

# **CITY OF WILLIAMS LAKE**

## **Review of 2006 Receiving Environment Monitoring**



*Revised: July 2007*  
*First Submitted: April 2007*  
*Ref: 602-021*

**City of Williams Lake**

**Review of Receiving Environment Monitoring**

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## **SECTION 1.0 – INTRODUCTION**

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In December 2001, TRUE Consulting Group (TRUE) prepared a report for the City of Williams Lake titled “Outfall Assessment and Environmental Impact Report”. This report described upgrading requirements to the City’s wastewater treatment plant outfall into the Fraser River to comply with the Municipal Sewage Regulation (MSR) and provided an environmental impact assessment to confirm compliance with receiving environment sections of the MSR. The report was reviewed with staff of the Ministry of Environment and formed the basis for an application for registration under the MSR by the City of Williams Lake in January 2002. The MSR registration application was accepted by the Ministry of Environment and the effective date established as January 31, 2002.

In the spring of 2002, the City of Williams Lake completed construction of an extension of the treatment plant outfall to achieve compliance with the outfall design provisions of the MSR. The outfall was extended about 40m “further” into the Fraser River to insure that the east edge of the initial dilution zone as defined in the MSR did not extend beyond the calculated river edge at the 7 day low flow having a return frequency of 2 years.

In July 2004, the City of Williams Lake entered into discussions with the Ministry of Environment to develop a receiving environment monitoring program consistent with the requirements of the MSR. From these discussions an appropriate receiving environment monitoring program was agreed to by both the City and Ministry staff as described in a TRUE letter dated August 23, 2004 (copy enclosed Appendix A). The City of Williams Lake proceeded with the implementation of the receiving environment monitoring program in September 2004. A review of receiving environment monitoring data for 2004 and 2005 is presented in a report by TRUE Consulting Group dated March 2006. This report is a review of the City of Williams Lake receiving environment data for 2006. For comparison, some components of the March 2006 report (2004 and 2005 data) are also presented herein.

## SECTION 2.0 – RECEIVING ENVIRONMENT MONITORING PROGRAM & REVIEW REQUIREMENTS

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The Receiving Environment Monitoring program is described in a TRUE letter dated August 23, 2004 (please refer to Appendix A) and comprises annual sampling of the Fraser River and Williams Lake River summarized as follows.

- Fraser River approximately 100m upstream of Outfall (Station No. 1)
- Fraser River at the midpoint of the Calculated Edge of the Initial Dilution Zone (Station No. 2)
- Williams Lake River upstream of Confluence with the Fraser River (Station No. 3)

The sampling of the Fraser River represents monitoring necessary to comply with the MSR. The sampling of the Williams Lake River is included only for general information purposes. The Williams Lake River quality testing is intended to provide the City with a background database for future planning and infrastructure assessment purposes, for example stormwater infrastructure.

Monitoring parameters are summarized following.

Turbidity	Sites 1, 2
Total Suspended Solids	Sites 1, 2
Total Phosphorus (as P)	Sites 1, 2 and 3
Ortho Phosphorus (as P)	Sites 1, 2 and 3
Ammonia Nitrogen (as N)	Sites 1, 2 and 3
Nitrate – Nitrite Nitrogen (as N)	Sites 1, 2 and 3
Fecal Coliforms (3 samples each site)	Sites 1, 2 and 3

Sampling of the Williams Lake River for fecal coliform was suggested recognizing that it is a potential source of fecal coliform in the Fraser River adjacent to the recreation area. Three fecal coliform samples were suggested at each of the three sites recognizing that fecal coliform results can be variable.

From the Municipal Sewage Regulation and correspondence from the Ministry of Environment, monitoring program, review and reporting requirements are:

- discharger (City) must document any effect of the discharge on the receiving environment using appropriate statistical and graphic analysis.
- discharger (City) must document any trends in environmental quality in the receiving environment affected by the discharge using background or pre-discharge data and by using all the years of record in which the discharge has taken place.
- the report must be written by a qualified professional and provide interpretation of the monitoring data.
- the report should explain the sampling results in relation to the key issues outlined in the registration. The key issues are the effectiveness of the mixing of the effluent with receiving waters, ammonia levels at the edge of the initial dilution zone and fecal coliform impacts on the beach area from May to September inclusive.

### **SECTION 3.0 – WASTEWATER TREATMENT PLANT EFFLUENT QUALITY DATA**

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Data from monthly sampling of the wastewater treatment plant effluent by the City of Williams Lake for the period January 01, 2004 to December 31, 2006 are summarized in Table 3.1. Comparisons of the effluent quality data presented in Table 3.1 with assumptions presented in the “Outfall Assessment and Environmental Impact Report” dated December 2001 are as follows:

➤ Ammonia (as N)

Assumed Concentration December 2001 – 30 mg/L

2004/2005 Data (Table 3.1) – Fall, Winter, Spring – Average 18.3 mg/L

2004/2005 Data (Table 3.1) – Summer, July, Aug., Sept. – Average 0.3 mg/L

2006 Data (Table 3.1) – Fall, Winter, Spring – Average – 20.0 mg/L

2006 Data (Table 3.1) – Summer, Aug. Sept. Oct. – Average – 2.9 mg/L

Ammonia concentrations in the fall, winter, spring period of 2006 averaged 20.0 mg/L, comparable to data for the same period in 2004/2005. Summer period ammonia concentrations in 2006 averaged 2.9 mg/L consistent with trends in 2004/2005. Nitrification within the treatment lagoons is temperature dependent and possibly summer 2006 temperatures were less than 2004 and 2005 resulting in modestly higher summer period ammonia concentrations. It is relevant to note that actual ammonia concentrations are significantly less than the December 2001 assumed concentration of 30 mg/L.

