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Golder Associates

REPORT ON

2002 GROUNDWATER MONITORING PROGRAM
COMMUNAL SEWAGE SYSTEM
NATION MUNICIPALITY
FOURNIER, ONTARIO

Submitted to:

Ontario Clean Water Agency
2015 Lajoie Street
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March 2003

021-2735

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March 21, 2003

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Ontario Clean Water Agency
Box 252, 2015 Lajoie Street
Lefaivre, Ontario
K0B 1J0

Attention: Mr. Jacques Breen

RE: 2002 GROUNDWATER MONITORING PROGRAM
COMMUNAL SEWAGE SYSTEM
NATION MUNICIPALITY, FOURNIER, ONTARIO

Dear Mr. Breen,

Please find enclosed two copies of a report sent to you based on direction from Mary McCuaig (Nation Municipality) with respect to annual reporting requirements of Certificate of Approval (Sewage) No. 3-0436-99-006 for the Fournier communal sewage system. Completion of the 2002 groundwater monitoring program satisfies Condition 3.1(c) of the Certificate of Approval. This report specifically addresses the reporting requirements of Condition 5.2(a) of the Certificate of Approval.

This report prepared by Golder Associates Ltd. along with the additional monitoring data to be provided by the Ontario Clean Water Agency must be prepared, and upon request, submitted to the Ministry of the Environment (MOE) by March 31, 2003 as per Condition 5.2 of the Certificate of Approval.

Based on our telephone conversation of March 19, 2003 and in accordance with the discussion presented in Section 7.0 of this report, it is our opinion that the existing Certificate of Approval should be amended as soon as possible (from a hydrogeological perspective) to incorporate a revised trigger mechanism and groundwater monitoring program.

Do not hesitate to contact the undersigned should you have any questions.

Yours truly,

GOLDER ASSOCIATES LTD.
Environmental Division

Heather Fenton, M.Sc.
Hydrogeology

for K.A. Marentette, M.Sc., P.Geo.
Senior Hydrogeologist/Associate

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EXECUTIVE SUMMARY

The following Executive Summary highlights key points of the report only; for complete information, as well as limitations, it is necessary for the reader to examine the complete report.

The following report presents the results of the 2002 groundwater monitoring program at the Fournier communal sewage system located on part of Lot 1, Concession XIII, in the former Township of South Plantagenet, near the Village of Fournier, in the Nation Municipality, Ontario. The objectives of the 2002 monitoring program were: 1) to further define the baseline groundwater quality at the site; and 2) to provide an assessment of the Fournier communal sewage system with respect to the site-specific trigger mechanisms and background groundwater quality. The 2002 groundwater monitoring program consisted of monthly sampling and analysis of groundwater at eight monitoring wells located on the site for the period between January and December 2002.

Groundwater elevation data indicate that the direction of shallow groundwater flow on the site is to the north. Based on these data, the shallow groundwater flow velocity is estimated to be between 1 and 4 metres per year.

The following points summarize the interpretation of groundwater quality downgradient of the sewage system:

- Groundwater at monitoring well MW99-1 (located approximately 5 metres downgradient of the sewage system) is interpreted to have been impacted by septic effluent since the end of 2001 based on elevated concentrations of typically sewage effluent indicator parameters. This interpretation is supported by calculated values for groundwater flow velocity which indicates the likelihood that groundwater impacted by the sewage system could have travelled to this monitor by the end of 2001;

- Concentrations of ammonia, bromide, chloride, conductivity, and DOC are consistently elevated in monitor MW99-4 (located approximately 125 metres downgradient of the sewage system) compared to background concentrations. The elevated concentrations of these parameters are not related to impact by effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002 and by the elevated concentrations of these parameters that were present in groundwater at this location prior to operation of the sewage system;

- Concentrations of bromide, chloride, and conductivity are cyclically elevated in monitor MW99-5 (located approximately 125 metres downgradient of the sewage system) compared to background concentrations. The elevated concentrations of these parameters are not related to impact by effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002;

- Concentrations of ammonia, bromide, chloride, conductivity, DOC, nitrate, nitrite, sulphate, and TKN are consistently elevated in monitor MW99-8 (located 265 metres downgradient of the sewage system) compared to background concentrations. The elevated concentrations of these parameters are not related to impact from effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002 and by the elevated concentrations of these parameters that were present in groundwater at this location prior to operation of the sewage system;

Monitoring well MW99-1 is the only groundwater monitor exhibiting groundwater quality impacts as a result of the sewage system. Based on the estimated groundwater flow velocity at the site, groundwater impacted by effluent from the sewage system is estimated to reach monitors MW99-2 and MW99-3 (located approximately 25 metres downgradient of the sewage system) no sooner than five years after the sewage systems became operational (three years from present). Similarly, groundwater impacted by effluent from the sewage system is estimated to reach monitors MW99-4 and MW99-5 approximately 30 years after the sewage system became operational (28 years from present). It is estimated that monitoring well MW99-8 will be impacted by effluent approximately 65 years after the sewage system became operational (63 years from present).

Based on estimated groundwater velocities, groundwater impacts due to septic effluent are not expected to reach the closest trigger monitoring wells MW99-4 and MW-95 for about three decades. As such, it is reasonable to defer the discussion of site compliance until a time in the future when the influence of the system on groundwater quality becomes apparent at these trigger locations.

The existing trigger mechanism is inappropriate for this sewage system site as it was developed prior to the definition of existing groundwater quality at the site. Based on the groundwater quality data obtained during the 2001 and 2002 monitoring programs, groundwater flow velocity at the site and the size of the property associated with the sewage system, the existing trigger mechanisms (and groundwater monitoring program) associated with the site should be re-evaluated.

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1.0 INTRODUCTION

This report presents the results of the 2002 groundwater monitoring program at the Fournier communal sewage system. The sewage system is located on part of Lot 1, Concession XIII, in the former Township of South Plantagenet, near the Village of Fournier, in the Nation Municipality, Ontario (Figure 1). It is understood that the sewage system became operational in November or December 2000.

In 2000, Golder Associates Ltd. (Golder) conducted a borehole drilling and monitoring well installation program at the communal sewage system. The investigation included borehole drilling and the installation of eight monitoring wells (MW99-1 through MW99-8) as illustrated in Figure 2. For the purpose of defining the baseline groundwater quality at the Fournier Sewage Site, monthly groundwater sampling and analysis was completed from August to December 2000. The results of this monitoring program are summarized in Golder Associates (2001).

In 2001, Golder conducted a groundwater monitoring program that included monthly sampling of all eight groundwater monitors from January 2001 to December 2001. The results of this monitoring program are summarized in Golder Associates (2002). The main observations noted in the 2001 Monitoring Report were as follows:

- Background water quality was variable between monitoring wells MW99-6 and MW99-7 with higher ammonia, bromide, chloride, conductivity, TKN and unionized ammonia levels in background monitoring well MW99-6 and slightly higher elevated DOC and sulphate levels in background monitoring well MW99-7;

- Monitoring well MW99-1 was the only well interpreted to be potentially impacted by the septic system. This well was interpreted to have become impacted at the end of 2001, based on increased levels of chloride, conductivity, nitrate and sulphate concentrations;

- High chloride concentrations were detected in MW99-4 (most sampling sessions) and MW99-5 (October, November and December 2001);

- Consistently elevated concentrations of ammonia, bromide, chloride, conductivity, DOC and nitrate, were detected in monitoring well MW99-4;

- Increased ammonia, bromide, chloride and conductivity levels were observed at the end of 2001 in monitoring well MW99-5; and,

- Consistently elevated concentrations of ammonia, bromide, chloride, conductivity, DOC, nitrate, sulphate and TKN were observed in monitoring well MW99-8. Chloride and DOC concentrations were particularly high.

Similar to the previous monitoring programs, the 2002 groundwater monitoring program, as described in this report, included monthly sampling and analysis of groundwater from all eight groundwater monitors from January 2002 to December 2002. The objectives of the 2002 monitoring program are as follows:

- to further define the baseline groundwater quality at the site; and

- to provide an assessment of the impact of Fournier communal sewage system on groundwater with respect to the site-specific trigger mechanisms and background groundwater quality as measured in MW99-6 and MW99-7.

Completion of the groundwater monitoring program satisfies Condition 3.1(c) of Certificate of Approval (Sewage) No. 3-0436-99-006 dated June 11, 1999. Completion of the following report satisfies Condition 5.2(a) of the Certificate of Approval.

2.0 FIELD PROCEDURES

The groundwater monitoring sessions were conducted once a month covering the period from January to December 2002 and included all eight monitoring wells installed during the 2000 borehole drilling and monitoring well installation program (Figure 2). The groundwater levels in the monitoring wells were measured during each monitoring session. The monitoring wells were then developed by the removal of at least three standing volumes of water using samplers dedicated to each of the respective monitoring wells. Sampling of groundwater using the dedicated samplers was performed in all monitoring wells immediately after well development.

The temperature, pH, and conductivity of the groundwater samples were measured in the field at the time of sampling. The field conductivity measurements were obtained using a conductivity meter calibrated in the field prior to use. All samples were entered on a Chain of Custody Form and placed in coolers with ice packs until they were delivered in person to Accutest Laboratories Ltd. in Nepean, Ontario for analysis of ammonia, bromide, chloride, DOC, *Escherichia coli* (*E-coli*) fluoride, nitrate, nitrite, sulphate, total kjeldahl nitrogen (TKN) and unionized ammonia. In addition, for the purpose of evaluating the potential for surface water impact, samples collected from MW99-4 and MW99-5 were analyzed for surface water parameters total phosphorus and dissolved reactive phosphorous (DRP).

Dissolved reactive phosphorus (DRP) was added to the parameter list for monitoring wells MW99-4 and MW99-5 because, based on our experience, DRP is a better indicator of phosphorus that is mobile in a groundwater system than total phosphorus (in an unfiltered sample). Total phosphorus concentrations appear to be highly variable over time and may relate more to the nature (e.g., turbidity) of groundwater derived from a monitoring well and the sampling protocol as compared to the actual amount of phosphorus that is migrating in the groundwater flow system.

The groundwater samples collected for the specific analyses were collected, prepared, and preserved in the field using the following protocols:

Analytical Parameters	Preparation and Preservation Protocols
Escherichia-coli	plastic bottle, unfiltered and preserved with $Na_2S_2O_3$
Sulphate, nitrate, nitrite, chloride, bromide, fluoride	plastic bottle, unfiltered and unpreserved
Dissolved organic carbon	amber glass bottle with foil lined cap, unfiltered and preserved to pH<4 with sulphuric acid
Dissolved reactive phosphorous	plastic bottle, field filtered and unpreserved
Total Kjeldahl Nitrogen, Total Phosphorous, ammonia	plastic bottle, unfiltered and preserved to pH<2 with sulphuric acid

3.0 GEOLOGICAL CONDITIONS

The geological conditions encountered during the 2000 borehole drilling and monitoring well installation program are given on the Record of Boreholes in Appendix A. Details of the monitoring well installations in each of the boreholes are also included in the Record of Boreholes in Appendix A. It should be noted that the boundaries between strata on the Record of Borehole Sheets have been inferred from observations during drilling and non-continuous sampling and, as such, their positions should be considered as transitional in nature rather than an exact plane of geologic change. Natural variations other than those encountered in the boreholes should also be expected to exist.

In general, the geological conditions at the site consist of a surficial topsoil layer underlain by fine sand to depths of between 0.9 and 2.7 metres. At each borehole location (except MW99-8), silty sand containing clay interbeds was present below the sand layer. At MW99-8, the sand is underlain by silty clay. None of the boreholes at the site encountered bedrock to a maximum depth of investigation of 4.6 metres below ground surface.

4.0 PHYSICAL HYDROGEOLOGY

Water levels measured in the monitoring wells prior to each sampling event in 2002 are presented in Table 1. Elevations were referenced to a geodetic datum located at the invert of the inlet pipe at Pumping Station "B" (Figure 2).

As illustrated in Figure 2, groundwater elevation data as measured in December 2002 indicate that the shallow groundwater flow direction is to the north. This is consistent with that observed in December, 2001 as part of the 2001 groundwater monitoring program.

Grain size analysis completed by Neil A. Levac Engineering Ltd. (1999) on soil samples taken at the site indicate that the silty sand deposit has a hydraulic conductivity in the order of 10^{-4} cm/sec.

Hydraulic gradients between groundwater monitors MW99-1 and MW99-2, MW99-1 and MW99-5, and MW99-1 and MW99-8 were calculated based on groundwater elevations measured as part of the 2002 groundwater monitoring program. Hydraulic gradients ranged from 0.022 (May) to 0.045 (July) between monitors MW99-1 and MW99-2, from 0.017 (May) to 0.033 (October and November) between monitors MW99-1 and MW99-5, and from 0.022 (March) to 0.028 (November) between monitors MW99-1 and MW99-8.

Based on the estimated horizontal hydraulic conductivity value for the sand unit (10^{-4} cm/s), the range of horizontal gradients presented above (0.017 to 0.045), and an estimated porosity of 35 percent for silty sand, the groundwater flow velocity through the silty sand deposit is estimated to range from 1.5 to 4 metres per year. These values are similar to estimates of 1 to 4 metres per year, that were determined using gradients calculated from groundwater elevations measured as part of the 2001 groundwater monitoring program (Golder Associates, 2002).

5.0 GROUNDWATER QUALITY

Groundwater quality in the vicinity of the communal sewage system was assessed based on the chemical, physical, and bacteriological results obtained for groundwater collected at each of the eight monitors in 2002. Current and historical results of field and laboratory chemical, physical, and bacteriological analyses conducted on groundwater samples, along with relevant Ontario Drinking Water Standards (MOE, 2001), are presented in Appendix B. Copies of the Report of Analysis sheets from Accutest Laboratories Ltd. for the 2002 groundwater monitoring program are provided in Appendix C. The unionized ammonia values presented in Appendix B are calculated values based on field pH and temperature measurements. The unionized ammonia values presented in the Report of Analysis sheets in Appendix C are calculated values provided by Accutest Laboratories Ltd. and do not incorporate field measurements.

Discussions relating to compliance with the Ontario Drinking Water Standards (ODWS) relate specifically to non-health related objectives (i.e., aesthetic parameters) and health related parameters for which a Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC) have been established.

