



Gartner Lee Limited

February 6, 2008

Mr. Doug Sedgwick  
Environmental Services  
Deloitte & Touche Inc.  
79 Wellington Street West, Suite 1900  
Toronto, Ontario M5K 1B9

Dear Mr. Sedgwick:

**Re: GLL 70-497 – 2007 Town of Faro Water Wells Investigation**

We are pleased to submit this letter report that incorporates results of studies completed in 2007 supporting the Town of Faro Water Wells Investigation project. The 2007 program incorporated a focussed sampling program in Vangorda Creek to investigate the source of elevated nitrate and chloride concentrations, detected in earlier investigations.

This letter report also incorporates a complete summary of all investigations undertaken on this project since 2004. The work completed in 2007 addresses all recommendations outlined in study work completed the previous year and effectively completes the Town of Faro Water Wells Investigation.

If you have any questions concerning this report, please do not hesitate to contact me at (604) 299-4144 x 250.

Yours very truly,  
GARTNER LEE LIMITED

Don McCallum, MAsc., P.Eng.  
Senior Environmental Engineer / Regional Manager

DM:jf

Please find the following documents attached:

- Figure 1. Site Plan
- Figure 2. Sampling Locations
- Figure 3. 2007 Nitrate Concentrations – Vangorda Creek
- Table 1. Vangorda Creek Focussed Water Quality 2007 – Comparison to Guidelines
- Table 2. Vangorda Creek Water Quality 2005 to 2007 – Comparison to Guidelines
- Table 3. Town of Faro Water Supply Quality 2004 to 2006 – Comparison to Guidelines
- Appendix A: Photo Log - 2007 Focussed Sampling Program
- Appendix B: Laboratory Reports



## **1. 2007 Study Objectives**

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The Gartner Lee (February 2006) report, entitled "Town of Faro Water Wells Investigation", contained a recommendation to investigate the source of elevated nitrate and chloride concentrations detected in lower Vangorda Creek samples. A sampling and analytical program conducted in 2007 has addressed this recommendation. A further objective of the current study is to determine if future studies and monitoring efforts are required to address the Town of Faro Water Wells Investigation.

## **2. Reporting Framework**

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In addition to the 2007 results, this letter report provides a brief overview of results obtained from previous studies completed in support of the Town of Faro Water Wells Investigation. All of the combined results are used to support the final summary and conclusions for this investigation.

## **3. Background**

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The Anvil Range water license QZ03-059 contains a condition requiring an investigation of the potential influence of Vangorda Creek on the Town of Faro water supply. In response to this water license condition, Gartner Lee completed a February 2006 report entitled "Town of Faro Water Wells Investigation". This study indicated that water is being recharged to the Town of Faro water supply aquifer by Vangorda Creek. However, the study also indicated that the Town of Faro water supply is consistently of very good quality. Further, the Gartner Lee report noted that metal concentrations measured in Vangorda Creek throughout the study period were well below Canadian Drinking Water Quality Guidelines and therefore posed minimal risks to the Town of Faro water supply.

Continued routine monitoring of Vangorda Creek was recommended in the Gartner Lee Ltd. (2006) report because of the observed hydraulic connection between Vangorda Creek and the Town of Faro water supply aquifer. It was also observed during the study that concentrations of two compounds - nitrate and chloride - were elevated in the Vangorda Creek samples compared to samples obtained in the Pelly River. All measurements of these compounds were well below the respective Canadian Drinking Water Quality Guidelines (CDWQG). The source of these elevated concentrations (natural or anthropogenic) could not be determined in the study owing to the lack of data from historical monitoring (of these parameters) throughout Vangorda Creek.

A focussed sampling and analysis program was initiated in Spring 2007 to investigate the elevated nitrate and chloride concentrations observed in lower Vangorda Creek. This letter report provides a summary of all data previously collected, in addition to the results of the 2007 investigations.



## **4. Summary of Data Collected**

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### **4.1 2004 – 2005 Site Activities**

A hydrogeological investigation was conducted as part of the initial study, to determine if the Town's water supply was drawing a portion of its water from Vangorda Creek. An initial site visit during Summer 2004 facilitated an interpretation of the geological setting and site characterization of the area. Based on this characterization and a background data review (site air photo, drilling logs, site elevation data, preliminary terrain analysis including ground-truthing) a conceptual hydrogeological flow regime was hypothesized with Vangorda Creek surface water recharging the groundwater system. A site survey of the local study area was completed during Summer 2004, including pertinent land features and reference points such as the top of monitoring wells and gauging locations. This allowed for the precise measurement of water elevations in the vicinity of the town pumping wells, two observation wells, lower Vangorda Creek, and the Pelly River (Figure 1), and also provided a 'snapshot' of surveyed water elevations at the time the survey was conducted ultimately providing insight for a local flow regime under summer conditions. During October 2004 level loggers were installed within each observation well, and in Vangorda Creek and the Pelly River, adjacent to the Town pumping wells. Installation of the Level Loggers commenced a year-long study involving continuous water depth and temperature measurements at each point of interest. Daily measurements of groundwater flow and temperature data were also obtained for the town water supply wells. In addition, stream flow measurements were obtained at two locations in Vangorda Creek during each of the concurrent water quality sampling visits in 2004 and 2005.

Water quality data were also obtained during the study, encompassing the collection of surface water samples from Vangorda Creek and the Pelly River, and groundwater samples from both observation wells and the Town's water supply wells. Comparison of indicator water quality parameters among monitored stations provided an additional line of evidence to seasonal variability and chemical similarities and differences among sampling locations. Nitrate, chloride, and sulphate were strategically chosen for their ability to provide useful information regarding source water characteristics to graphically portray these trends (GLL 2006, Figure 6.). A review of historical water quality for the Town of Faro water supply wells and lower Vangorda Creek was also carried-out as part of the study.

### **4.2 2007 Follow-Up Work**

Follow-up work to the Town of Faro Water Wells Investigation conducted in 2007 was initiated to investigate elevated concentrations of nitrate and chloride in lower Vangorda Creek. A focussed sampling and analysis program was then carried-out involving the collection of water quality samples at four locations along Vangorda Creek during the months of June and October. The sampling locations of Vangorda Creek (see Figure 2) were selected as follows:



- V1 – upstream of mine site (background);
- V27 – immediately downstream of all mining activity;
- V8 – upstream of Town; and
- VCWLS1-04 – downstream of Town (2004-2005 Gartner Lee study site).

Field parameters collected during each site visit included pH, specific conductance, and temperature. Analyses by ALS Environmental Laboratories in Vancouver included general chemistry (pH, conductivity, TDS, TSS, hardness) and an anion scan (bromide, chloride, fluoride, sulphate, nitrate, nitrite). A photo upstream and downstream of each sampling location was taken during the June and October site visits (Appendix A).

## 5. Results

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### 5.1 *Hydrogeological Analysis*

The hydrogeological study (encompassing the components described in Section 3.1 of this report) conducted for a period of one year by GLL in 2005-2006, revealed the Town water supply wells were receiving a varying portion of their water from Vangorda Creek, and identified three key flow regimes occurring within the local study area:

- *Late Summer-Fall Flow Regime* – begins in August following Spring high flow and continues through January; well field receives recharge water from both Vangorda Creek and the Pelly River.
- *Late Winter Flow Regime* – occurs primarily in February and March; well field receives recharge water from both Vangorda Creek and the Pelly River; however, recharge from Vangorda Creek is likely reduced during this time period due to reduced flow in the creek and freezing of the creek bottom in the lower reaches, preventing infiltration.
- *Spring-Early Summer Flow Regime* – occurs in May through July; begins with a rapid rise in water levels in the aquifer and streams due to Spring freshet and represents the most significant aquifer recharge event; well field is primarily fed by recharge from Vangorda Creek.