**TABLE 3.1: WILLIAMS LAKE WASTEWATER TREATMENT PLANT  
EFFLUENT QUALITY**

<i>Date</i>	<i>BOD<sub>5</sub></i>	<i>TSS</i>	<i>NH<sub>3</sub> (as N)</i>	<i>Tot P</i>	<i>Total Ortho P</i>
Jan-04	24	15	19.60	3.85	3.24
Feb-04	26	20	19.70	3.87	2.77
Mar-04	10	4	19.50	3.58	3.07
Apr-04	<10	13	11.60	3.83	3.2
May-04	21	22	17.10	4.1	2.94
Jun-04	77	42	0.15	5.22	2.96
Jul-04	16	27	0.06	3.3	2.71
Aug-04	14	11	0.02	3.33	2.85
Sep-04	16	12	1.21	4.69	2.39
Oct-04	<10	14	16.40	3.76	2.71
Nov-04	13	27	17.10	3.65	3.1
Dec-04	27	32	16.50	3.44	2.89
Jan-05	32	24	18.00	3.71	2.86
Feb-05	28	10	18.50	3.69	3.69
Mar-05	21	26	18.20	3.84	3.14
Apr-05	16	10	22.80	4.17	3.87
May-05	15	17	20.80	3.66	3.25
Jun-05	18	16	18.90	3.52	2.97
Jul-05	18	27	0.24	3.48	3.01
Aug-05	<10	18	<0.01	3.27	3.06
Sep-05	11	10	0.27	3.22	3.12
Oct-05	<10	13	2.40	3.29	2.85
Nov-05	<10	9	19.10	3.61	3.37
Dec-05	19	18	19.70	3.43	2.95
Average 2004 and 2005				3.73	3.04
Jan. 19/06	22	28	18.5	3.23	2.91
Feb. 16/06	26	21	20.5	3.31	2.68
Mar. 15/06	20	14	18.3	3.37	2.94
Apr. 19/06	13	14	17.6	3.48	3.01
May 17/06	11	5	19	3.24	2.94
June 20/06	16	30	24.3	3.38	2.99
July 18/06	<10	19	23.1	3.66	3.21
Aug. 16/06	28	36	<0.005	3.72	2.99
Sept. 18/06	17	25	2.45	3.41	2.83
Oct 17/06	<10	20	3.38	3.49	2.69
Nov. 16/06	<10	20	18.6	3.2	2.86
Dec. 14/06	23	12	20.8	3.24	3.01
Average 2006				3.39	2.92