5.1 Background Monitoring Wells

The background groundwater quality upgradient (south) of the sewage system is represented by groundwater at monitoring wells MW99-6 and MW99-7. These monitors are hydrogeologically upgradient from the sewage system (see Figure 2) and are interpreted to not be impacted by septic effluent originating from it. The table below summarizes the historical ranges in concentrations of parameters in groundwater samples collected from these monitoring wells. Comparison of the groundwater quality at monitoring locations MW99-6 and MW99-7 reveals differences in a number of parameters. Concentrations of bromide, chloride, conductivity, and nitrate are higher in MW99-6 than in MW99-7. Concentrations of ammonia and unionized ammonia are slightly higher in MW99-6 than in MW99-7. Concentrations of DOC are higher in MW99-7 than in MW99-6. In 2002, concentrations of chloride in MW99-6, and DOC in MW99-7 approached their respective non-health related objectives as outlined in the ODWS. Concentrations of these parameters exceeded the non-health related objectives in 2001 in the respective groundwater monitors. Analytical results for the background monitors obtained in 2002 are similar to those obtained in 2001. However, a steady increase in chloride concentrations from 22.0 to 126.0 mg/L was observed in MW99-7 from August to December, 2002. A chloride concentration of 126.0 mg/L is higher than previously observed in this groundwater monitor. Also, TKN concentrations were lower in both MW99-6 and MW99-7 in 2002 as compared to 2001.

Parameter	Historical Ranges in Background Concentrations (mg/L)	
	Monitoring Well MW99-6	Monitoring Well MW99-7
Ammonia	0.30 – 1.23	0.28 – 0.78
Bromide	<0.05 – 2.46	<0.05 – 0.75
Chloride	32.0 – 263.0	13.0 – 137.0
Conductivity	380 – 847	220 – 540
DOC	0.9 – 3.1	2.0 – 5.3
E-coli	0 - <10	0 – 1
Fluoride	<0.10 – 0.76	<0.10 – 0.63
Nitrate	<0.10 – 1.19	<0.10 – 0.37
Nitrite	<0.10	<0.10
pH	6.2 – 8.5	6.3 – 8.2
Sulphate	<3.0 – 28.0	18.0 – 37.0
TKN	0.54 – 2.87	0.44 – 2.41
Unionized Ammonia	<0.02 - 0.05	0.02

5.2 Discussion of Downgradient Groundwater Quality

A comparison of the downgradient groundwater quality to background conditions in monitoring wells MW99-6 and MW99-7 and an interpretation of the 2002 monitoring data are presented in Table 2. The following points summarize the interpretation of the groundwater quality data:

- Groundwater at monitoring well MW99-1 is interpreted to have been impacted by septic effluent since the end of 2001 based on elevated chloride, conductivity, nitrate, and sulphate concentrations which are typically sewage effluent indicator parameters. This interpretation is supported by calculated values for groundwater flow velocity which indicates the likelihood that groundwater impacted by the sewage system could have travelled to this monitor by the end of 2001;

- Concentrations of ammonia, bromide, chloride, conductivity, and DOC are consistently elevated in monitor MW99-4 compared to background concentrations. The elevated concentrations of these parameters are not related to impact by effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002 and by the elevated concentrations of these parameters that were present in groundwater at this location prior to operation of the sewage system;

- Concentrations of bromide, chloride, and conductivity are cyclically elevated in monitor MW99-5 compared to background concentrations. The elevated concentrations of these parameters are not related to impact by effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002;

- Concentrations of ammonia, bromide, chloride, conductivity, DOC, nitrate, nitrite, sulphate, and TKN are consistently elevated in monitor MW99-8 compared to background concentrations. The elevated concentrations of these parameters are not related to impact from effluent from the sewage system. This interpretation is supported by calculated values for groundwater flow velocity which indicate that groundwater impacted by effluent from the sewage system could not have reached this monitor by the end of 2002 and by the elevated concentrations of these parameters that were present in groundwater at this location prior to operation of the sewage system;

Monitoring well MW99-1, located approximately 5 metres downgradient of the sewage system, is the only groundwater monitor exhibiting groundwater quality impacts as a result of the sewage system. Groundwater flow velocity on the site is estimated to range between 1 to 4 metres per year. Hence, the arrival of groundwater impacted by effluent from the sewage system at MW99-1 approximately one year after the sewage system became operational is consistent with the estimated groundwater flow velocity and the separation distance of approximately 5 metres between monitoring well MW99-1 and the nearest leaching bed.

Based on the estimated groundwater flow velocity at the site, groundwater impacted by effluent from the sewage system is estimated to reach monitors MW99-2 and MW99-3 (located approximately 20 metres downgradient of MW99-1) no sooner than five years after the sewage systems became operational (three years from present). Similarly, groundwater impacted by effluent from the sewage system is estimated to reach monitors MW99-4 and MW99-5 (located approximately 120 metres downgradient of MW99-1) approximately 30 years after the sewage system became operational (28 years from present). It is estimated that monitoring well MW99-8 (located 260 metres downgradient of MW99-1) will be impacted by effluent approximately 65 years after the sewage system became operational (63 years from present). Groundwater quality in monitoring wells MW99-2, MW99-3, MW99-4, MW99-5 and MW99-8 continues to represent water quality conditions that are not impacted by effluent from the sewage system.

6.0 COMPLIANCE ASSESSMENT

In accordance with Certificate of Approval (Sewage) No. 3-0436-99-006 dated June 11, 1999 (refer to Appendix D), a trigger level of 3.7 mg/L nitrate (based on an assumed background nitrate level of 0 mg/L) at monitoring well MW99-8 has been established for the Fournier communal sewage system site. The purpose of the trigger value was to ensure that the wastewater treatment system installed at the site is in accordance with MOE Reasonable Use Guideline B-7 (MOE, 1994). Exceedance of the trigger level activates contingency measures to upgrade treatment processes and improve the quality of wastewater being discharged before exceeding the Reasonable Use requirements at the downgradient property. In addition, a trigger mechanism at monitoring wells MW99-4 and MW99-5 associated with possible surface water impact has been developed. The trigger is based on total ammonia (1.8 mg/L at 10°C and pH of 8) and total phosphorus (5 mg/L).

As noted previously in Section 5.2, groundwater quality impact by the sewage system is interpreted to be present only at monitoring well MW99-1. Based on estimated groundwater velocities, groundwater impacts due to septic effluent are not expected to reach the closest trigger monitoring wells MW99-4 and MW-95 for about three decades. Therefore, groundwater quality results at the trigger monitoring wells MW99-4, MW99-5 and MW99-8 are not impacted by effluent from the sewage system. As such, it is reasonable to defer the discussion of site compliance until a time in the future when the influence of the system on groundwater quality becomes apparent at these trigger locations.

It is noted, however, that during 2002, the nitrate concentration detected in MW99-8 was below the trigger level during each of the monthly sampling events with the exception of that completed in September. Exceedance of the nitrate trigger concentration detected in this monitor in September was an anomalous result when compared to other nitrate concentrations at this location. Concentrations of nitrate detected in this groundwater monitor since September 2002 have been well below the trigger concentration of 3.7 mg/L.

Total phosphorous concentrations are periodically reported to be present in MW99-4 at concentrations that exceed the trigger concentration of 5 mg/L. Total phosphorous concentrations in MW99-5 have consistently exceeded the trigger concentration of 5 mg/L.

Based on the groundwater quality data obtained during the 2001 and 2002 monitoring programs, groundwater flow velocity at the site and the size of the property associated with the sewage system, the existing trigger mechanisms associated with the site should be re-evaluated.

In summary, the existing trigger mechanism is inappropriate for this sewage system site as it was developed prior to the definition of existing groundwater quality at the site. For example, the nitrate trigger concentration of 3.7 mg/L at MW99-8 was developed based on the assumption that background nitrate levels were 0 mg/L, yet nitrate levels exceeding 2 mg/L have been reported in monitoring wells downgradient of the sewage system that have not been impacted by septic effluent. Similarly, total phosphorus levels at monitoring wells MW99-4 and MW99-5 (which are not impacted by septic effluent) have frequently exceeded the trigger concentration of 5 mg/L and this has occurred even prior to the sewage system becoming operational.

7.0 PROPOSED FUTURE MONITORING PROGRAM

The 2000, 2001 and 2002 monitoring programs have characterized the baseline groundwater quality upgradient (MW99-6 and MW99-7), immediately downgradient (MW99-1, MW99-2 and MW99-3) and distant (MW99-4, MW99-5 and MW99-8) from the sewage system.

Future monitoring at the Fournier Sewage System should reflect the physical hydrogeological setting of the site. Therefore, due to the relatively low horizontal groundwater flow velocities (1 to 4 metre per year) at the site, it is proposed that the scope of the groundwater monitoring program be reduced from monthly sampling to two sampling sessions per year, to be completed in the spring (April/May) and the fall (October/November). In Golder Associates' letter dated March 27, 2002 to the MOE District Manager (see Appendix E), approval for modifications to the groundwater monitoring program at the site was requested. In the MOE memorandum dated June 14, 2002 (see Appendix E), the MOE Technical Reviewer responded to the letter of March 27, 2002 and agreed that the trigger mechanism at this site should be re-evaluated and stated that until the Certificate of Approval is amended to reflect a revised trigger mechanism, the MOE Technical Reviewer would not support any changes to the monitoring program. Therefore, until such time that the Certificate of Approval is amended to reflect a revised trigger mechanism and groundwater monitoring program, the monthly monitoring program on the existing Certificate of Approval should be conducted.

8.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the Ontario Clean Water Agency and the Nation Municipality. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by Golder Associates and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by Golder Associates as described in this report, and in the previous reports prepared by Golder Associates (see *References* for list of previous reports). Each of these reports must be read and understood collectively, and can only be relied upon in their totality.

The assessment of environmental conditions and possible hazards at this site has been made using the results of physical measurements and chemical analyses of liquids from a number of locations. The site conditions between sampling locations have been inferred based on conditions observed at borehole and monitoring well locations. Subsurface conditions may vary from these sampled locations.

The services performed, as 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 responsibilities of such third parties. Golder Associates accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, Golder should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

GOLDER ASSOCIATES LTD.
Environmental Division

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Hydrogeology

for K.A. Marentette, M.Sc., P.Geo.
Senior Hydrogeologist/Associate

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TABLE 1

2002 GROUNDWATER ELEVATIONS

Monitoring Well	Ground Surface Elevation (m)	Top of Casing Elevation (m)	Groundwater Elevation (m)											
			Jan 24 2002	Feb 13 2002	Mar 15 2002	Apr 18 2002	May 15 2002	Jun 25 2002	Jul 23 2002	Aug 19 2002	Sep 26 2002	Oct 23 2002	Nov 24 2002	Dec 12 2002
MW99-1	53.48	54.08	52.76	52.57	52.83	52.94	52.93	52.83	52.27	51.87	51.30	51.97	52.64	52.45
MW99-2	53.05	53.78	52.06	51.82	52.26	52.49	52.48	52.23	51.38	51.05	50.64	51.15	51.85	51.73
MW99-3	53.67	53.67	51.97	51.88	52.21	52.38	52.41	52.21	51.32	50.96	50.53	51.06	51.86	51.62
MW99-4	52.91	51.73	49.32	49.23	49.65	49.81	50.05	49.85	48.82	48.39	47.79	47.96	48.83	48.80
MW99-5	51.50	52.25	49.45	49.40	49.94	50.73	50.84	50.60	49.24	48.63	48.10	47.98	48.72	48.91
MW99-6	52.86	53.60	52.02	51.69	52.42	52.33	52.46	52.05	51.13	50.86	50.58	51.23	52.17	51.60
MW99-7	53.36	54.12	52.91	52.44	52.97	52.85	53.03	52.70	51.93	51.62	51.36	52.22	52.91	52.38
MW99-8	47.72	48.43	46.41	46.37	47.11	47.03	46.96	46.82	45.90	45.56	44.95	44.93	45.38	45.58