The flow regimes described above were supported by individual study components. Stream gauging results indicated that a portion of Vangorda Creek flow in the vicinity of the water supply wells is lost as recharge to the underlying sediments. Each flow regime was primarily identified through trends observed on a surface water and groundwater hydrograph (GLL, 2006, Figure 7), constructed through water elevation data obtained via the Level Loggers. Calculated groundwater travel times from Vangorda Creek and/or the Pelly River were found to be less than seven days. This also supports that the Town's wells are at least seasonally, under the direct influence of surface water. The collection of water quality samples also supported the hydrogeological flow results described herein. Previously reported water quality results are discussed in Section 5.2 of



this report. Water quality results obtained from the 2007 sampling program are discussed in Section 5.3.

## **5.2 Water Quality Analysis (Previous Studies)**

The collection of water quality samples during 2005-2006 within the local study area also supports the recharge of Vangorda Creek water to the Town water supply wells. This was indicated by a distinct variation in the Town water quality throughout the course of a year suggesting the influence of surface water recharge sources. In addition, the Town of Faro water supply was consistently higher in indicator parameters of chloride, nitrate, and sulphate than was the Pelly River. Other water quality observations included the Town water supply being of good quality compared to CDWQG, indicated by historical monitoring and monitoring undertaken during this study period. Table 1 includes a summary of routine monitoring data collected in Vangorda Creek between 2005 and 2007 (as part of the Anvil Range water license). A discussion of the 2005 and 2006 routine Vangorda Creek monitoring data was provided in the February 2007 Gartner Lee letter report titled, "2006 Town of Faro Water Wells Investigation". As the data in Table 1 indicates, trace metal concentrations measured in Vangorda Creek are below CDWQG with only very few exceptions, indicating minimal risk to the Town water supply. Vangorda Creek drinking water quality guideline exceedances highlighted in the table generally relate to aesthetic parameters such as colour, iron, and manganese.

The Town of Faro conducts annual monitoring of their drinking water supply as a condition of their water license #MN05-058. Sampling of the Town's water supply wells generally occurs during the month of May. As indicated in Table 2, no exceedances of drinking quality guidelines associated with the Town's water supply were observed between 2004 and 2006.

## **5.3 Water Quality Analysis (2007 Sampling Program)**

The results of all water quality data obtained during the 2007 field program are summarized in Table 3. As discussed previously, this sampling and analytical program was initiated to investigate elevated concentrations of nitrate and chloride in lower Vangorda Creek *relative* to the Pelly River (as observed in the Gartner Lee 2006 study).

Chloride concentrations were non-detectable (<0.05 mg/L) at all sampling stations during both events, with the exception of the October result of 0.79 mg/L at the lower Vangorda Creek location (VCWLS1-04). This measurement was well below the aesthetic drinking water quality guideline of 250 mg/L. The data provide no indication of chloride sources associated with mine-related activities or land uses. The source of chlorides detected at VCWLS1-4 is not known but could be related to road maintenance activity.

Nitrate concentrations observed at each Vangorda Creek location are summarized in Table 3 and illustrated in Figure 3. All results are at least one order of magnitude (and sometimes two orders of magnitude) lower than the Canadian Drinking Water Quality Guideline of 10 mg/L. Nitrate



concentrations in Vangorda Creek were found to be highest (maximum of 0.257 mg/L) during each sampling event at station V27. This suggests some degree of influence from mining related activity to nitrate levels within Vangorda Creek. However, the relatively low concentration observed at location V27 (compared to the guideline) indicates minimal risk to the Town of Faro water supply.

## **6. Key Findings from 2007 Sampling and Analytical Program**

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- There is no indication of mining-related sources of chlorides to Vangorda Creek; and
- Elevated levels of nitrate concentrations in Vangorda Creek, relative to Pelly River, may be related to mining-related activities and land uses. Nitrate concentrations observed downstream of the Anvil Range site pose minimal risks to the Town of Faro water supply.

## **7. Conclusions**

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The following conclusions are based on the current 2007 study results in conjunction with previous studies reported by Gartner Lee in their February 2006 report, "Town of Faro Water Wells Investigation".

- water is being recharged to the Town of Faro water supply aquifer by Vangorda Creek. Year-round the wells receive varying portions of their water from Vangorda Creek and the Pelly River.
- surface water quality in Vangorda Creek is generally very good when compared to Drinking Water Quality Guidelines.
  - elevated chloride levels detected in lower Vangorda Creek, relative to Pelly River, are not related to mining-related sources. Chloride concentrations detected in lower Vangorda Creek are well below Canadian Drinking Water Quality guidelines.
  - elevated levels of nitrate concentrations in Vangorda Creek, relative to Pelly River, may be related to mining-related activities and land uses. Nitrate concentrations observed downstream of the Anvil Range site are well below Canadian Drinking Water Quality guidelines and pose minimal risks to the Town of Faro water supply.
- the Town of Faro water supply is of very good quality, including low metal concentrations, as compared to Canadian Drinking Water Quality Guidelines.
- the potential influence of Vangorda Creek on the Town of Faro water supply has been adequately investigated, as a condition of Anvil Range water license QZ03-059.



## **8. Closure**

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This report was prepared for Deloitte and Touche Inc. The report, which specifically includes all text, figures, tables and appendices, is based on data and information collected during the investigations conducted by Gartner Lee Limited, and is based solely on the conditions of the site at the time of the investigation, supplemented by historical information and data obtained by Gartner Lee Limited, as described in this report.

The work described in this report, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibility of such third parties. Gartner Lee Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the information contained in this report.

If you have any questions regarding the contents of this report do not hesitate to contact Don McCallum at 604-299-4144 ext. 250.

### **Report Prepared By:**

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Hydrogeologist  
GARTNER LEE LIMITED

### **Report Reviewed By:**

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Senior Environmental Engineer / Principal  
GARTNER LEE LIMITED

## **9. References**

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Gartner Lee Limited, 2007:

GLL 60-614 – 2006 Town of Faro Water Wells Investigation. Prepared for Deloitte & Touch Inc., February 2007.

Gartner Lee Limited, 2006:

Town of Faro Water Wells Investigation, Project #25. Prepared for Deloitte & Touche Inc., February 2006.



Health Canada, 2007:

Guidelines for Canadian Drinking Water Quality, Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment, March 2007.

