-SEP-10
WG1171030-1 MB								
Ammonia as N			<0.050		mg/L		0.05	21-SEP-10
OGG-IR-WP	**Water**							
Batch R1470248								
WG1168879-2 CCV								
Total Oil and Grease			101		%		85-115	17-SEP-10
WG1168879-1 CVS								
Total Oil and Grease			99		%		85-115	17-SEP-10
WG1168874-2 LCS								
Total Oil and Grease			99		%		70-130	17-SEP-10
WG1168874-1 MB								
Total Oil and Grease			<1.0		mg/L		1	17-SEP-10
PH-WP	**Water**							
Batch R1465201								
WG1166356-4 CCV								
pH			100		%		90-110	13-SEP-10
WG1166356-3 CVS								
pH			100		%		99-101	13-SEP-10
WG1166356-7 DUP		**L930522-6**						
pH		8.04	8.05		pH units	0.050	5	13-SEP-10
WG1166356-8 DUP		**L930527-2**						
pH		8.47	8.47		pH units	0.012	5	13-SEP-10
PHENOLS-4AAP-WT	**Water**							
Batch R1467205								
WG1167405-4 CVS								
Phenols (4AAP)			102		%		85-115	15-SEP-10
WG1167405-3 DUP		**L929296-7**						
Phenols (4AAP)		0.0080	0.0080	J	mg/L	0.0000	0.004	15-SEP-10
WG1167405-5 DUP		**L931369-1**						
Phenols (4AAP)		0.0050	0.0050	J	mg/L	0.0000	0.004	15-SEP-10
WG1167405-2 LCS								
Phenols (4AAP)			100		%		85-115	15-SEP-10
WG1167405-1 MB								

Quality Control Report

Client: R.J. BURNSIDE & ASSOCIATES LTD
292 SPEEDVALE AVE., WEST UNIT #7
GUELPH ON N1H 1C4
Contact: STEPHANIE CHARITY / JIM WALLS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	**Water**							
Batch R1467205								
WG1167405-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	15-SEP-10
SOLIDS-TOTSUS-WP	**Water**							
Batch R1469793								
WG1167743-2 CVS								
Total Suspended Solids			96		%		85-115	16-SEP-10
WG1167743-10 DUP		**L932278-1**						
Total Suspended Solids		530	510		mg/L	3.8	20	16-SEP-10
WG1167743-5 DUP		**L930600-1**						
Total Suspended Solids		8.0	8.0	J	mg/L	0.0	20	16-SEP-10
WG1167743-6 DUP		**L930600-2**						
Total Suspended Solids		169	162		mg/L	4.3	20	16-SEP-10
WG1167743-7 DUP		**L930543-13**						
Total Suspended Solids		111	119		mg/L	7.0	20	16-SEP-10
WG1167743-8 DUP		**L930543-14**						
Total Suspended Solids		131	133		mg/L	1.5	20	16-SEP-10
WG1167743-1 MB								
Total Suspended Solids			<5.0		mg/L		5	16-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	10-SEP-10 11:35	13-SEP-10 12:52	0.25	73	hours	EHTR-FM
	2	10-SEP-10 11:15	13-SEP-10 12:52	0.25	74	hours	EHTR-FM
Anions and Nutrients							
Anions scan (IC)							
	1	10-SEP-10 11:35	14-SEP-10 15:19	48	100	hours	EHTR
	2	10-SEP-10 11:15	14-SEP-10 15:19	48	100	hours	EHTR
Bacteriological Tests							
Fecal Coliform							
	1	10-SEP-10 11:35	13-SEP-10 08:54	48	69	hours	EHTR
	2	10-SEP-10 11:15	13-SEP-10 08:54	48	70	hours	EHTR
	3	10-SEP-10 14:45	13-SEP-10 14:59	48	72	hours	EHTR
	4	10-SEP-10 14:30	13-SEP-10 14:59	48	72	hours	EHTR
	5	10-SEP-10 15:00	13-SEP-10 14:59	48	72	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)							
	1	10-SEP-10 11:35	13-SEP-10 08:48	48	69	hours	EHTR
	2	10-SEP-10 11:15	13-SEP-10 08:48	48	70	hours	EHTR
	3	10-SEP-10 14:45	13-SEP-10 08:48	48	66	hours	EHTR
	4	10-SEP-10 14:30	13-SEP-10 08:48	48	66	hours	EHTR
	5	10-SEP-10 15:00	13-SEP-10 08:48	48	66	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L930600 were received on 13-SEP-10 11:34.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

O. Reg 153 Petroleum Hydrocarbon F1 - F4 in Water (With PAHs)

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	BW-1 1988754
C6 - C10 (F1)	g/L		25	<25
C6 - C10 (F1 minus BTEX)	g/L		25	<25
C>10 - C16 (F2)	g/L		100	<100
C>10 - C16 (F2 minus Naphthalene)	g/L		100	<100
C6 - C16 (F1 F2)	g/L		100	<100
C>16 - C34 (F3)	g/L		100	<100
C>16 - C34 (F3 minus PAHs)	g/L		100	<100
C>34 - C50 (F4)	g/L		100	<100
C>16 - C50 (F3 F4)	g/L		100	<100
Gravimetric Heavy Hydrocarbons	g/L		500	NA

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

1988754
The C6-C10 fraction is calculated using Toluene response factor.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.
Total C6-C50 results are corrected for BTEX and PAH contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 nC16 nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Certified By: Jordy Takewaki

AGAT Laboratories

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

O. Reg. 153 PAHs in Water

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	BW-1 1988754
Naphthalene	g/L		0.12	<0.12
Acenaphthylene	g/L		0.11	<0.11
Acenaphthene	g/L		0.10	<0.10
Fluorene	g/L		0.09	<0.09
Phenanthrene	g/L		0.10	<0.10
Anthracene	g/L		0.07	<0.07
Fluoranthene	g/L		0.12	<0.12
Pyrene	g/L		0.12	<0.12
Benzo(a)anthracene	g/L		0.08	<0.08
Chrysene	g/L		0.05	<0.05
Benzo(b)fluoranthene	g/L		0.05	<0.05
Benzo(k)fluoranthene	g/L		0.06	<0.06
Benzo(a)pyrene	g/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	g/L		0.03	<0.03
Dibenzo(a,h)anthracene	g/L		0.09	<0.09
Benzo(g,h,i)perylene	g/L		0.06	<0.06
2-and 1-methyl Napthalene	g/L		0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**		
Chrysene-d12	%	60-130		97

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	BW-1 1988754
Dichlorodifluoromethane	g/L		0.20	20
Chloromethane	g/L		0.40	<0.40
Vinyl Chloride	g/L		0.17	<0.17
Bromomethane	g/L		0.20	<0.20
Chloroethane	g/L		0.20	<0.20
Trichlorofluoromethane	g/L		0.40	17
Acetone	g/L		1.0	<1.0
1,1 Dichloroethylene	g/L		0.30	<0.30
Methylene Chloride	g/L		0.30	<0.30
trans- 1,2-dichloroethylene	g/L		0.20	<0.20
Methyl tert-butyl ether	g/L		0.20	<0.20
1,1-Dichloroethane	g/L		0.30	<0.30
Methyl Ethyl Ketone	g/L		1.0	<1.0
cis- 1,2-Dichloroethylene	g/L		0.20	<0.20
Chloroform	g/L		0.20	<0.20
1,2 - Dichloroethane	g/L		0.20	<0.20
1,1,1-Trichloroethane	g/L		0.30	<0.30
Carbon Tetrachloride	g/L		0.20	<0.20
Benzene	g/L		0.20	<0.20
1,2-Dichloropropane	g/L		0.20	<0.20
Trichloroethylene	g/L		0.20	<0.20
Bromodichloromethane	g/L		0.20	<0.20
cis-1,3-Dichloropropene	ug/L		0.20	<0.20
Methyl Isobutyl Ketone	g/L		1.0	<1.0
trans-1,3-Dichloropropene	g/L		0.30	<0.30
1,1,2-Trichloroethane	g/L		0.20	<0.20
Toluene	g/L		0.20	<0.20
2-Hexanone	g/L		0.30	<0.30
Dibromochloromethane	g/L		0.10	<0.10
Ethylene Dibromide	g/L		0.20	<0.20
Tetrachloroethylene	g/L		0.20	<0.20
1,1,1,2-Tetrachloroethane	g/L		0.10	<0.10
Chlorobenzene	g/L		0.10	<0.10

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	BW-1 1988754
Ethylbenzene	g/L		0.10	<0.10
m p-Xylene	g/L		0.20	<0.20
Bromoform	g/L		0.10	<0.10
Styrene	g/L		0.10	<0.10
1,1,2,2-Tetrachloroethane	g/L		0.10	<0.10
o-Xylene	g/L		0.10	<0.10
1,3-Dichlorobenzene	g/L		0.10	<0.10
1,4-Dichlorobenzene	g/L		0.10	<0.10
1,2-Dichlorobenzene	g/L		0.10	<0.10
1,2,4-Trichlorobenzene	g/L		0.30	<0.30
1,3-Dichloropropene (Cis Trans)	g/L		0.30	<0.30
Xylene Mixture (Total)	g/L		0.20	<0.20
n-Hexane	g/L		0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-130		100
4-Bromofluorobenzene	% Recovery	70-130		92

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

BURNSIDE - Water Quality Assessment

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	LF-1 1988705	LF-2 1988707	LF-3 1988716	SL-Wet1 1988725	SL-Wet2 1988736	SL-Wet3 1988742	SL-Wet4 1988748
Aluminum	mg/L		0.004	<0.004	0.006	0.004	0.059	0.033	0.054	0.143
Arsenic	mg/L		0.003	<0.003	0.003	0.003	0.007	0.005	0.006	0.011
Barium	mg/L		0.002	0.045	0.041	0.035	0.006	0.007	0.009	0.015
Boron	mg/L		0.010	0.736	0.805	0.773	0.179	0.176	0.162	0.230
Cadmium	mg/L		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L		0.05	283	225	169	15.9	20.9	24.4	12.0
Chromium	mg/L		0.003	<0.003	0.006	0.006	0.008	0.006	0.005	0.007
Copper	mg/L		0.003	<0.003	<0.003	<0.003	0.012	0.006	0.011	0.027
Iron	mg/L		0.010	<0.010	0.074	0.020	0.503	1.41	1.28	2.55
Potassium	mg/L		0.05	20.8	30.6	37.5	15.6	14.8	14.7	21.7
Magnesium	mg/L		0.05	24.5	42.1	43.1	8.66	15.9	17.7	9.76
Mercury	mg/L		0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Manganese	mg/L		0.002	0.045	0.216	0.226	0.226	0.412	0.461	0.274
Molybdenum	mg/L		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sodium	mg/L		0.05	82.5	171	204	75.5	111	110	94.2
Nickel	mg/L		0.003	<0.003	0.003	<0.003	0.004	0.003	0.005	0.006
Total Phosphorus	mg/L		0.05	1.57	0.34	0.20	0.98	1.56	1.45	4.54
Lead	mg/L		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium	mg/L		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	mg/L		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	mg/L		0.005	2.54	1.71	1.31	0.142	0.237	0.214	0.111
Thallium	mg/L		0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Titanium	mg/L		0.002	0.008	0.007	0.006	0.003	0.002	0.003	0.005
Uranium	mg/L		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L		0.002	<0.002	<0.002	<0.002	0.004	0.003	0.003	0.006
Zinc	mg/L		0.005	0.007	0.013	0.009	0.007	<0.005	<0.005	0.022
Fluoride	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.50
Chloride	mg/L		0.10	114	267	334	120	204	186	140
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ortho phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10	1.53	1.71	0.55	2.33
Bromide	mg/L		0.05	1.42	2.63	2.58	<0.05	1.16	<0.05	<0.05
Nitrate as N	mg/L		0.05	<0.05	0.81	<0.05	1.00	0.30	0.39	0.40
Sulphate	mg/L		0.10	650	518	469	18.4	37.3	26.6	11.5

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

BURNSIDE - Water Quality Assessment

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	LF-1 1988705	LF-2 1988707	LF-3 1988716	SL-Wet1 1988725	SL-Wet2 1988736	SL-Wet3 1988742	SL-Wet4 1988748
pH	pH Units		NA	7.90	8.03	8.27	7.89	7.82	7.84	8.18
Ammonia as N	mg/L		0.02	<0.02	1.23	0.26	36.5	25.7	18.3	71.9
Total Organic Carbon	mg/L		0.5	36.5	25.8	26.5	28.3	21.0	22.7	61.4
Electrical Conductivity	uS/cm		2	1750	2040	2070	793	1020	957	1030
Total Dissolved Solids	mg/L		20	1440	1520	1450	368	496	484	436
Saturation pH				6.59	6.53	6.70	7.70	7.52	7.43	7.53
% Difference/ Ion Balance			0.1	3.6	3.8	5.6	0.6	4.5	3.6	3.8
Total Hardness (as CaCO3)	mg/L		10	808	735	599	75	118	134	70
Langlier Index				1.31	1.50	1.57	0.19	0.30	0.41	0.65
Carbonate (as CaCO3)	mg/L		5	<5	<5	<5	<5	<5	<5	<5
Bicarbonate (as CaCO3)	mg/L		5	252	322	263	193	186	200	306
Turbidity	NTU		0.5	0.9	3.3	1.6	3.1	4.1	5.2	20.0
Alkalinity (as CaCO3)	mg/L		5	252	322	263	193	186	200	306
Hydroxide (as CaCO3)	mg/L		5	<5	<5	<5	<5	<5	<5	<5
Reactive Silica	mg/L		0.05	15.9	8.84	9.34	12.3	11.4	8.67	14.2
Colour	TCU		5	30	55	49	107	100	131	209

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

Chromium VI TSS (Water)

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	LF-1 1988705
Chromium VI	mg/L		0.005	<0.005
Total Suspended Solids	mg/L		10	288

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

Chromium VI, Phenols TSS (Water)

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	LF-2 1988707	LF-3 1988716
Chromium VI	mg/L		0.005	<0.005	<0.005
Phenols	mg/L		0.001	0.002	0.001
Total Suspended Solids	mg/L		10	21	<10

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T434899
PROJECT NO: N-015746

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD

ATTENTION TO: Stephanie Charity

TSS (Water)

DATE SAMPLED: Sep 09, 2010 | DATE RECEIVED: Sep 13, 2010 | DATE REPORTED: Sep 22, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	SL-Wet1 1988725	SL-Wet2 1988736	SL-Wet3 1988742	SL-Wet4 1988748
Total Suspended Solids	mg/L		10	44	<10	<10	78

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T449096

PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Microbiological Analysis (water)

DATE SAMPLED: Nov 02, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-2 2104291
Fecal Coliform	CFU/100mL	1	1	TNTC*

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard: Refers to SDWA -Schedule 23

2104291 * TNTC – Too numerous to count, refers to overgrown colonies.