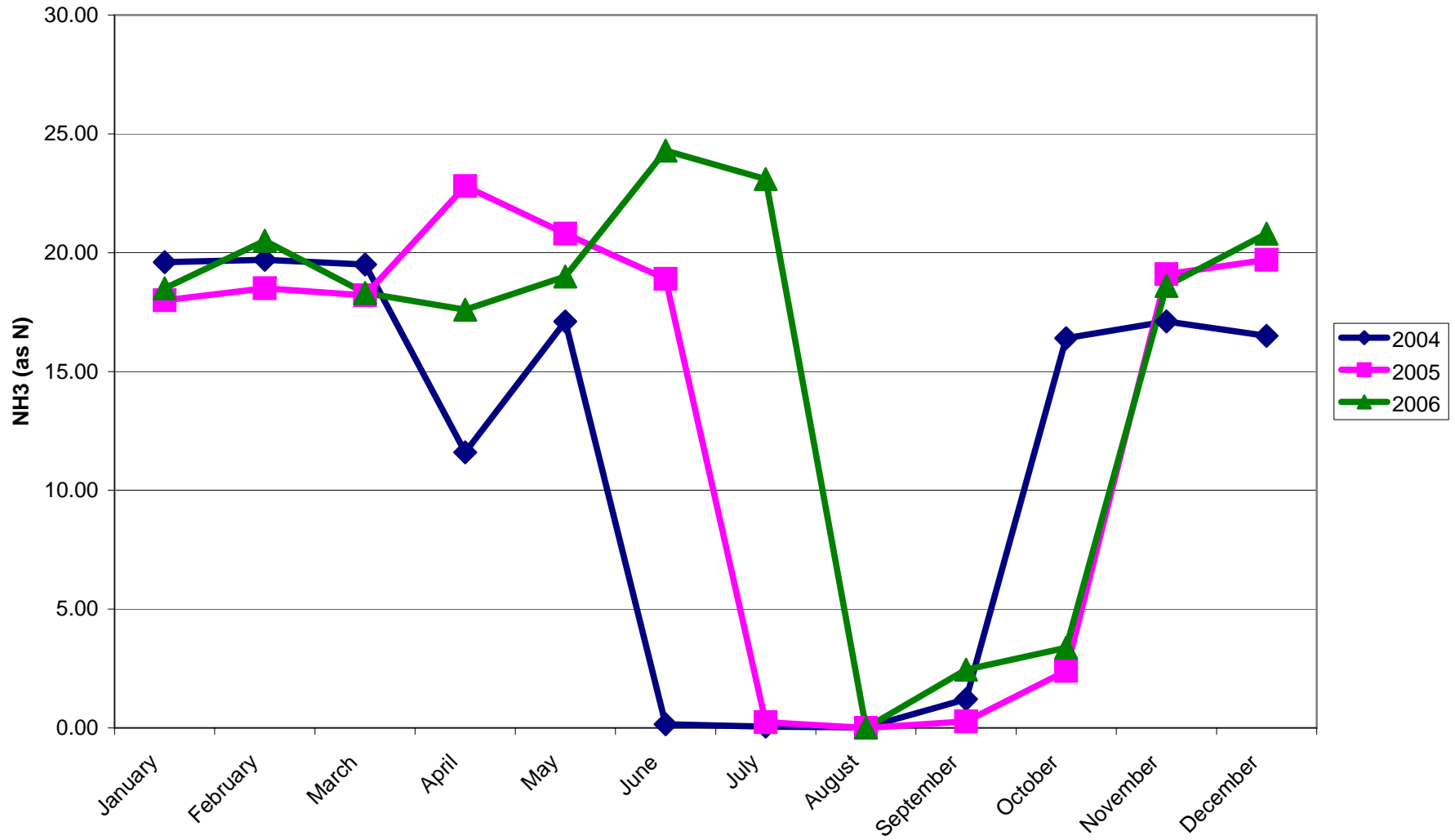
➤ Phosphorus

	<i>Assumed Concentration December 2001</i>	<i>2004/2005 Averages</i>	<i>2006 Average</i>
Total Phosphorus	6.0 mg/L	3.73 mg/L	3.39 mg/L
Total Ortho Phosphorus	5.5 mg/L	3.04 mg/L	2.92 mg/L

In the period to December 2001, the City of Williams Lake did not monitor the effluent quality for either total phosphorus or total ortho phosphate. In the absence of any actual data, effluent concentrations for total phosphorus of 6.0 mg/L and total ortho phosphorus of 5.5 mg/L were assumed based on data for other lagoon systems treating primarily municipal wastewater. Monitoring data for phosphorus in 2006 is consistent with data for 2004/2005. Average concentrations for total and orthophosphorus through 2006 are approximately 60% of the assumed concentration used to support the MSR Registration.



**Figure 3.1: Williams Lake Wastewater Treatment Plant  
Ammonia Concentrations**



## SECTION 4.0 – RECEIVING ENVIRONMENT MONITORING

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Monitoring data of the receiving environment by the City of Williams Lake in accordance with the monitoring program as described in TRUE letter dated August 23, 2004 is presented in Table 4.1. The analytical report from EcoTech Laboratory Ltd. for samples taken in December 2006 is contained in Appendix B.

Receiving environment monitoring in 2004 and 2005 was undertaken in September at which time Fraser River flows were 3 to 5 times the 2 year return low flow derived in December 2001 as 375 cms. It was suggested in the March 2006 receiving environment review report that the City try to delay sampling of the Fraser River to the late fall when river flows would be approaching seasonal minimums. Consistent with this suggestion, the 2006 Fraser River sampling was undertaken in December 2006.

River flow data for the period when the sampling was undertaken on December 07, 2006 has been obtained from the Water Survey of Canada website for the Fraser River at Marguerite (Station 08 MC 018). While the river flow data is discontinuous, the Fraser River flow on the sampling date was about 600 cms (please refer to Appendix C). The Fraser River flow in December 2006 was about 150% of the calculated 2 year return low flow therefore dilution ratios on December 07, 2006 will be of comparable values as derived in the December 2001 supporting document for the MSR Calculation. The estimated dilution ratio at the IDZ on December 07, 2006 is presented as follows.

	<i>December 2001 IDZ Dilution Ratio Calculation</i>	<i>December 2006 IDZ Dilution Ratio Calculation</i>
Fraser River Flow	375 cms	600 cms
Flow in IDZ Cross Section	75.9 cms	121 cms (est.)
Effluent Discharge Volume	8000m <sup>3</sup> /day	6376m <sup>3</sup> /day (actual)
Theoretical Dilution Ratio at IDZ	820:1	1640:1

Using the theoretical dilution ratio of 1640:1 as calculated for December 2006, the increase in total phosphorus, orthophosphorus, and ammonia concentrations measured at the IDZ compared to background are:

$$\text{Total Phosphorus} - 3.24 \text{ mg/L} \div 1640 = 0.002 \text{ mg/L increase}$$

Total Orthophosphorus –  $2.95 \text{ mg/L} \div 1640 = 0.002 \text{ mg/L}$  increase  
Ammonia –  $20.8 \text{ mg/L} \div 1640 = 0.013 \text{ mg/L}$

The above theoretical calculations would suggest that the City of Williams Lake effluent should not be “identifiable” by significant concentration increases of the monitoring parameters upstream and downstream of the outfall.