Health Canada, 1987:

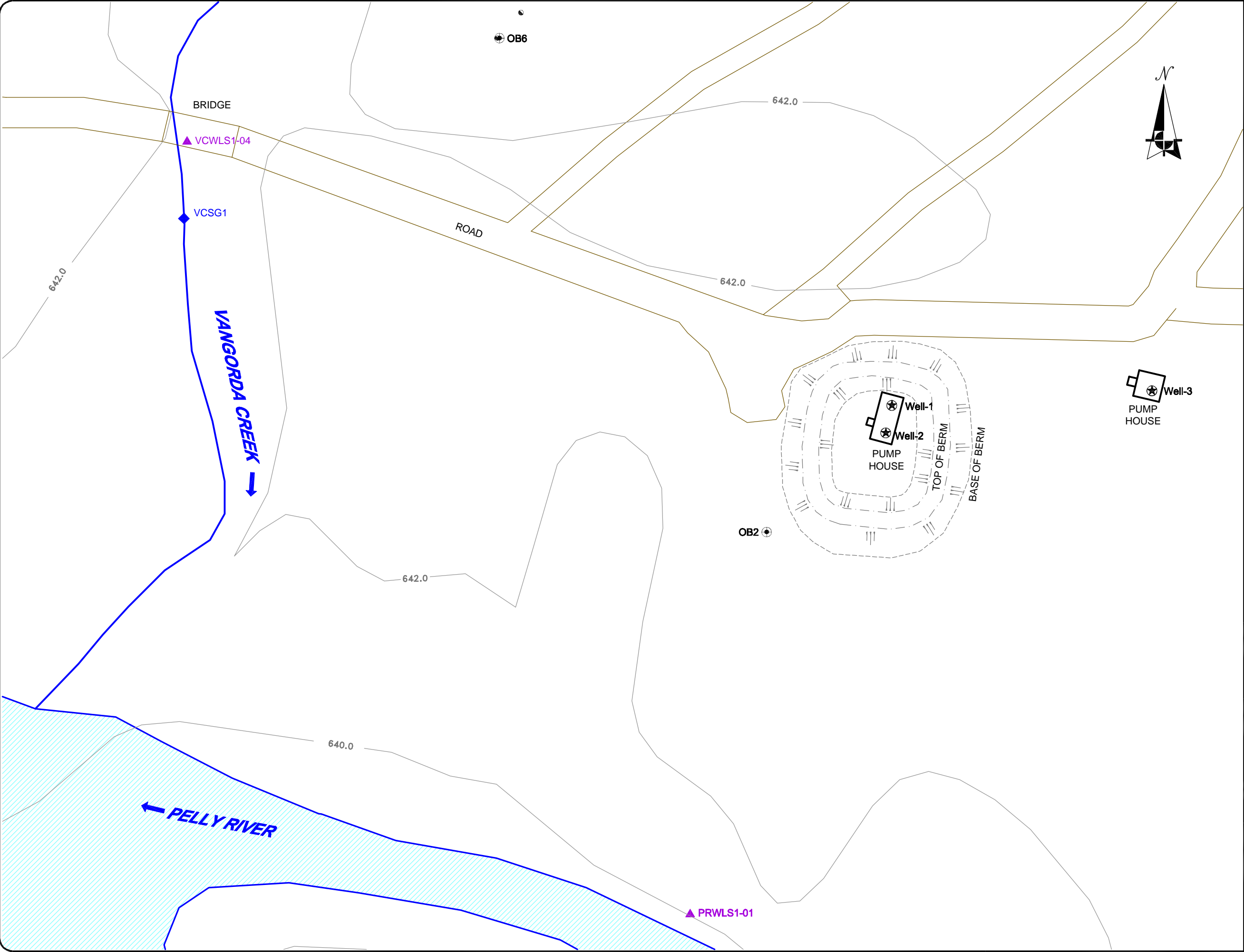
Guidelines for Canadian Drinking Water Quality – Supporting Documents. Nitrate/Nitrite. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment, Edited October 1992.

Health Canada, 1979:

Guidelines for Canadian Drinking Water Quality – Supporting Documents. Chloride. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment, Updated November 1987.



# Figures



Legend:

- Building
- Stream, River
- Road
- VCSG1** Location of Stream Gauge
- PRWLS1-04** Water Level Sensor
- OB6** Observation Well  
2" or 6" diameter
- Well-2** Town of Faro Water Supply Well
- Abandoned Well

Data Sources:

- Digital copy of 1:50,000 topographic map and orthophoto supplied by SRK Consulting.
- Survey conducted in summer 2004 by Yukon Engineering Services

0 5 10 20 Metres

SCALE 1:500

Projection : UTM NAD 27 Zone 8  
Contour Interval : 2 m (ASL)

Reviewed By : DMcC/JK  
Prepared By : PW  
Date Issued : February 3, 2006  
Project No. : 50-564  
File Name : 50564\_B2\_06bFeb03\_Fig2.DWG  
Revision : 0

**Deloitte & Touche**

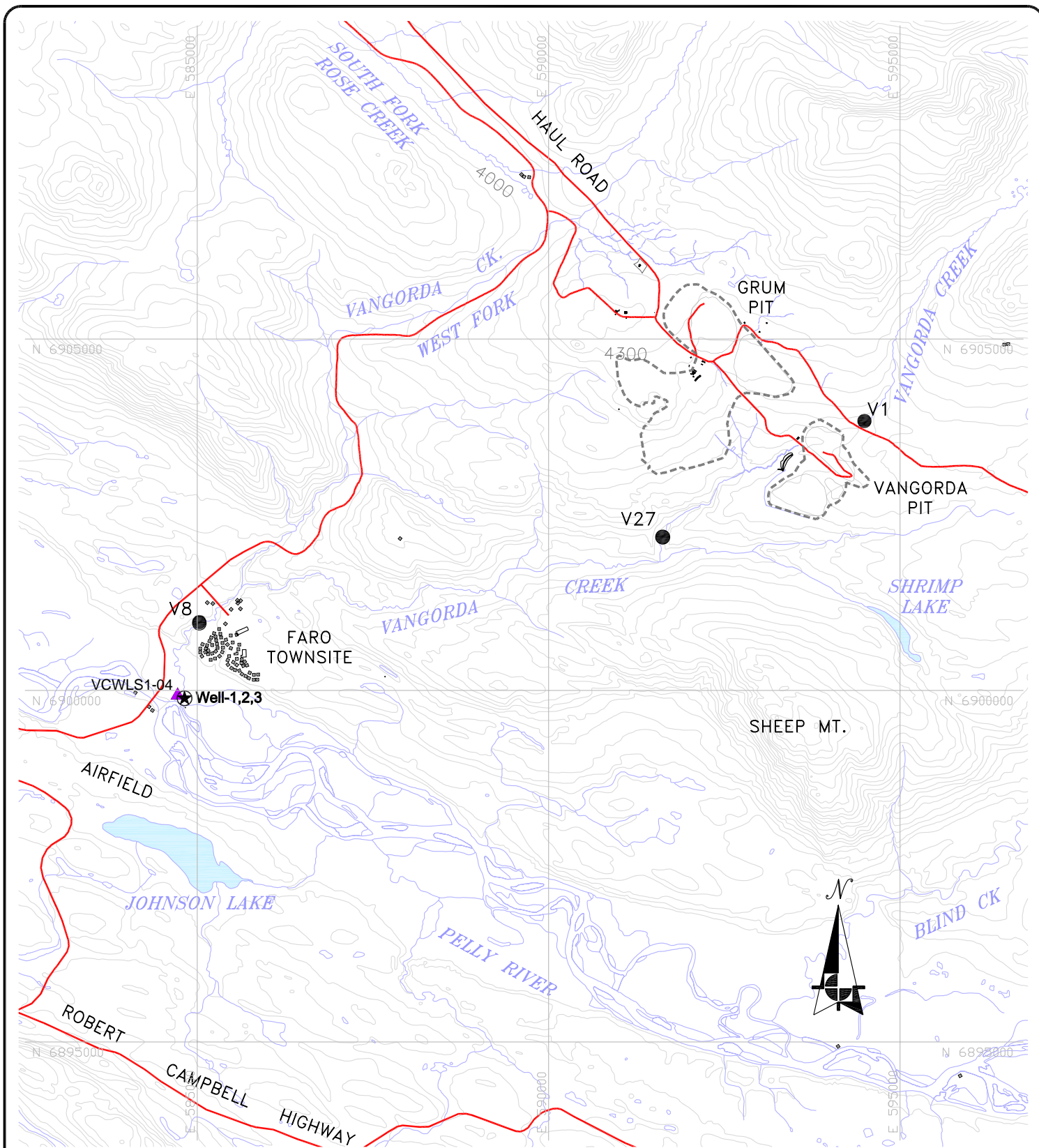
Project: Faro Townsite Water Supply  
Location: Faro, Yukon Territory  
Client: Deloitte & Touche