Certified By: Elizabeth Rolakowska

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Microbiological Analysis (water)

DATE SAMPLED: Nov 02, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-4 2104288
Escherichia coli	CFU/100mL	1	1	14
Total Coliforms	CFU/1mL*	1	1	4400
Fecal Coliform	CFU/100mL	1	1	5

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard: Refers to SDWA -Schedule 23

2104288 * TC counts refer to a 1 ml sample aliquot diluted prior to filtration a larger aliquot resulted in overgrown colonies. The RDL has been adjusted.

Certified By: Elizabeth Rolokowska

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Particle Size Analysis

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Soil

Parameter	Unit	G / S	RDL	ARV-5-1 2104259	ARV-5-2 2104261	ARV-4-1 2104263
Sieve Analysis - 4.75 mm	%		N/A	7.98	0.00	10.42
Sieve Analysis - 2.36 mm	%		N/A	1.85	0.05	3.75
Sieve Analysis - 1.18 mm	%		N/A	2.15	0.10	8.09
Sieve Analysis - 600 microns	%		N/A	3.29	0.19	25.98
Sieve Analysis - 300 microns	%		N/A	7.47	1.47	45.95
Sieve Analysis - 150 microns	%		N/A	9.57	3.16	5.03
Sieve Analysis - 75 microns	%		N/A	14.71	11.28	0.34
Sieve Analysis - Retaining Pan	%		N/A	52.98	83.75	0.44

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By: Tony Nash

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Soil Analysis - Texture

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Soil

Parameter	Unit	G / S	RDL	ARV-5-1 2104259	ARV-5-2 2104261
Particle Size Distribution (Sand)	%		1	52	16
Particle Size Distribution (Silt)	%		1	40	68
Particle Size Distribution (Clay)	%		1	8	16
Soil Texture				Sandy Loam	Silt Loam

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

O. Reg 153 Petroleum Hydrocarbon F1 - F4 in Water (-BTEX)

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-5 2104265	RDL	ARV-5-2 2104274
C6 - C10 (F1)	g/L		25	<25	50	<50
C6 - C10 (F1 minus BTEX)	g/L		25	<25	50	<50
C>10 - C16 (F2)	g/L		100	<100	100	<100
C6 - C16 (F1 F2)	g/L		100	<100	100	<100
C>16 - C34 (F3)	g/L		100	<100	100	<100
C>34 - C50 (F4)	g/L		100	<100	100	<100
C>16 - C50 (F3 F4)	g/L		100	<100	100	<100
Gravimetric Heavy Hydrocarbons	g/L		500	NA	500	NA

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

2104265-2104274 The C6-C10 fraction is calculated using Toluene response factor.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.
Total C6-C50 results are corrected for BTEX and PAH contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 nC16 nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-5 2104265	RDL	ARV-5-2 2104274
Dichlorodifluoromethane	g/L		0.40	<0.40	2.00	<2.00
Chloromethane	g/L		0.80	<0.80	4.00	<4.00
Vinyl Chloride	g/L		0.34	<0.34	1.70	<1.70
Bromomethane	g/L		0.40	<0.40	2.00	<2.00
Chloroethane	g/L		0.40	<0.40	2.00	<2.00
Trichlorofluoromethane	g/L		0.80	<0.80	4.00	<4.00
Acetone	g/L		2.0	<2.0	10.0	<10.0
1,1 Dichloroethylene	g/L		0.60	<0.60	3.00	<3.00
Methylene Chloride	g/L		0.60	<0.60	3.00	<3.00
trans- 1,2-dichloroethylene	g/L		0.40	<0.40	2.00	<2.00
Methyl tert-butyl ether	g/L		0.40	<0.40	2.00	<2.00
1,1-Dichloroethane	g/L		0.60	<0.60	3.00	<3.00
Methyl Ethyl Ketone	g/L		2.0	<2.0	10.0	<10.0
cis- 1,2-Dichloroethylene	g/L		0.40	<0.40	2.00	<2.00
Chloroform	g/L		0.40	<0.40	2.00	<2.00
1,2 - Dichloroethane	g/L		0.40	<0.40	2.00	<2.00
1,1,1-Trichloroethane	g/L		0.60	<0.60	3.00	<3.00
Carbon Tetrachloride	g/L		0.40	<0.40	2.00	<2.00
Benzene	g/L		0.40	<0.40	2.00	<2.00
1,2-Dichloropropane	g/L		0.40	<0.40	2.00	<2.00
Trichloroethylene	g/L		0.40	<0.40	2.00	<2.00
Bromodichloromethane	g/L		0.40	<0.40	2.00	<2.00
cis-1,3-Dichloropropene	ug/L		0.40	<0.40	2.00	<2.00
Methyl Isobutyl Ketone	g/L		2.0	<2.0	10.0	<10.0
trans-1,3-Dichloropropene	g/L		0.60	<0.60	3.00	<3.00
1,1,2-Trichloroethane	g/L		0.40	<0.40	2.00	<2.00
Toluene	g/L		0.40	<0.40	2.00	<2.00
2-Hexanone	g/L		0.60	<0.60	3.00	<3.00
Dibromochloromethane	g/L		0.20	<0.20	1.00	<1.00
Ethylene Dibromide	g/L		0.40	<0.40	2.00	<2.00
Tetrachloroethylene	g/L		0.40	<0.40	2.00	<2.00
1,1,1,2-Tetrachloroethane	g/L		0.20	<0.20	1.00	<1.00
Chlorobenzene	g/L		0.20	<0.20	1.00	<1.00

Certified By: Jordy Takewaki

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-5 2104265	RDL	ARV-5-2 2104274
Ethylbenzene	g/L		0.20	<0.20	1.00	<1.00
m p-Xylene	g/L		0.40	<0.40	2.00	<2.00
Bromoform	g/L		0.20	<0.20	1.00	<1.00
Styrene	g/L		0.20	<0.20	1.00	<1.00
1,1,2,2-Tetrachloroethane	g/L		0.20	<0.20	1.00	<1.00
o-Xylene	g/L		0.20	<0.20	1.00	<1.00
1,3-Dichlorobenzene	g/L		0.20	<0.20	1.00	<1.00
1,4-Dichlorobenzene	g/L		0.20	<0.20	1.00	<1.00
1,2-Dichlorobenzene	g/L		0.20	<0.20	1.00	<1.00
1,2,4-Trichlorobenzene	g/L		0.60	<0.60	3.00	<3.00
1,3-Dichloropropene (Cis Trans)	g/L		0.60	<0.60	3.00	<3.00
Xylene Mixture (Total)	g/L		0.40	<0.40	2.00	<2.00
n-Hexane	g/L		0.40	<0.40	2.00	<2.00
Surrogate	**Unit**	**Acceptable Limits**				
Toluene-d8	% Recovery	60-130		76		74
4-Bromofluorobenzene	% Recovery	70-130		89		85

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

2104265 Dilution factor 2
The sample was diluted becauce it was foamy. The reporting detection limit has been corrected for the dilution factor used.

2104274 Dilution factor 10
The sample was diluted becauce it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Certified By: Jordy Takewaki

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Certificate of Analysis

AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

BOD (Water)

DATE SAMPLED: Nov 02, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-2 2104291
BOD (5)	mg/L		5	34

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

BOD, EC, pH TSS (Water)

DATE SAMPLED: Nov 02, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-4 2104288
BOD (5)	mg/L		5	30
Electrical Conductivity	uS/cm		2	2510
pH	pH Units		NA	7.92
Total Suspended Solids	mg/L		10	368

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Water Quality Assessment

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-5 2104265	RDL	ARV-5-2 2104274
Aluminum	mg/L		0.004	3.92	0.040	6.13
Arsenic	mg/L		0.003	0.008	0.003	0.012
Barium	mg/L		0.002	0.073	0.002	0.074
Boron	mg/L		0.010	0.045	0.010	0.769
Cadmium	mg/L		0.002	<0.002	0.002	0.003
Calcium	mg/L		0.05	45.5	0.05	106
Chromium	mg/L		0.003	0.010	0.003	0.111
Copper	mg/L		0.003	0.010	0.003	0.039
Iron	mg/L		0.010	5.85	0.100	131
Potassium	mg/L		0.05	7.66	0.05	57.1
Magnesium	mg/L		0.05	32.7	0.05	290
Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001
Manganese	mg/L		0.002	0.490	0.002	0.831
Molybdenum	mg/L		0.002	<0.002	0.002	0.003
Sodium	mg/L		0.05	160	0.05	1640
Nickel	mg/L		0.003	0.012	0.003	0.049
Total Phosphorus	mg/L		0.05	0.87	0.05	2.42
Lead	mg/L		0.002	0.008	0.002	0.010
Selenium	mg/L		0.004	<0.004	0.004	<0.004
Silver	mg/L		0.002	<0.002	0.002	<0.002
Strontium	mg/L		0.005	0.408	0.005	1.50
Thallium	mg/L		0.006	<0.006	0.006	<0.006
Titanium	mg/L		0.002	0.114	0.002	0.132
Uranium	mg/L		0.002	<0.002	0.002	0.004
Vanadium	mg/L		0.002	0.022	0.002	0.056
Zinc	mg/L		0.005	0.068	0.005	0.079
Fluoride	mg/L		0.05	<0.05	0.50	<0.50
Chloride	mg/L		0.10	340	1.00	3110
Nitrite as N	mg/L		0.05	<0.05	0.50	<0.50
Ortho phosphate as P	mg/L		0.10	<0.10	1.00	<1.00
Bromide	mg/L		0.05	1.28	0.50	12.3
Nitrate as N	mg/L		0.05	<0.05	0.50	<0.50
Sulphate	mg/L		0.10	55.9	1.00	636

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1 2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 10T449096
PROJECT NO: NAO157460.0002

CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

Water Quality Assessment

DATE SAMPLED: Nov 01, 2010 | DATE RECEIVED: Nov 03, 2010 | DATE REPORTED: Nov 23, 2010 | SAMPLE T PE: Water

Parameter	Unit	G / S	RDL	ARV-5 2104265	RDL	ARV-5-2 2104274
pH	pH Units		NA	6.61	NA	6.31
Ammonia as N	mg/L		0.02	<0.02	0.02	20.8
Total Organic Carbon	mg/L		0.5	53.6	0.5	240
Electrical Conductivity	uS/cm		2	1200	2	9230
Total Dissolved Solids	mg/L		20	816	20	5930
Saturation pH				7.83		6.66
% Difference/ Ion Balance			0.1	1.7	0.1	<0.1
Total Hardness (as CaCO3)	mg/L		10	248	10	1460
Langlier Index				-1.22		-0.35
Carbonate (as CaCO3)	mg/L		5	<5	5	<5
Bicarbonate (as CaCO3)	mg/L		5	47	5	118
Turbidity	NTU		0.5	369	0.5	239
Alkalinity (as CaCO3)	mg/L		5	47	5	118
Hydroxide (as CaCO3)	mg/L		5	<5	5	<5
Reactive Silica	mg/L		0.05	13.8	0.05	31.8
Colour	TCU		5	113	5	1050

Comments: RDL - Reported Detection Limit G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 10T449096

PROJECT NO: NAO157460.0002

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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CLIENT NAME: R.J. BURNSIDE ASSOCIATES LTD.

ATTENTION TO: Stephanie Charity

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANAL SIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2104288	ARV-4	SDWA -Schedule 23	Microbiological Analysis (water)	Escherichia coli	1	14
2104288	ARV-4	SDWA -Schedule 23	Microbiological Analysis (water)	Fecal Coliform	1	5
2104288	ARV-4	SDWA -Schedule 23	Microbiological Analysis (water)	Total Coliforms	1	4400

AQUATOX
AquaTox Testing & Consulting Inc.
11B Nicholas Beaver Rd.
RR 3
Guelph ON N1H 6H9
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 217681
Sample Number : 28312

SAMPLE IDENTIFICATION

Company :	R.J Burnside & Associates Ltd.	Time Collected :	17:30
Location :	Orangeville ON	Date Collected :	2010-09-08
Substance :	ARV Sewage Lagoon	Date Received :	2010-09-10
Sampling Method :	Not given	Date Tested :	2010-09-10
Sampled By :	R.J.	Temp. on arrival :	7.0 °C
Sample Description :	Cloudy, green, earthy odour.		

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	Dm10-17		
Date Tested (yyyy/mm/dd) :	2010-09-13	Historical Mean LC50 :	6.7 g/L
LC50 (95% Confidence Limits) :	6.5 g/L (6.1 - 6.9)	Warning Limits (± 2SD) :	6.1 - 7.4 g/L
Statistical Method :	Probit	Analyst(s) :	LB/SM

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	7.6 days	Mean Young Per Brood :	30.6
Culture Mortality :	0% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm10-17	Organism Loading Rate :	15.0 mL/organism

Date: 2010-09-29
yyyy-mm-dd

Approved by: K Dube
Project Manager

Work Order: 217681
Sample Number: 28312

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	120	None	7.7	3.7	931	20.0	42	0:00

0 hours

Date & Time 2010-09-10 14:30
Technician: LB

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.7	3.7	931	20.0	42	120
100B	0	0	7.7	3.7	931	20.0		
100C	0	0	7.7	3.7	931	20.0		
Control A	0	0	8.5	8.6	397	21.0		
Control B	0	0	8.5	8.6	397	21.0		
Control C	0	0	8.5	8.6	397	21.0	99	220

Notes: Indigenous organisms, were attempted to be removed from 100% effluent prior to test initiation.
Dark coloured sample.