On the basis of the preceding theoretical dilution ratio calculations, interpretive comments related to receiving environment monitoring data in Table 4.1 are presented as follows:

- turbidity in the Fraser River increases in direct relation to river flow. As would be expected, Fraser River turbidity was 21 NTU in September 2004 with a river flow of 1750 cms, 9.1 NTU in September 2005 with a river flow of 1120 cms and 4.5 NTU in December 2006 with a river flow of 600 cms. There is no significant difference in river turbidity above and downstream of the City’s outfall.
- a nitrate-nitrite Nitrogen concentration at the IDZ on December 07, 2006 was 0.006 mg/L higher than upstream of the outfall. Both concentrations are representative of background recognizing that nitrate-nitrite nitrogen concentrations in the City effluent discharge in December 2006 would have been less than 1.0 mg/L.
- the total phosphorus concentration above the outfall on December 07, 2006 was greater than the concentration at the IDZ. The 2005 data exhibited the same trend, i.e. greater concentration above the outfall than at the outfall. The sampling results are consistent with the dilution calculations, i.e. there should be no measurable increase in total phosphorus at the IDZ.
- ortho phosphorus concentrations above and below the outfall were the same concentration (<0.003 mg/L) on December 07, 2006 indicating no impact (as calculated) by the City’s outfall. The 2006 data is the same as data for 2004 and 2005.

- the ammonia concentration on December 07, 2006 was 0.032 mg/L higher at the IDZ than upstream. This increase is reasonably consistent with the theoretical calculated increase of 0.013 mg/L.
- fecal coliform concentrations would appear to be statistically higher at the IDZ than above the outfall. Recognizing that effluent fecal coliform concentrations in December 2006 were likely in the range of  $10^5$  and  $10^6$  per 100 ml, the IDZ fecal coliform concentrations are consistent with the calculated IDZ dilution ratio.

Monitoring data presented in Table 4.1 for the Williams Lake River is intended for background information purposes.

**Table 4.1: Receiving Environment Monitoring Data  
Fraser River**

<i>Date</i>	<i>Sept. 21, 2004</i>		<i>Sept. 29, 2005</i>		<i>Dec. 07, 2006</i>	
	<i>Upstream</i>	<i>At IDZ**</i>	<i>Upstream</i>	<i>At IDZ**</i>	<i>Upstream</i>	<i>At IDZ**</i>
River Flow	1750 cms		1120 cms		600 cms	
River Flow Trend	decreasing		increasing		stable	
Turbidity	21	22	9.2	9.1	4.5	4.7
Total Suspended Solids	22	24	8	10	not done	
Nitrate+Nitrate (as N)	0.050	<0.003	<0.003	0.053	0.089	0.095
Total Phosphate (as P)	0.023	0.107	0.003	0.045	0.0197	0.063
Ortho Phosphate (as P)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Ammonia (N)	0.067	0.031	0.032	0.142	0.099	0.131
Fecal Coliform (CFU/100ml)***	99	55	62	93	67	160± (Note 4)

**Williams Lake River**

<i>Date</i>	<i>Sept. 21, 2004</i>	<i>Sept. 29, 2005</i>	<i>Dec. 07, 2006</i>
Turbidity	1.4	2.8	0.35
Total Suspended Solids	2	1	not done
Nitrate+Nitrate (as N)	<0.003	<0.003	0.024
Total Phosphate (as P)	0.015	0.058	0.011
Ortho Phosphate (as P)	<0.003	0.010	<0.003
Ammonia (N)	0.007	0.131	0.073
Fecal Coliform (CFU/100ml)***	11	82	5

\*\* refer to Appendix A for sampling site location plan

\*\*\* average of 3 samples

(4) Fecal coliform concentrations at IDZ >200, >200 and 81

## SECTION 5.0 – SUMMARY

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This review of receiving environment (Fraser River) monitoring data for sampling by the City of Williams Lake in December 2006 may be summarized as follows.

- at the time of sampling in December 2006 the Fraser River flow was 600 cms. This flow is about 50% greater than the 7 day low flow having a 2 year return period of 375 cms used for the MSR dilution zone calculations.
- the MSR registration supporting documents calculated a dilution rate of 820:1 at the edge of the initial dilution zone corresponding to a river flow of 375 cms. With river flow of 600 cms in December 2006, the dilution ratio achieved at the IDZ is estimated to be 1640:1, therefore water quality data upstream and downstream of the City's outfall is expected to be the same.
- from the December 2006 monitoring data, as would be expected, there is no increase in nitrate-nitrate nitrogen, orthophosphorus or total phosphorus measured at the edge of the initial dilution zone.
- the ammonia concentration at the IDZ was 0.131 mg/L which was 0.032 mg/L higher than above the outfall. The increase in concentration is reasonably consistent with the estimated dilution ratio on December 07, 2006.
- fecal coliform concentrations at the IDZ below the outfall were statistically higher than as measured above the outfall. The fecal coliform concentration increase is consistent with values derived using the estimated dilution ratios.

*APPENDIX 'A'*

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**Receiving Monitoring Program – TRUE letter dated August 23, 2004**



August 23, 2004

Our File: 602-021

Ministry of Water, Land and Air Protection  
400 – 640 Borland Street  
Williams Lake, B.C.  
V2G 4T1

Attention: Mr. Doug Hill

Dear Sir:

**RE: *Receiving Environment Monitoring Program***  
***Your File: RE 255 – City of Williams Lake***

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The City of Williams Lake has requested the writer present a proposal to you for the Receiving Environment Monitoring Program associated with the registration of the City's wastewater treatment plant and outfall to the Fraser River under the Municipal Sewage Regulation. A "draft" receiving environment monitoring program proposal was presented in a letter dated July 15, 2004. This proposal formed the basis for discussion with representatives of the City of Williams Lake at City Hall on July 20, 2004. On the basis of this meeting, the receiving environment monitoring program has been finalized and is presented herein.