**SITE PLAN**

Gartner Lee

Figure No.

1



#### LEGEND:

- Main Road
- Surface Drainage
- Footprint of Open Pits and Rock Dumps
- Water Well
- Water Level Sensor
- Key Monitoring Locations

0 500 1000 2000 3000 m  
1 : 75,000

COORDINATES ARE UTM NAD83 ZONE 8  
CONTOUR INTERVAL 100 FT.

#### DRAWING INFORMATION:

REVIEWED BY: RM  
DRAWN BY: MP  
DATE ISSUED: Jan, 2007  
PROJECT NUMBER: 60-614  
FILE NAME: 60614\_By1\_Fig01\_Report.dwg  
REVISION: 0

Town of Faro  
Water Wells Investigation

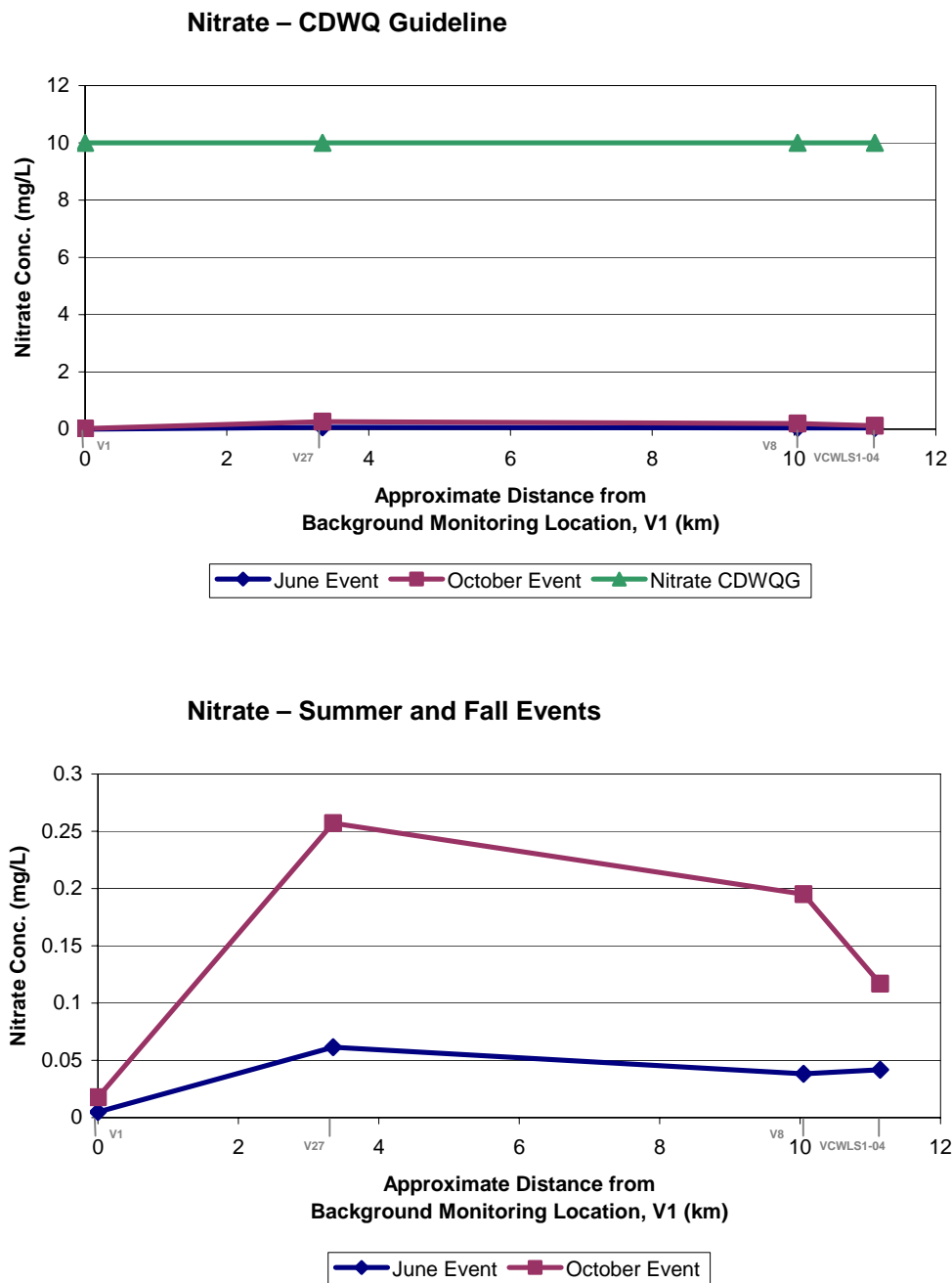
#### SAMPLING LOCATIONS



FIGURE NO.