24 hours

Date & Time 2010-09-11 14:30
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	1	–	–	–	21.0
100B	0	0	–	–	–	21.0
100C	0	0	–	–	–	21.0
Control A	0	0	–	–	–	21.0
Control B	0	0	–	–	–	21.0
Control C	0	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2010-09-12 14:30
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	8.6	9.6	912	20.0
100B	0	0	8.6	9.6	914	20.0
100C	0	0	8.6	10.0	907	20.0
Control A	0	0	8.5	8.5	395	20.0
Control B	0	0	8.6	8.6	399	20.0
Control C	0	0	8.6	8.5	402	20.0

Notes: >30 live organisms counted. No dead daphnids or carapaces found within sample.

# of control organisms showing stress: 0
Daphnia Batch #: Dm10-17

Number immobile does not include number of mortalities.

– = not measured
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: KEH
Date: 2010-09-29

AquaTox Testing & Consulting Inc.
11B Nicholas Beaver Rd.
RR 3
Guelph ON N1H 6H9
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 217681
Sample Number : 28312

SAMPLE IDENTIFICATION

Company :	R.J Burnside & Associates Ltd.	Time Collected :	17:30
Location :	Orangeville ON	Date Collected :	2010-09-08
Substance :	ARV Sewage Lagoon	Date Received :	2010-09-10
Sampling Method :	Not given	Date Tested :	2010-09-10
Sampled By :	R.J.	Temp. on arrival :	7.0°C
Sample Description :	Cloudy, green, earthy odour.		

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	100.0 %

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T10-12		
Date Tested (yyyy-mm-dd) :	2010-09-01	Historical Mean LC50 :	4004 mg/L
LC50 (95% Confidence Limits) :	3560 mg/L (3187 - 3961)	Warning Limits (± 2SD) :	3365 - 4766 mg/L
Statistical Method :	Probit	Analyst(s) :	MP/FS/TL

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.91 ± 0.44 g	Mean Fish Fork Length (± 2 SD) :	45.2 ± 7.3 mm
Range of Weights :	0.59 - 1.27 g	Range of Fork Lengths (mm) :	40 - 50 mm
Fish Loading Rate :	0.4 g/L		

TEST CONDITIONS

Sample Treatment :	None	Volume Tested (L) :	21
pH Adjustment :	None	Number of Replicates :	1
Test Aeration :	Yes	Organisms Per Replicate :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Total Organisms Per Test Level :	10
Organism Batch :	T10-12		

Date: 2010-09-20
yyyy-mm-dd

Approved by: _____
Project Manager

Work Order: 217681
Sample Number: 28312

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
2:00	**Initial Water Chemistry:**	7.4	2.6	835	16.0	–
	Chemistry after 30min air:	7.4	4.5	826	16.0	49

0 hours

Date & Time 2010-09-10 16:10
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.4	7.3	825	15.5	76
Control	0	0	7.9	9.6	535	15.0	100

Notes:

24 hours

Date & Time 2010-09-11 16:10
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	9	0	7.8	7.2	811	15.5
Control	0	0	–	–	–	15.5

Notes:

48 hours

Date & Time 2010-09-12 16:10
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	10	0	7.9	7.8	821	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2010-09-13 16:10
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	10	0	–	–	–	–
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2010-09-14 16:10
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	10	0	–	–	–	–
Control	0	0	8.2	9.4	519	15.0

Notes:

# of control organisms showing stress: 0
Trout Batch #: T10-12

"–" = not measured
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: KFH
Date: 2010-09-16

AquaTox Testing & Consulting Inc.
11B Nicholas Beaver Rd.
RR 3
Guelph ON N1H 6H9
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 217681
Sample Number : 28313

SAMPLE IDENTIFICATION

Company :	R.J Burnside & Associates Ltd.	Time Collected :	17:45
Location :	Orangeville ON	Date Collected :	2010-09-08
Substance :	ARV Landfill	Date Received :	2010-09-10
Sampling Method :	Not given	Date Tested :	2010-09-10
Sampled By :	R.J.	Temp. on arrival :	7.0 °C
Sample Description :	Cloudy, green, earthy odour.		

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	Dm10-17		
Date Tested (yyyy/mm/dd) :	2010-09-13	Historical Mean LC50 :	6.7 g/L
LC50 (95% Confidence Limits) :	6.5 g/L (6.1 - 6.9)	Warning Limits (± 2SD) :	6.1 - 7.4 g/L
Statistical Method :	Probit	Analyst(s) :	LB/SM

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	7.6 days	Mean Young Per Brood :	30.6
Culture Mortality :	0% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm10-17	Organism Loading Rate :	15.0 mL/organism

Date: 2010-09-27
yyyy-mm-dd

Approved by: K Dube
Project Manager

Work Order: 217681
Sample Number: 28313

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	820	None	7.9	6.2	2471	21.0	72	0:00

0 hours

Date & Time 2010-09-10 14:35
Technician: LB

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.9	6.2	2471	21.0	72	820
100B	0	0	7.9	6.2	2471	21.0		
100C	0	0	7.9	6.2	2471	21.0		
Control A	0	0	8.5	8.6	397	21.0		
Control B	0	0	8.5	8.6	397	21.0		
Control C	0	0	8.5	8.6	397	21.0	99	220

Notes: Indigenous organisms, were attempted to be removed from 100% effluent prior to test initiation.
Dark coloured sample.

24 hours

Date & Time 2010-09-11 14:35
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	–	–	–	21.0
100B	0	0	–	–	–	21.0
100C	0	0	–	–	–	21.0
Control A	0	0	–	–	–	21.0
Control B	0	0	–	–	–	21.0
Control C	0	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2010-09-12 14:35
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	8.4	9.7	2218	20.0
100B	0	0	8.4	9.8	2236	20.0
100C	0	0	8.5	9.8	2257	20.0
Control A	0	0	8.4	8.7	399	20.0
Control B	0	0	8.5	8.6	406	20.0
Control C	0	0	8.5	8.6	395	20.0

Notes:

# of control organisms showing stress: 0
Daphnia Batch #: Dm10-17

Number immobile does not include number of mortalities.

– = not measured
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: KEH
Date: 2010-09-23

AquaTox Testing & Consulting Inc.
11B Nicholas Beaver Rd.
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Guelph ON N1H 6H9
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 217681
Sample Number : 28313

SAMPLE IDENTIFICATION

Company :	R.J Burnside & Associates Ltd.	Time Collected :	17:45
Location :	Orangeville ON	Date Collected :	2010-09-08
Substance :	ARV Landfill	Date Received :	2010-09-10
Sampling Method :	Not given	Date Tested :	2010-09-10
Sampled By :	R.J.	Temp. on arrival :	7.0°C
Sample Description :	Cloudy, green, earthy odour.		

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	100.0 %

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T10-12		
Date Tested (yyyy-mm-dd) :	2010-09-01	Historical Mean LC50 :	4004 mg/L
LC50 (95% Confidence Limits) :	3560 mg/L (3187 - 3961)	Warning Limits (± 2SD) :	3365 - 4766 mg/L
Statistical Method :	Probit	Analyst(s) :	MP/FS/TL

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.72 ± 0.20 g	Mean Fish Fork Length (± 2 SD) :	42.8 ± 5.1 mm
Range of Weights :	0.62 - 0.95 g	Range of Fork Lengths (mm) :	40 - 48 mm
Fish Loading Rate :	0.4 g/L		

TEST CONDITIONS

Sample Treatment :	None	Volume Tested (L) :	17
pH Adjustment :	None	Number of Replicates :	1
Test Aeration :	Yes	Organisms Per Replicate :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Total Organisms Per Test Level :	10
Organism Batch :	T10-12		

Date: 2010-09-20
yyyy-mm-dd

Approved by: K Dube
Project Manager

Work Order: 217681
Sample Number: 28313

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
1:30	Initial Water Chemistry:	7.7	5.5	2290	16.0	–
	Chemistry after 30min air:	7.9	6.4	2165	16.0	68

0 hours

Date & Time 2010-09-10 15:40
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.8	7.1	2152	16.0	74
Control	0	0	7.9	9.6	535	15.0	100

Notes:

24 hours

Date & Time 2010-09-11 15:40
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	4	0	–	–	–	15.5
Control	0	0	–	–	–	15.5

Notes:

48 hours

Date & Time 2010-09-12 15:40
Technician: DK

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	8	0	8.1	8.4	2055	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2010-09-13 15:40
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	9	1	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes: Remaining test organism in 100% effluent is on side at bottom of test chamber.

96 hours

Date & Time 2010-09-14 15:40
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	10	0	8.1	8.2	2036	15.0
Control	0	0	8.3	9.3	544	15.0

Notes:

# of control organisms showing stress: 0
Trout Batch #: T10-12

"–" = not measured
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: KEH
Date: 2010-09-16

BURNSIDE
An Aboriginal Owned Company

Appendix F
CCME Guidelines

Canadian Water Quality Guidelines for the Protection of Aquatic Life

SUMMARY TABLE

Update 7.0
September 2007

Summary of Canadian water quality guidelines for the protection of aquatic life.

	Freshwater		Marine	
Parameter[a]	**Concentration (µg·L^{-1})**	**Date[b]**	**Concentration (µg·L^{-1})**	**Date[b]**
Acenaphthene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Acridine [See Polycyclic aromatic hydrocarbons (PAHs)]				
Aldicarb	1[c]	1993	0.15[c]	1993
Aldrin + Dieldrin[d]	~~0.004~~[e,f]	1987		
Aluminium[d]	5–100[g]	1987		
Ammonia (total)	see factsheet	2001		
Ammonia (un-ionized)	19[h]	2001		
Aniline	2.2[i]	1993	Insufficient data	1993
Anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Arsenic[j]	5.0[k]	1997	12.5[c]	1997
Atrazine	1.8[i]	1989		
Benz*(a)*anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Benzene[j]	370[c, k]	1999	110[c]	1999
Benzo*(a)*pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]				
2,2-Bis(*p*-chlorophenyl)-1,1,1-trichloroethane [See DDT (total)]				
Bromacil	5.0[c,i]	1997	Insufficient data	1997
Bromoform [See Halogenated methanes, Tribromomethane]				
Bromoxynil	5.0[i]	1993	Insufficient data	1993
Cadmium	0.017[c,l]	1996	0.12[i]	1996
Captan	1.3[c]	1991		
Carbaryl	0.20[i]	1997	0.32[c,i]	1997
Carbofuran	1.8[i]	1989		
Carbon tetrachloride [See Halogenated methanes, Tetrachloromethane]				
Chlordane[d]	~~0.006~~[e,f]	1987		
Chlorinated benzenes				
Monochlorobenzene	1.3[c,k]	1997	25[c,k]	1997
1,2-Dichlorobenzene	0.70[c,k]	1997	42[c,k]	1997
1,3-Dichlorobenzene	150[c,k]	1997	Insufficient data[k]	1997
1,4-Dichlorobenzene	26[c,k]	1997	Insufficient data[k]	1997
1,2,3-Trichlorobenzene	8.0[c,k]	1997	Insufficient data[k]	1997
1,2,4-Trichlorobenzene	24[c,k]	1997	5.4[c,k]	1997
1,3,5-Trichlorobenzene[d]	Insufficient data[k]	1997	Insufficient data[k]	1997

Continued.

Parameter[a]	Freshwater		Marine	
	Concentration ($\mu g \cdot L^{-1}$)	Date[b]	Concentration ($\mu g \cdot L^{-1}$)	Date[b]
Chlorinated benzenes—Continued				
1,2,3,4-Tetrachlorobenzene	1.8[c,k]	1997	Insufficient data[k]	1997
1,2,3,5-Tetrachlorobenzene[d]	Insufficient data[k]	1997	Insufficient data[k]	1997
1,2,4,5-Tetrachlorobenzene[d]	Insufficient data[k]	1997	Insufficient data[k]	1997
Pentachlorobenzene	6.0[c,k]	1997	Insufficient data[k]	1997
Hexachlorobenzene[d]	Insufficient data[e,f,k]	1997	Insufficient data[k]	1997
Chlorinated ethanes				
1,2-Dichloroethane	100[c,i]	1991	Insufficient data	1991
1,1,1-Trichloroethane	Insufficient data	1991	Insufficient data	1991
1,1,2,2-Tetrachloroethane	Insufficient data	1991	Insufficient data	1991
Chlorinated ethenes				
1,1,2-Trichloroethene (Tichloroethylene; TCE)	21[c,i]	1991	Insufficient data	1991
1,1,2,2-Tetrachloroethene (Tetrachloroethylene; PCE)	111[c,i]	1993	Insufficient data	1993
Chlorinated methanes [See Halogenated methanes]				
Chlorinated phenols[d]				
Monochlorophenols	7	1987		
Dichlorophenols	0.2	1987		
Trichlorophenols	18	1987		
Tetrachlorophenols	1	1987		
Pentachlorophenol (PCP)	0.5	1987		
Chlorine, reactive [See Reactive chlorine species]				
Chloroform [See Halogenated methanes, Trichloromethane]				
4-Chloro-2-methyl phenoxy acetic acid [See MCPA]				
Chlorothalonil	0.18[c]	1994	0.36[c]	1994
Chlorpyrifos	0.0035	1997	0.002[c]	1997
Chromium				
Trivalent chromium (Cr(III))	8.9[c,k]	1997	56[c,k]	1997
Hexavalent chromium (Cr(VI))	1.0[k]	1997	1.5[k]	1997
Chrysene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Colour	Narrative	1999	Narrative	1999
Copper[d]	2–4[m]	1987		
Cyanazine	2.0[c,i]	1990		
Cyanide[d]	5 (as free CN)	1987		
DDAC (Didecyl dimethyl ammonium chloride)	1.5[c]	1999	Insufficient data	1999
DDT (total)[d] (2,2-Bis(*p*-chlorophenyl)-1,1,1-trichloroethane; dichloro diphenyl trichloroethane)	~~0.001~~[e,f]	1987		
Debris (litter/settleable matter)			Narrative[c]	1996

Continued.

