

***DEPARTMENT OF TRANSPORTATION  
GOVERNMENT OF THE NORTHWEST TERRITORIES***

**Surveillance Network Program**

**MV2001L3-0012  
Water Quality Report, November 2008**



**Planning, Policy and Environment Division  
Department of Transportation**

## **1.0 Background**

The Yellowknife Airport is in close proximity to Long Lake. As per Water License MV2001L3-0012, Part B, Item 3, a Surveillance Network Program (SNP) was developed to monitor environmental impacts of aircraft deicing and maintenance garage activities at the Yellowknife Airport. The Department of Transportation (DOT) conducted sampling at stations located on Long Lake.

## **2.0 Introduction**

This report presents conclusions based on laboratory findings submitted by the Maxxam Analytics Inc., a Canadian Association for Environmental Analytical Laboratories (CAEAL) accredited laboratory. Water from stations L1, L2, L3, L4, L5 and S1 were sampled and analyzed for various parameters; chemical oxygen demand, ethylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and propylene glycol.

The sampling procedure followed the sampling protocol as set out by the Canadian Environmental Protection Act Glycol Guideline. Please refer to the Quality Assurance and Quality Control (QA/QC) Program in Appendix 'A' for information regarding the sampling techniques used.

## **3.0 Sampling Locations**

<u>Station number</u>	<u>Description</u>
S1	Surface water located on Highway #3, near west end of culvert.62°28'45" N, 114°26'34" W
L1	Long Lake, approx. 30 meters from shoreline (632189 mE, 6929332 mN)
L2	Long Lake, approx. 30 meters from shoreline (632197 mE, 6929319 mN)
L3	Long Lake, approx. 30 meters from shoreline (632199 mE, 6929299 mN)
L4	Long Lake, approx. 60 meters from shoreline (632231 mE, 6929321 mN)
L5	Long Lake, approx 100 meters from shoreline

### **Materials:**

Samples were obtained in correspondence to appropriate procedures as outlined in the Quality Assurance/Quality Control program. All samples were collected in bottles supplied by the laboratory and were not re-used.

## **Methods:**

Samples L1, L2, L3, L4 and L5 were taken on the surface of Long Lake and the sample for station S1 was collected by submerging a bottle in a flowing area of water with the mouth of the bottle pointed downstream. Sampling, preservation and storage of surface water samples for laboratory analysis was conducted according to the guidelines provided by Maxxam Analytics Inc. Latex or Nitrile gloves were worn when collecting and handling all samples.

## **Results and Discussion:**

Table 1 provides a summary of the laboratory analytical results for L1, L2, L3, L4, L5 and S1.

Non-detectable levels of Glycols (ethylene glycol, diethylene glycol, triethylene glycol, & tetraethylene glycol) were found for all the samples taken from L1, L2, L3, L4 & L5. The sample taken from S1 showed a glycol level of 24 mg/L and CCME guidelines Protection of Aquatic Life is 192 mg/L. There are currently no guidelines for Chemical Oxygen Demand.

## **Conclusion:**

Sampling results for Glycols (ethylene glycol, diethylene, triethylene, & tetraethylene) taken last May and October resulted non-detectable for L1, L2, L3, L4 and L5. The relatively low level of glycol flowing into Long Lake from the S1 culvert appears to be diluting to non-detectable levels at the other sites sampled.

## **APPENDIX A**

### **Quality Assurance/Quality Control Program**

***Department of Transportation  
Government of the Northwest Territories***

***Yellowknife Airport  
Water License MV2001L3-0012***

**Quality Assurance/Quality Control Program**



*November 2008*

## **1.0 INTRODUCTION**

The purpose of this Quality Assurance /Quality Control (QA/QC) document is to outline methods for the collection, sampling, handling and storage of Yellowknife Airport water samples.

## **2.0 SAMPLE COLLECTION**

### **2.1 LOCATION**

The sampling sites are located along Long Lake, airside at the Yellowknife Airport, off the side of Highway #3 by the airport and in Long Lake.

<u>Station number</u>	<u>Description</u>
S1	Surface water located on Highway #3, near west end of culvert. 62°28'40" N, 114°26'31" W
L1	Long Lake, approx. 30 meters from shoreline (632189 mE, 6929332 mN)
L2	Long Lake, approx. 30 meters from shoreline (632197 mE, 6929319 mN)
L3	Long Lake, approx. 30 meters from shoreline (632199 mE, 6929299 mN)
L4	Long Lake, approx. 60 meters from shoreline (632231 mE, 6929321 mN)
L5	Long Lake, approx 100 meters from shoreline (632324 mE, 6929338 mN) (control)

### **2.2 SAMPLING EQUIPMENT**

Water samples will be collected at each of the sampling locations. Maxxam Analytics will analyze these samples. The parameters to be analyzed by Maxxam include: chemical oxygen demand (COD) and different types of glycol (mainly ethylene glycol, diethylene glycol, and propylene glycol), as per the SNP requirements. Maxxam Analytics will transport these samples to a recognized laboratory in the south for analyses.