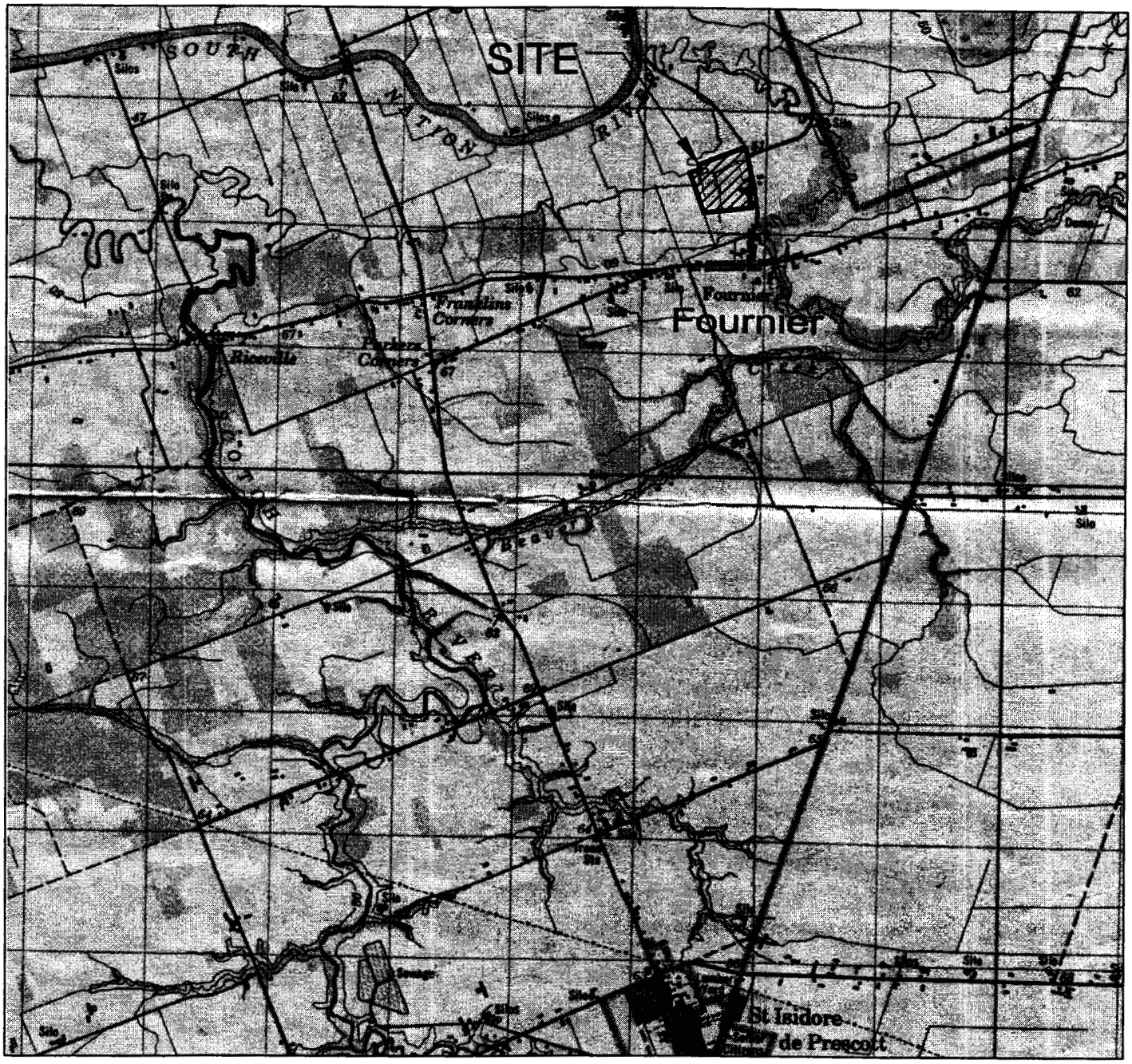
TABLE 2

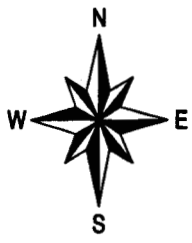
INTERPRETATION OF GROUNDWATER QUALITY DATA FROM DOWNGRADIENT MONITORING WELLS

Sampling Location	Parameters Exceeding ODWS in 2002	Historical Trend(s)	Parameters Consistently Elevated Compared to Historical Background Concentrations at		Hydrogeological Interpretation
			MW 99-6	MW99-7	
MW99-1	chloride, nitrate, nitrite	• Chloride, conductivity, nitrate, and nitrite concentrations increased significantly in late 2001/early 2002 and remained fairly stable through the remainder of 2002 • Sulphate concentrations have steadily increased since early 2002	• chloride, conductivity, nitrate, and nitrite (since late 2001/early 2002), sulphate	• chloride, conductivity, nitrate, and nitrite (since late 2001/early 2002), sulphate	• borehole MW99-1 is located approximately 5 metres downgradient from leaching beds (see Figure 2) • groundwater impacted by effluent from sewage system since late 2001/early 2002
MW99-2	None	• groundwater quality generally consistent over time with no obvious increasing or decreasing trends in parameter concentrations	None	None	• borehole MW99-2 is located approximately 25 metres downgradient from leaching beds (see Figure 2) • groundwater interpreted to not be impacted by sewage system based on groundwater quality and flow velocity
MW99-3	None	• groundwater quality generally consistent over time with no obvious increasing or decreasing trends in parameter concentrations	Sulphate	Sulphate	• borehole MW99-3 is located approximately 25 metres downgradient from leaching beds (see Figure 2) • groundwater interpreted to not be impacted by sewage system based on groundwater quality and flow velocity
MW99-4	chloride, Escherichia coli	• groundwater quality variable over time • increases and decreases in ammonia, bromide, chloride, DOC, and conductivity levels appear to follow similar trends	ammonia, bromide, chloride, conductivity, and DOC	ammonia, bromide, chloride, and conductivity	• borehole MW99-4 is located approximately 125 metres downgradient from leaching beds (see Figure 2) • groundwater interpreted to not be impacted by sewage system based on groundwater flow velocity • source(s) of elevated ammonia, bromide, chloride, conductivity, and DOC in groundwater is/are interpreted to be other than the sewage system • total phosphorous frequently but not consistently, exceeds the trigger of 5 mg/L for this location

TABLE 2 – continued

Sampling Location	Parameters Exceeding ODWS in 2002	Historical Trend(s)	Parameters Consistently Elevated Compared to Historical Background Concentrations at		Hydrogeological Interpretation
			MW 99-6	MW99-7	
MW99-5	chloride, Escherichia coli	• elevated chloride, bromide and conductivity levels from October 2001 to March 2002 and from October 2002 to December 2002 • trends in chloride, bromide and conductivity levels are similar	chloride (cyclically), conductivity (cyclically)	bromide (cyclically), chloride (cyclically), conductivity (cyclically)	• borehole MW99-5 is located about 125 metres downgradient from leaching beds (see Figure 2) • groundwater interpreted to not be impacted by sewage system based on groundwater flow velocity • source(s) of elevated chloride, bromide, and conductivity in groundwater is/are interpreted to be other than the sewage system • total phosphorous has consistently exceeded the trigger of 5 mg/L for this location since July 2002
MW99-8	chloride, DOC, nitrite	• groundwater quality variable over time • overall increasing trend in nitrate concentrations • frequent spikes in bromide concentration	ammonia, bromide, chloride, conductivity, DOC, nitrite, sulphate, and TKN	ammonia, bromide, chloride, conductivity, DOC, nitrate, nitrite, sulphate, and TKN	• borehole MW99-8 is located across municipal drain 265 metres downgradient from the leaching beds system (see Figure 2) • groundwater interpreted to not be impacted by sewage system based on groundwater flow velocity • source(s) of elevated ammonia, bromide, chloride, conductivity, DOC, nitrate, nitrite, sulphate, and TKN in groundwater is/are interpreted to be other than the sewage system • nitrate exceeded the trigger of 3.7 mg/L for this location in September, 2002, however this result is anomalous when compared to other nitrate concentrations at this location





SPECIAL NOTE
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT

Golder Associates
Irvine, California

SCALE	1:50,000
DATE	02/04/03
DESIGN	P.M.
CADD	P.M.
CHECK	H.F.
REVIEW	

FILE No. 021-2735-01
PROJECT No. 021-2735 REV. 0

TITLE

KEY PLAN

FIGURE 1

APPENDIX A

RECORD OF BOREHOLE SHEETS

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open Sampler for a distance of 300 mm (12 in.)

Dynamic Penetration Resistance; N_d:
The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive Uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

Peizo-Cone Penetration Test (CPT):
An electronic cone penetrometer with a 60° conical tip and a projected end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded Electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm Or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	C_u, S_u Kpa	Psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	Over 200	Over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limited
w_l	liquid limit
C	consolidaiton (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, G_s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	modified Proctor compaction test
SPC	standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane test (LV-laboratory vane test)
γ	unit weight

Note:
1. Tests which are anisotropically consolidated prior shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	= 3.1416
ln x, natural logarithm of x	
$\log_{10}$ x or log x, logarithm of x to base 10	
g	Acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma'$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma''-u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1\sigma_2\sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1+\sigma_2+\sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma'=\gamma-\gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = p_s/p_w$) formerly (G_s)
e	void ratio
n	porosity
S	degree of saturation
*	Density symbol is p. Unit weight symbol is γ where γ=pg(i.e. mass density x acceleration due to gravity)

(a) Index Properties (cont'd.)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity Index=(w_l-w_p)
w_s	shrinkage limit
I_L	liquidity index=($w-w_p$)/I_p
I_c	consistency index=(w_l-w)/I_p
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index-(e_{max}-e)/(e_{max}-e_{min}) (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or poential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_a	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	Overconsolidation ratio=σ'_p/σ'_{vo}

(d) Shear Strength

$\tau_p\tau_r$	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction=tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength (ϕ=0 analysis)
p	mean total stress $(\sigma_1+\sigma_3)/2$
p'	mean effective stress $(\sigma'_1+\sigma'_3)/2$
q	$(\sigma_1-\sigma_3)/2$ or $(\sigma'_1-\sigma_3)/2$
q_u	compressive strength $(\sigma_1-\sigma_3)$
S_t	sensitivity

Notes: 1. $\tau=c'\sigma'\tan\phi'$

2. Shear strength=(Compressive strength)/2

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-1

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 3, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q- ●, rem V. ⊕ U- ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		53.48							
		TOPSOIL		0.00							Native Backfill
				53.18							
		Brown medium SAND		0.30							Bentonite Seal
				52.57							Native Backfill
1		Loose brown very fine SAND		0.91							
				51.80							Bentonite Seal
		Loose grey SILTY SAND, laminated with clay interbeds		1.68	1	SS	5				▽
2	Power Auger 200mm Diam. Hollow Stem										Native Backfill
					2	SS	2				
3											
											38mm PVC #10 Slot Screen
4											
				48.91							Granular Filter
		END OF BOREHOLE		4.57							
5											W.L.in Screen at Elev. 51.76m Aug. 10/00

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MW

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 3, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		53.05							
0	Power Auger 200mm Diam. Hollow Stem	TOPSOIL		0.00 / 52.84							Native Backfill
		Loose brown very fine SAND, trace silt		0.21 / 51.37							Bentonite Seal
1											Native Backfill
											Bentonite Seal
		Loose grey SILTY SAND, with clay interbeds		1.68	1	50 DO	5				▽
2											Native Backfill
					2	50 DO	4				38mm PVC #10 Slot Screen
3											
					3	50 DO	2				Granular Filter
4				48.48							
		END OF BOREHOLE		4.57							W.L.in Screen at Elev. 51.27m Aug. 10/00
5											

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MW

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-3

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 3, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		53.67							
		TOPSOIL		0.00							Native Backfill
				53.06							Bentonite Seal
		Loose very fine brown SAND		0.61							Granular Filter
1											Native Backfill
				51.99							
	Power Auger 200mm Diam. Hollow Stem	Loose grey SILTY SAND, with clay interbeds		1.68	1	50 DO	6				Bentonite Seal
2											
											Native Backfill ▽
3					2	50 DO	3				
											38mm PVC #10 Slot Screen
4					3	50 DO	2				Granular Filter
				49.10							
		END OF BOREHOLE		4.57							W.L.in Screen at Elev. 51.26m Aug. 10/00
5											

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: .....

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-4

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 3, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-4} 10^{-4} 10^{-4} 10^{-5}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		52.91							
	Power Auger 200mm Diam. Hollow Stem	TOPSOIL		0.00 / 52.70							Native Backfill
		Loose brown very fine SAND, laminated		0.21							Bentonite Seal
1											Native Backfill
											Bentonite Seal
2					1	50 DO	3				Native Backfill
				50.17							
		Loose grey SILTY SAND, with clay interbeds		2.74							
3					2	50 DO	4				38mm PVC #10 Slot Screen
											▽
4					3	50 DO	2				Granular Filter
				48.34							
		END OF BOREHOLE		4.57							W.L.in Screen at Elev. 48.98m Aug. 10/00
5											

DEPTH SCALE
1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MV

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

PROJECT: 001-2772

LOCATION: See Site Plan

SAMPLER HAMMER, 64kg; DROP, 760mm

RECORD OF BOREHOLE: MW 99-5

BORING DATE: August 8, 2000

SHEET 1 OF 1

DATUM: Geodetic

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		51.50							
		TOPSOIL		0.00							Native Backfill
				51.10							Bentonite Seal
		Loose brown very fine SAND		0.40							Native Backfill
1											Bentonite Seal
					1	50 DO	4				
2	Power Auger 200mm Diam. Hollow Stem										Native Backfill ▽
		Loose grey SILTY SAND, with clay interbeds		48.94 2.56							
3											Granular Filter
					2	50 DO	4				38mm PVC #10 Slot Screen
4											
					3	50 DO	4				Granular Filter
		END OF BOREHOLE		46.93 4.57							
5											W.L.in Screen at Elev. 49.31m Aug. 10/00

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MV

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-6

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 3, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		52.86							
0	Power Auger 200mm Diam. Hollow Stem	Sand (FILL)		0.00 / 52.71							Concrete
		TOPSOIL		0.15 / 52.40							Granular Filter
1		Loose brown very fine SAND, some silt		0.46 / 51.64							Bentonite Seal
		Loose grey SILTY fine SAND, with clay interbeds		1.22	1	50 DO	5				▽
2											Native Backfill
					2	50 DO	2				38mm PVC #10 Slot Screen
3											Granular Filter
		END OF BOREHOLE		49.05 / 3.81							
4											W.L.in Screen at Elev. 51.36m Aug. 10/00
5											

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED:

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-7

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 4, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		53.36							
		TOPSOIL		0.00 / 53.21							Native Backfill
		Loose brown very fine SAND		0.15							Bentonite Seal
											Native Backfill
1		Loose grey SILTY fine SAND, laminated with clay interbeds		52.45 / 0.91							Bentonite Seal
	Power Auger 200mm Diam. Hollow Stem				1	50 DO	4				Native Backfill
2											
											38mm PVC #10 Slot Screen
3					2	50 DO	3				
											Granular Filter
		END OF BOREHOLE		49.55 / 3.81							
4											W.L.in Screen at Elev. 52.09m Aug. 10/00
5											

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MW

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

PROJECT: 001-2772

RECORD OF BOREHOLE: MW 99-8

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: August 8, 2000

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger 200mm Diam. Hollow Stem	Ground Surface		47.72							
		Fine sand (FILL)		0.00							Native Backfill
				47.20							Bentonite Seal
		PEAT		0.52							Granular Filter
				47.01							
		TOPSOIL		46.93							
		Loose very fine brown SAND		0.79							Bentonite Seal
1				45.98							
		Grey SILTY CLAY, with sand seams		1.74	1	50 DO	2				
2											Native Backfill
											▽
3					2	50 DO	2				Granular Filter
											38mm PVC #10 Slot Screen
4					3	50 DO	2				
				43.15							
		END OF BOREHOLE		4.57							W.L.in Screen at Elev. 45.04m Aug. 10/00
5											