	Freshwater		Marine	
Parameter[a]	**Concentration (µg·L^{-1})**	**Date[b]**	**Concentration (µg·L^{-1})**	**Date[b]**
Deltamethrin	0.0004	1997	Insufficient data	1997
Deposited bedload sediment [See Total particulate matter]				
Dibromochloromethane [See Halogenated methanes]				
Dicamba	10[c,i]	1993		
Dichlorobenzene [See Chlorinated benzenes]				
Dichlorobromomethane [See Halogenated methanes]				
Dichloro diphenyl trichloroethane [See DDT (total)]				
Dichloroethane [See Chlorinated ethanes]				
Dichloroethylene [See Chlorinated ethanes, 1,2-Dichloroethane]				
Dichloromethane [See Halogenated methanes]				
Dichlorophenols [See Chlorinated phenols]				
2,4-Dichlorophenoxyacetic acid [see Phenoxy herbicides]				
Diclofop-methyl	6.1	1993		
Didecyl dimethyl ammonium chloride [See DDAC]				
Diethylene glycol [See Glycols]				
Di(2-ethylhexyl) phthalate [See Phthalate esters]				
Diisopropanolamine (DIPA)[aa]	1600[c]	2005	Insufficient data	2005
Dimethoate	6.2[c]	1993	Insufficient data	1993
Di-*n*-butyl phthalate [See Phthalate esters]				
Di-*n*-octyl phthalate [See Phthalate esters]				
Dinoseb	0.05	1992		
Dissolved gas supersaturation	Narrative	1999	Narrative	1999
Dissolved oxygen	5500–9500[k,n]	1999	>8000 and Narrative[c,k]	1996
Endosulfan[d]	0.02	1987		
Endrin[d]	~~0.0023~~[e,f]	1987		
Ethylbenzene[j]	90[c,k]	1996	25[c,k]	1996
Ethylene glycol [See Glycols]				
Fluoranthene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Glycols				
Ethylene glycol	192 000[k]	1997	Insufficient data	1997
Diethylene glycol	Insufficient data[k]	1997	Insufficient data	1997
Propylene glycol	500 000[k]	1997	Insufficient data	1997
Glyphosate	65[c]	1989		

Continued

Parameter[a]	Freshwater		Marine	
	Concentration ($\mu g \cdot L^{-1}$)	Date[b]	Concentration ($\mu g \cdot L^{-1}$)	Date[b]
Halogenated methanes				
Monochloromethane (Methyl chloride)[d]	Insufficient data	1992	Insufficient data	1992
Dichloromethane (Methylene chloride)	98.1[c,i]	1992	Insufficient data	1992
Trichloromethane (Chloroform)	1.8[c,i]	1992	Insufficient data	1992
Tetrachloromethane (Carbon tetrachloride)	13.3[c,i]	1992	Insufficient data	1992
Monobromomethane (Methyl bromide)[d]	Insufficient data	1992	Insufficient data	1992
Tribromomethane (Bromoform)[d]	Insufficient data	1992	Insufficient data	1992
Dibromochloromethane[d]	Insufficient data	1992	Insufficient data	1992
Dichlorobromomethane[d]	Insufficient data	1992	Insufficient data	1992
HCBD [See Hexachlorobutadiene (HCBD)]				
Heptachlor (Heptachlor epoxide)[d]	~~0.01~~[e,f]	1987		
Hexachlorobenzene [See Chlorinated benzenes]				
Hexachlorobutadiene (HCBD)	1.3[c, k]	1999		
Hexachlorocyclohexane (Lindane)[d]	0.01	1987		
Hypochlorous acid [See Reactive chlorine species]				
Imidacloprid[aa]	0.23[c]	2007	0.65[c]	2007
Inorganic fluorides	120[c]	2002		
3-Iodo-2-propynyl butyl carbamate [See IPBC]				
IPBC (3-Iodo-2-propynyl butyl carbamate)	1.9[c]	1999		
Iron[d]	300	1987		
Lead[d]	1.7[c]	1987		
Lindane [See Hexachlorocyclohexane]				
Linuron	7.0[c]	1995	Insufficient data	1995
MCPA (4-Chloro-2-methyl phenoxy acetic acid; 2-methyl-4-chloro phenoxy acetic acid)	2.6[c]	1995	4.2[c]	1995
Mercury[v]				
Inorganic Mercury[v]	0.026	2003	0.016[c,w]	2003
Methylmercury[v]	0.004[c,w]	2003		
Methyl bromide [See Halogenated methanes, Monobromomethane]				
Methyl chloride [See Halogenated methanes, Monochloromethane]				
2-Methyl-4-chloro phenoxy acetic acid [See MCPA]				
Methylene chloride [See Halogenated methanes, Dichloromethane]				
Methyl *tertiary*-butyl ether [See MTBE]				
Metolachlor	7.8[c]	1991		
Metribuzin	1.0[c]	1990		
Molybdenum[j]	73[c]	1999		
Monobromomethane [See Halogenated methanes]				
Monochloramine [See Reactive chlorine species]				

Continued.

	Freshwater		Marine	
Parameter[a]	**Concentration ($\mu g \cdot L^{-1}$)**	**Date**[b]	**Concentration ($\mu g \cdot L^{-1}$)**	**Date**[b]
Monochlorobenzene [See Chlorinated benzenes]				
Monochloromethane [See Halogenated methanes]				
Monochlorophenols [See Chlorinated phenols]				
MTBE (methyl *tertiary*-butyl ether)	10 000[c]	2003	5 000[c]	2003
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Nickel[d]	25–150[p]	1987		
Nitrate	13 000[c,u,y]	2003	16 000[c,u,y]	2003
Nitrite[d]	60[z]	1987		
Nonylphenol and its ethoxylates	1.0[c,t]	2002	0.7[c,t]	2002
Nutrients	Guidance Framework[x]	2004	Guidance Framework [aa,bb]	2007
Organotins				
Tributyltin	0.008[c]	1992	0.001[c]	1992
Tricyclohexyltin	Insufficient data	1992	Insufficient data	1992
Triphenyltin	0.022[c,i]	1992	Insufficient data	1992
Oxygen, dissolved [See Dissolved oxygen]				
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]				
PCBs [See Polychlorinated biphenyls (PCBs)(total)]				
PCE [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]				
PCP [See Chlorinated phenols, Pentachlorophenol]				
Pentachlorobenzene [See Chlorinated benzenes]				
Pentachlorophenol [See Chlorinated phenols]				
Permethrin[aa]	0.004[c]	2006	0.001[c]	2006
pH[d]	6.5–9	1987	7.0–8.7 and Narrative	1996
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Phenols (mono- & dihydric)	4.0[k]	1999		
Phenoxy herbicides[d, q]	4.0	1987		
Phosphorus	Guidance Framework[x]	2004	Guidance Framework[bb]	2007
Phthalate esters				
Di-*n*-butyl phthalate	19[c]	1993	Insufficient data	1993
Di(2-ethylhexyl) phthalate	16[c]	1993	Insufficient data	1993
Di-*n*-octyl phthalate	Insufficient data	1993	Insufficient data	1993
Picloram	29[c]	1990		
Polychlorinated biphenyls (PCBs) (total)[d]	~~0.001~~[e,f]	1987	~~0.01~~[e,f]	1991

Continued.

	Freshwater		Marine	
Parameter[a]	**Concentration (µg·L^{-1})**	**Date**[b]	**Concentration (µg·L^{-1})**	**Date**[b]
Polycyclic aromatic hydrocarbons (PAHs)				
Acenaphthene	5.8[c]	1999	Insufficient data	1999
Acridine	4.4[c]	1999	Insufficient data	1999
Anthracene	0.012[c]	1999	Insufficient data	1999
Benz*(a)*anthracene	0.018[c]	1999	Insufficient data	1999
Benzo*(a)*pyrene	0.015[c]	1999	Insufficient data	1999
Chrysene	Insufficient data	1999	Insufficient data	1999
Fluoranthene	0.04[c]	1999	Insufficient data	1999
Fluorene	3.0[c]	1999	Insufficient data	1999
Naphthalene	1.1[c]	1999	1.4[c]	1999
Phenanthrene	0.4[c]	1999	Insufficient data	1999
Pyrene	0.025[c]	1999	Insufficient data	1999
Quinoline	3.4[c]	1999	Insufficient data	1999
Propylene glycol [See Glycols]				
Pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]				
Quinoline [See Polycyclic aromatic hydrocarbons (PAHs)]				
Reactive chlorine species (hypochlorous acid and monochloramine)	0.5 and Narrative	1999	0.5 and Narrative	1999
Salinity			≤10% fluctuation[c]	1996
Selenium[d]	1.0	1987		
Silver[d]	0.1	1987		
Simazine	10	1991		
Streambed substrate [See Total particulate matter]				
Styrene	72[c]	1999		
Sulfolane[aa]	50 000[c]	2005	Insufficient data	2005
Suspended sediments [See Total particulate matter]				
TCE [See Chlorinated ethenes, 1,1,2-Trichloroethene]				
Tebuthiuron	1.6[c]	1995	Insufficient data	1995
Temperature	Narrative[s]	1987	Not to exceed ±1°C and Narrative[c]	1996
Tetrachlorobenzene [See Chlorinated benzenes]				
Tetrachloroethane [See Chlorinated ethanes]				
Tetrachloroethene [See Chlorinated ethenes]				
Tetrachloroethylene [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]				

Continued.

Parameter[a]	Freshwater		Marine	
	Concentration ($\mu g \cdot L^{-1}$)	Date[b]	Concentration ($\mu g \cdot L^{-1}$)	Date[b]
Tetrachloromethane [See Halogenated methanes]				
Tetrachlorophenols [See Chlorinated phenols]				
Thallium[j]	0.8	1999		
Toluene	2.0[c,j,k]	1996	215[c,k]	1996
Total particulate matter				
Deposited bedload sediment	Insufficient data	1999	Insufficient data	1999
Streambed substrate	Narrative	1999	Narrative	1999
Suspended sediments	Narrative	1999	Narrative	1999
Turbidity	Narrative	1999	Narrative	1999
Toxaphene[d]	~~0.008~~ [e,f]	1987		
Triallate	0.24[e]	1992		
Tribromomethane [See Halogenated methanes]				
Tributyltin [See Organotins]				
Trichlorobenzene [See Chlorinated benzenes]				
Trichloroethane [See Chlorinated ethanes]				
Trichloroethene [See Chlorinated ethenes]				
Trichloroethylene [See Chlorinated ethenes, 1,1,2-Trichloroethene]				
Trichloromethane [See Halogenated methanes]				
Trichlorophenols [See Chlorinated phenols]				
Tricyclohexyltin [See Organotins]				
Trifluralin	0.20[i]	1993		
Triphenyltin [See Organotins]				
Turbidity [See Total particulate matter]				
Zinc[d]	30	1987		

[a] Unless otherwise indicated, supporting documents are available from the National Guidelines and Standards Office, Environment Canada.

[b] The guidelines dated 1987 have been carried over from *Canadian Water Quality Guidelines* (CCREM 1987) and no fact sheet was prepared. The guidelines dated 1989 to 1997 were developed and initially published in CCREM 1987 as appendixes on the date indicated. They are published as fact sheets in this document. Other guidelines dated 1997 and those dated 1999 are published for the first time in this document.

[c] Interim guideline.

[d] No fact sheet created. For more information on this guideline, please refer to *Canadian Water Quality Guidelines* (CCREM 1987).

[e] This guideline (originally published in *Canadian Water Quality Guidelines* [CCREM 1987 + Appendixes] in 1987 or 1991 [PCBs in marine waters]) is no longer recommended and the value is withdrawn. A water quality guideline is not recommended. Environmental exposure is predominantly via sediment, soil, and/or tissue, therefore, the reader is referred to the respective guidelines for these media.

[f] This substance meets the criteria for Track 1 substances under the national CCME Policy for the Management of Toxic Substances (PMTS) (i.e., persistent, bioaccumulative, primarily the result of human activity, and CEPA-toxic or equivalent), and should be subject to virtual elimination strategies. Guidelines can serve as action levels or interim management objectives towards virtual elimination.

[g] Aluminium guideline= 5 $\mu g \cdot L^{-1}$ at pH <6.5
= 100 $\mu g \cdot L^{-1}$ at pH ≥6.5

[h] Ammonia guideline: Expressed as µg unionized ammonia·L^{-1}. This would be equivalent to 15.2 µg ammonia-nitrogen·L^{-1}. Guideline for total ammonia is temperature and pH dependent, please consult factsheet for more information.

[i] Guideline value slightly modified from CCREM 1987 + Appendixes due to re-evaluation of the significant figures.

[j] The technical document for the guideline is available from the Ontario Ministry of the Environment.

[k] Substance has been re-evaluated since CCREM 1987 + Appendixes. Either a new guideline has been derived or insufficient data existed to derive a new guideline.

[l]Cadmium guideline = $10^{\{0.86[\log(\text{hardness})] - 3.2\}}$.

[m]Copper guideline = 2 $\mu g \cdot L^{-1}$ at a water hardness of 0–120 $mg \cdot L^{-1}$ (soft to medium) as $CaCO_3$
= 3 $\mu g \cdot L^{-1}$ at a water harness of 120–180 $mg \cdot L^{-1}$ (hard) as $CaCO_3$
= 4 $\mu g \cdot L^{-1}$ at a water harness >180 $mg \cdot L^{-1}$ (very hard) as $CaCO_3$

[n]Dissolved oxygen for warm-water biota: early life stages = 6000 $\mu g \cdot L^{-1}$
other life stages = 5500 $\mu g \cdot L^{-1}$
for cold-water biota: early life stages = 9500 $\mu g \cdot L^{-1}$
other life stages = 6500 $\mu g \cdot L^{-1}$

[o]Lead guideline = 1 $\mu g \cdot L^{-1}$ at a water harness of 0–60 $mg \cdot L^{-1}$ (soft) as $CaCO_3$
= 2 $\mu g \cdot L^{-1}$ at a water harness of 60–120 $mg \cdot L^{-1}$ (medium) as $CaCO_3$
= 4 $\mu g \cdot L^{-1}$ at a water harness of 120–180 $mg \cdot L^{-1}$ (hard) as $CaCO_3$
= 7 $\mu g \cdot L^{-1}$ at a water harness >180 $mg \cdot L^{-1}$ (very hard) as $CaCO_3$

[p]Nickel guideline = 25 $\mu g \cdot L^{-1}$ at a water harness of 0–60 $mg \cdot L^{-1}$ (soft) as $CaCO_3$
= 65 $\mu g \cdot L^{-1}$ at a water harness of 60–120 $mg \cdot L^{-1}$ (medium) as $CaCO_3$
= 110 $\mu g \cdot L^{-1}$ at a water harness of 120–180 $mg \cdot L^{-1}$ (hard) as $CaCO_3$
= 150 $\mu g \cdot L^{-1}$ at a water harness >180 $mg \cdot L^{-1}$ (very hard) as $CaCO_3$

[q]The guideline of 4.0 $\mu g \cdot L^{-1}$ for phenoxy herbicides is based on data for ester formulations of 2,4-dichlorophenoxyacetic acid.