**1.0 Description of Works and Monitoring Programme Constraints**

Associated with the registration of the City's sewerage works under the Municipal Sewage Regulation (MSR), the City's outfall was extended in 2002 "further" into the Fraser River to fully comply with the Initial Dilution requirements of the MSR. Referring to TRUE drawing 602-021-05 R2, as constructed drawing of the outfall extension, the outfall location and calculated initial dilution zone as referenced in documentation supporting the MSR regulation are illustrated. The drawing also illustrates the calculated Fraser River width at 2 year low flow (375 cms) and the, as surveyed, edge of river on May 01, 2001 at which time the river flow was 2310 cms. In relation to the as surveyed stream boundary on May 01, 2001, the outfall is approximately 65m from the east riverbank.

Winter weather conditions make access to the Fraser River for sampling purposes impractical in the period from November to April annually. Outside of this period, the monthly mean flows for Fraser River as measured at Marguerite are tabulated as follows:

May	2902 cms
June	3300 cms
July	2825 cms
August	1909 cms
September	1320 cms
October	1100 cms

.../2



On the basis of these mean flow data, it is our opinion that undertaking sampling for the purpose of receiving environment monitoring in the period from May to August when the Fraser River flow is greater than 2000 cms would provide no meaningful data. This suggestion is based on:

- (1) the centre point of the initial dilution zone will be approximately 65m from the edge of the river and very difficult to "locate" for sampling purposes.
- (2) in relation to the 2 year low flow of 375 cms, the calculated dilution ratio for a discharge volume of 8000 m<sup>3</sup>/day is 820:1. When the river flow is 2000 cms, the average depth of water in the initial dilution zone is 6m and the calculated dilution ratio is about 4200:1.
- (3) assuming that ammonia is the parameter of particular concern, and that the ammonia concentration in the discharge is 30 mg/L (conservatively high), the calculated increase in concentration at the edge of the initial dilution zone is 0.006 mg/L which is approaching the minimum detection limit of the ammonia test.

Correspondence from the Ministry of Water, Land and Air Protection dated February 04, 2002 requests that the receiving environment monitoring programme address possible "fecal coliform impacts on the beach area from May to September inclusive". Referring to drawing 602-021-05 the following should be noted relative to the recreation area.

- (1) in the period May to September when the Fraser River flows are of the order of 2000 cms, the outfall is a minimum of 50 m into the river at the recreation area.
- (2) while the recreation area is only approximately shown on drawing 602-021-05, the majority of the area is upstream of the outfall. The southern extent of the recreation area is about 15 m downstream of the outfall.

In the period May to August when mean river flows are 2000 cms or greater it would appear impossible for fecal coliforms from the outfall to impact the river edge fronting the recreational area. It is the writer's opinion that the Williams Lake River is however a potential source of fecal coliforms in the Fraser River adjacent to the recreation area.

## 2.0 Receiving Environment – Proposed Monitoring Programme

On the basis of the discussion of the outfall and Fraser River flows, it is proposed that receiving environment monitoring be undertaken sometime in the period after September 15<sup>th</sup> annually when Fraser River flows, based on historical data, will be in the range of 1100 to 1300 cms. At this time natural turbidity concentrations in the river will be approaching seasonal minimums therefore water quality parameters will not be as subject to anomalies attributable to suspended solids as compared to sampling in May, June or July. At periods of lower flow in the Fraser River, it is anticipated that it will be more straightforward for the City to determine the location of the initial dilution zone for sampling purposes.

Effluent and receiving environment parameters referenced in the MSR would form the basis for the proposed monitoring programme. The proposed monitoring program is presented as follows:

*Sample Locations:*

- Site 1 – 100m upstream of outfall – Fraser River
- Site 2 – midpoint of calculated edge of initial dilution zone – Fraser River
- Site 3 – Williams Lake River – upstream of confluence with Fraser River

*Monitoring Parameters*

Turbidity	Sites 1, 2
Total Suspended Solids	Sites 1, 2
Total Phosphorus (as P)	Sites 1, 2 and 3
Otho Phosphorus (as P)	Sites 1, 2 and 3
Ammonia Nitrogen (as N)	Sites 1, 2 and 3
Nitrate – Nitrite Nitrogen (as N)	Sites 1, 2 and 3
Fecal Coliforms (3 samples each site)	Sites 1, 2 and 3

Sampling of the Williams Lake River for fecal coliform is suggested recognizing that it is a potential source of fecal coliform in the Fraser River adjacent to the recreation area. Three fecal coliform samples are suggested at each of the three sites recognizing that fecal coliform results can be variable.

In the course of the meeting on July 20, 2004, it was requested that the Williams Lake River also be sampled for nutrient parameters. While this sampling is not specifically required to comply with the requirements of the MSR, concurrent sampling for nutrients of the Williams Lake River would provide data that, in the future, may assist the City in addressing water quality concerns related to stormwater discharges, the effectiveness of the proposed Stormwater Management Plan intended to be implemented on a phased basis and background data to support a possible future application for an increase in the wastewater discharge quantity.