BOREHOLE 001-2772.GPJ HYDROGEO.GDT 3 19 01

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: JFB

CHECKED: MW

APPENDIX B

GROUNDWATER CHEMICAL ANALYSES DATA

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.17	0.18	0.08	0.09	Frozen
Bromide		<0.05	<0.05	<0.05	<0.05	
Chloride	250	12.0	11.0	7.0	6.0	
Conductivity (uS/cm)		448	441	420	280	
DOC	5	3.5	2.6	2.4	2.1	
Escherichia coli (per 100mL)	0	<10	0	0	0	
Fluoride	1.5	<0.10	0.11	0.11	0.11	
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.7	7.1	7.9	7.7	
Sulphate	500	41.0	43.0	44.0	47.0	
Temperature (C)	15		11.0		6.0	
TKN		2.74	0.33	0.21	0.24	
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.04	0.10	<0.02	0.12
Bromide			<0.05	<0.05	<0.05	<0.05
Chloride	250		3.0	5.0	5.0	6.0
Conductivity (uS/cm)			325	285	330	300
DOC	5		2.3	1.5	1.2	1.9
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		<0.10	0.10	0.11	0.11
Nitrate (as N)	10		0.45	0.17	<0.10	0.19
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.7	7.2	6.8	7.9
Sulphate	500		36.0	37.0	32.0	35.0
Temperature (C)	15		6.0	6.0	5.5	7.5
TKN			0.21	0.21	0.17	0.15
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.04	0.10	0.05	0.07	0.12
Bromide		<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	250	6.0	7.0	12.0	18.0	44.0
Conductivity (uS/cm)		345	335	330	470	255
DOC	5	1.5	1.6	1.3	1.1	0.8
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.13	0.12	0.15	0.14	0.13
Nitrate (as N)	10	0.19	0.22	0.12	0.20	0.25
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.5	6.2	7.4	7.4	6.7
Sulphate	500	32.0	27.0	31.0	28.0	25.0
Temperature (C)	15	8.0	7.5	12.0	8.0	10.0
TKN		0.11	0.13	0.22	0.20	0.21
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.09	0.10	0.25	0.16	0.09
Bromide		<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	250	116.0	218.0	296.0	312.0	332.0
Conductivity (uS/cm)		540	790	1175	1200	1100
DOC	5	0.9	1.4	1.9	1.7	2.3
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.51	0.13	0.49	0.61	0.59
Nitrate (as N)	10	0.75	4.38	7.85	11.80	11.60
Nitrite (as N)	1	<0.10	<0.10	1.36	0.66	2.02
pH (pH units)	6.5-8.5	7.5	7.2	7.7	7.5	8.0
Sulphate	500	27.0	29.0	40.0	43.0	49.0
Temperature (C)	15	8.0	7.0	7.0	5.0	5.0
TKN		0.31	0.11	0.34	0.33	0.14
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1** Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.10	0.16	0.07	0.07	0.05
Bromide		<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	250	326.0	304.0	301.0	289.0	321.0
Conductivity (uS/cm)		1200	1400	1300	1400	1600
DOC	5	1.8	3.2	2.1	2.6	2.6
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.49	0.50	0.13	0.10	0.14
Nitrate (as N)	10	11.50	14.90	16.20	23.70	22.10
Nitrite (as N)	1	2.05	1.47	1.45	2.32	1.44
pH (pH units)	6.5-8.5	7.8	6.8	7.7	7.6	7.5
Sulphate	500	53.0	57.0	59.0	59.0	64.0
Temperature (C)	15	8.5	10.0	10.0	12.0	13.0
TKN		0.32	0.74	0.31	0.30	0.39
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-1**

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.07	0.10	0.10	0.07
Bromide		<0.05	<0.05	<0.05	<0.05
Chloride	250	280.0	289.0	280.0	304.0
Conductivity (uS/cm)		1200	1000	1100	1100
DOC	5	1.9	2.2	3.4	2.7
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.10	<0.10	<0.10	<0.10
Nitrate (as N)	10	16.40	17.80	18.20	20.40
Nitrite (as N)	1	1.91	1.11	<0.10	1.68
pH (pH units)	6.5-8.5	7.6	7.9	8.0	8.0
Sulphate	500	67.0	68.0	73.0	74.0
Temperature (C)	15	12.5	12.0	8.0	8.0
TKN		0.39	0.36	0.52	0.46
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.23	0.26	0.14	0.16	Frozen
Bromide		<0.05	<0.05	<0.05	<0.05	
Chloride	250	8.0	16.0	5.0	4.0	
Conductivity (uS/cm)		340	359	305	230	
DOC	5	3.7	2.4	2.4	1.8	
Escherichia coli (per 100mL)	0	<10	0	0	0	
Fluoride	1.5	0.12	0.13	0.13	0.12	
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.8	7.4	7.9	7.7	
Sulphate	500	28.0	25.0	24.0	26.0	
Temperature (C)	15		11.0		6.0	
TKN		2.48	0.41	0.19	0.31	
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.16	0.11	0.02	0.12
Bromide			0.15	<0.05	<0.05	<0.05
Chloride	250		35.0	6.0	3.0	3.0
Conductivity (uS/cm)			440	325	245	230
DOC	5		2.3	1.4	1.3	1.6
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		0.11	0.10	0.12	0.12
Nitrate (as N)	10		0.30	0.13	<0.10	0.12
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.8	7.1	7.1	7.1
Sulphate	500		31.0	36.0	22.0	23.0
Temperature (C)	15		6.0	5.5	6.0	7.0
TKN			0.29	0.25	0.09	0.18
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.08	0.13	0.06	0.11	0.29
Bromide		<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	250	3.0	4.0	4.0	4.0	12.0
Conductivity (uS/cm)		265	255	280	370	180
DOC	5	1.8	1.9	1.3	1.2	1.2
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.12	0.13	0.16	0.15	0.15
Nitrate (as N)	10	0.13	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.9	6.0	7.2	7.5	7.4
Sulphate	500	23.0	25.0	26.0	26.0	24.0
Temperature (C)	15	6.5	7.5	10.0	9.0	11.0
TKN		0.18	0.13	0.27	0.18	0.33
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.27	0.19	0.36	0.23	0.10
Bromide		<0.05	0.13	0.09	<0.05	<0.05
Chloride	250	18.0	19.0	15.0	13.0	10.0
Conductivity (uS/cm)		270	270	290	250	220
DOC	5	0.9	1.3	1.8	1.6	1.6
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.52	0.27	0.51	0.50	0.55
Nitrate (as N)	10	0.11	0.12	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.8	7.4	7.9	7.8	8.2
Sulphate	500	42.0	28.0	30.0	30.0	29.0
Temperature (C)	15	7.5	8.0	7.5	5.0	6.0
TKN		0.47	0.19	0.36	0.27	0.10
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2** Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.20	0.16	0.11	0.08	0.08
Bromide		<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	250	10.0	5.0	7.0	12.0	10.0
Conductivity (uS/cm)		280	290	320	300	320
DOC	5	1.5	2.7	1.3	1.5	1.9
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.47	0.52	0.15	0.12	0.14
Nitrate (as N)	10	<0.10	<0.10	0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.0	6.9	7.9	8.1	7.7
Sulphate	500	27.0	32.0	27.0	26.0	26.0
Temperature (C)	15	9.0	9.5	9.5	11.5	12.0
TKN		0.26	3.00	0.32	0.17	0.20
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-2**

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.08	0.08	0.13	0.10
Bromide		<0.05	<0.05	<0.05	<0.05
Chloride	250	10.0	13.0	15.0	8.0
Conductivity (uS/cm)		280	280	280	240
DOC	5	0.8	1.0	2.3	2.1
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.11	<0.10	<0.10	0.43
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.1	8.4	8.0	8.3
Sulphate	500	26.0	27.0	26.0	30.0
Temperature (C)	15	12.0	11.0	8.0	8.5
TKN		0.22	0.19	0.48	0.17
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.34	0.40	0.45	0.35	Frozen
Bromide		0.22	0.26	0.08	<0.05	
Chloride	250	44.0	63.0	16.0	18.0	
Conductivity (uS/cm)		545	595	447	310	
DOC	5	2.3	2.9	2.6	2.1	
Escherichia coli (per 100mL)	0	<10	0	0	0	
Fluoride	1.5	0.11	0.15	0.13	0.12	
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.4	7.3	8.0	7.4	
Sulphate	500	39.0	32.0	37.0	41.0	
Temperature (C)	15		11.0		6.0	
TKN		2.02	0.77	0.45	0.53	
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.28	0.13	0.30	0.34
Bromide			0.12	<0.05	<0.05	<0.05
Chloride	250		21.0	12.0	12.0	13.0
Conductivity (uS/cm)			390	340	360	330
DOC	5		2.3	1.2	1.5	1.7
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		0.10	0.11	0.11	0.12
Nitrate (as N)	10		0.49	<0.10	<0.10	<0.10
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.8	7.2	7.1	8.2
Sulphate	500		27.0	38.0	37.0	37.0
Temperature (C)	15		5.5	6.5	6.0	7.5
TKN			0.37	0.19	1.04	0.35
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.29	0.30	0.15	0.19	0.28
Bromide		0.55	<0.05	<0.05	<0.05	0.14
Chloride	250	13.0	13.0	13.0	13.0	20.0
Conductivity (uS/cm)		395	370	400	470	235
DOC	5	1.4	2.0	1.6	1.3	3.3
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.13	0.13	0.16	0.14	0.14
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.0	5.8	7.1	7.4	7.6
Sulphate	500	37.0	37.0	38.0	38.0	35.0
Temperature (C)	15	7.5	8.0	8.0	7.0	10.5
TKN		0.31	0.38	0.27	0.45	0.33
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.28	0.16	0.28	0.28	0.10
Bromide		<0.05	<0.05	<0.05	0.07	<0.05
Chloride	250	21.0	15.0	16.0	16.0	14.0
Conductivity (uS/cm)		330	300	350	320	280
DOC	5	1.0	1.1	1.5	1.5	1.7
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.53	0.59	0.57	0.15	0.56
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.8	7.1	7.6	7.8	8.2
Sulphate	500	40.0	45.0	45.0	39.0	43.0
Temperature (C)	15	7.0	8.0	7.5	5.0	5.0
TKN		0.52	0.16	0.40	0.29	0.17
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3** Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.33	0.45	0.17	0.17	0.17
Bromide		<0.05	<0.05	0.07	0.10	<0.05
Chloride	250	12.0	13.0	14.0	17.0	17.0
Conductivity (uS/cm)		320	350	360	410	440
DOC	5	1.5	2.5	2.2	1.0	1.8
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.54	0.48	0.14	0.11	0.13
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.0	6.8	7.8	8.0	7.6
Sulphate	500	41.0	42.0	40.0	39.0	38.0
Temperature (C)	15	9.0	9.5	9.0	10.0	11.0
TKN		0.36	0.56	0.47	0.26	0.30
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-3**

Sheet: 6

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.21	0.21	0.20	0.18
Bromide		<0.05	<0.05	<0.05	<0.05
Chloride	250	16.0	16.0	13.0	13.0
Conductivity (uS/cm)		390	270	290	320
DOC	5	1.0	1.5	2.4	2.2
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.12	<0.10	<0.10	0.54
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.0	8.3	7.9	8.2
Sulphate	500	38.0	39.0	37.0	38.0
Temperature (C)	15	12.5	10.5	8.0	8.0
TKN		0.26	0.36	0.40	0.27
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.89	0.29	1.28	1.61	Frozen
Bromide		3.52	6.37	5.19	<0.05	
Chloride	250	591.0	1160.0	1030.0	1030.0	
Conductivity (uS/cm)		2080	3760	3310	310	
DOC	5	6.2	6.0	3.9	5.8	
Escherichia coli (per 100mL)	0	<10	1	0	0	
Fluoride	1.5	0.17	0.20	0.22	0.22	
Nitrate (as N)	10	0.32	<0.10	<0.10	<0.10	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.6	7.6	7.7	7.7	
Phosphorus (dissolved reactive)						
Phosphorus (total)		0.05	18.10	0.60	0.09	
Sulphate	500	36.0	8.0	8.0	5.0	
Temperature (C)	15		13.0		5.5	
TKN		2.35	1.66	1.49	1.88	
Unionized Ammonia		<0.02	<0.02	<0.02	0.02	

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.33	0.36	0.68	0.17
Bromide			<0.05	<0.05	<0.05	3.75
Chloride	250		20.0	23.0	205.0	497.0
Conductivity (uS/cm)			390	410	850	1600
DOC	5		2.5	1.5	2.2	2.2
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		0.10	0.11	0.23	0.22
Nitrate (as N)	10		0.44	<0.10	<0.10	0.41
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.8	7.2	7.6	8.0
Phosphorus (dissolved reactive)						
Phosphorus (total)			5.73	6.34	0.89	5.25
Sulphate	500		28.0	35.0	48.0	25.0
Temperature (C)	15		6.0	6.0	5.5	10.0
TKN			0.37	0.42	0.80	0.44
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		1.65	1.27	1.59	1.71	1.94
Bromide		<0.05	6.23	13.40	6.75	4.46
Chloride	250	653.0	993.0	1200.0	1320.0	1130.0
Conductivity (uS/cm)		2150	2900	3200	4150	2600
DOC	5	3.5	4.1	3.3	3.2	3.4
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.19	0.23	0.26	0.23	0.21
Nitrate (as N)	10	2.23	0.40	0.28	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	0.13	0.10
pH (pH units)	6.5-8.5	6.9	6.9	7.1	7.4	7.6
Phosphorus (dissolved reactive)					0.03	0.06
Phosphorus (total)		3.31	1.08	5.40	5.66	2.16
Sulphate	500	19.0	8.0	5.0	5.0	6.0
Temperature (C)	15	8.0	7.5	9.0	8.0	9.0
TKN		1.54	1.69	1.70	1.89	1.94
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		1.43	1.29	1.45	1.30	0.60
Bromide		2.34	4.35	4.64	4.07	1.82
Chloride	250	1090.0	1000.0	1020.0	902.0	725.0
Conductivity (uS/cm)		2900	2700	3100	3350	2100
DOC	5	3.4	3.1	2.9	2.4	2.9
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.47	0.53	0.62	0.62	0.65
Nitrate (as N)	10	0.69	0.57	0.32	1.61	0.21
Nitrite (as N)	1	0.54	1.16	0.14	0.50	0.17
pH (pH units)	6.5-8.5	7.2	7.0	7.6	7.4	7.9
Phosphorus (dissolved reactive)		0.05	0.06	0.07	0.12	0.08
Phosphorus (total)		7.78	0.31	4.20	4.04	2.19
Sulphate	500	11.0	12.0	13.0	16.0	20.0
Temperature (C)	15	4.0	7.0	6.5	5.0	6.0
TKN		1.97	1.29	1.81	1.55	1.09
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4**

Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.97	1.47	0.97	1.44	1.48
Bromide		2.41	3.14	2.18	4.93	5.90
Chloride	250	583.0	824.0	570.0	1100.0	1280.0
Conductivity (uS/cm)		1750	2400	2000	2400	4000
DOC	5	1.7	3.4	2.4	3.3	3.7
Escherichia coli (per 100mL)	0	0	0	0	1	0
Fluoride	1.5	0.64	0.55	0.23	0.15	0.25
Nitrate (as N)	10	0.15	0.19	0.36	<0.10	0.35
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.1	7.0	7.9	7.9	7.4
Phosphorus (dissolved reactive)		0.09	0.09	0.11	0.14	0.21
Phosphorus (total)		3.40	3.34	4.90	2.74	3.44
Sulphate	500	24.0	15.0	19.0	7.0	6.0
Temperature (C)	15	9.0	9.5	10.0	12.0	11.0
TKN		1.03	1.57	1.19	1.65	1.70
Unionized Ammonia		<0.02	<0.02	<0.02	0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-4**

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		1.79	1.69	1.57	1.56
Bromide		<0.05	4.87	4.61	4.00
Chloride	250	1190.0	1060.0	1050.0	997.0
Conductivity (uS/cm)		3500	2800	2800	2700
DOC	5	2.8	3.5	4.5	3.6
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.64	0.37	0.11	0.48
Nitrate (as N)	10	1.31	0.10	0.10	0.27
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.7	8.2	7.8	8.4
Phosphorus (dissolved reactive)		0.17	0.20	0.16	0.19
Phosphorus (total)		3.60	6.20	5.02	2.63
Sulphate	500	8.0	13.0	8.0	11.0
Temperature (C)	15	12.0	9.0	7.0	8.0
TKN		1.94	1.95	1.84	1.76
Unionized Ammonia		0.02	0.04	<0.02	0.06