[r]The technical document for the guideline is available from British Columbia Ministry of Environment, Lands and Parks.

[s]Temperature: (for more information, see CCREM 1987)

Thermal Stratification: Thermal additions to receiving waters should be such that thermal stratification and subsequent turnover dates are not altered from those existing prior to the addition of heat from artificial origins.

Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded.

Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

[t]Expressed on a TEQ basis using NP TEFs, see Table 2 in factsheet.

[u]For protection from direct toxic effects; the guidelines do not consider indirect effects due to eutrophication.

[v]May not prevent accumulation of methylmercury in aquatic life, therefore, may not protect wildlife that consume aquatic life; see factsheet for details. Consult also the appropriate Canadian Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota.

[w]May not fully protect higher trophic level fish; see factsheet for details.

[x]Canadian Guidance Framework for Phosphorus is for developing phosphorus guidelines (does not provide guidance on other freshwater nutrients). It provides Trigger Ranges for Total Phosphorus (see Guidance Framework for Phosphorus factsheet):

ultra-oligotrophic <4 $\mu g \cdot L^{-1}$
oligotrophic 4-10 $\mu g \cdot L^{-1}$
mesotrophic 10-20 $\mu g \cdot L^{-1}$
meso-eutrophic 20-35 $\mu g \cdot L^{-1}$
eutrophic 35-100 $\mu g \cdot L^{-1}$
hyper-eutrophic >100 $\mu g \cdot L^{-1}$

[y]Guidelines are expressed in μg nitrate$\cdot L^{-1}$. These values are equivalent to 2900 μg nitrate-nitrogen$\cdot L^{-1}$, and 3600 μg nitrate-nitrogen$\cdot L^{-1}$, for freshwater and marine respectively.

[z]Guideline is expressed as μg nitrite-nitrogen$\cdot L^{-1}$. This value is equivalent to 197 μg nitrite$\cdot L^{-1}$.

[aa]Supporting documents are available from the Canadian Council of Ministers of the Environment at http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=125

[bb]The Canadian Guidance Framework for the Management of Nearshore Marine Systems is for developing nutrient (phosphorus and nitrogen) guidelines for nearshore marine systems. Refer to factsheet for details

Reference

CCREM (Canadian Council of Resource and Environment Ministers). 1987. Canadian water quality guidelines. Prepared by the Task Force on Water Quality Guidelines.

Reference listing:

Canadian Council of Ministers of the Environment. 2007. Canadian water quality guidelines for the protection of aquatic life: Summary table. Updated September, 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

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Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health

SUMMARY TABLES

Update 7.0
September 2007

Table 1. Canadian Soil Quality Guidelines (mg·kg^{-1}).

Substance[y]	Year revised/ released[a]	Land Use and Soil Texture							
		Agricultural[*]		Residential/ parkland[*]		Commercial[*]		Industrial[*]	
		Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine
Arsenic (inorganic)	1997	12[b]		12[b]		12[b]		12[b]	
Barium	2003	750[c]		500[c]		2000[c]		2000[c]	
Benzene									
Surface[w]	2004	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]
Subsoil[w]	2004	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]
Surface[x]	2004	0.0095[t,u]	0.0068[t,u]	0.0095[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]
Subsoil[x]	2004	0.011[t,u]	0.0068[t,u]	0.011[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]	0.030[t,u]	0.0068[t,u]
Benzo*(a)*pyrene	1997	0.1[e]		0.7[f]		0.7[f]		0.7[f]	
Cadmium	1999	1.4[b]		10[g]		22[b]		22[b]	
Chromium									
Total chromium	1997	64[b]		64[b]		87[b]		87[b]	
Hexavalent chromium (VI)	1999	0.4[h]		0.4[h]		1.4[h]		1.4[h]	
Copper	1999	63[b]		63[b]		91[b]		91[b]	
Cyanide (free)	1997	0.9[b]		0.9[b]		8.0[b]		8.0[b]	
DDT (total)	1999	0.7[i]		0.7[i]		12[i, j]		12[i, j]	
Diisopropanolamine (DIPA)[z]	2006	180[b]		180[b]		180[b]		180[b]	
Ethylbenzene									
Surface	2004	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]
Subsoil	2004	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]	0.082[t]	0.018[t,u]
Ethylene glycol	1999	960[k]		960[k]		960[k]		960[k]	
Lead	1999	70[b]		140[b]		260[b]		600[b]	
Mercury (inorganic)	1999	6.6[b]		6.6[b]		24[b]		50[b]	
Naphthalene	1997	0.1[d]		0.6[h]		22[h]		22[h]	
Nickel	1999	50[l]		50[l]		50[l]		50[l]	
Nonylphenol (and its ethyloxylates)	2002	5.7[p]		5.7[p]		14[p]		14[p]	
Pentachlorophenol	1997	7.6[b]		7.6[b]		7.6[b]		7.6[b]	
Phenol	1997	3.8[b]		3.8[b]		3.8[b]		3.8[b]	
Polychlorinated biphenyls (PCBs)	1999	0.5[m]		1.3[l]		33[j,l]		33[j,l]	
Polychlorinated dibenzo-*p*-dioxins/ dibenzofurans (PCDD/Fs)	2002	4 ng TEQ·kg^{-1} [q]		4 ng TEQ·kg^{-1} [q]		4 ng TEQ·kg^{-1} [r]		4 ng TEQ·kg^{-1} [s]	
Propylene glycol	2006	Insufficient information[v]		Insufficient information[v]		Insufficient information[v]		Insufficient information[v]	
Selenium	2007	1[b]		1[b]		2.9[b]		2.9[b]	

Continued

Substance	Year revised/ released[a]	Land Use and Soil Texture							
		Agricultural*		Residential/ parkland*		Commercial*		Industrial*	
		Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine
Sulfolane[z]	2006	0.8[b]		0.8[b]		0.8[b]		0.8[b]	
Tetrachloroethylene	1997	0.1[e]		0.2[f]		0.5[f]		0.6[f]	
Thallium	1999	1[n]		1[o]		1[o]		1[o]	
Toluene									
Surface	2004	0.37[t]	0.08[t]	0.37[t]	0.08[t]	0.37[t]	0.08[t]	0.37[t]	0.08[t]
Subsoil	2004	0.37[t]	0.08[t]	0.37[t]	0.08[t]	0.37[t]	0.08[t]	0.37[t]	0.08[t]
Trichloroethylene	2006	0.01[b,u]		0.01[b,u]		0.01[b,u]		0.01[b,u]	
Uranium[z]	2007	23[t]		23[t]		33[t]		300[t]	
Vanadium	1997	130[l]		130[l]		130[i]		130[i]	
Xylenes									
Surface	2004	11[t]	2.4[t]	11[t]	2.4[t]	11[t]	2.4[t]	11[t]	2.4[t]
Subsoil	2004	11[t]	2.4[t]	11[t]	2.4[t]	11[t]	2.4[t]	11[t]	2.4[t]
Zinc	1999	200[l]		200[l]		360[l]		360[l]	

Notes: SQG_E = soil quality guideline for environmental health; SQG_{HH} = soil quality guideline for human health.

*For guidelines derived prior to 2004, differentiation between soil texture (coarse/fine) is not applicable.

[a]Guidelines released in 1997 were originally published in the working document entitled "Recommended Canadian Soil Quality Guidelines" (CCME 1997) and have been revised, edited, and reprinted here. Guidelines revised/released in 1999 are published here for the first time (see Table 2).

[b]Data are sufficient and adequate to calculate an SQG_{HH} and an SQG_E. Therefore the soil quality guideline is the lower of the two and represents a fully integrated *de novo* guideline for this land use, derived in accordance with the soil protocol (CCME 1996; 2006). The corresponding interim soil quality criterion (CCME 1991) is superseded by the soil quality guideline.

[c]Data are insufficient/inadequate to calculate an SQG_{EH}, a provisional SQG_{HH}, an SQG_E, or a provisional SQG_E. Therefore the interim soil quality criterion (CCME 1991) is retained as the soil quality guideline for this land use (see table 2).

[d]Data are sufficient and adequate to calculate only a provisional SQG_E. It is greater than the corresponding interim soil quality criterion (CCME 1991). Therefore, in consideration of receptors and/or pathways not examined, the interim soil quality criterion is retained as the soil quality guideline for this land use.

[e]Data are sufficient and adequate to calculate an SQG_{HH} and a provisional SQG_E. Both are greater than the corresponding interim soil quality criterion (CCME 1991). Therefore, in consideration of receptors and/or pathways not examined, the interim soil quality criterion is retained as the soil quality guideline for this land use.

[f]Data are sufficient and adequate to calculate an SQG_{EH} and a provisional SQG_E. Both are less than corresponding interim soil quality criterion (CCME 1991). Therefore the soil quality guideline supersedes the interim soil quality criterion for this land use.

[g]The soil–plant–human pathway was not considered in the guideline derivation. If produce gardens are present or planned, a site-specific objective must be derived to take into account the bioaccumulation potential (e.g., adopt the agricultural guideline as objective). The off-site migration check should be recalculated accordingly.

[h]Data are sufficient and adequate to calculate only a provisional SQG_E, which is less than the existing interim soil quality criterion (CCME 1991). Therefore the provisional soil quality guideline supersedes the interim soil quality criterion for this land use.

[i]Data are sufficient and adequate to calculate only an SQG_E. An interim soil quality criterion (CCME 1991) was not established for this land use, therefore the SQG_E becomes the soil quality guideline.

[j]In site-specific situations where the size and/or the location of commercial and industrial land uses may impact primary, secondary, or tertiary consumers, the soil and food ingestion guideline is recommended as the SQG_E.

[k]Data are sufficient and adequate to calculate only a provisional SQG_E.

[l]Data are sufficient and adequate to calculate only an SQG_E, which is less than the interim soil quality criterion (CCME 1991) for this land use. Therefore the SQG_E becomes the soil quality guideline, which supersedes the interim soil quality criterion for this land use.

[m]Data are sufficient and adequate to calculate only an SQG_E, which is greater than the interim soil quality criterion (CCME 1991) for this land use. Therefore the interim soil quality criterion (CCME 1991) is retained as the soil quality guideline for this land use.

[n]Data are sufficient and adequate to calculate a provisional SQG_{HH} and an SQG_E. The provisional SQG_{HH} is equal to the SQG_E and to the existing interim soil quality criterion (CCME 1991) and thus becomes the soil quality guideline, which supersedes the interim soil quality criterion for this land use.

[o]Data are sufficient and adequate to calculate a provisional SQG_{HH} and an SQG_E. The provisional SQG_{HH} is less than the SQG_E and thus becomes the soil quality guideline for this land use.

[p]Data are sufficient and adequate to calculate only an SQG_E. An interim soil quality criterion (CCME 1991) was not established for these substances, therefore, the SQG_E becomes the soil quality guideline.

[q]Data are sufficient and adequate to calculate only a provisional SQG_{HH}, which is less than the existing interim soil quality criterion (CCME 1991). Thus the provisional SQG_{HH} becomes the soil quality guideline, which supersedes the interim soil quality criterion for this land use.

[r]Data are sufficient and adequate to calculate only a provisional SQG_{HH}. An interim soil quality criterion (CCME 1991) was not established for this land use, therefore the provisional SQG_{HH} becomes the soil quality guideline.

[s]Data are sufficient and adequate to calculate only an SQG_{HH}. An interim soil quality criterion (CCME 1991) was not established for this land use, therefore the SQG_{HH} becomes the soil quality guideline.

[t]Data are sufficient and adequate to calculate an SQG_{HH} and an SQG_E. Therefore the soil quality guideline is the lower of the two and represents a fully integrated *de novo* guideline for this land use.

[u]This guideline value may be less than the common limit of detection in some jurisdictions. Contact jurisdictions for guidance.

[v]Data are sufficient and adequate to calculate only a preliminary SQG_{FWAL} (Soil Quality Guideline for freshwater aquatic life). This value is 6,210 $mg \cdot kg^{-1}$. See accompanying factsheet for further information.

[w]10^{-5} Incremental Risk

[x]10^{-4} Incremental Risk

[y]Unless otherwise indicated, supporting documents are available from the National Guidelines and Standards Office, Environment Canada.

[z]Supporting documents are available from the Canadian Council of Ministers of the Environment at http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=125

References

CCME (Canadian Council of Ministers of the Environment). 1991. Interim Canadian environmental quality criteria for contaminated sites. CCME, Winnipeg.

———. 1996. A protocol for the derivation of environmental and human health soil quality guidelines. CCME, Winnipeg. [A summary of the protocol appears in Canadian environmental quality guidelines, Chapter 7, Canadian Council of Ministers of the Environment, 1999, Winnipeg.]

———. 1997. Recommended Canadian soil quality guidelines. CCME, Winnipeg.

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Table 2. Interim remediation criteria for soil ($mg \cdot kg^{-1}$) that have not yet been replaced by Canadian Soil Quality Guidelines[1].