Other requirements and suggestions relative to the sampling and monitoring program discussed on July 20, 2004 are summarized as follows:

- sampling should be scheduled for a period of relatively stable weather conditions. For example, sampling would not be appropriate immediately following a period of significant rainfall which may have resulted in short term increases in turbidity and suspended solids in the Fraser River.
- the flow in the Fraser River at the Marguerite Station on the date of sampling should be reported with the sampling data. Flow data for the Fraser River of Marguerite can be obtained from the Environment Canada website as follows:
  - web address: [www.msc.ec.gc.ca/wscl](http://www.msc.ec.gc.ca/wscl)
  - follow links to "Real Time Hydrometric Data"
  - Fraser River at Marguerite is Station 08 MC 018.
- sampling site No. 2, centre of the edge of the initial dilution zone, may be located by using GPS equipment. Local datum coordinates for Site 2 are provided on drawing 602-021-05. The GPS coordinates for Site 2 can be calculated from measured GPS coordinates of on shore reference points.

➤ suggested sample depths at the three sample sites are:

- Site 1 – 0.6m depth
- Site 2 – 2.0m depth if practical
- Site 3 – midstream and mid depth

Depth suggestions at Sites 1 and 3 have the objective of ensuring that floatable materials do not influence the sample analytical results. In late September, it is anticipated that the water depth at the outfall will be about 4m. A sample depth of 2m is suggested to ensure that the sample is as representative as possible.

I trust this letter satisfactorily responds to the requirements for a receiving Environment Monitoring programme for the City of Williams Lake's sanitary sewer outfall to the Fraser River. Should questions arise, please contact the undersigned.

Yours truly,



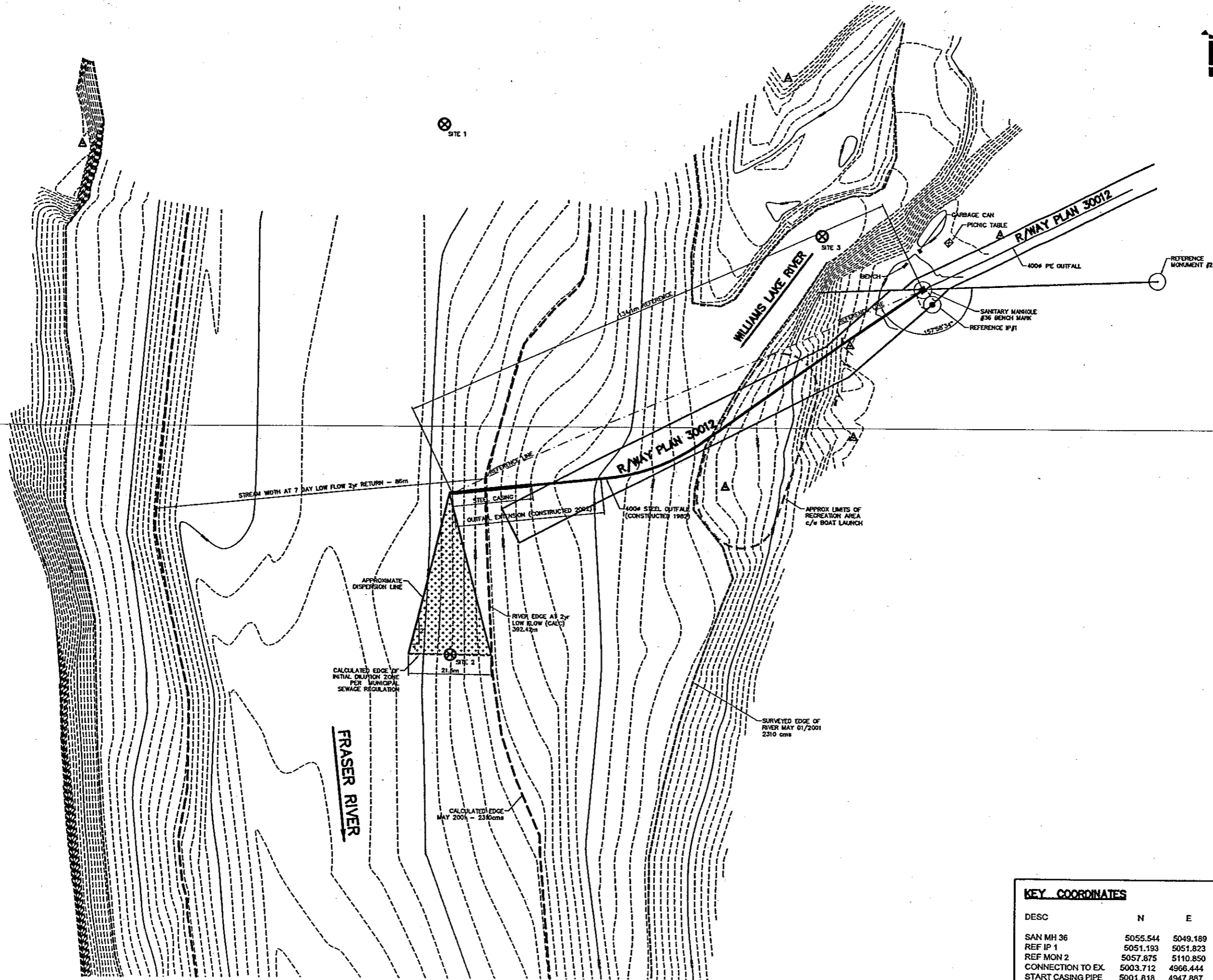
T.R. Underwood, P. Eng.