The samples will be collected, handled, and stored in accordance with the appropriate protocols for each parameter. Bottles supplied by the laboratory will be used at every sampling site and will not be re-used. Latex or nitrile sampling gloves will be worn by those collecting and handling the samples.

The equipment required for the various samples is as follows:

- Equipment supplied by the laboratory for analyzing Chemical oxygen demand is a 250mL plastic bottle. – preserved with sulfuric acid

- Equipment supplied by the laboratory for analyzing different types of glycol is a 250mL plastic bottle.

## **2.3 SAMPLING METHODS**

Grab samples will be taken by submerging a bottle under water, if possible with the mouth pointed downstream.

Samples that to be later analyzed in the laboratory will be obtained according to protocols provided by Maxxam Analytics (see below). Latex or nitrile sampling gloves will be worn when collecting and handling the samples and preservatives.

Maxxam Analytical guidelines for sampling are as follows:

- To Measure chemical oxygen demand the bottle will be rinsed 3 times with the sample and then filled to the shoulder, and preservatives (Sulfuric Acid) will be added before the bottle is capped.
- To measure glycol the bottle will be rinsed 3 times with the sample and the vial will be filled to ensure no headspace.

Any leftover supplies will be returned to the laboratory.

## **3.0 SAMPLE HANDLING**

### **3.1 SAMPLE PRESERVATION**

The guidelines provided by Maxxam Analytical for preserving the various samples are as follows:

- Samples that will be analyzed for chemical oxygen demand will be preserved with sulfuric acid and will be stored at 4° C.
- Samples that will be analyzed for glycol do not require any preservatives but will be stored at 4°C and sent to the laboratory within 24 hours.

### **3.2 SAMPLE IDENTIFICATION**

Once samples are collected, they will be labeled with a waterproof pen. Samples will also be recorded on a chain of custody form that will include information such as the site owner's name, sampling date, time, sample ID and location. The chain of custody form will be submitted to the laboratory along with the samples; a copy will also be retained by DOT. When field testing, a log sheet will be used to record information such as: the date, time, location, sample ID and names of those conducting the testing, as well as pH and temperature.

### **3.3 TRANSPORTATION**

The water samples will be promptly delivered to Maxxam Analytical (same day delivery) for analysis. While in transit, the sealed samples will be stored snugly, upright and immobile, in an ice-packed cooler.

## **4.0 LAB ANALYSIS**

### **4.1 LAB REQUIREMENTS**

Maxxam Analytical, Yellowknife will be used to analyze all samples and will supply the required bottles and preservatives for sampling. Refer to Appendix B for a list of sampling equipment and preservation methods.

### **4.2 REPORTING REQUIREMENTS**

One field sample will be collected for each site on the sampling event date, these will be analyzed by Maxxam Analytics and the results will be included in reports.

**APPENDIX E**

**LABORATORY RESULTS NOVEMBER 2008**

**Table 1: Laboratory analysis of water samples from sites L1, L2, L3, L4,L5 &S1.**

*All measurements are recorded in mg/L unless otherwise indicated. Bold text indicates results above criteria.*

Parameter	CCME Guidelines for the Protection of Aquatic Life	CCME Guidelines for Drinking Water	L1, Oct. 24, 2008	L2, Oct. 24, 2008	L3, Oct. 24, 2008	L4, Oct. 24, 2008	L5, Oct. 24, 2008	S1, Oct. 24, 2008
Ethylene Glycol	192	N/A	<10	<10	<10	<10	<10	24
Diethylene Glycol	N/A	N/A	<10	<10	<10	<10	<10	<10
Triethylene Glycol	N/A	N/A	<10	<10	<10	<10	<10	<10
Tetraethylene Glycol	N/A	N/A	<10	<10	<10	<10	<10	<10
Propylene Glycol	N/A	N/A	<10	<10	<10	<10	<10	<10
COD	N/A	N/A	19	14	14	11	9	-



Your Project #: Y2F SNP  
Site: LONG LAKE  
Your C.O.C. #: 30854

**Attention: TERRI BUGG**

DEPARTMENT OF TRANSPORTATION - GNWT  
YELLOWKNIFE  
PO BOX 1320  
YELLOWKNIFE , NT  
CANADA X1A 2L9

**Report Date: 2008/10/31**

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: A858193**

**Received: 2008/10/27, 8:50**

Sample Matrix: Water  
# Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Chemical Oxygen Demand	5	N/A	2008/10/28	EENV SOP-00064	HACH CH8
Ethylene, Di, Tri & Tetraethylene glycol ☉	5	N/A	2008/10/29	CAL SOP-00093	EPA 8015D
Ethylene, Di, Tri & Tetraethylene glycol ☉	1	N/A	2008/10/30	CAL SOP-00093	EPA 8015D

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

SHELYCE MORRISON, Project Manager  
Email: shelyce.morrison@maxxamanalytics.com  
Phone# (780) 577-7115 Ext:7115