Parameter	Year released	Land use			
		Agricultural	Residential/ parkland	Commercial	Industrial
General Parameters					
Conductivity [dS/m]	1991	2	2	4	4
pH	1991	6 to 8	6 to 8	6 to 8	6 to 8
Sodium adsorption ratio	1991	5	5	12	12
Inorganic Parameters					
Antimony	1991	20	20	40	40
Beryllium	1991	4	4	8	8
Boron (hot water soluble)	1991	2			
Cobalt	1991	40	50	300	300
Fluoride (total)	1991	200	400	2000	2000
Molybdenum	1991	5	10	40	40
Silver	1991	20	20	40	40
Sulphur (elemental)	1991	500			
Tin	1991	5	50	300	300
Monocyclic Aromatic Hydrocarbons					
Chlorobenzene	1991	0.1	1	10	10
1,2-Dichlorobenzene	1991	0.1	1	10	10
1,3-Dichlorobenzene	1991	0.1	1	10	10
1,4-Dichlorobenzene	1991	0.1	1	10	10
Styrene	1991	0.1	5	50	50
Phenolic Compounds					
Chlorophenols[a] (each)	1991	0.05	0.5	5	5
Nonchlorinated[b] (each)	1991	0.1	1	10	10
Polycyclic Aromatic Hydrocarbons (PAHs)					
Benzo*(a)*anthracene	1991	0.1	1	10	10
Benzo*(b)*fluoranthene	1991	0.1	1	10	10
Benzo*(k)*fluoranthene	1991	0.1	1	10	10
Dibenz*(a,h)*anthracene	1991	0.1	1	10	10
Indeno(1,2,3-c,d)pyrene	1991	0.1	1	10	10
Phenanthrene	1991	0.1	5	50	50
Pyrene	1991	0.1	10	100	100
Chlorinated Hydrocarbons					
Chlorinated aliphatics[c] (each)	1991	0.1	5	50	50
Chlorobenzenes[d] (each)	1991	0.05	2	10	10
Hexachlorobenzene	1991	0.05	2	10	10
Hexachlorocyclohexane	1991	0.01	—	—	—
Miscellaneous Organic Parameters					
Nonchlorinated aliphatics (each)	1991	0.3	—	—	—
Phthalic acid esters (each)	1991	30			
Quinoline	1991	0.1			
Thiophene	1991	0.1			

[1]**Notes:**

All values are in $mg \cdot kg^{-1}$ unless otherwise stated.

Guidelines released in 1991 were published in "Interim Canadian Environmental Quality Criteria for Contaminated Sites" (CCME, 1991).

These interim remediation criteria are considered generally protective of human and environmental health and were based on experience and professional judgement.

These interim criteria (CCME, 1991) should only be used when soil quality guidelines based on the CCME soil protocol (CCME, 1996; 2006) have not yet been developed for a given chemical. Also, because the interim remediation criteria were not developed using the soil protocol and its integral checks, they cannot be modified through the site specific remediation objective procedure.

[a]Chlorophenols include
chlorophenol isomers (ortho, meta, para)
dichlorophenols (2,6- 2,5- 2,4- 3,5- 2,3- 3,4-)
trichlorophenols (2,4,6- 2,3,6- 2,4,5- 2,3,4- 3,4,5-)
tetrachlorophenols (2,3,5,6- 2,3,4,5- 2,3,4,6-)

[b]Nonchlorinated phenolic compounds include
2,4-dimethylphenol
2,4-dinitrophenol
2-methyl 4,6-dinitrophenol
nitrophenol (2-,4-)
phenol
cresol

[c]Aliphatic chlorinated hydrocarbons include
chloroform
dichloroethane (1,1- 1,2-), dichloroethene (1,1- 1,2-)
dichloromethane
1,2-dichloropropane, 1,2-dichloropropene (cis and trans)
1,1,2,2-tetrachloroethane, tetrachloroethene
carbon tetrachloride
trichloroethane (1,1,1- 1,1,2-), trichloroethene

[d]Chlorobenzenes include
all trichlorobenzene isomers
all tetrachlorobenzene isomers
pentachlorobenzene

References

CCME (Canadian Council of Ministers of the Environment). 1991. Interim Canadian environmental quality criteria for contaminated sites. CCME, Winnipeg.

———. 1996. A protocol for the derivation of environmental and human health soil quality guidelines. CCME, Winnipeg. [A summary of the protocol appears in Canadian environmental quality guidelines, Chapter 7, Canadian Council of Ministers of the Environment, 1999, Winnipeg.]

———. 2006. A protocol for the derivation of environmental and human health soil quality guidelines. CCME, Winnipeg. [The protocol is available online through the CCME website at http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=125]

Reference listing:

Canadian Council of Ministers of the Environment. 2007. Canadian soil quality guidelines for the protection of environmental and human health: Summary tables. Updated September, 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

For further scientific information, contact:

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For additional copies, contact:

CCME Documents
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Aussi disponible en français.

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Canadian Council of Ministers of the Environment

CANADA-WIDE STANDARDS

for

PETROLEUM HYDROCARBONS (PHC) IN SOIL

CANADA-WIDE STANDARDS for PETROLEUM HYDROCARBONS (PHC) IN SOIL

These Canada-Wide Standards (CWS) for petroleum hydrocarbons in soil are established pursuant to the 1998 Canada-wide Accord on Environmental Harmonization of the Canadian Council of Ministers of the Environment (CCME) and its Canada-wide Environmental Standards Sub-Agreement.

The PHC CWS is a remedial standard for contaminated soil and subsoil occurring in four land use categories. The standard is grounded in the science of risk assessment and can be applied at any of three "Tiers": Tier 1 – generic numerical levels; Tier 2 – adjustments to Tier 1 levels based on site-specific information; Tier 3 – site-specific risk assessment. The same high level of environmental and human health protection is required at all three tiers.

Because the PHC CWS is tiered and risk-based there is necessarily some complexity in its development and application. Details regarding development and application of the standards are provided in a Technical Supplement.

The PHC CWS was developed with the input of four multistakeholder technical advisory groups and one dedicated working group involving the Canadian oil and gas industry, government and an academic chair. The PHC CWS represents a consensus view of the national Development Committee, developed with the assistance and input of the technical advisory groups.

RATIONALE

Petroleum hydrocarbons (PHC) are used in nearly every facet of Canadian life. They provide energy to heat our homes and places of work, fuel our transportation systems, power manufacturing processes and tools, as well as providing a source for the numerous synthetic materials we take for granted in our lives. Used as intended, PHC provide great benefits to society. However, when released to the soil environment as raw feedstocks or refined fuels or lubricants, a number of problems can result. These include fire/explosion hazard, human and environmental toxicity, movement through soil to air or water, odour, and impairment of soil processes such as water retention and nutrient cycling.

About 60% of Canada's contaminated sites involve petroleum hydrocarbon (PHC) contamination that, left unaddressed, impairs the quality and uses of both land and water. Presently, management of these sites across Canada varies considerably and generally lacks an adequate scientific basis – resulting in over- and under-management. Where over-management occurs, land sale transactions and real estate redevelopment are limited by remediation costs. Under-managed sites continue to pose risks to human and environmental health. The PHC Canada-wide Standard will provide a consistent approach to managing PHC-contaminated sites across the country.

DEFINITIONS

Petroleum hydrocarbons (PHC) is a general term used to describe mixtures of organic compounds found in or derived from geological substances such as oil, bitumen and coal. For the purposes of this CWS, PHC are considered to be comprised of 4 fractions as defined in Part 1. PHC exclude – for the purposes of this standard – known carcinogens such as benzene and benzo(a)pyrene, which are addressed as target compounds. Because of the relatively long history of managing toluene, ethylbenzene and xylenes ("TEX") as target compounds, these are also excluded from PHC.

CONTEXT

Petroleum products released to the environment typically contain thousands of compounds, in varying proportions, composed predominantly of carbon and hydrogen, with minor amounts of nitrogen, sulphur and oxygen. The properties of PHC contamination in soils varies with the petroleum source, soil type, the composition, degree of processing (crude, blended or refined), and the extent of weathering caused by exposure to the environment.

The complexity of PHC, and the extreme variability of sources and site-specific circumstances, complicates assessment of the human and environmental health risks associated with PHC contamination in soil.

PHC contamination in soil is a concern for a number of reasons. First, the chemically reactive nature and volatility of PHC can pose a fire/explosion hazard, especially if vapours enter confined spaces. Second, most PHC constituents are toxic to some degree. Third, lighter hydrocarbons (i.e. those of lower molecular weights) are mobile and can become a problem at considerable distances from their point of release due to transport in ground, water or air. Fourth, larger and branched-chain hydrocarbons are persistent in the environment. Fifth, PHC may create aesthetic problems such as offensive odour, taste or appearance in environmental media. Finally, under some conditions, PHC can degrade soil quality by interfering with water retention and transmission, and with nutrient supplies.

Canadian regulatory agencies have responded to these concerns with assessment and remediation requirements where PHC contaminate soils and groundwater. A blend of generic guidelines and site-specific, risk-based approaches has emerged across Canada, but there is very little consistency across jurisdictions in the rationale for guidelines, numerical values provided, or application to land uses.

The CWS is founded on documented and scientifically defensible risk-based methodology, namely the *CCME Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines* and the American Society for Testing & Materials (ASTM) *Risk-based Corrective Action (RBCA)* - and additions/improvements thereon, including the Atlantic *Partners in RBCA Implementation (PIRI)* (see Technical Supplement, section 1). Consequently, the derivation of the CWS involves explicitly listed receptors - both human and ecological, and the levels of protection accorded. It also involves defined exposure scenarios, and documented underlying assumptions, equations and policies (see Technical Supplement, sections 1 and 2).

Moreover, a vast array of analytical chemistry options exists for quantifying hydrocarbons in soil. Various methods have been developed to measure most or part of the hydrocarbons present in a sample based on different sampling, storage, extraction, purification, quantification, and data treatment approaches. Lack of measurement standardization has led to high variability in results and confusion for users of the data. The PHC CWS includes an analytical reference method to promote consistency in PHC-in-soil measurement practices and to ensure comparability of data nationally (see Technical Supplement, section 4).

The CWS Tier-1 levels have been selected despite gaps and uncertainties in some of the information used to support them. Nevertheless, the information available is sufficient to conclude that implementing the CWS will protect the environment and is technically and economically feasible. In this regard, jurisdictions will have considerable flexibility in the detailed design of jurisdictional plans and an opportunity to reduce information gaps and uncertainties.

PART 1:

NUMERICAL TARGETS and TIMEFRAMES

The PHC CWS is a remedial standard. The standard does not specify timelines that jurisdictions must follow in remediating PHC contaminated sites. Rather, it specifies consistent methods and outcomes for assessment and management of such sites. The CWS requires jurisdictions to commit to timelines for implementation of this consistent assessment and management approach, however.

The PHC CWS is based on the assessment and consistent management of risks posed to human, plants, animals and environmental processes under four common uses of land – agricultural, residential/parkland, commercial, and industrial. The standard is laid out in three tiers, which incorporate different amounts of site-specific information. Environmental and human health protection goals do not change between the tiers. Additional site-specific information available at Tiers 2 and 3 is used to manage risks through more precise knowledge of actual or potential exposure.

The environmental and human health protection goals of the PHC CWS are stated in the Tier 1 levels. A summary of Tier 1 levels is provided in Table 1. Additional Tier 1 levels are provided in the Technical Supplement along with Tier 2 and Tier 3 guidance. To develop these levels, the Development Committee identified -- in consultation with stakeholders -- for each land use: (1) the receptors and resources to be protected, (2) the pathways by which each could be exposed, and (3) the tolerable exposure along all applicable receptor/exposure pathway combinations. These tolerable exposures acknowledge that people may experience PHC exposures unrelated to contaminated soil and adjustments for known or expected exposures are made. Under Tier 1 and many Tier-2 approaches, exposures are managed below the tolerable level through reduction of PHC concentrations in the soil. Some Tier-2 and Tier-3 approaches achieve the same result by reducing exposures through engineered and/or institutional controls. The former approach is preferred; however, the latter is needed in some cases as indicated by socio-economic considerations. Irrespective of the approach chosen, the same high level of environmental and human health protection is required at each Tier.

Tier-1 levels are used when the proponent accepts the base assumptions and parameters in the Tier-1 exposure scenario. Tier-2 levels may be generated and used when site conditions exist that significantly modify the exposure and risk scenarios. Tier-3 levels are based on site-specific assessment and management of risks.

The PHC CWS implementation differs from other CWS. The trigger for remedial action is usually the need to act on a site-by-site basis to accommodate a new or intensified land use, and thus avoid human and ecological exposure to PHC during the modified land use. In such cases, the timeframe for achieving target cleanup levels at a particular site will depend largely upon the timeframe associated with the proposed land use for the site. The CWS will also find application in the cleanup and restoration phases of responses to pollution emergencies involving petroleum products and crude oils.

One of the guiding principles of the *CCME Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines* is that impairment of relatively clean soil up to guideline levels is not advocated. Consistent with the principle, the PHC CWS target levels are not intended to be used as 'pollute-up-to levels' for uncontaminated land.

Tier 1: Numerical Levels for Different Land Uses

Tier-1 numerical levels are summarized in Table 1, where:

- "Fraction" refers to the equivalent normal straight-chain hydrocarbon (nC) boiling point ranges (Fraction #1: nC6 to nC10; Fraction #2: >nC10 to nC16; Fraction #3: >nC16 to nC34; and, Fraction #4: nC35+).
- "Coarse" means coarse-textured soil having a median grain size of >75 µm as defined by the American Society for Testing and Materials.

- "Fine" means fine-textured soil having a median grain size of ≤75 µm as defined by the American Society for Testing and Materials. .
- Levels without parentheses do not include consideration of the soil-to-groundwater contamination pathway.
- Levels within parentheses do include protection of groundwater.

Table 1. Summary of Tier 1 Levels (mg/kg) for surface soil.*

Land Use	Soil Texture	Fraction 1	Fraction 2	Fraction 3	Fraction 4
Agricultural	Coarse-grained soil	30[b]	150	300	2800
	Fine-grained soil	210 (170[a])	150	1300	5600
Residential/ Parkland	Coarse-grained soil	30[b]	150	300	2800
	Fine-grained soil	210 (170[a])	150	1300	5600
Commercial	Coarse-grained soil	320 (240[a])	260	1700	3300
	Fine-grained soil	320 (170[a])	260 (230[a])	2500	6600
Industrial	Coarse-grained soil	320 (240[a])	260	1700	3300
	Fine-grained soil	320 (170[a])	260 (230[a])	2500	6600

* Additional Tier 1 levels are presented in Technical Supplement.
a= Where applicable, for protection of potable groundwater.
b= assumes contamination near residence

Tier 2: Site-specific Adjustments to Tier-1 Levels

Tier-2 levels may be generated and used when site-specific information indicates that site conditions exist that modify human or ecological exposure to PHC contamination and, thereby, alter risks significantly, relative to the generic conditions used to derive Tier-1 levels.