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.59	0.29	0.32	0.51	Frozen
Bromide		0.32	0.11	0.13	<0.05	
Chloride	250	77.0	21.0	29.0	7.0	
Conductivity (uS/cm)		588	329	345	600	
DOC	5	4.5	2.3	3.0	2.1	
Escherichia coli (per 100mL)	0	10	0	0	1	
Fluoride	1.5	<0.10	0.14	0.14	0.11	
Nitrate (as N)	10	0.21	0.20	0.24	<0.10	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.8	7.7	7.8	7.7	
Phosphorus (dissolved reactive)						
Phosphorus (total)		0.04	0.05	0.08	1.36	
Sulphate	500	39.0	26.0	24.0	47.0	
Temperature (C)	15		10.0		5.0	
TKN		3.65	0.52	0.46	0.68	
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5**

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.37	0.34	0.02	0.15
Bromide			<0.05	0.20	<0.05	<0.05
Chloride	250		15.0	28.0	5.0	17.0
Conductivity (uS/cm)			360	415	255	310
DOC	5		2.6	1.6	1.2	1.7
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		<0.10	0.11	0.11	0.11
Nitrate (as N)	10		0.32	<0.10	<0.10	0.21
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.7	6.9	7.6	8.0
Phosphorus (dissolved reactive)						
Phosphorus (total)			6.17	7.21	4.46	0.50
Sulphate	500		35.0	35.0	23.0	28.0
Temperature (C)	15		6.0	6.0	6.0	6.0
TKN			0.62	0.42	0.14	0.31
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.11	0.13	0.10	0.26	0.82
Bromide		0.57	0.10	<0.05	0.34	1.71
Chloride	250	16.0	22.0	20.0	62.0	360.0
Conductivity (uS/cm)		360	300	340	450	1025
DOC	5	1.7	1.4	1.1	1.0	1.1
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.12	0.13	0.14	0.14	0.16
Nitrate (as N)	10	0.25	0.22	0.19	0.12	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.3	5.0	7.2	7.3	7.7
Phosphorus (dissolved reactive)					<0.01	0.02
Phosphorus (total)		5.71	1.75	4.15	2.09	2.48
Sulphate	500	27.0	26.0	25.0	27.0	19.0
Temperature (C)	15	9.0	7.0	9.0	8.5	8.0
TKN		0.27	0.13	0.29	0.45	0.98
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.70	0.75	0.89	0.55	0.37
Bromide		1.43	1.90	1.75	0.89	0.65
Chloride	250	400.0	468.0	400.0	216.0	285.0
Conductivity (uS/cm)		1200	1400	1750	1300	1100
DOC	5	1.2	1.5	1.2	0.9	1.8
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.53	0.53	0.64	0.51	0.69
Nitrate (as N)	10	0.12	0.13	<0.10	0.15	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.4	7.1	8.2	7.7	8.3
Phosphorus (dissolved reactive)		0.02	0.01	<0.01	0.12	0.03
Phosphorus (total)		2.41	0.09	4.76	4.27	2.58
Sulphate	500	24.0	23.0	25.0	29.0	28.0
Temperature (C)	15	4.5	7.0	8.5	5.0	5.0
TKN		0.88	0.77	1.22	0.57	0.55
Unionized Ammonia		<0.02	<0.02	0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5** Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.32	0.26	0.17	0.13	0.14
Bromide		0.25	0.14	0.12	0.16	<0.05
Chloride	250	59.0	31.0	32.0	32.0	52.0
Conductivity (uS/cm)		480	400	370	420	520
DOC	5	1.4	1.9	1.5	1.2	1.5
Escherichia coli (per 100mL)	0	0	0	0	1	0
Fluoride	1.5	0.57	0.46	0.14	0.10	0.12
Nitrate (as N)	10	0.10	0.22	0.27	0.21	0.17
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.6	7.1	8.4	8.2	7.6
Phosphorus (dissolved reactive)		0.02	<0.01	0.07	0.03	0.12
Phosphorus (total)		1.72	0.21	4.48	6.57	14.30
Sulphate	500	30.0	30.0	26.0	25.0	26.0
Temperature (C)	15	8.0	9.5	9.5	9.0	12.0
TKN		0.36	0.93	0.36	0.22	0.14
Unionized Ammonia		<0.02	0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-5** Sheet: 6

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.22	0.42	0.62	0.57
Bromide		<0.05	1.29	2.09	2.04
Chloride	250	85.0	270.0	406.0	415.0
Conductivity (uS/cm)		520	940	1200	1200
DOC	5	0.5	1.1	2.0	1.9
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.12	0.56	0.12	0.62
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.0	8.2	8.0	8.2
Phosphorus (dissolved reactive)		0.04	0.07	0.05	0.06
Phosphorus (total)		14.20	19.80	3.90	7.16
Sulphate	500	26.0	25.0	19.0	29.0
Temperature (C)	15	11.0	9.0	7.0	7.0
TKN		0.30	0.55	0.99	0.80
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6** Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.77	0.81	0.95	0.89	Frozen
Bromide		<0.05	1.25	1.30	1.07	
Chloride	250	195.0	182.0	199.0	263.0	
Conductivity (uS/cm)		847	821	838	600	
DOC	5	2.3	2.3	2.2	1.7	
Escherichia coli (per 100mL)	0	<10	0	0	0	
Fluoride	1.5	<0.10	0.19	0.22	<0.10	
Nitrate (as N)	10	<0.10	<0.10	<0.10	1.00	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	8.0	6.9	8.1	7.7	
Sulphate	500	<3.0	4.0	3.0	21.0	
Temperature (C)	15		10.0		5.0	
TKN		2.87	1.12	1.11	1.24	
Unionized Ammonia		<0.02	0.03	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		0.76	0.75	0.80	0.43	0.30
Bromide		1.36	0.75	2.46	<0.05	0.76
Chloride	250	215.0	150.0	189.0	32.0	136.0
Conductivity (uS/cm)		700	600	600	420	550
DOC	5	1.0	3.1	2.1	1.8	2.7
Escherichia coli (per 100mL)	0	0	0	<10	<10	<10
Fluoride	1.5	0.18	0.19	0.27	0.15	0.18
Nitrate (as N)	10	0.19	<0.10	0.18	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.0	7.6	7.3	7.2	8.1
Sulphate	500	3.0	11.0	5.0	26.0	11.0
Temperature (C)	15	6.5	5.5	5.5	5.5	9.0
TKN		0.83	0.78	1.08	0.71	0.63
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.94	0.84	0.85	0.90	1.10
Bromide		0.48	0.76	1.32	0.94	1.06
Chloride	250	194.0	208.0	196.0	197.0	201.0
Conductivity (uS/cm)		600	550	650	750	390
DOC	5	1.1	2.1	1.2	0.9	1.6
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.20	0.22	0.24	0.22	0.24
Nitrate (as N)	10	0.59	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.1	6.2	7.0	7.5	8.2
Sulphate	500	6.0	4.0	4.0	4.0	4.0
Temperature (C)	15	11.5	7.0	10.0	9.0	9.5
TKN		0.93	0.94	0.86	1.07	1.19
Unionized Ammonia		0.02	<0.02	<0.02	<0.02	0.03

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.97	1.13	1.15	1.23	0.39
Bromide		0.91	1.11	1.10	1.02	0.37
Chloride	250	223.0	226.0	222.0	223.0	149.0
Conductivity (uS/cm)		600	575	520	560	380
DOC	5	1.2	1.6	1.3	1.0	2.1
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.65	0.61	0.60	0.56	0.31
Nitrate (as N)	10	<0.10	0.25	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.1	7.5	8.4	7.8	8.3
Sulphate	500	8.0	9.0	8.0	8.0	15.0
Temperature (C)	15	7.0	6.5	6.0	5.0	4.0
TKN		1.10	1.15	1.17	1.29	0.54
Unionized Ammonia		<0.02	<0.02	0.04	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6**

Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.81	1.09	0.74	0.71	0.71
Bromide		0.34	0.34	0.69	0.93	1.03
Chloride	250	76.0	70.0	170.0	196.0	210.0
Conductivity (uS/cm)		400	380	640	800	800
DOC	5	2.7	2.9	2.6	1.1	2.0
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.59	0.60	0.23	0.20	0.22
Nitrate (as N)	10	<0.10	0.17	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.2	7.0	7.9	8.3	7.8
Sulphate	500	25.0	28.0	12.0	7.0	5.0
Temperature (C)	15	10.0	10.0	8.0	11.5	11.0
TKN		0.88	1.44	1.00	0.72	1.01
Unionized Ammonia		0.02	0.03	<0.02	0.03	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-6** Sheet: 6

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.80	0.86	0.90	0.98
Bromide		<0.05	0.76	0.97	0.93
Chloride	250	222.0	223.0	235.0	239.0
Conductivity (uS/cm)		680	640	620	730
DOC	5	0.9	1.1	2.7	2.4
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.13	0.18	0.29	0.76
Nitrate (as N)	10	1.19	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.2	8.5	7.8	8.5
Sulphate	500	9.0	3.0	3.0	6.0
Temperature (C)	15	12.5	10.0	7.5	7.5
TKN		1.07	1.25	1.24	1.11
Unionized Ammonia		0.03	0.05	<0.02	0.05

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7** Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		0.39	0.68	0.56	0.58	Frozen
Bromide		0.05	0.20	0.15	<0.05	
Chloride	250	28.0	52.0	29.0	21.0	
Conductivity (uS/cm)		385	451	370	270	
DOC	5	3.9	3.8	5.1	5.3	
Escherichia coli (per 100mL)	0	<10	1	0	0	
Fluoride	1.5	<0.10	0.21	0.19	0.17	
Nitrate (as N)	10	<0.10	<0.10	<0.10	0.32	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.7	7.1	7.9	7.6	
Sulphate	500	29.0	18.0	21.0	30.0	
Temperature (C)	15		12.0		6.5	
TKN		2.41	0.94	0.78	0.90	
Unionized Ammonia		<0.02	0.02	<0.02	<0.02	

All values reported in mg/L unless otherwise noted.

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Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.60	0.56	0.33	0.30
Bromide			0.07	<0.05	0.25	<0.05
Chloride	250		29.0	22.0	17.0	21.0
Conductivity (uS/cm)			400	250	335	300
DOC	5		2.5	4.4	3.6	4.2
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		0.12	0.15	0.16	0.15
Nitrate (as N)	10		0.37	<0.10	<0.10	<0.10
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.7	7.2	7.1	8.1
Sulphate	500		31.0	29.0	37.0	32.0
Temperature (C)	15		6.0	5.5	5.5	6.0
TKN			0.64	0.79	0.85	0.44
Unionized Ammonia			<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		0.58	0.57	0.37	0.46	0.66
Bromide		0.75	0.09	0.15	0.21	0.10
Chloride	250	20.0	21.0	30.0	27.0	19.0
Conductivity (uS/cm)		365	335	450	455	220
DOC	5	3.5	3.6	2.3	2.1	2.8
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	0.16	0.17	0.21	0.20	0.17
Nitrate (as N)	10	<0.10	<0.10	<0.10	0.14	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.9	6.3	7.3	7.3	7.8
Sulphate	500	31.0	27.0	22.0	22.0	24.0
Temperature (C)	15	9.0	8.5	10.0	9.5	11.5
TKN		0.73	0.71	0.57	0.65	0.74
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7** Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.56	0.46	0.55	0.62	0.28
Bromide		<0.05	<0.05	<0.05	<0.05	0.07
Chloride	250	16.0	13.0	13.0	14.0	15.0
Conductivity (uS/cm)		300	260	315	300	225
DOC	5	3.0	3.4	3.4	3.4	4.0
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.58	0.55	0.56	0.50	0.25
Nitrate (as N)	10	0.19	0.17	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.8	7.4	7.8	7.6	8.2
Sulphate	500	29.0	28.0	30.0	28.0	26.0
Temperature (C)	15	8.5	7.0	6.5	5.0	5.0
TKN		0.70	0.77	0.75	0.78	0.48
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7** Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		0.56	0.78	0.48	0.40	0.44
Bromide		<0.05	<0.05	0.08	0.07	<0.05
Chloride	250	13.0	15.0	17.0	17.0	22.0
Conductivity (uS/cm)		290	300	320	360	410
DOC	5	4.8	4.8	2.0	3.2	4.3
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.57	0.49	0.17	0.22	0.16
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	8.2	6.7	7.9	7.9	7.6
Sulphate	500	26.0	31.0	26.0	26.0	25.0
Temperature (C)	15	9.0	9.5	10.0	12.5	13.0
TKN		0.66	1.00	0.87	0.59	0.47
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

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FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-7**

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		0.44	0.53	0.52	0.46
Bromide		<0.05	0.08	<0.05	<0.05
Chloride	250	42.0	88.0	137.0	126.0
Conductivity (uS/cm)		370	420	440	540
DOC	5	2.7	3.1	3.8	4.1
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.15	<0.10	0.10	0.63
Nitrate (as N)	10	<0.10	<0.10	<0.10	<0.10
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	7.8	8.0	7.8	7.8
Sulphate	500	24.0	25.0	25.0	28.0
Temperature (C)	15	12.0	11.5	7.5	8.0
TKN		0.69	0.91	0.82	0.84
Unionized Ammonia		<0.02	<0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8**

Sheet: 1

Date Sampled:		10-Aug-2000	13-Sep-2000	05-Oct-2000	10-Nov-2000	11-Dec-2000
Parameter	ODWS/O					
Ammonia (as N)		3.58	4.19	4.41	4.07	Frozen
Bromide		12.40	10.60	10.60	0.33	
Chloride	250	3560.0	2940.0	3260.0	3800.0	
Conductivity (uS/cm)		10300	10100	10200	8200	
DOC	5	15.6	14.1	13.6	14.4	
Escherichia coli (per 100mL)	0	<10	0	0	0	
Fluoride	1.5	<0.10	<0.10	<0.10	0.30	
Nitrate (as N)	10	<0.10	<0.10	<0.10	3.45	
Nitrite (as N)	1	<0.10	<0.10	<0.10	<0.10	
pH (pH units)	6.5-8.5	7.9	7.4	7.7	7.4	
Sulphate	500	90.0	113.0	100.0	203.0	
Temperature (C)	15		10.0		5.0	
TKN		9.76	4.23	4.66	5.55	
Unionized Ammonia		0.04	0.16	0.05	0.05	