2

**Figure 3. 2007 Nitrate Concentrations – Vangorda Creek**



**Notes:**

1. Less than detection limit values are shown at the d.l. (0.005 mg/L).

# Tables

**Table 1. Vangorda Creek Water Quality  
2005 to 2007 - Comparison to Guidelines**

Parameter	Canadian Drinking Water Quality Guidelines <sup>1</sup>		Vangorda Creek Sampling Sites																	
			V1										V27							
			07-Mar-05	07-Jun-05	12-Sep-05	01-Dec-05	20-Mar-06	05-Jun-06	09-Jun-06	06-Sep-06	18-Jun-07	24-Sep-07	26-May-05	21-Sep-05	29-May-06	01-Aug-06	26-Sep-06	04-Jun-07	25-Jul-07	10-Oct-07
Physical Tests																				
Colour	TCU	15	AO	-	-	-	-	-	-	-	8	<5	-	-	-	-	-	28	6	< 5
Conductivity	uS/cm	-		-	42	67	104	121	35	73	48	71	185	152	129	235	221	47	204	239
Hardness	CaCO3	-		56	18	29	47	59	13	29	21	26	57	84	55	110	94	17	100	108
pH		6.5-8.5	AO	-	7	8	8.1	8.1	8.3	8.1	8.1	7.5	7.2	-	-	8.2	7.9	7.9	7.5	7.8
Total Dissolved Solids	mg/L	500	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.3/1.0/0.1	AO <sup>2</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25
Dissolved Anions (mg/L)																				
Alkalinity-Total	CaCO3	-		-	18.8	-	35.5	45.4	14.8	26.2	26.2	21.4	25.8	-	48.5	-	-	-	-	-
Chloride	Cl	250	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	F	1.5	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	SO4	500	AO	10.7	4.6	10.5	10.8	10.8	3.62	9.71	9.71	5.31	9.75	28.5	48.5	25.3	56.4	52	8.46	47.5
Nutrients (mg/L)																				
Nitrate Nitrogen	N	10	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite Nitrogen	N	1	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphate - P	P	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals (mg/L)																				
Aluminum	T-Al	-		0.012	0.043	0.013	0.006	0.99	0.099	0.024	0.024	0.033	0.012	0.12	0.023	0.083	0.021	< 0.005	0.16	0.021
Antimony	T-Sb	0.006	MAC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic	T-As	0.01	MAC	< 0.001	0.002	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium	T-Ba	1	MAC	0.037	0.016	0.025	0.037	0.12	0.013	0.025	0.025	0.014	0.022	0.018	0.026	0.019	0.032	0.029	0.012	0.03
Beryllium	T-Be	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Boron	T-B	5	MAC	< 0.05	0.07	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium	T-Cd	0.005	MAC	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Calcium	T-Ca	-		17.9	6.03	9.61	14.7	18.7	4.31	9.48	9.48	6.62	7.73	14.3	22.3	14.9	28.2	24.2	4.68	26.5
Chromium	T-Cr	0.05	MAC	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	T-Co	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	T-Cu	1	AO	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.002	0.002	< 0.001	0.001	< 0.001
Iron	T-Fe	0.3	AO	0.08	0.09	< 0.05	< 0.05	< 0.05	0.14	< 0.05	< 0.05	0.07	< 0.05	0.19	< 0.05	0.16	0.06	< 0.05	0.36	0.09
Lead	T-Pb	0.010	MAC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.002	< 0.001	< 0.001	0.002	< 0.001	< 0.001
Magnesium	T-Mg	-		2.87	0.75	1.3	2.46	2.89	0.64	1.4	1.4	0.97	1.11	5.25	6.83	4.37	9.46	8.2	1.35	8.22
Manganese	T-Mn	0.05	AO	< 0.001	0.002	0.001	< 0.001	< 0.001	0.005	< 0.001	< 0.001	0.014	0.002	0.008	0.008	0.023	0.004	0.003	0.039	0.004
Mercury	T-Hg	0.001	MAC	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.02	< 0.02	< 0.00002	< 0.00002	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.02	< 0.00002	< 0.02
Molybdenum	T-Mo	-		0.0006	< 0.0005	< 0.0005	0.0005	0.0007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Nickel	T-Ni	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001
Potassium	T-K	-		1.4	0.8	0.3	0.6	0.6	0.4	0.3	0.3	0.4	0.3	0.6	0.5	0.8	0.6	0.5	0.5	0.6
Selenium	T-Se	0.01	MAC	< 0.001	0.011	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sodium	T-Na	200	AO	2.71	1.61	1.7	1.89	2.27	0.87	1.79	1.79	1.89	1.64	1.39	2.03	1.22	2.14	2.05	0.69	2.12
Titanium	T-Ti	-		< 0.001	0.001	< 0.001	< 0.001	0.001	0.003	< 0.001	< 0.001	0.002	< 0.001	0.003	0.001	0.001	< 0.001	< 0.001	0.005	< 0.001
Uranium	T-U	0.02	MAC	0.0014	< 0.0005	< 0.0005	0.0006	0.0012	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.001	0.0009	0.0009	0.0014	0.0013	< 0.0005	0.001
Vanadium	T-V	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	T-Zn	5	AO	0.011	0.006	< 0.005	< 0.005	0.038	< 0.005	< 0.005	< 0.005	< 0.005	0.006	0.031	0.017	0.022	0.018	0.023	0.016	0.031

**Notes:**

<sup>1</sup> Summary of Guidelines for Canadian Drinking Water Quality, March 2007.

AO Aesthetic objective (taste, odour, appearance, etc.).

MAC Maximum Acceptable Concentration.

<sup>2</sup> 1 NTU maximum allowed for water entering distribution systems.

< Indicates less than the detection limit.

- Indicates no guideline or analysis for this parameter.

**bold** Indicates parameter exceeded guideline.

**Table 1. Vangorda Creek Water Quality  
2005 to 2007 - Comparison to Guidelines**

Parameter	Canadian Drinking Water Quality Guidelines <sup>1</sup>		Vangorda Creek Sampling Sites																		
			V8																		
			21-Jan-05	08-Feb-05	15-Mar-05	11-Apr-05	09-May-05	20-Jun-05	25-Jul-05	22-Aug-05	05-Sep-05	10-Oct-05	01-Nov-05	14-Dec-05	24-Jan-06	13-Feb-06	24-Mar-06	24-Apr-06	17-May-06	19-Jun-06	
Physical Tests																					
Colour	TCU	15	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Conductivity	uS/cm	-		628	632	661	662	174	390	581	716	267	237	302	614	673	694	781	737	272	220
Hardness	CaCO3	-		373	374	395	382	116	214	321	449	210	237	275	328	384	381	402	356	143	118
pH		6.5-8.5	AO	7.3	8.3	8.3	8	8.1	8.1	8	8.1	8.3	8.5	8.3	8.1	8.1	8	7.8	8.2	8.5	8
Total Dissolved Solids	mg/L	500	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity	NTU	0.3/1.0/0.1	AO <sup>2</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Anions (mg/L)																					
Alkalinity-Total	CaCO3	-		225	241	231	236	78.6	96.7	121	133	134	137	168	192	207	214	231	222	89.1	76.6
Chloride	Cl	250	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Fluoride	F	1.5	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sulphate	SO4	500	AO	159	155	176	175	33.3	133	238	312	102	82.1	112	139	166	191	204	184	51.9	35
Nutrients (mg/L)																					
Nitrate Nitrogen	N	10	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nitrite Nitrogen	N	1	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphate - P	P	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Metals (mg/L)																					
Aluminum	T-Al	-		0.012	0.009	0.007	0.011	1.05	0.078	0.28	0.048	0.04	0.024	0.018	0.019	0.012	0.017	< 0.005	< 0.005	0.9	0.5
Antimony	T-Sb	0.006	MAC	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic	T-As	0.01	MAC	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001
Barium	T-Ba	1	MAC	0.077	0.073	0.081	0.072	0.065	0.056	0.083	0.074	0.044	0.053	0.058	0.07	0.073	0.078	0.082	0.065	0.067	0.045
Beryllium	T-Be	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Boron	T-B	5	MAC	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium	T-Cd	0.005	MAC	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Calcium	T-Ca	-		87.5	87.1	97	88.1	28.8	55.4	84.4	120	51.8	55.8	65.4	77.4	87.6	87.2	91.6	82.1	34.8	29.9
Chromium	T-Cr	0.05	MAC	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.001	0.003	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.002
Cobalt	T-Co	-		< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001
Copper	T-Cu	1	AO	< 0.001	< 0.001	< 0.001	0.001	0.006	0.002	0.002	< 0.001	0.001	< 0.001	0.045	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.006	0.003
Iron	T-Fe	0.3	AO	0.18	< 0.05	0.26	0.13	1.92	0.27	0.44	< 0.05	0.19	< 0.05	0.05	0.13	0.14	0.07	< 0.05	< 0.05	1.71	0.82
Lead	T-Pb	0.010	MAC	< 0.001	< 0.001	< 0.001	< 0.001	0.007	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.007	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.005	0.002
Magnesium	T-Mg	-		37.5	37.8	36.9	39.4	10.7	18.4	26.8	36.3	19.6	23.7	27	32.6	39.9	39.5	42	36.6	13.7	10.6
Manganese	T-Mn	0.05	AO	0.035	0.034	0.037	0.033	0.094	0.047	0.32	0.38	0.016	0.015	0.015	0.028	0.029	0.028	0.035	0.029	0.098	0.03
Mercury	T-Hg	0.001	MAC	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	T-Mo	-		0.0011	0.0011	0.0013	0.0013	< 0.0005	< 0.0005	0.0005	0.0005	0.0015	0.0007	0.0008	0.0009	0.0011	0.0011	0.0012	0.0012	0.0006	< 0.0005
Nickel	T-Ni	-		0.002	0.002	0.003	0.002	0.007	0.001	0.002	< 0.001	0.002	0.001	0.001	< 0.001	0.002	0.002	0.002	0.003	0.006	0.002
Potassium	T-K	-		1.3	1.3	1.3	1.4	1.2	0.9	1.1	1.3	0.9	0.9	0.9	1.1	1.1	1.4	1.4	1.3	1.6	0.8
Selenium	T-Se	0.01	MAC	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.002	< 0.001	< 0.001	0.001	< 0.001	0.002	0.001	0.001	< 0.001	< 0.001
Sodium	T-Na	200	AO	4.55	4.71	5.31	5.04	1.5	2.64	3.2	3.73	2.87	3.25	3.2	4.15	4.89	5.01	5.16	4.45	1.67	1.97
Titanium	T-Ti	-		< 0.001	< 0.001	< 0.001	< 0.001	0.025	0.001	0.007	0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.022	0.014
Uranium	T-U	0.02	MAC	0.0071	0.0074	0.0082	0.008	0.0014	0.0021	0.0028	0.0034	0.0031	0.003	0.0047	0.0052	0.0067	0.0071	0.0081	0.0067	0.002	0.0018
Vanadium	T-V	-		< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.001
Zinc	T-Zn	5	AO	0.012	0.014	0.009	0.011	0.037	0.022	0.024	0.015	0.026	0.007	0.031	0.022	0.015	0.017	0.019	0.013	0.022	0.011