TRU/cab

attach.

cc: City of Williams Lake, Attn: Brian Lawrence  
TRUE Consulting Group, Attn Dave Underwood

602-021\MWLAP-Hill.doc



NO.	DATE	DESCRIPTION	BY	CHK
9				
8				
7				
6				
5				
4				
3	JULY 14/01	ADD SANITARY MANHOLE MARK	ML	ML
2	MAY 1/01	AS CONSTRUCTED	ML	ML
1	MAY 01/01	ISSUED FOR CONCEPTUAL APPROVAL	ML	ML
0				

ISSUES / REVISIONS

SCALE	1:500
DESIGNED BY	
DRAWN BY	
DATE	JULY 2001
CHK BY	
DATE	



**SANITARY SEWER OUTFALL EXTENSION**

**OVERALL LOCATION PLAN**

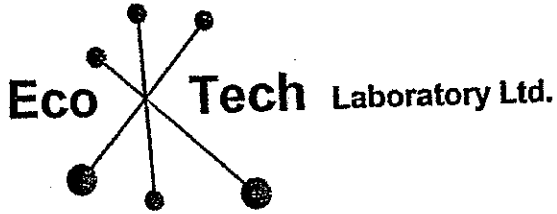
KEY COORDINATES			
DESC	N	E	ELEV
SAN MH 36	5055.544	5049.189	405.56
REF IP 1	5051.193	5051.823	405.60
REF MON 2	5057.875	5110.850	411.51
CONNECTION TO EX	5003.712	4966.444	393.24
START CASING PIPE	5001.818	4947.887	391.46
END OUTFALL	4999.928	4926.518	391.725

50% REDUCED DWG

*APPENDIX 'B'*

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**Analytical Reports – EcoTech Laboratory Ltd. dated  
December 22, 2006**



ASSAYING  
GEOCHEMISTRY  
ANALYTICAL CHEMISTRY  
ENVIRONMENTAL TESTING

10041 Dallas Drive, Kamloops, BC V2C 6T4  
Phone (250) 573-5700 Fax (250) 573-4557  
E-mail: info@ecotechlab.com  
www.ecotechlab.com

**ANALYTICAL RESULTS - #:E06-2640**

CITY OF WILLIAMS LAKE  
450 Mart Street  
WILLIAMS LAKE, BC  
V2G 1K3

22-Dec-06

**ATTENTION: Joe Engelberts**

**SAMPLE IDENTIFICATION:**

Water Samples Received: December 8, 2006  
Samples Dated: December 7, 2006  
Labelled: 1. Fraser River Site #1  
2. Fraser River Site #2  
3. Williams Lake Creek Site #3

<b>PARAMETERS:</b>	<b>1</b>	<b>2</b>	<b>3</b>
Turbidity (NTU)	4.5	4.7	0.35
Total Dissolved Solids	186	214	621
Nitrate & Nitrite (as N)	0.089	0.095	0.024
Total Phosphate (as P)	0.197	0.063	0.011
Ortho Phosphate (as P)	<0.003	<0.003	<0.003
Ammonia (as N)	0.099	0.131	0.073
Fecal Coliform (CFU/100mL)	61	>200	8
Fecal Coliform (CFU/100mL)	54	>200	5
Fecal Coliform (CFU/100mL)	85	81	3

**NOTE:** Results expressed in mg/L unless otherwise indicated.

ECO-TECH LABORATORIES LTD.  
John Andrew, BSc.  
Environmental Lab Manager

*APPENDIX 'C'*

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**Water Survey of Canada Historical Streamflow Data.  
Fraser River at Marguerite for December 2006**



Environment Canada / Environnement Canada

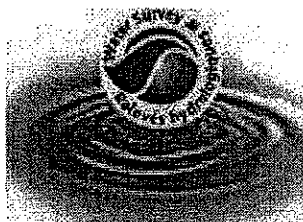
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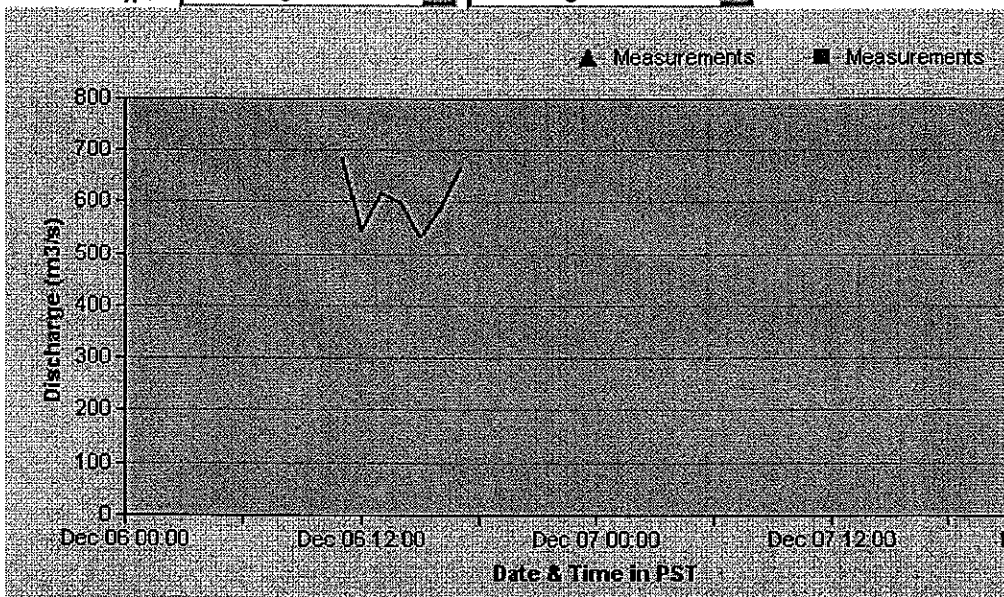
Canal  
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### FRASER RIVER NEAR MARGUERITE (08MC018)