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8** Sheet: 2

Date Sampled:		17-Jan-2001	19-Feb-2001	21-Mar-2001	20-Apr-2001	11-May-2001
Parameter	ODWS/O					
Ammonia (as N)		Frozen	0.47	0.20	3.58	3.88
Bromide			0.49	<0.05	<0.05	29.40
Chloride	250		129.0	13.0	3450.0	3760.0
Conductivity (uS/cm)			500	390	>5000	>5000
DOC	5		2.1	1.4	12.1	12.3
Escherichia coli (per 100mL)	0		0	<10	<10	<10
Fluoride	1.5		0.19	0.12	<0.10	<0.10
Nitrate (as N)	10		0.25	<0.10	<0.10	<0.10
Nitrite (as N)	1		<0.10	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5		7.8	6.0	7.5	7.8
Sulphate	500		17.0	38.0	68.0	62.0
Temperature (C)	15		5.5	6.5	5.5	8.0
TKN			0.58	0.30	1.65	4.35
Unionized Ammonia			<0.02	<0.02	<0.02	0.04

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8** Sheet: 3

Date Sampled:		15-Jun-2001	13-Jul-2001	24-Aug-2001	19-Sep-2001	18-Oct-2001
Parameter	ODWS/O					
Ammonia (as N)		3.94	3.35	4.19	4.48	4.08
Bromide		<0.05	20.40	30.60	16.00	16.50
Chloride	250	5100.0	3610.0	4600.0	4800.0	4570.0
Conductivity (uS/cm)		>5000	>5000	>5000	>5000	>5000
DOC	5	13.3	11.9	11.2	12.1	11.6
Escherichia coli (per 100mL)	0	<10	<10	0	<10	0
Fluoride	1.5	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate (as N)	10	<0.10	0.70	0.18	0.53	0.14
Nitrite (as N)	1	<0.10	0.27	<0.10	0.19	<0.10
pH (pH units)	6.5-8.5	7.7	6.3	6.9	7.5	7.4
Sulphate	500	62.0	65.0	42.0	34.0	25.0
Temperature (C)	15	8.5	8.0	9.0	8.0	9.0
TKN		3.36	3.37	4.72	5.11	4.37
Unionized Ammonia		0.03	0.04	<0.02	0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8**

Sheet: 4

Date Sampled:		13-Nov-2001	18-Dec-2001	24-Jan-2002	13-Feb-2002	15-Mar-2002
Parameter	ODWS/O					
Ammonia (as N)		0.05	2.50	3.68	3.55	3.03
Bromide		<0.05	16.70	<0.05	<0.05	10.70
Chloride	250	4290.0	4100.0	3920.0	3680.0	3160.0
Conductivity (uS/cm)		>5000	>5000	>5000	>5000	>5000
DOC	5	12.3	13.2	10.8	9.8	11.9
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	<0.10	<0.10	<0.10	<0.10	0.28
Nitrate (as N)	10	1.16	0.73	0.21	0.95	0.59
Nitrite (as N)	1	<0.10	<0.10	<0.10	0.26	0.23
pH (pH units)	6.5-8.5	7.3	6.9	7.1	7.8	7.1
Sulphate	500	46.0	54.0	82.0	103.0	133.0
Temperature (C)	15	8.0	7.5	9.0	5.0	7.0
TKN		3.61	4.22	4.83	3.97	3.18
Unionized Ammonia		<0.02	<0.02	<0.02	0.03	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8**

Sheet: 5

Date Sampled:		18-Apr-2002	15-May-2002	25-Jun-2002	23-Jul-2002	19-Aug-2002
Parameter	ODWS/O					
Ammonia (as N)		2.88	2.76	3.31	3.49	2.81
Bromide		17.30	11.00	0.30	12.30	13.80
Chloride	250	3060.0	3320.0	34.0	3500.0	3870.0
Conductivity (uS/cm)		>5000	8400	>5000	>5000	>10000
DOC	5	11.6	11.7	9.8	11.6	12.7
Escherichia coli (per 100mL)	0	0	0	0	0	0
Fluoride	1.5	0.26	<0.10	0.73	<0.10	<0.10
Nitrate (as N)	10	0.39	0.95	<0.10	0.31	0.95
Nitrite (as N)	1	<0.10	1.41	<0.10	<0.10	<0.10
pH (pH units)	6.5-8.5	6.8	6.9	7.4	7.6	7.3
Sulphate	500	137.0	122.0	28.0	104.0	90.0
Temperature (C)	15	12.0	11.0	14.0	14.0	14.0
TKN		4.81	2.96	3.66	4.15	3.71
Unionized Ammonia		<0.02	<0.02	0.02	<0.02	<0.02

All values reported in mg/L unless otherwise noted.

Golder Associates

FOURNIER SEWAGE SYSTEM (NATION MUNICIPALITY) - REPORT OF MONITORING RESULTS

Sample Source: **MW 99-8** Sheet: 6

Date Sampled:		26-Sep-2002	23-Oct-2002	24-Nov-2002	12-Dec-2002
Parameter	ODWS/O				
Ammonia (as N)		4.15	3.90	2.53	2.53
Bromide		<0.05	19.20	13.10	19.60
Chloride	250	3940.0	3920.0	4140.0	3920.0
Conductivity (uS/cm)		>5000	>5000	>5000	>5000
DOC	5	11.1	12.6	13.1	12.4
Escherichia coli (per 100mL)	0	0	0	0	0
Fluoride	1.5	0.33	<0.10	<0.10	0.29
Nitrate (as N)	10	7.74	0.81	0.59	1.11
Nitrite (as N)	1	1.41	0.23	<0.10	0.62
pH (pH units)	6.5-8.5	7.4	7.5	7.6	7.9
Sulphate	500	66.0	62.0	61.0	76.0
Temperature (C)	15	12.5	10.0	8.0	9.5
TKN		5.16	4.64	3.41	3.18
Unionized Ammonia		0.02	0.02	0.02	0.04

All values reported in mg/L unless otherwise noted.

APPENDIX C

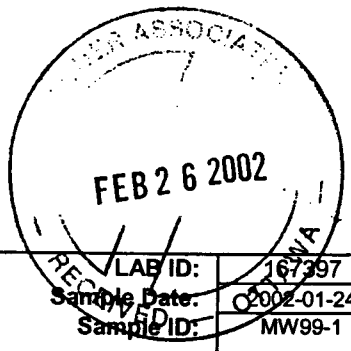
REPORT OF ANALYSIS SHEETS
ACCUTEST LABORATORIES LTD.

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis



Report Number: 2200875
Date: 2002-02-05
Date Submitted: 2002-01-24

Project: 001-2772

P.O. Number:
Matrix: Groundwater

	LAB ID:	167397	167398	167399	167400	167401
	Sample Date:	2002-01-24	2002-01-24	2002-01-24	2002-01-24	2002-01-24
	Sample ID:	MW99-1	S-1 DUPLICATE MW 99-1	MW99-2	MW99-3	MW99-4
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	<0.05	<0.05	0.09	<0.05	4.64
Cl	mg/L	1	296	300	15	16	1020
DOC	mg/L	0.5	1.9	1.7	1.8	1.5	2.9
Escherichia Coli	ct/100mL		0	0	0	0	0
F	mg/L	0.10	0.49	0.56	0.51	0.57	0.62
N-NH3	mg/L	0.02	0.25	0.22	0.36	0.28	1.45
N-NH3 (unionized)	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	0.05
N-NO2	mg/L	0.10	1.36	1.42	<0.10	<0.10	0.14
N-NO3	mg/L	0.10	7.85	7.71	<0.10	<0.10	0.32
pH			7.93	8.01	8.17	8.23	8.13
SO4	mg/L	1	40	42	30	45	13
Total Kjeldahl Nitrogen	mg/L	0.05	0.34	0.30	0.36	0.40	1.81
Dissolved Reactive Phosphorus	mg/L	0.01					0.07
Total P	mg/L	0.01					4.20

MDL = Method Detection Limit INC = Incomplete
Comment:

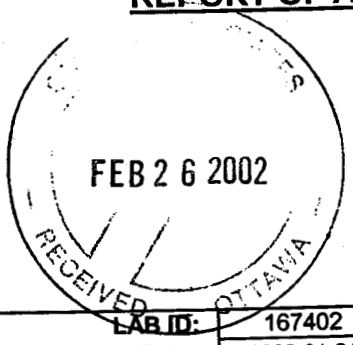
APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2200875
Date: 2002-02-05
Date Submitted: 2002-01-24

Project: 001-2772

P.O. Number:
Matrix: Groundwater

	LAB ID:	167402	167403	167404	167405	
	Sample Date:	2002-01-24	2002-01-24	2002-01-24	2002-01-24	
	Sample ID:	MW99-5	MW99-6	MW99-7	MW99-8	
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	1.75	1.10	<0.05	<0.05
Cl	mg/L	1	400	222	13	3920
Dissolved Reactive Phosphorus	mg/L	0.01	<0.01			
DOC	mg/L	0.5	1.2	1.3	3.4	10.8
Escherichia Coli	ct/100mL		0	0	0	0
F	mg/L	0.10	0.64	0.60	0.56	<0.10
N-NH3	mg/L	0.02	0.89	1.15	0.55	3.68
N-NH3 (unionized)	mg/L	0.02	0.04	0.04	0.02	0.13
N-NO2	mg/L	0.10	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10	<0.10	<0.10	<0.10	0.21
pH			8.17	8.23	8.14	7.99
SO4	mg/L	1	25	8	30	82
Total Kjeldahl Nitrogen	mg/L	0.05	1.22	1.17	0.75	4.83
Total P	mg/L	0.01	4.76			

MDL = Method Detection Limit INC = Incomplete

Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2201812
Date: 2002-02-26
Date Submitted: 2002-02-13

Project: 001-2772

P.O. Number:
Matrix: Groundwater

			LAB ID:	169898	169899	169900	169901	169902
			Sample Date:	2002-02-13	2002-02-13	2002-02-13	2002-02-13	2002-02-13
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	0.07	4.07	0.89
Cl	mg/L	1		312	13	16	902	216
DOC	mg/L	0.5		1.7	1.6	1.5	2.4	0.9
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.61	0.50	0.15	0.62	0.51
N-NH3	mg/L	0.02		0.16	0.23	0.28	1.30	0.55
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	<0.02	0.05	0.02
N-NO2	mg/L	0.10		0.66	<0.10	<0.10	0.50	<0.10
N-NO3	mg/L	0.10		11.8	<0.10	<0.10	1.61	0.15
pH				7.97	8.00	8.16	8.04	8.00
SO4	mg/L	1		43	30	39	16	29
Total Kjeldahl Nitrogen	mg/L	0.05		0.33	0.27	0.29	1.55	0.57
Dissolved Reactive Phosphorus	mg/L	0.01					0.12	0.12
Total P	mg/L	0.01					4.04	4.27

GOLDER ASSOCIATES
MAR - 6 2002
RECEIVED — OTTAWA

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2201812
Date: 2002-02-26
Date Submitted: 2002-02-13

Project: 001-2772

P.O. Number:
Matrix: Groundwater

	LAB ID:	169903	169904	169905	169906	
	Sample Date:	2002-02-13	2002-02-13	2002-02-13	2002-02-13	
	Sample ID:	MW99-6	MW99-7	MW99-8	MW99-9 DUPLICATE MW99-1	
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	1.02	<0.05	<0.05	<0.05
Cl	mg/L	1	223	14	3680	319
DOC	mg/L	0.5	1.0	3.4	9.8	2.2
Escherichia Coli	ct/100mL		0	0	0	0
F	mg/L	0.10	0.56	0.50	<0.10	0.52
N-NH3	mg/L	0.02	1.23	0.62	3.55	0.12
N-NH3 (unionized)	mg/L	0.02	0.04	0.02	0.13	<0.02
N-NO2	mg/L	0.10	<0.10	<0.10	0.26	0.72
N-NO3	mg/L	0.10	<0.10	<0.10	0.95	11.4
pH			8.20	8.02	7.94	7.90
SO4	mg/L	1	8	28	103	45
Total Kjeldahl Nitrogen	mg/L	0.05	1.29	0.78	3.97	0.45

GOLDER ASSOCIATES
MAR - 6 2002
RECEIVED — OTTAWA

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2203073
Date: 2002-03-22
Date Submitted: 2002-03-15

Project: 021-2735 Task 5000

P.O. Number:
Matrix: Groundwater

			LAB ID:	173385	173386	173387	173388	173389
			Sample Date:	2002-03-15	2002-03-15	2002-03-15	2002-03-15	2002-03-15
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	1.82	0.65
Cl	mg/L	1		332	10	14	725	285
DOC	mg/L	0.5		2.3	1.6	1.7	2.9	1.8
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.59	0.55	0.56	0.65	0.69
N-NH3	mg/L	0.02		0.09	0.10	0.10	0.60	0.37
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	<0.02	0.02	<0.02
N-NO2	mg/L	0.10		2.02	<0.10	<0.10	0.17	<0.10
N-NO3	mg/L	0.10		11.6	<0.10	<0.10	0.21	<0.10
pH				7.92	8.05	8.14	8.07	8.07
SO4	mg/L	1		49	29	43	20	28
Total Kjeldahl Nitrogen	mg/L	0.05		0.14	0.10	0.17	1.09	0.55
Dissolved Reactive Phosphorus	mg/L	0.01					0.08	0.03
Total P	mg/L	0.01					2.19	2.58

GOLDER ASSOCIATES — APR 05 2002 — RECEIVED — OTTAWA

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2203073
Date: 2002-03-22
Date Submitted: 2002-03-15

Project: 021-2735 Task 5000

P.O. Number:
Matrix: Groundwater

			LAB ID:	173390	173391	173392	173393	
			Sample Date:	2002-03-15	2002-03-15	2002-03-15	2002-03-15	
			Sample ID:	MW99-6	MW99-7	MW99-8	5-9	
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		0.37	0.07	10.7	<0.05	
Cl	mg/L	1		149	15	3160	357	
DOC	mg/L	0.5		2.1	4.0	11.9	2.4	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.31	0.25	0.28	0.24	
N-NH3	mg/L	0.02		0.39	0.28	3.03	0.10	
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	0.11	<0.02	
N-NO2	mg/L	0.10		<0.10	<0.10	0.23	0.90	
N-NO3	mg/L	0.10		<0.10	<0.10	0.59	11.0	
pH				8.24	8.08	7.91	7.93	
SO4	mg/L	1		15	26	133	55	
Total Kjeldahl Nitrogen	mg/L	0.05		0.54	0.48	3.18	0.19	

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2204685
Date: 2002-05-01
Date Submitted: 2002-04-18