**Notes:**

<sup>1</sup> Summary of Guidelines for Canadian Drinking Water Quality, March 2007.

AO Aesthetic objective (taste, odour, appearance, etc.).

MAC Maximum Acceptable Concentration.

<sup>2</sup> 1 NTU maximum allowed for water entering distribution systems.

< Indicates less than the detection limit.

- Indicates no guideline or analysis for this parameter.

**bold** Indicates parameter exceeded guideline.

**Table 1. Vangorda Creek Water Quality  
2005 to 2007 - Comparison to Guidelines**

Parameter	Canadian Drinking Water Quality Guidelines <sup>1</sup>		Vangorda Creek Sampling Sites															
			V8															
			17-Jul-06	21-Aug-06	11-Sep-06	16-Oct-06	14-Nov-06	13-Dec-06	15-Jan-07	13-Feb-07	11-Mar-07	18-Apr-07	14-May-07	18-Jun-07	16-Jul-07	13-Aug-07	10-Sep-07	23-Oct-07
<b>Physical Tests</b>																		
Colour TCU	15	AO	-	-	-	-	-	-	<5	<5	<5	<5	70	18	8	<5	<5	<5
Conductivity uS/cm	-		271	580	339	434	585	633	673	695	715	729	361	232	288	363	361	476
Hardness CaCO <sub>3</sub>	-		143	309	166	230	312	328	362	369	410	371	197	112	133	202	180	260
pH	6.5-8.5	AO	8.1	8.1	8.4	8	8	8.2	8	8.1	7.8	8	8.1	8	7.9	8.2	7.9	8.1
Total Dissolved Solids mg/L	500	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity NTU	0.3/1.0/0.1	AO <sup>2</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
<b>Dissolved Anions (mg/L)</b>																		
Alkalinity-Total CaCO <sub>3</sub>	-		101	214	119	160	212	222	238	237	255	242	129	84.7	107	148	150	183
Chloride Cl	250	AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride F	1.5	MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate SO <sub>4</sub>	500	AO	-	85	58.7	84	130	144	165	163	201	185	61.2	35.8	48.4	73	74	99.8
<b>Nutrients (mg/L)</b>																		
Nitrate Nitrogen N	10	MAC	-	0.095	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite Nitrogen N	1	MAC	-	< 0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphate - P P	-		-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total Metals (mg/L)</b>																		
Aluminum T-Al	-		0.39	0.1	0.13	0.22	0.026	0.018	0.016	0.015	0.008	0.026	0.19	0.3	1.37	0.054	0.014	0.04
Antimony T-Sb	0.006	MAC	< 0.001	0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Arsenic T-As	0.01	MAC	< 0.001	< 0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium T-Ba	1	MAC	0.042	0.084	0.042	0.056	0.068	0.073	0.077	0.072	0.085	0.075	0.051	0.036	0.074	0.055	0.053	0.057
Beryllium T-Be	-		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Boron T-B	5	MAC	< 0.05	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium T-Cd	0.005	MAC	< 0.0002	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Calcium T-Ca	-		34.7	76.1	38.8	53.3	69.2	77.3	83.8	84.9	90.9	85.5	47.1	26.9	32.3	48.4	42.3	60.6
Chromium T-Cr	0.05	MAC	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.003	< 0.001	< 0.001	< 0.001
Cobalt T-Co	-		< 0.001	0.007	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper T-Cu	1	AO	0.002	0.006	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.001	0.004	0.002	0.005	0.001	< 0.001	0.001
Iron T-Fe	0.3	AO	0.64	0.049	0.25	0.42	0.12	0.08	0.06	0.14	0.12	0.2	0.49	0.5	2.13	0.1	0.07	0.13
Lead T-Pb	0.010	MAC	< 0.001	0.04	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	< 0.001
Magnesium T-Mg	-		13.8	36.6	16.8	23.5	33.7	32.8	37	38.2	44.3	38.1	19.3	11	12.8	19.7	18.1	26.4
Manganese T-Mn	0.05	AO	0.018	0.014	0.011	0.024	0.016	0.017	0.034	0.018	0.028	0.028	0.026	0.019	0.038	0.011	0.006	0.009
Mercury T-Hg	0.001	MAC	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.02
Molybdenum T-Mo	-		0.0005	0.02	0.0005	0.0007	0.001	0.0009	0.0012	0.0012	0.001	0.0013	0.0014	< 0.0005	0.0006	0.0007	0.0008	0.001
Nickel T-Ni	-		0.002	< 0.02	0.001	0.002	0.001	0.002	0.003	0.002	0.003	0.006	0.004	0.002	0.005	0.001	0.001	0.001
Potassium T-K	-		0.7	0.8	0.6	0.9	0.9	1.1	1.2	1.3	1.5	1.5	1.5	0.7	0.9	0.8	0.8	1
Selenium T-Se	0.01	MAC	< 0.001	< 0.05	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.001	0.002	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sodium T-Na	200	AO	2.34	4.3	2.7	3.42	4.09	4.28	4.61	4.66	5.38	4.59	2.48	2.01	2.14	3.08	2.77	3.84
Titanium T-Ti	-		0.008	< 0.002	0.003	0.006	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.008	0.008	0.036	< 0.001	< 0.001	< 0.001
Uranium T-U	0.02	MAC	0.0017	0.0022	0.0021	0.0038	0.0057	0.0071	0.0072	0.0074	0.0089	0.0063	0.0037	0.0016	0.002	0.0032	0.0033	0.0044
Vanadium T-V	-		< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001
Zinc T-Zn	5	AO	0.01	0.028	0.01	0.011	0.013	0.028	0.064	0.011	0.028	0.045	0.018	0.03	0.017	0.019	0.007	0.01