Data Category:

Parameter Type:



**Station Navigation**

**Customization**

In partnership with

**British Columbia  
Ministry of Environment**

Y-Axis View: Min  Max

Start Date:

End Date:

Statistics for period of record

Max  Mean  Lower quartile

Min  Upper quartile  Median

The current primary water level as of 2007-04-11 05:00:00 is: 4.048 metres. Most recent measured water level: 2.516 metres, Measured discharge: n/a. Curve 31 is currently used to generate the preliminary discharge values on the graph. If a measured discharge deviates from the curve by more than 5%, the displayed discharge may be inaccurate and will be revised for final publication following detailed review of discharge records.

**Station Information:**

Active or discontinued	Active	Province/Territory	BC
Latitude	52° 31' 48" N	Longitude	122°
Gross drainage area	114000 km <sup>2</sup>		
Record length	57 Years	Period of record	1950
Regulation type	Regulated		

Hydrometric measurement

Period of record      Type      Operation schedule





Environment Canada / Environnement Canada

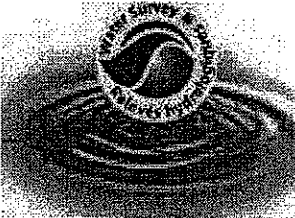
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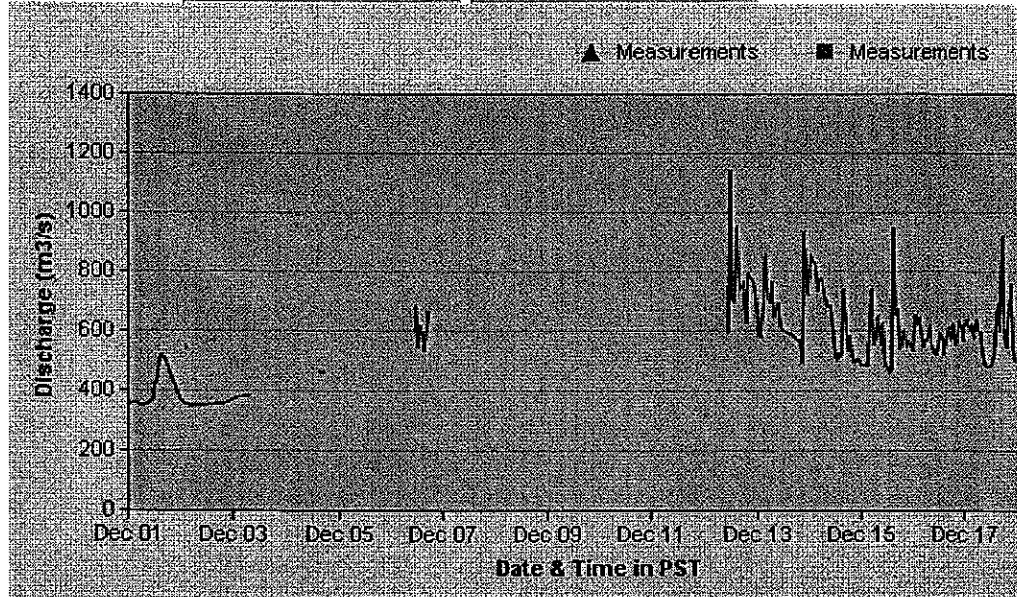
Canada  
Environnement  
Canada



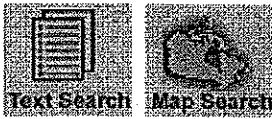
FRASER RIVER NEAR MARGUERITE (08MC018)

Data Category: Real Time [Go]

Parameter Type: Discharge [Discharge]



Station Navigation



Customization



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British Columbia Ministry of Environment

Y-Axis View

Min [ ] Max [ ]

Start Date

Dec 1 2006

End Date

Dec 18 2006

Statistics for period of record

- Max
- Mean
- Lower quartile
- Min
- Upper quartile
- Median

The current primary water level as of 2007-04-11 05:00:00 is: 4.048 metres. Most recent: 2007-03-14 06:47:00, Measured water level: 2.516 metres, Measured discharge: n/a . . . Curve 31 is currently used to generate the preliminary discharge values on the graph. If measured discharge deviates from the curve by more than 5%, the displayed discharge may be inaccurate and will be revised for final publication following detailed review of discharge records.

Station Information:

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Hydrometric measurement  
Period of record      Type      Operation schedule