Project: 021-2735

P.O. Number:
Matrix: Groundwater

			LAB ID:	177622	177623	177624	177625	177626
			Sample Date:	2002-04-18	2002-04-18	2002-04-18	2002-04-18	2002-04-18
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	2.41	0.25
Cl	mg/L	1		326	10	12	583	59
DOC	mg/L	0.5		1.8	1.5	1.5	1.7	1.4
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.49	0.47	0.54	0.64	0.57
N-NH3	mg/L	0.02		0.10	0.20	0.33	0.97	0.32
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	<0.02	0.04	<0.02
N-NO2	mg/L	0.10		2.05	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		11.5	<0.10	<0.10	0.15	0.10
pH				8.22	8.44	8.40	8.43	8.46
SO4	mg/L	1		53	27	41	24	30
Total Kjeldahl Nitrogen	mg/L	0.05		0.32	0.26	0.36	1.03	0.36
Dissolved Reactive Phosphorus	mg/L	0.01					0.09	0.02
Total P	mg/L	0.01					3.40	1.72

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2204685
Date: 2002-05-01
Date Submitted: 2002-04-18

Project: 021-2735

P.O. Number:
Matrix: Groundwater

			LAB ID:	177627	177628	177629	177630	
			Sample Date:	2002-04-18	2002-04-18	2002-04-18	2002-04-18	
			Sample ID:	MW99-6	MW99-7	MW99-8	S-9	
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		0.34	<0.05	17.3	0.10	
Cl	mg/L	1		76	13	3060	329	
DOC	mg/L	0.5		2.7	4.8	11.6	2.0	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.59	0.57	0.26	0.53	
N-NH3	mg/L	0.02		0.81	0.56	2.88	0.07	
N-NH3 (unionized)	mg/L	0.02		0.03	0.02	0.11	<0.02	
N-NO2	mg/L	0.10		<0.10	<0.10	<0.10	2.10	
N-NO3	mg/L	0.10		<0.10	<0.10	0.39	11.5	
pH				8.57	8.43	8.41	8.21	
SO4	mg/L	1		25	26	137	53	
Total Kjeldahl Nitrogen	mg/L	0.05		0.88	0.66	4.81	0.36	

MDL = Method Detection Limit INC = Incomplete
Comment:

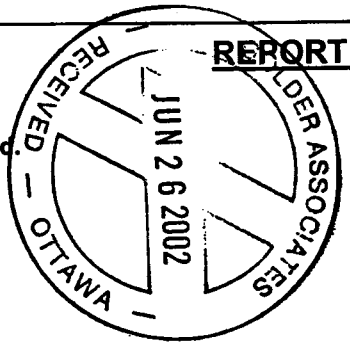
APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2206337
Date: 2002-06-03
Date Submitted: 2002-05-16

Project: 021-2735

P.O. Number: 200281
Matrix: Groundwater

			LAB ID:	182940	182941	182942	182943	
			Sample Date:	2002-05-15	2002-05-15	2002-05-15	2002-05-15	
			Sample ID:	MW99-6	MW99-7	MW99-8	Mw99-9	
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		0.34	<0.05	11.0	0.09	
Cl	mg/L	1		70	15	3320	318	
DOC	mg/L	0.5		2.9	4.8	11.7	3.3	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.60	0.49	<0.10	0.47	
N-NH3	mg/L	0.02		1.09	0.78	2.76	0.19	
N-NH3 (unionized)	mg/L	0.02		0.04	0.03	0.10	<0.02	
N-NO2	mg/L	0.10		<0.10	<0.10	1.41	1.30	
N-NO3	mg/L	0.10		0.17	<0.10	0.95	15.9	
pH				8.29	8.22	7.99	7.95	
SO4	mg/L	1		28	31	122	63	
Total Kjeldahl Nitrogen	mg/L	0.05		1.44	1.00	2.96	0.39	

MDL = Method Detection Limit INC = Incomplete

Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2206337
Date: 2002-06-03
Date Submitted: 2002-05-16

Project: 021-2735

P.O. Number: 200281
Matrix: Groundwater

			LAB ID:	182935	182936	182937	182938	182939
			Sample Date:	2002-05-15	2002-05-15	2002-05-15	2002-05-15	2002-05-15
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	3.14	0.14
Cl	mg/L	1		304	5	13	824	31
DOC	mg/L	0.5		3.2	2.7	2.5	3.4	1.9
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.50	0.52	0.48	0.55	0.46
N-NH3	mg/L	0.02		0.16	0.16	0.45	1.47	0.26
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	<0.02	0.06	<0.02
N-NO2	mg/L	0.10		1.47	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		14.9	<0.10	<0.10	0.19	0.22
pH				7.94	8.12	8.17	8.10	8.10
SO4	mg/L	1		57	32	42	15	30
Total Kjeldahl Nitrogen	mg/L	0.05		0.74	0.19	0.56	1.57	0.93
Dissolved Reactive Phosphorus	mg/L	0.01					0.09	<0.01
Total P	mg/L	0.01					3.34	0.21

MDL = Method Detection Limit INC = Incomplete

Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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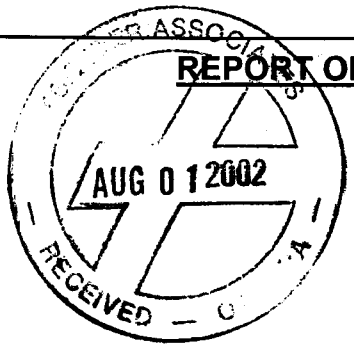

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2208674
Date: 2002-07-23
Date Submitted: 2002-06-26

Project: 021-2735

P.O. Number: 200281
Matrix: Groundwater

			LAB ID:	190780	190781	190782	190783	190784
			Sample Date:	2002-06-25	2002-06-25	2002-06-25	2002-06-25	2002-06-25
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	0.07	2.18	0.12
Cl	mg/L	1		301	7	14	570	32
DOC	mg/L	0.5		2.1	1.3	2.2	2.4	1.5
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.13	0.15	0.14	0.23	0.14
N-NH3	mg/L	0.02		0.07	0.11	0.17	0.97	0.17
N-NH3 (unionized)	mg/L	0.02		<0.02	<0.02	<0.02	0.04	<0.02
N-NO2	mg/L	0.10		1.45	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		16.2	0.10	<0.10	0.36	0.27
pH				7.90	8.02	8.09	7.83	7.96
SO4	mg/L	1		59	27	40	19	26
Total Kjeldahl Nitrogen	mg/L	0.05		0.31	0.32	0.47	1.19	0.36
Dissolved Reactive Phosphorus	mg/L	0.01					0.11	0.07
Total P	mg/L	0.01					4.90	4.48

MDL = Method Detection Limit INC = Incomplete

Comment:

This is a correction certificate and supercedes all previous copies of this report.
DOC results have been corrected.

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2208674
Date: 2002-07-23
Date Submitted: 2002-06-26

Project: 021-2735

P.O. Number: 200281
Matrix: Groundwater

			LAB ID:	190785	190786	190787	190788	
			Sample Date:	2002-06-25	2002-06-25	2002-06-25	2002-06-25	
			Sample ID:	MW99-6	MW99-7	MW99-8	MW99-9	
PARAMETER	UNITS	MDL						
Br	mg/L	0.05		0.69	0.08	0.30	0.08	
Cl	mg/L	1		170	17	34	297	
DOC	mg/L	0.5		2.6	2.0	9.8	2.5	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.23	0.17	0.73	0.12	
N-NH3	mg/L	0.02		0.74	0.48	3.31	0.09	
N-NH3 (unionized)	mg/L	0.02		0.03	<0.02	0.03	<0.02	
N-NO2	mg/L	0.10		<0.10	<0.10	<0.10	1.34	
N-NO3	mg/L	0.10		<0.10	<0.10	<0.10	16.2	
pH				8.12	8.00	7.86	7.84	
SO4	mg/L	1		12	26	28	59	
Total Kjeldahl Nitrogen	mg/L	0.05		1.00	0.87	3.66	0.38	

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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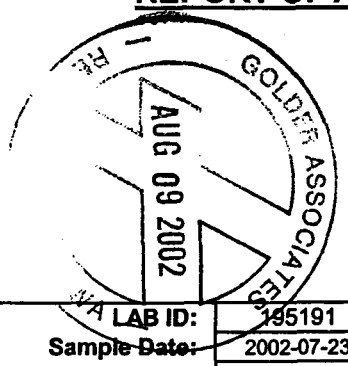
ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2210054
Date: 2002-08-01
Date Submitted: 2002-07-24

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

	LAB ID:	195191	195192	195193	195194	195195
	Sample Date:	2002-07-23	2002-07-23	2002-07-23	2002-07-23	2002-07-23
	Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	<0.05	<0.05	0.10	4.93	0.16
Cl	mg/L	1	289	12	17	1100	32
DOC	mg/L	0.5	2.6	1.5	1.0	3.3	1.2
Escherichia Coli	ct/100mL		0	0	0	1	1
F	mg/L	0.10	0.10	0.12	0.11	0.15	0.10
N-NH3	mg/L	0.02	0.07	0.08	0.17	1.44	0.13
N-NO2	mg/L	0.10	2.32	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10	23.7	<0.10	<0.10	<0.10	0.21
SO4	mg/L	1	59	26	39	7	25
Total Kjeldahl Nitrogen	mg/L	0.05	0.30	0.17	0.26	1.65	0.22
Dissolved Reactive Phosphorus	mg/L	0.01				0.14	0.03
Total P	mg/L	0.01				2.74	6.57

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL:

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608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2210054
Date: 2002-08-01
Date Submitted: 2002-07-24

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	195196	195197	195198	195199	
			Sample Date:	2002-07-23	2002-07-23	2002-07-23	2002-07-23	
			Sample ID:	MW99-6	MW99-7	MW99-8	S-9	
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		0.93	0.07	12.3	<0.05	
Cl	mg/L	1		196	17	3500	10	
DOC	mg/L	0.5		1.1	3.2	11.6	1.6	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.20	0.22	<0.10	0.12	
N-NH3	mg/L	0.02		0.71	0.40	3.49	0.08	
N-NO2	mg/L	0.10		<0.10	<0.10	<0.10	<0.10	
N-NO3	mg/L	0.10		<0.10	<0.10	0.31	<0.10	
SO4	mg/L	1		7	26	104	26	
Total Kjeldahl Nitrogen	mg/L	0.05		0.72	0.59	4.15	0.20	

MDL = Method Detection Limit INC = Incomplete

Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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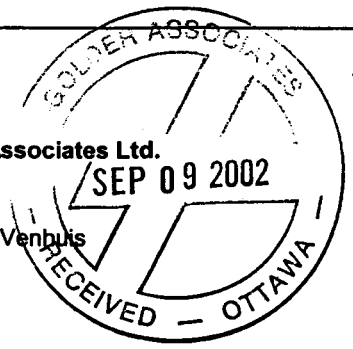
ACCUTEST LABORATORIES LTD.



REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2211280
Date: 2002-08-27
Date Submitted: 2002-08-19

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	199574	199575	199576	199577	199578
			Sample Date:	2002-08-19	2002-08-19	2002-08-19	2002-08-19	2002-08-19
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	5.90	<0.05
Cl	mg/L	1		321	10	17	1280	52
DOC	mg/L	0.5		2.6	1.9	1.8	3.7	1.5
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.14	0.14	0.13	0.25	0.12
N-NH3	mg/L	0.02		0.05	0.08	0.17	1.48	0.14
N-NO2	mg/L	0.10		1.44	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		22.1	<0.10	<0.10	0.35	0.17
SO4	mg/L	1		64	26	38	6	26
Total Kjeldahl Nitrogen	mg/L	0.05		0.39	0.20	0.30	1.70	0.14
Dissolved Reactive Phosphorus	mg/L	0.01					0.21	0.12
Total P	mg/L	0.01					3.44	14.3

MDL = Method Detection Limit INC = Incomplete

Comment:

Samples filtered for N-NH3 analysis.

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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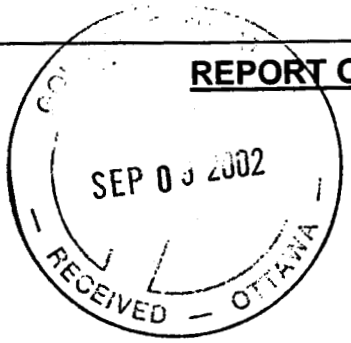
ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Mr. Michael Venhuis

Report Number: 2211280
Date: 2002-08-27
Date Submitted: 2002-08-19

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

	LAB ID:	199579	199580	199581	199582	
	Sample Date:	2002-08-19	2002-08-19	2002-08-19	2002-08-19	
	Sample ID:	MW99-6	MW99-7	MW99-8	MW99-9	
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	1.03	<0.05	13.8	<0.05
Cl	mg/L	1	210	22	3870	307
DOC	mg/L	0.5	2.0	4.3	12.7	3.4
Escherichia Coli	ct/100mL		0	0	0	0
F	mg/L	0.10	0.22	0.16	<0.10	0.13
N-NH3	mg/L	0.02	0.71	0.44	2.81	0.06
N-NO2	mg/L	0.10	<0.10	<0.10	<0.10	1.25
N-NO3	mg/L	0.10	<0.10	<0.10	0.95	21.4
SO4	mg/L	1	5	25	90	64
Total Kjeldahl Nitrogen	mg/L	0.05	1.01	0.47	3.71	0.16

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

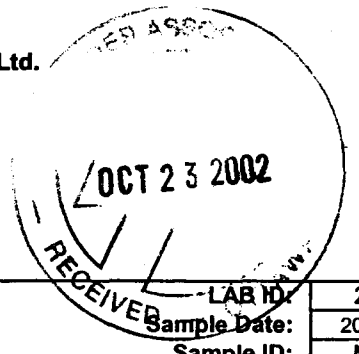
608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton



Report Number: 2213374
Date: 2002-10-15
Date Submitted: 2002-09-26

Project: 021-2735-5000

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	207313	207314	207315	207316	207317
			Sample Date:	2002-09-26	2002-09-26	2002-09-26	2002-09-26	2002-09-26
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05
Cl	mg/L	1		280	10	16	1190	85
DOC	mg/L	0.5		1.9	0.8	1.0	2.8	0.5
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		0.10	0.11	0.12	0.64	0.12
N-NH3	mg/L	0.02		0.07	0.08	0.21	1.79	0.22
N-NO2	mg/L	0.10		1.91	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		16.4	<0.10	<0.10	1.31	<0.10
SO4	mg/L	1		67	26	38	8	26
Total Kjeldahl Nitrogen	mg/L	0.05		0.39	0.22	0.26	1.94	0.30
Dissolved Reactive Phosphorus	mg/L	0.01					0.17	0.04
Total P	mg/L	0.01					3.60	14.2