Thus, Tier-2 levels are derived on a site-by-site basis using site-specific parameters where necessary; the potentially adjustable parameters and corresponding calculation protocols are summarized and referenced in the Technical Supplement (section 2).

Tier 3: Site-specific Risk Assessment and Management

The process of developing site-specific cleanup levels and related management options requires the appropriate use of both general and site-specific information. Background information and guiding principles have been established to direct and focus this process, and are documented in the *Guidance Manual for Developing Site-specific Soil Quality Remediation Objectives for Contaminated Sites in Canada* (CCME 1996). The use of these guiding principles in developing Tier 3 standards is outlined in the Technical Supplement.

Additional guidance in this connection is also available in *A Framework for Ecological Risk Assessment: General Guidance* (CCME, 1995) and *Risk Assessment Guidance for Superfund Vol I (USEPA 1989).* Other appropriate guidance may also be available from the appropriate jurisdictional authority.

PART 2:

IMPLEMENTATION

Because environmental issues related to PHC release to soil are principally limited to intra-jurisdictional effects, Clause 6.1 of the CWS Sub-agreement applies for this CWS. This means that specific measures undertaken by each government to meet this CWS will be at the discretion of each jurisdiction.

Jurisdictions agree to review current programs and tools and, as required, develop and activate jurisdictional implementation plans to integrate the CWS or ensure equal or better protection.

REVIEW

The CWS will be reviewed as follows:

By the end of year 2003, review of additional scientific, technical and economic analysis to reduce information gaps and uncertainties and allow revision of the PHC CWS in the year 2005 as appropriate.

REPORTING on PROGRESS

Progress towards meeting the above provisions will be reported as follows:

(a) to the respective publics of each jurisdiction on a regular basis, the timing and scope of reporting to be determined by each jurisdiction; and,

(b) to Ministers, with comprehensive reports at five-year intervals beginning in year 2003.

ADMINISTRATION

Jurisdictions will review and renew Part 2 and the Annexes five years from coming into effect.

Any party may withdraw from these Canada-wide Standards upon three month's notice.

These Canada-wide Standards come into effect for each jurisdiction on the date of signature by the jurisdiction.

Canada-wide Standards for Petroleum Hydrocarbons (PHC) in Soil

Signed by:

British Columbia	Honourable Ian Waddell
Alberta	Honourable Lorne Taylor
Saskatchewan	Honourable Buckley Belanger
Manitoba	Honourable Oscar Lathlin
Ontario	Honourable Elizabeth Witmer
Environment Canada	Honourable David Anderson
New Brunswick	Honourable Kim Jardine
Nova Scotia	Honourable David Morse
Prince Edward Island	Honourable Chester Gillan
Newfoundland and Labrador	Honourable Ralph Wiseman
	Honourable Tom Lush
Yukon	Honourable Dale Eftoda
Northwest Territories	Honourable Joseph Handley
Nunavut	Honourable Olayuk Akesuk

Note. Québec has not endorsed the Canada-wide Accord on Environmental Harmonization or the Canada-wide Environmental Standards Sub-agreement.

BURNSIDE
An Aboriginal Owned Company

Appendix G
INAC Inspection Report

Indian and Northern Affairs Canada **Affaires Indiennes et du Nord Canada**

WATER USE INSPECTION REPORT FORM CIDM # 428915

Date: September 2 2010	**Licensee Rep.** (Name/Title)**:** Ed Murphy SAO & Cyril Malla Hamlet staff
Licensee: Hamlet of Arviat	**Licence No.: 3AM-ARV1014**

WATER SUPPLY

Source(s): Wolf River Creek	**Quantity used: Unknown** – (to be sent by E-mail)
Owner:/Operator: Government of Nunavut	Treatment systems operated by C&GS, Gov. Nu.

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Intake Facilities: A	**Storage Structure:** A	**Treatment Systems:** A	**Chemical Storage:** NI
Flow Meas. Device: U	**Conveyance Lines:** A	**Pumping Stations:** A	**Screen : NI**

Comments:
The Government of Nunavut, Dept. of Community and Government Services provides the oversight and drinking water treatment services for the community. Staff members from the Government of Nunavut were available to provide access to the pumping station for inspection. Staff members were found to be working on the refilling of reservoir cell number 2 and the cleaning of the new filtration system.

Water Samples were collected. Chlorination records were noted on site. Chlorination records show that sampling is not done daily as required and that not all trucks are tested. This is to be addressed. Trucks are also to be cleaned on a quarterly basis.

As the Government of Nunavut has retained ownership of the pump house and intake facilities and employs staff to provide water treatment and distribution to the Municipality it would be prudent for the Government of Nunavut, Department of Community and Government services apply for a license for this use of Water.

WASTE DISPOSAL

Sewage: Sewage Treatment System (Prim./Sec/Ter.)**: Single cell Lagoon**

Natural Water Body: No	**Continuous Discharge** (land or water)**: seepages**	
Seasonal Discharge: Decanting	**Wetlands Treatment:** Y	**Trench:** None

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Discharge Quality: U	**Decant Structure:** NI	**Erosion:** A
Discharge Meas. Device: NA	**Dyke Inspection:** NA	**Seepages:** U
Dams, Dykes: NI	**Freeboard:** A	**Spills:** A
Construction: NI	**O&M Plan:** U	**A&R Plan:** U
Periods of Discharge: Cont.	**Effluent Discharge Rate:** Unknown	

Comments:
Sewage from Lagoon seeps continually through the toe of the berm and then travels overland to the ocean. Samples were collected. Decanting of the Lagoon is not required (according to Hamlet staff) as there is never enough effluent in the lagoon to decant.

An obvious flow of effluent was noted in the ditch behind the lagoon and flowing into a pond immediately adjacent to the lagoon and down gradient.

The Old lagoon remains on site. An Abandonment and Restoration Plan is required to address this.

Solid Waste: Non-combustible waste consolidated at waste metals area.

Owner/Operator: Hamlet of Arviat

Landfill: A- evidence of segregation	**Burn & Landfill:** A	**Other:**

Comments: Water management from the municipal waste management area is required to address runoff and ponding of contact water outside the management area.

Hazardous materials were noted throughout the Bulk Waste Management Area. Hydrocarbon impacted soils are also piled at the back of this area. No liner is present for either the Hazardous materials or the Impacted soils.

FUEL STORAGE:

Owner/Operator: Government of Nunavut

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Berms & Liners: NI	**Water within Berms:** NI	**Evidence of Leaks:** NI
Drainage Pipes: NI	**Pump Station & Catchments Berm:** NI	
Pipeline Condition: NI	**Condition of Tanks: NI**	

Waste Oil Storage: None noted

SURVEILLANCE NETWORK PROGRAM (SNP)

Samples Collected: 0	**Owner /Operator:** No samples from Municipality have been submitted	
Samples Collected: 3	**INAC:** Potable (Reservoir), Effluent discharge, Dump Leachate	
Signs Posted	**SNP:** None	**Warning: Some signs were noted**
Records & Reporting: No records of water usage, waste discharge, Operations manuals, or required Plans.		
Geotechnical Inspection: N/A		

Non-Compliance of Act or Licence:

The Hamlet of Arviat recently had a Class A license issued.

The Municipality is required to address those deficiencies identified in this and the 2009 Inspection reports.

The Municipality shall also submit a Plan for Compliance outlining the steps the municipality will undertake to bring themselves into compliance with the new license. This plan is to also include a firm timetable with dates for compliance milestones.

A.Keim
Inspector's Name

Sent by E-mail
Inspector's Signature

BURNSIDE
An Aboriginal Owned Company

Appendix H
Reply Letter to INAC Inspection Report

Nuna Burnside Engineering and Environmental Ltd. 15 Townline Orangeville ON L9W 3R4 Canada
telephone (519) 941-5331 **fax** (519) 941-8120 **web** info@nunaburnside.com

NUNA BURNSIDE
An Aboriginal Owned Company

December 22, 2010

Mr. Andrew Keim
Water Resources Officer
INAC Nunavut Regional Office
P.O. Box 100
Iqaluit, Nunavut X0A 0H0

Re: Response to 2010 Annual Inspection Report – September 2, 2010
File No. N-O15746

Dear Mr. Keim,

At the request of the Hamlet of Arviat, the following is in response to the Water Use Inspection Report issued for the Hamlet of Arviat on September 2, 2010.

The comments taken from the Inspection Report are in italics, with the Hamlet's response following each item.

Water Supply

The Government of Nunavut, Dept. of Community and Government Services provides the oversight and drinking water treatment services for the community. Staff members from the Government of Nunavut were available to provide access to the pumping station for inspection. Staff members were found to be working on the refilling of reservoir cell number 2 and the cleaning of the new filtration system. Water Samples were collected. Chlorination records were noted on site. Chlorination records show that sampling is not done daily as required and that not all trucks are tested. This is to be addressed. Trucks are also to be cleaned on a quarterly basis. As the Government of Nunavut has retained ownership of the pump house and intake facilities and employs staff to provide water treatment and distribution to the Municipality it would be prudent for the Government of Nunavut, Department of Community and Government services apply for a license for this use of Water.

The Hamlet has taken over all operations relating to the water supply facility. Community and Government Services (CGS) of the Government of Nunavut (GN), assists with funding and technical support for the pumping operation overseen by the Hamlet, however the Hamlet owns the facility and is responsible for the general

operations of the system. This topic was discussed during the Type A license consultation completed in May 2010.

The water license does not include guidelines for chlorination records as it only deals with environmental impacts and not community health. Recording procedures for chlorination and cleaning of trucks is the jurisdiction of other agencies and not part of the NWB license.

Waste Disposal: Sewage

Sewage from Lagoon seeps continually through the toe of the berm and then travels overland to the ocean. Samples were collected. Decanting of the Lagoon is not required (according to Hamlet staff) as there is never enough effluent in the lagoon to decant. An obvious flow of effluent was noted in the ditch behind the lagoon and flowing into a pond immediately adjacent to the lagoon and down gradient. The Old lagoon remains on site. An Abandonment and Restoration Plan is required to address this.

Seepage

The lagoon was designed to allow seepage to flow through an area of the berm that was filled with highly permeable rocks. The seepage occurs continuously through the year and discharges into an established wetland treatment area. Sewage lagoon as-built drawings have been submitted for the NWB for circulation.

Discharge Quality

Water samples were taken from ARV-4 which is a pond at the head of the wetland treatment area located just outside of the sewage lagoon. This sample location represents the quality of water leaving the lagoon however does not accurately reflect the quality of water discharging to the ocean at the end of the wetland treatment area. It is proposed that an additional sampling location be added at the end of the wetland treatment area to accurately reflect the final discharge water quality. Water samples taken in September 2010 showed that surface water quality at the end of the wetland treatment area was less impacted than samples taken just downstream of the lagoon at ARV-4. These sample results will be included in the 2010 Annual Report.

Abandonment and Restoration Plan

An abandonment and restoration plan for the old sewage lagoons has been completed as described in the Work Plan (July 2010) and submitted to the NWB.

Operation and Maintenance Plans

Operation and Maintenance Plans updated in May 2010 are located in the Hamlet office. These plans were reviewed by Ian Parsons of INAC during the NWB license application process.

Waste Disposal: Solid Waste

Water management from the municipal waste management area is required to address run off and ponding of contact water outside the management area. Hazardous materials were noted throughout the Bulk Waste Management Area. Hydrocarbon impacted soils are also piled at the back of this area. No liner is present for either the Hazardous materials or the impacted soils.

Based upon the findings of studies conducted and conditions of the new NWB license, the Soil Stockpiles, Bulky Metals Area, Hazardous Waste Storage Area, and Landfill Site Discharge have been addressed in reports submitted to the NWB for circulation.

Surveillance Network Program

No records of water usage, waste discharge, Operations Manuals, or required Plans.

Records of water usage are available from the Hamlet by request. Monitoring and sampling for 2010 was completed in July, August, September, and November 2010. A record of water usage for the Hamlet and results from sampling has been submitted to the NWB as part of reports required by the license and with the 2010 Annual Report. A set of Operation and Maintenance Plans updated in May 2010 for the Water Supply Facility, Sewage Treatment Facility and Solid Waste Management Facility are located in the Hamlet office. Also included with these reports are an Environmental Monitoring Program and Quality Assurance/ Quality Control Plan and an Environmental Emergency Contingency Plan.

These documents are in the keeping of the Hamlet on both hard copy and electronic copy. Copies were also provided to INAC and commented upon (Ian Parsons) during the NWB license application process.

Non-Compliance of Act or License

The Hamlet of Arviat recently had a Class A license issued. The Municipality is required to address those deficiencies identified in this and the 2009 Inspection reports. The Municipality shall also submit a Plan for Compliance outlining the steps the municipality will undertake to bring themselves into compliance with the new license. This plan is to also include a firm timetable with dates for compliance milestones.

Public hearings were conducted in 2010 as part of the process for obtaining a Class A water license. Ian Parsons was the INAC representative at the public hearings. During the hearing, comments from Environment Canada, INAC, the DFO and Nunavut Water Board were brought forward. A work plan dated June 21, 2010 to address the INAC, DFO and NWB license compliance issues raised during the public hearing was submitted during the hearing. On August 23, 2010, the NWB issued the Hamlet a Class A license (3AM-ARV1015). Many of the issues brought forward during public consultation were made conditions as part of the new license. Since the new license was only received in late August, our work plan was modified to comply with the new

license as much as possible. A Plan of Compliance has been submitted to the Nunavut Water Board.

If you have any questions please feel free to contact the undersigned.

Yours truly,

Nuna Burnside Engineering and Environmental Ltd.

Jim Walls, P.Geo.

REGISTERED PROFESSIONAL GEOLOGIST
J.R. WALLS
LICENSEE
NWT/NU

cc: Mr. Richard Dwyer, Nunavut Water Board
Mr. Balihar Antaal, Project Officer, Community and Government Services, Government of Nunavut
Mr. Wayne Thistle, Regional Projects Manager, Community and Government Services, Government of Nunavut
Mr. Ed Murphy, SAO Hamlet of Arviat

Attachments:

Nuna Burnside Letter Workplan Dated June 23, 2010

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NUNA BURNSIDE
An Aboriginal Owned Company

June 23, 2010

Mr. Bryan Purdy
Project Engineer
Government of Nunavut
Department of Community and Government Services
P.O. Bag 002
Rankin Inlet, Nunavut X0C 0G0

Dear Mr. Purdy:

Re: Work Plan to Address INAC, DFO, and NWB License Compliance Issues
GN File 08-3025
Hamlet of Arviat, Nunavut
File No. N-O 15746.1

1.0 Introduction

At the request of the Government of Nunavut (GN), Community and Government Services (CGS), on behalf of the Hamlet of Arviat, we provide herein a workplan to address environmental issues related to compliance with the Nunavut Water Board (NWB) expired license and ongoing application for a new Type A license.