**Notes:**

<sup>1</sup> Summary of Guidelines for Canadian Drinking Water Quality, March 2007.

AO Aesthetic objective (taste, odour, appearance, etc.).

MAC Maximum Acceptable Concentration.

<sup>2</sup> 1 NTU maximum allowed for water entering distribution systems.

< Indicates less than the detection limit.

- Indicates no guideline or analysis for this parameter.

**bold** Indicates parameter exceeded guideline.



**Table 2. Town of Faro Water Supply Quality  
2004 to 2006 – Comparison to Guidelines**

Parameter		Canadian Drinking Water Quality Guidelines <sup>1</sup>		Town of Faro Water Supply		
				May-04	May-05	May-06
<b>Physical Tests</b>						
Colour	CU	15	AO	<5	<5	5
Conductivity	uS/cm	-		-	582	536
Hardness	CaCO3	-		266	297	327
pH		6.5-8.5	AO	7.7	7.52	7.43
Total Dissolved Solids	mg/L	500	AO	277	370	430
Turbidity	NTU	5	AO <sup>2</sup>	-	0.2	0.2
<b>Dissolved Anions (mg/L)</b>						
Alkalinity-Total	CaCO3	-		177	199	192
Chloride	Cl	250	AO	0.8	1.6	1.28
Fluoride	F	1.5	MAC	0.12	0.1	0.1
Sulphate	SO4	500	AO	77	115	129
<b>Nutrients (mg/L)</b>						
Nitrate Nitrogen	N	10	MAC	0.1	0.32	0.33
Nitrite Nitrogen	N	1	MAC	<0.05	<0.03	<0.03
Phosphate - P	P			-	<0.001	-
<b>Total Metals (mg/L)</b>						
Aluminum	T-Al	-		0.026	0.005	<0.005
Antimony	T-Sb	0.006	MAC	<0.001	<0.0002	<0.0002
Arsenic	T-As	0.025	MAC	<0.001	0.0002	<0.0002
Barium	T-Ba	1	MAC	0.086	0.089	0.105
Beryllium	T-Be	-		-	-	<0.0001
Boron	T-B	5	MAC	0.035	0.003	0.003
Cadmium	T-Cd	0.005	MAC	<0.00005	0.00002	0.00004
Calcium	T-Ca	-		57.9	72.6	81.7
Chromium	T-Cr	0.05	MAC	<0.002	<0.0005	<0.0005
Cobalt	T-Co	-		-	-	-
Copper	T-Cu	1	AO	<0.005	0.004	0.006
Iron	T-Fe	0.3	AO	<0.5	<0.1	<0.1
Lead	T-Pb	0.010	MAC	<0.0005	0.0004	0.0001
Magnesium	T-Mg	-		24.0	28.0	30
Manganese	T-Mn	0.05	AO	<0.02	<0.005	<0.005
Mercury	T-Hg	0.001	MAC	<0.0002	<0.0002	<0.0001
Molybdenum	T-Mo	-		-	-	-
Nickel	T-Ni	-		-	-	-
Potassium	T-K	-		<2	0.9	1.2
Selenium	T-Se	0.01	MAC	0.0016	0.001	0.0016
Sodium	T-Na	200	AO	3.1	3	3.9
Titanium	T-Ti	-		-	-	-
Uranium	T-U	0.02	MAC	0.0041	0.0055	0.0058
Vanadium	T-V	-		-	-	-
Zinc	T-Zn	5	AO	<0.005	0.009	0.007

**Notes:**

- <sup>1</sup> Summary of Guidelines for Canadian Drinking Water Quality, April 2004.
- AO Aesthetic objective (taste, odour, appearance, etc.).
- MAC Maximum Acceptable Concentration.
- <sup>2</sup> 1 NTU maximum allowed for water entering distribution systems.
- < Indicates less than the detection limit.
- Indicates no guideline or analysis for this parameter.
- bold** Indicates parameter exceeded guideline.

**Table 3. Vangorda Creek Focussed Water Quality 2007 - Comparison to Guidelines**

Station		Drinking Water Guideline <sup>1</sup>	Detection Limits	V1	V8	V27	VCWCS1-04	V1	V8	V27	VCWLS1-04
Date		GCDWQ		02-JUN-07	03-JUN-07	02-JUN-07	02-JUN-07	11-OCT-07	11-OCT-07	11-OCT-07	11-OCT-07
<b>Physical Tests</b>											
	Hardness (as CaCO <sub>3</sub> )	-	0.5	13.6	60	45.5	119	32	183	122	216
	Conductivity (uS/cm)	-	2	32.1	118	94.8	205	73.1	365	259	418
	pH (pH unit)	6.5-8.5 (AO)	0.01	7.54	7.90	7.68	8.13	7.71	8.26	8.05	8.36
	Total Dissolved Solids	500 (AO)	10	32.0	76.0	74.0	135	57.0	235	168	269
	Total Suspended Solids	-	3	<3.0	11.0	<3.0	13.0	<3.0	<3.0	<3.0	3.3
<b>Dissolved Anions</b>											
	Bromide (Br)	-	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	250 (AO)	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.79
	Fluoride (F)	1.5 (MAC)	0.02	0.035	0.058	0.042	0.085	0.048	0.071	0.052	0.095
	Sulfate (SO <sub>4</sub> )	500 (AO)	0.5	3.05	21.5	22.8	36.1	10.1	72.3	68.1	76.8
	Nitrate (as N)	10 (MAC)	0.005	<0.0050	0.0383	0.0615	0.0418	0.0178	0.195	0.257	0.117
	Nitrite (as N)	3.2 (MAC)	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
<b>Dissolved Metals</b>											
	Calcium (Ca)	-	0.05	4.35	15.0	11.7	29.8	10.3	46.0	31.4	52.3
	Magnesium (Mg)	-	0.1	0.67	5.45	3.97	10.9	1.53	16.5	10.6	20.6

**Notes:**

Results are expressed as milligrams per litre except where noted.

Samples collected in June 2007 reported as Total Metals.

<sup>1</sup> Guidelines for Canadian Drinking Water Quality, March 2007.

AO = Aesthetic Objective.

MAC = Maximum Acceptable Concentration.

< = Less than detection limit.

- = No guideline for this parameter.