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Total cover pages: 1

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		M36286	M36287	M36288		
Sampling Date		2008/10/24	2008/10/24	2008/10/24		
		15:00	15:10	15:15		
COC Number		30854	30854	30854		
	<b>Units</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Demand Parameters</b>						
Total Chemical Oxygen Demand	mg/L	19	14	14	5	2686798

RDL = Reportable Detection Limit

Maxxam ID		M36289	M36290		
Sampling Date		2008/10/24	2008/10/24		
		15:20	15:30		
COC Number		30854	30854		
	<b>Units</b>	<b>L4</b>	<b>L5</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Demand Parameters</b>					
Total Chemical Oxygen Demand	mg/L	11	9	5	2686798

RDL = Reportable Detection Limit

**GLYCOLS BY GC-FID (WATER)**

Maxxam ID		M36286	M36287	M36288		
Sampling Date		2008/10/24	2008/10/24	2008/10/24		
		15:00	15:10	15:15		
COC Number		30854	30854	30854		
	<b>Units</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Glycols</b>						
Ethylene Glycol	mg/L	<10	<10	<10	10	2690501
Diethylene Glycol	mg/L	<10	<10	<10	10	2690501
Triethylene Glycol	mg/L	<10	<10	<10	10	2690501
Tetraethylene Glycol	mg/L	<10	<10	<10	10	2690501
Propylene Glycol	mg/L	<10	<10	<10	10	2690501
<b>Surrogate Recovery (%)</b>						
Methyl Sulfone (sur.)	%	100	82	80		2690501

RDL = Reportable Detection Limit

Maxxam ID		M36289	M36290	M36291		
Sampling Date		2008/10/24	2008/10/24	2008/10/24		
		15:20	15:30	16:07		
COC Number		30854	30854	30854		
	<b>Units</b>	<b>L4</b>	<b>L5</b>	<b>S1</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Glycols</b>						
Ethylene Glycol	mg/L	<10	<10	24	10	2690501
Diethylene Glycol	mg/L	<10	<10	<10	10	2690501
Triethylene Glycol	mg/L	<10	<10	<10	10	2690501
Tetraethylene Glycol	mg/L	<10	<10	<10	10	2690501
Propylene Glycol	mg/L	<10	<10	<10	10	2690501
<b>Surrogate Recovery (%)</b>						
Methyl Sulfone (sur.)	%	93	98	93		2690501

RDL = Reportable Detection Limit

**General Comments**

**Results relate only to the items tested.**

Quality Assurance Report  
 Maxxam Job Number: EA858193

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2686798 HA2	Calibration Check	Total Chemical Oxygen Demand	2008/10/28		100	%	80 - 120
	MATRIX SPIKE [M36286-01]	Total Chemical Oxygen Demand	2008/10/28		104	%	80 - 120
	BLANK	Total Chemical Oxygen Demand	2008/10/28	<5		mg/L	
	RPD [M36286-01]	Total Chemical Oxygen Demand	2008/10/28	NC		%	20
2690501 LQ	Calibration Check	Ethylene Glycol	2008/10/29		104	%	80 - 120
		Diethylene Glycol	2008/10/29		108	%	80 - 120
		Triethylene Glycol	2008/10/29		103	%	80 - 120
		Tetraethylene Glycol	2008/10/29		102	%	80 - 120
		Propylene Glycol	2008/10/29		102	%	80 - 120
	MATRIX SPIKE [M36286-02]	Methyl Sulfone (sur.)	2008/10/29		105	%	70 - 130
		Ethylene Glycol	2008/10/29		87	%	70 - 130
		Diethylene Glycol	2008/10/29		85	%	70 - 130
		Triethylene Glycol	2008/10/29		83	%	70 - 130
		Tetraethylene Glycol	2008/10/29		94	%	70 - 130
		Propylene Glycol	2008/10/29		81	%	70 - 130
	SPIKE	Methyl Sulfone (sur.)	2008/10/29		108	%	70 - 130
		Ethylene Glycol	2008/10/29		107	%	70 - 130
		Diethylene Glycol	2008/10/29		107	%	70 - 130
		Triethylene Glycol	2008/10/29		101	%	70 - 130
		Tetraethylene Glycol	2008/10/29		101	%	70 - 130
		Propylene Glycol	2008/10/29		104	%	70 - 130
	BLANK	Methyl Sulfone (sur.)	2008/10/29		102	%	70 - 130
		Ethylene Glycol	2008/10/29	<10		mg/L	
		Diethylene Glycol	2008/10/29	<10		mg/L	
		Triethylene Glycol	2008/10/29	<10		mg/L	
		Tetraethylene Glycol	2008/10/29	<10		mg/L	
		Propylene Glycol	2008/10/29	<10		mg/L	
	RPD [M36287-02]	Ethylene Glycol	2008/10/30	NC		%	20
		Diethylene Glycol	2008/10/30	NC		%	20
		Triethylene Glycol	2008/10/30	NC		%	20
		Tetraethylene Glycol	2008/10/30	NC		%	20
		Propylene Glycol	2008/10/30	NC		%	20

NC = Non-calculable  
 RPD = Relative Percent Difference