The Technical Meeting/Pre-Hearing Conference conducted in Arviat in March 2010 resulted in the creation of a "Compilation of Issues", dated March 25, 2020. Many of these issues were derived from INAC Inspection Reports and review agency comments on the license application documents.

In May 2010 updated supporting documents for the NWB license application were submitted. They included O&M Plans for the Sewage Treatment Facility, Solid Waste Management Facility, and Water Supply Facility, as well as an Environmental Monitoring Program and QA/QC Control Plan, and Environmental Emergency Contingency Plan.

Each of these documents also noted issues that were out of compliance with the expired NWB license conditions and the expected conditions of a new Type A license.

The workplan outlined herein is designed to:

- Address the data and information gaps identified (i.e. as-built drawings, documentation, impact assessment, and reporting)
- Conduct studies to address outstanding issues (i.e. DFO fish habitat impact)
- Conduct sampling and data collection
- Conduct training of Hamlet staff as to sampling and information recording requirements

- Prepare Summary Reports and Annual Reports for the facilities and submit the documentation prior to December 31, 2010.

It is noted that some items may require engineering or additional detailed study to obtain compliance. The required engineering work, with estimates of cost and potential schedules, will be included in the submitted reports.

2.0 Workplan

2.1 Water Supply Facility

2.1.1 Issues

The Water Supply Facility consists of an intake from Wolf River that is pumped in late August and early September of each year, to fill the reservoirs in the Hamlet. A truck fill station at the reservoirs services the annual supply to the community.

A Water Supply Facility O&M Plan revised May 10, 2010 was submitted in support of the NWB license application.

The Technical Meeting/Pre-Hearing Conference for the new NWB License conducted in Arviat in March 2010 resulted in the creation of a Compilation of Issues related to the Water Supply Facility. A copy of a letter from DFO outlining their concerns includes the following comments:

> *Based on the above information and in conjunction with the review currently being undertaken by the NWB, DFO is in the opinion that the proposal could result in impacts to fish and fish habitat and requires additional information for further review. Of particular concern is draw down of the Wolf River and the intake fish screen.*
>
> *In order to provide our advice with respect to the impact to fish and fish habitat or determine our potential role related to this Type "A" Water Licence, we require, at a minimum, the following additional information on impacts to fish and fish habitat:*
>
> - *A detailed assessment of the proposed volume of water to be withdrawn from Wolf River against total annual recharge and the potential ramifications of draw down*
> - *A detailed description of the proposed water intake. Refer to the Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995), which is available at www~ mpo.gc.ca/library/223669.pdj.*

There is limited information available regarding Wolf River and the fish habitat, however local people indicate there is fish in Wolf River and there are concerns of impacts due to drawdown.

There are several issues that require the acquisition of field data during the late summer when reservoir filling occurs. We suggest that DFO's requirements be fulfilled by December 31, 2010. Should engineering and construction be required to achieve compliance with DFO requirements, we suggest that they be required to be completed by December 31, 2011.

INAC also requested “operating capacity of pump used and intake screen size used”.

As discussed above, no data was found detailing this information. Provision of this data including as-built drawings (or newly created as-builts if the originals cannot be found) will be needed.

2.1.2 2010 Work Program

To address these issues, the following work will be undertaken during the period of pumping from Wolf River in the late summer of 2010:

- Topographic survey including water depth measurements and flow measurements of the water intake area of Wolf River
- Measurements of the intake and facilities for the creation of basic as-built drawings sufficient for assessment of regulatory compliance
- Document the intake screen details, pump capacity, pumping rates, and duration
- Collect surface water samples for laboratory analysis including:
  - One upstream during pumping
  - One downstream during pumping
- Prepare an assessment report of the impact of seasonal withdrawals on Wolf River and fish habitat, including a projected impact due to withdrawals over the next 10 years, based on community growth and water supply demands
- Confirm through local knowledge and on Site observations the types of fish and fish habitat
- Evaluate the intake and impacts of withdrawals according to DFO Guidelines
- Conduct training of Hamlet staff to sample and record information needed for the Annual Report
- Establish long term monitoring locations and water level gauge stations with signs
- Prepare a report outlining the findings with conclusions and recommendations (including cost estimates and proposed schedule for any needed action) prior to December 31, 2010.

2.2 Sewage Treatment Facility

2.2.1 Issues

The supporting documents from the new NWB license application included a Sewage Treatment Facility O&M Plan revised May 2010.

In the process of applying for a NWB water license renewal, data gaps and missing information to meet the requirements of various regulatory agencies, as well as to meet the requirements of the expired license were identified.

Many of these items were documented in the Compilation of Issues generated from the Technical Meeting/Pre-Hearing Conference in March 2010.

Many of these items will require study during the summer and fall seasons, and the creation of base maps and engineering drawings. The issues include:

- Accumulation and management of sludge
- Monitoring discharge criteria
- Abandonment and restoration of the two old lagoons

- Evaluation of the effluent discharge flow path and long term attenuative capacity of wet land treatment system
- Lagoon discharge period and flows
- Quantification of retention times during different seasons (i.e. thawed and unthawed)
- Evaluation of the seepage area in the berm and its long term structural integrity
- The need for seasonal decanting
- Sludge thickness assessment and monitoring protocol.

It was also noted that the following should be implemented:

- Fence around the lagoon to prevent access by humans and animals
- Monitoring stations to be marked with a sign
- Signage on the fence and at locations in the Wetland Treatment Area indicating the presence of sewage impacted surface water
- Encourage the public to avoid travel through the Sewage Treatment Facility Area
- Prepare an Abandonment and Restoration Plan for the two old lagoons.

2.2.2 2010 Work Program

In order to address these issues, the following work will be undertaken in 2010:

- Topographic survey of the lagoon and wetland area including the two abandoned lagoons
- Lagoon, wetland, and abandoned lagoon inspection to identify environmental issues
- Determine the need for restoration work due to possible leaks
- Collection of water depth and sludge thickness in the lagoon and two abandoned lagoons
- Collect surface water samples for laboratory analysis including:
  - Lagoon intake area
  - Lagoon out fall area
  - Abandoned Lagoon 1
  - Abandoned Lagoon 2
  - Six samples in the wetland treatment area along the primary flow paths
- Excavation of test pits/boreholes into the active zone in late summer to develop an understanding of the active layer as a seasonal flow path
- Install a lagoon gauge station to monitor levels over time and install signs to identify sampling stations in the wetland
- Train Hamlet staff to collect samples and record the required monitoring information
- Prepare an Abandonment and Restoration Plan for the two old lagoons
- Use of Nunavut appropriate model to assess the current and potential future (based on Hamlet growth) effectiveness of the wetland treatment area and provide recommendations for any requited alternations
- Prepare a technical report outlining the findings of the study, with conclusions and recommendations (with potential costs and timelines) for submission by December 31, 2010.

2.3 Solid Waste Management Facility

2.3.1 Issues

A Solid Waste Management Facility O&M Plan updated May 2010 was prepared by Nuna Burnside, as required by the original license and submitted in support of the application for a new license.

The Plan also addresses comments provided by review agencies during the Type A license application process, in particular the Compilation of Issues from the Technical Meeting/Pre-Hearing Conference conducted in March 2010.

It was noted in the O&M Plan, that existing facilities designed and constructed prior to the O&M Plan being prepared, have significant environmental compliance issues.

A new Solid Waste Management Facility was designed for the Hamlet of Arviat in May 2009 by Nuna Burnside. To date, the Hamlet has not reached a decision on the location of a new facility.

Currently the existing landfill, bulky metals area, and hazardous waste storage area are not in compliance. The O&M Plan outlined a “best efforts plan” to work with the current facilities until a new facility is constructed.

The following issues have been identified by regulatory agencies and documented in the Compilation of Issues during the Technical Meeting/Pre-Hearing Conference in March 2010:

- As-built plans for the bulky waste and hazardous waste storage area
- O&M Plan for the interim management of facilities
- Environmental assessment of the soil, surface water, and shallow groundwater in the active layer
- Lack of monitoring and reporting.

In the areas of the landfill, bulky metals, and hazardous waste storage:

- Evaluating and addressing the storage of contaminated soil at the bulky metals area
- Future method and process of disposal of sewage sludge
- Control and management of leachate discharge from the landfill bulky metals and hazardous waste storage areas
- Development and management of a landfarm to handle stockpiled hydrocarbon contained soil
- Abandonment and restoration plans
- As-built (or currently constructed) plans
- Burning control as per GN-DOE policy document “Municipal Solid Wastes Suitable for Open Burning”
- Adding a landfarm facility to the NWB license to handle hydrocarbon impacted soil.

2.3.2 2010 Work Program

It is recognized that there is significant work required, including studies, engineering, and training to bring the Solid Waste Management Facility into compliance. This work program will begin this process.

The following work will be undertaken in 2010:

- Topographic survey of the landfill site and surrounding area that may be impacted by leachate, waste topography (to assess remaining capacity), bulky metals area, and contaminated soil stockpiles, and hazardous waste storage area
- Inspection of the landfill, bulky metals, and hazardous waste storage area, to identify environmental impacts and collect samples of soil, surface water, and groundwater seepage in the active layer
- Laboratory analysis of samples of:
  - Surface water seepage from the land fill – three samples
  - Surface water seepage from the bulky waste and contaminated soil stockpile – four samples
  - Contaminated soil from the stockpile – four samples
  - Contaminated soil at the hazardous waste site – two samples
- Conduct a test pitting program around the sites to determine the potential for contaminated migration in the active layer
- Prepare as-builts of existing conditions sufficient for the assessments needed for regulatory compliance
- Determine the potential size and location of a landfarm for the contaminated soil
- Determine the remaining capacity in the landfill and suggest fill limits (vertically and laterally) for the final contours for the site
- Prepare Abandonment and Restoration Plans for the landfill site, bulky metals, and contaminated soil, and hazardous waste storage area
- Install signs to mark the location of level gauge stations and monitoring locations for compliance monitoring
- Train Hamlet staff to operate the facility, collect samples, and record data as outlined in the O&M Plan
- Prepare a report summarizing the findings with Conclusions and Recommendations (including potential costs and timeline) for submission prior to December 31, 2010.

2.4 Monitoring and Annual Reporting

2.4.1 Requirements

This Environmental Monitoring Program and Quality Assurance/Quality Control Plan for the Hamlet of Arviat, revised May 2010, and was prepared as a condition of the expired license and reflects the current condition of Hamlet facilities. It also includes the proposed requirements for the new license application.

Surveillance Network Program for Water License

Station	Description	Frequency	Analysis Requirements
ARV-1	Raw water supply at the Wolf River Water Supply prior to treatment	Monthly and annual	Measure and record in cubic metres of water pumped from station.

Station	Description	Frequency	Analysis Requirements
ARV-2	Effluent discharge from the Final Discharge Point of the Solid Waste Disposal Facility	Monthly from May to August, Inclusive	· BOD · Faecal Coliforms · pH · Conductivity · Total Suspended Solids · Ammonia Nitrogen · Nitrate-Nitrite · Total Phenols · Sulphate · Total Phosphorous · Sodium · Potassium · Magnesium · Calcium · Arsenic · Cadmium · Copper · Chromium · Iron · Lead · Mercury · Nickel · Zinc
ARV-3	Raw sewage at truck offload point	Monthly and annual	Measure and record in cubic metres the raw sewage offloaded from trucks.
ARV-4	Effluent Discharge from Final Discharge Point of the Sewage Disposal Facilities	Monthly from May to August, Inclusive	Same as ARV-2

In addition, Environment Canada recommends a Pass/Fail Bioassay Toxicity test prior to effluent discharge to the receiving environment (ARV-2). Toxicity testing provides an evaluation of effluent quality that integrates all measured parameter's and provides an indication of overall effluent characterization with respect to deleteriousness.

2.4.2 2010 Work Program

The following work will be conducted:

- Collect annual monitoring samples and measurements
- Submit samples for laboratory analysis as required by the water license (on two occasions) including:
  - ARV-2 discharge samples – two surface water and two bioassay toxicity tests
  - ARV-4 discharge samples – two surface water
- Obtain current and historical data from previous sampling work conducted by INAC, Universities, and others
- Record measurements and collect information required for the Annual Monitoring Report
- Help Hamlet staff construct, paint, and set up staff gauges and signs for monitoring locations
- Train Hamlet staff how to conduct sampling, record data, ship samples to the lab, and prepare the Annual Monitoring Report using a provided template
- Train Hamlet staff to use the O&M Plans
- Submit the Annual Monitoring Report prior to December 31, 2010.

3.0 Summary

The workplan, as outlined above, is designed to address the issues identified at the Technical Meeting/Pre-Hearing Conference and the resulting Compilation of Issues.

Sampling will be conducted on two occasions in compliance with the expired license and proposed conditions of the new license. Additional sampling will be conducted, as outlined, to address environmental impact concerns of the regulatory agencies. Training will be provided to up to four Hamlet staff, to operate the facilities in accordance with the O&M Plans, and conduct the future sampling and measurements required. Training will also be provided as to preparation of the Annual Report from a prepared template.

Field work is based on two trips by a Geoscientist for one week each trip and one trip for a Surveyor/Engineer for one week.

This workplan is based on two site visits during the summer of 2010. One site visit will be coordinated, if possible, with the INAC Inspection tentatively scheduled for September 2, 2010. This workplan does not include engineering designs for additional civil works, or physical improvements or alternations to existing systems.

Detailed costs will be provided under separate cover.

If you have any questions or comments, please contact the undersigned.

Yours truly,

Nuna Burnside Engineering and Environmental Ltd.

Jim Walls, P.Geo.

Enclosure

cc: Mr. Balihar Antaal, Project Officer, Government of Nunavut
Mr. Wayne Thistle, Regional Projects Manager, Government of Nunavut

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