# Appendix A

## Photo Log – 2007 Focussed Sampling Program

## - PHOTOGRAPHS -

### PHOTOGRAPH 1

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Site V1 looking upstream, June 2007.

### PHOTOGRAPH 2

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Site V1 looking downstream, June 2007.



## - PHOTOGRAPHS -

### PHOTOGRAPH 3

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Site V27 looking upstream, June 2007.

### PHOTOGRAPH 4

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Site V27 looking downstream, June 2007.



## - PHOTOGRAPHS -

### PHOTOGRAPH 5

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Site V8 looking upstream, June 2007.

### PHOTOGRAPH 6

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Site V8 looking downstream in June 2007.



## - PHOTOGRAPHS -

### PHOTOGRAPH 7

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Site VCWLS1-04 looking upstream, June 2007.

### PHOTOGRAPH 8

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Site VCWLS1-04 looking downstream, June 2007.

## - PHOTOGRAPHS -

**PHOTOGRAPH 9**

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Site V1 looking upstream, October 2007.

**PHOTOGRAPH 10**

---



Site V1 looking downstream, October 2007.



## - PHOTOGRAPHS -

### PHOTOGRAPH 11

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Site V27 looking upstream, October 2007.

### PHOTOGRAPH 12

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Site V27 looking downstream, October 2007.



## - PHOTOGRAPHS -

**PHOTOGRAPH 13**

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Site V8 looking upstream (from footbridge), October 2007.

**PHOTOGRAPH 14**

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Site V8 looking downstream (from footbridge), October 2007.



## - PHOTOGRAPHS -

**PHOTOGRAPH 15**

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Site VCWLS1-04 looking upstream, October 2007.

**PHOTOGRAPH 16**

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Site VCWLS1-04 looking downstream, October 2007.

# Appendix B

## Laboratory Reports



**Environmental Division**

**ANALYTICAL REPORT**

GARTNER LEE LTD.

**ATTN:** JEN FUNSTON

2251 2ND AVENUE

WHITEHORSE YT Y1A 5W1

**Reported On:** 22-JUN-07 10:54 AM

**Lab Work Order #:** L513916

**Date Received:** 05-JUN-07

**Project P.O. #:**

**Job Reference:** TBD GILL/TOWN OF FARO

**Legal Site Desc:**

**CofC Numbers:** A005285

**Other Information:**

**Comments:**

Timothy Guy Crowther  
General Manager, Vancouver

**For any questions about this report please contact your Account Manager:**

**Can Dang**

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.  
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

## ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID				
		Description				
		Sampled Date				
		Sampled Time				
		Client ID				
Grouping	Analyte					
<b>WATER</b>						
<b>Physical Tests</b>	Hardness (as CaCO3) (mg/L)	13.6	60.0	45.5	119	
	Conductivity (uS/cm)	32.1	118	94.8	205	
	pH (pH)	7.54	7.90	7.68	8.13	
	Total Dissolved Solids (mg/L)	32	76	74	135	
	Total Suspended Solids (mg/L)	<3.0	11.0	<3.0	13.0	
<b>Anions and Nutrients</b>	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.035	0.058	0.042	0.085	
	Sulfate (SO4) (mg/L)	3.05	21.5	22.8	36.1	
	Nitrate (as N) (mg/L)	<0.0050	0.0383	0.0615	0.0418	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
<b>Total Metals</b>	Calcium (Ca)-Total (mg/L)	4.35	15.0	11.7	29.8	
	Magnesium (Mg)-Total (mg/L)	0.67	5.45	3.97	10.9	

## Reference Information

### Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
<b>ANIONS-BR-IC-VA</b>	Water	Bromide by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-CL-IC-VA</b>	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-F-IC-VA</b>	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-NO2-IC-VA</b>	Water	Nitrite by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-NO3-IC-VA</b>	Water	Nitrate by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-SO4-IC-VA</b>	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>EC-PCT-VA</b>	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
<b>HARDNESS-CALC-VA</b>	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
<b>MET-TOT-ICP-VA</b>	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
<b>PH-PCT-VA</b>	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
<b>TDS-VA</b>	Water	Total Dissolved Solids by Gravimetric	APHA 2540 Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
<b>TSS-VA</b>	Water	Solids by Gravimetric	APHA 2540 Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.  
*The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

## Reference Information

**Methods Listed (if applicable):**

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)	
Laboratory Definition Code	Laboratory Location		Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA			

**GLOSSARY OF REPORT TERMS**

*Surr* - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.





Environmental Division

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REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENE14.00



**Environmental Division**

**ANALYTICAL REPORT**

GARTNER LEE LTD.

ATTN: JEN FUNSTON

2251 2ND AVENUE

WHITEHORSE YT Y1A 5W1

Reported On: 28-OCT-07 11:49 AM

Lab Work Order #: **L566064**

Date Received: **15-OCT-07**

Project P.O. #: 70947

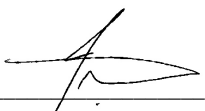
Job Reference: 70497

Legal Site Desc: TOWN OF FARO

CofC Numbers: A010550

Other Information:

Comments:

  
\_\_\_\_\_  
Joyce Chow  
General Manager, Vancouver

For any questions about this report please contact your Account Manager:

**NATASHA MARKOVIC-MIROVIC**

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.  
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

## ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID				
Description		L566064-1	L566064-2	L566064-3	L566064-4	
Sampled Date		11-OCT-07	11-OCT-07	11-OCT-07	11-OCT-07	
Sampled Time						
Client ID		V1	V8	V27	VCWLS1-04	
Grouping	Analyte					
<b>WATER</b>						
<b>Physical Tests</b>	Hardness (as CaCO <sub>3</sub> ) (mg/L)	32.0	183	122	216	
	Conductivity (uS/cm)	73.1	365	259	418	
	pH (pH)	7.71	8.26	8.05	8.36	
	Total Dissolved Solids (mg/L)	57	235	168	269	
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	3.3	
<b>Anions and Nutrients</b>	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	0.79	
	Fluoride (F) (mg/L)	0.048	0.071	0.052	0.095	
	Sulfate (SO <sub>4</sub> ) (mg/L)	10.1	72.3	68.1	76.8	
	Nitrate (as N) (mg/L)	0.0178	0.195	0.257	0.117	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
<b>Dissolved Metals</b>	Calcium (Ca)-Dissolved (mg/L)	10.3	46.0	31.4	52.3	
	Magnesium (Mg)-Dissolved (mg/L)	1.53	16.5	10.6	20.6	

## Reference Information

### Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
<b>ANIONS-BR-IC-VA</b>	Water	Bromide by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-CL-IC-VA</b>	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-F-IC-VA</b>	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-NO2-IC-VA</b>	Water	Nitrite by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-NO3-IC-VA</b>	Water	Nitrate by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>ANIONS-SO4-IC-VA</b>	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
<b>EC-PCT-VA</b>	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
<b>HARDNESS-CALC-VA</b>	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
<b>MET-DIS-ICP-VA</b>	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
<b>PH-PCT-VA</b>	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
<b>TDS-VA</b>	Water	Total Dissolved Solids by Gravimetric	APHA 2540 Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
<b>TSS-VA</b>	Water	Solids by Gravimetric	APHA 2540 Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			

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*The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

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Laboratory Definition Code	Laboratory Location		Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA			

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The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

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