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL:

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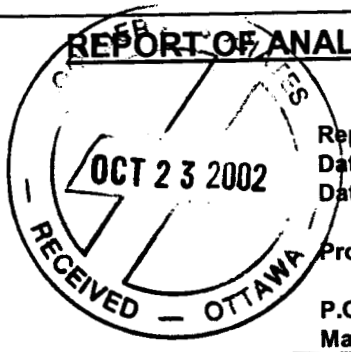
ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2213374
Date: 2002-10-15
Date Submitted: 2002-09-26
Project: 021-2735-5000
P.O. Number: 220037
Matrix: Groundwater

	LAB ID:	207318	207319	207320	207321	
	Sample Date:	2002-09-26	2002-09-26	2002-09-26	2002-09-26	
	Sample ID:	MW99-6	MW99-7	MW99-8	S-9	
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	<0.05	<0.05	<0.05	<0.05
Cl	mg/L	1	222	42	3940	268
DOC	mg/L	0.5	0.9	2.7	11.1	1.9
Escherichia Coli	ct/100mL		0	0	0	0
F	mg/L	0.10	0.13	0.15	0.33	0.11
N-NH3	mg/L	0.02	0.80	0.44	4.15	0.07
N-NO2	mg/L	0.10	<0.10	<0.10	1.41	2.62
N-NO3	mg/L	0.10	1.19	<0.10	7.74	17.0
SO4	mg/L	1	9	24	66	67
Total Kjeldahl Nitrogen	mg/L	0.05	1.07	0.69	5.16	0.39

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL:

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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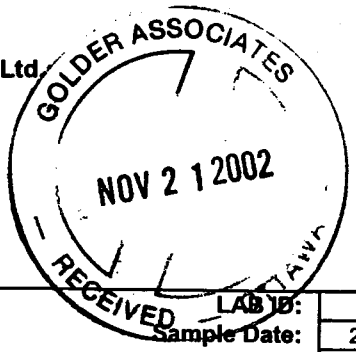
ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS



Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2214892
Date: 2002-11-05
Date Submitted: 2002-10-23

Project: 021-2735-5000

P.O. Number: 220037
Matrix: Groundwater

	LAB ID:	213197	213198	213199	213200	213201
	Sample Date:	2002-10-23	2002-10-23	2002-10-23	2002-10-23	2002-10-23
	Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	<0.05	<0.05	<0.05	4.87	1.29
Cl	mg/L	1	289	13	16	1060	270
DOC	mg/L	0.5	2.2	1.0	1.5	3.5	1.1
Escherichia Coli	ct/100mL		0	0	0	0	0
F	mg/L	0.10	<0.10	<0.10	<0.10	0.37	0.56
N-NH3	mg/L	0.02	0.10	0.08	0.21	1.69	0.42
N-NO2	mg/L	0.10	1.11	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10	17.8	<0.10	<0.10	0.10	<0.10
SO4	mg/L	1	68	27	39	13	25
Total Kjeldahl Nitrogen	mg/L	0.05	0.36	0.19	0.36	1.95	0.55
Dissolved Reactive Phosphorus	mg/L	0.01				0.20	0.07
Total P	mg/L	0.01				6.20	19.8

MDL = Method Detection Limit INC = Incomplete
Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

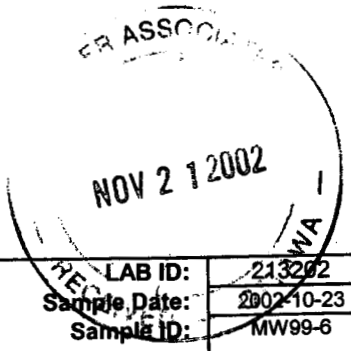
608 Norris Court, Kingston, ON, K7P

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton



Report Number: 2214892
Date: 2002-11-05
Date Submitted: 2002-10-23

Project: 021-2735-5000

P.O. Number: 220037
Matrix: Groundwater

	LAB ID:	213202	213203	213204	213205	
	Sample Date:	2002-10-23	2002-10-23	2002-10-23	2002-10-23	
	Sample ID:	MW99-6	MW99-7	MW99-8	S-9	
PARAMETER	UNITS	MDL				
Br	mg/L	0.05	0.76	0.08	19.2	<0.05
Cl	mg/L	1	223	88	3920	301
DOC	mg/L	0.5	1.1	3.1	12.6	2.5
Escherichia Coli	ct/100mL		0	0	0	0
F	mg/L	0.10	0.18	<0.10	<0.10	0.11
N-NH3	mg/L	0.02	0.86	0.53	3.90	0.11
N-NO2	mg/L	0.10	<0.10	<0.10	0.23	2.86
N-NO3	mg/L	0.10	<0.10	<0.10	0.81	16.7
SO4	mg/L	1	3	25	62	69
Total Kjeldahl Nitrogen	mg/L	0.05	1.25	0.91	4.64	0.34

MDL = Method Detection Limit INC = Incomplete

Comment:

APPROVAL: _____

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2216731
Date: 2002-12-05
Date Submitted: 2002-11-25

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	220262	220263	220264	220265	220266
			Sample Date:	2002-11-24	2002-11-24	2002-11-24	2002-11-24	2002-11-24
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	4.61	2.09
Cl	mg/L	1		280	15	13	1050	406
DOC	mg/L	0.5		3.4	2.3	2.4	4.5	2.0
Escherichia Coli	ct/100mL			0	0	0	0	0
F	mg/L	0.10		<0.10	<0.10	<0.10	0.11	0.12
N-NH3	mg/L	0.02		0.10	0.13	0.20	1.57	0.62
N-NO2	mg/L	0.10		<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		18.2	<0.10	<0.10	0.10	<0.10
SO4	mg/L	1		73	26	37	8	19
Total Kjeldahl Nitrogen	mg/L	0.05		0.52	0.48	0.40	1.84	0.99
Dissolved Reactive Phosphorus	mg/L	0.01					0.16	0.05
Total P	mg/L	0.01					5.02	3.90

MDL = Method Detection Limit INC = Incomplete Method references available upon request.
Comment:

APPROVAL: _____
Ewan McRobbie
Inorganic Lab Supervisor

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1 608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2216731
Date: 2002-12-05
Date Submitted: 2002-11-25

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	220267	220268	220269	220270	
			Sample Date:	2002-11-24	2002-11-24	2002-11-24	2002-11-24	
			Sample ID:	MW99-6	MW99-7	MW99-8	MW99-9	
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		0.97	<0.05	13.1	<0.05	
Cl	mg/L	1		235	137	4140	287	
DOC	mg/L	0.5		2.7	3.8	13.1	3.5	
Escherichia Coli	ct/100mL			0	0	0	0	
F	mg/L	0.10		0.29	0.10	<0.10	<0.10	
N-NH3	mg/L	0.02		0.90	0.52	2.53	0.10	
N-NO2	mg/L	0.10		<0.10	<0.10	<0.10	2.23	
N-NO3	mg/L	0.10		<0.10	<0.10	0.59	17.9	
SO4	mg/L	1		3	25	61	72	
Total Kjeldahl Nitrogen	mg/L	0.05		1.24	0.82	3.41	0.43	

MDL = Method Detection Limit INC = Incomplete Method references available upon request.
Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

608 Norris Court, Kingston, ON, K7P 2R9

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2217849
Date: 2002-12-30
Date Submitted: 2002-12-12

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	224678	224679	224680	224681	224682
			Sample Date:	2002-12-12	2002-12-12	2002-12-12	2002-12-12	2002-12-12
			Sample ID:	MW99-1	MW99-2	MW99-3	MW99-4	MW99-5
PARAMETER	**UNITS**	**MDL**						
Br	mg/L	0.05		<0.05	<0.05	<0.05	4.00	2.04
Cl	mg/L	1		304	8	13	997	415
DOC	mg/L	0.5		2.7	2.1	2.2	3.6	1.9
Escherichia Coli	ct/100 mL			0	0	0	0	0
F	mg/L	0.10		<0.10	0.43	0.54	0.48	0.62
N-NH3	mg/L	0.02		0.07	0.10	0.18	1.56	0.57
N-NO2	mg/L	0.10		1.68	<0.10	<0.10	<0.10	<0.10
N-NO3	mg/L	0.10		20.4	<0.10	<0.10	0.27	<0.10
SO4	mg/L	1		74	30	38	11	29
Total Kjeldahl Nitrogen	mg/L	0.05		0.46	0.17	0.27	1.76	0.80
Dissolved Reactive Phosphorus	mg/L	0.01					0.19	0.06
Total P	mg/L	0.01					2.63	7.16

MDL = Method Detection Limit INC = Incomplete Method references available upon request.

Comment:

APPROVAL: _____

Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD.

REPORT OF ANALYSIS

Client: Golder Associates Ltd.

ATT: Heather Fenton

Report Number: 2217849
Date: 2002-12-30
Date Submitted: 2002-12-12

Project: 021-2735

P.O. Number: 220037
Matrix: Groundwater

			LAB ID:	224683	224684	224685	224686	
			Sample Date:	2002-12-12	2002-12-12	2002-12-12	2002-12-12	
			Sample ID:	MW99-6	MW99-7	MW99-8	S-9	
PARAMETER	UNITS	MDL						
Br	mg/L	0.05		0.93	<0.05	19.6	<0.05	
Cl	mg/L	1		239	126	3920	297	
DOC	mg/L	0.5		2.4	4.1	12.4	3.1	
Escherichia Coli	ct/100 mL			0	0	0	0	
F	mg/L	0.10		0.76	0.63	0.29	0.56	
N-NH3	mg/L	0.02		0.98	0.46	2.53	0.09	
N-NO2	mg/L	0.10		<0.10	<0.10	0.62	1.37	
N-NO3	mg/L	0.10		<0.10	<0.10	1.11	20.7	
SO4	mg/L	1		6	28	76	79	
Total Kjeldahl Nitrogen	mg/L	0.05		1.11	0.84	3.18	0.46	

MDL = Method Detection Limit INC = Incomplete Method references available upon request.
Comment:

APPROVAL: _____
Ewan McRobbie
Inorganic Lab Supervisor

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1 608 Norris Court, Kingston, ON, K7P 2R9

APPENDIX D

CERTIFICATE OF APPROVAL (SEWAGE)
NO. 3-0436-99-006 DATED JUNE 11, 1999

Ontario

Ministry of the Environment | Ministère de l'Environnement

CERTIFICATE OF APPROVAL
SEWAGE
NUMBER 3-0436-99-006

Nation Municipality
958, Road 500 West, R.R. 3
Casselman, Ontario
K0A 1M0

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Sanitary sewers, sewage pumping stations, a sewage treatment and disposal system to be constructed to serve one hundred (100) dwellings located on part of Lot 1, Concession XIII, Village of Fournier in the Municipality of Nation (former Township of South Plantagenet) consisting of a recirculation sand filter, a sand filter recirculating system and a subsurface disposal system, rated at an average daily flow of 97,600 L/d, as follows:

SANITARY SEWERS

STREET	FROM	TO
County Road 10	Approx. 500 m W. of County Road 15	Approx. 195 m E. of St. Joseph Street
St. Joseph Street	County Road 10	Approx. 90 m N. of County Road 10
Union Street	Park Street	Approx. 125 m S. of Park Street
Park Street	Union Street	Park Street
County Road 15	County Road 10	Approx. 105 m N. of Park Street
Easement, approx. 105 m N. of Park Street	County Road 15	Approx. 85 m W. of County Road 15

SEWAGE PUMPING STATIONS

- a 2.4 mm diameter by 6 m deep underground Sewage Pumping Station A constructed on the south side of County Road 10 approximately 65 m west of St. Joseph Street consisting of two (one duty and one stand-by)

submersible pumps, each pump having a rated capacity of 1.27 L/s at a TDH of 11.0 m with a 1.2 kW electrical drive with a 100 mm diameter forcemain to discharge sewage to a manhole located at the intersection of County Road 10 and County Road 15;

- a 2.4 mm diameter by 6 m deep underground Sewage Pumping Station B constructed approximately 85 m west of County Road 15 and approximately 105 m north of Park Street consisting of two (one duty and one stand-by) submersible pumps, each pump having a rated capacity of 4.33 L/s at a TDH of 11.0 m with a 3.7 kW electrical drive with a 100 mm diameter forcemain to discharge sewage to the septic tanks described below;

- three (3) portable stand-by engine driven generators with a minimum continuous rating of 40 kW (electrical) per generator, provided and located in the municipal garage for the Nation Municipality to provide emergency power necessary to operate Sewage Pumping Stations A and B and septic system pumps and controls during power outage;

SEWAGE TREATMENT AND DISPOSAL SYSTEM

- four (4) 86,400 litre pre-cast concrete septic tanks, installed in series approximately 155 m west of Sewage Pumping Station B with septic tank effluent discharging to a biological sand filter recirculation tank described below, each septic tank equipped with an activated carbon filter at the vent and two (2) biotube effluent filters installed at the outlet of the fourth septic tank;

- a biological sand filter recirculating system installed immediately west of the fourth septic tank, consisting of a 86,400 litre pre-cast concrete tank, four (4) sets of two (2) alternating dosing pumps with four (4) distributing valve assemblies, four (4) sand filter return pumps with a recirculating valve assembly, and associated recirculating timer and flow control units for dosing septic tank effluent to the recirculation sand filter and recirculating sand filter effluent back to the recirculation tank, each dosing pump having a rated capacity of 1.9 L/s at a TDH of 18.9 m with a 0.37 kW electric drive with a 50 mm diameter forcemain to dose septic tank effluent onto the recirculation sand filter, each return pump having a rated capacity of 1.9 L/s at a TDH of 18.9 m with a 0.37 kW electric drive with a forcemain to return sand filter effluent to the recirculation tank;

- a 28.8 m by 21.0 m recirculation biological sand filter having a hydraulic loading of 6.8 L/m²/hr, constructed approximately 3.5 m south of the recirculation tank consisting of 600 mm deep sand media of effective size of 1 to 3 mm and uniformity coefficient of less than 2.0 in four (4) cells of six (6) zones, each cell having twelve (12) 25 mm diameter distribution pressure pipes of 21 m long connected to the distributing valve assembly at the front end of the sand filter and two (2) 100 mm diameter of perforated drain pipes at the bottom of the sand filter, each distribution pipe having thirty-five (35) 3.2 mm diameter orifices facing upward spaced at 600 mm interval and covered by orifice shields, installed on the sand filter surface, a pumping chamber located in the middle of each cell and connected the two perforated filter drain pipes to return the recirculation sand filter effluent to the recirculation tank;

- a 6,000 litre, pre-cast concrete leaching bed dosing chamber installed approximately 1 m north of the recirculation tank and equipped with two (2) sets of two (2) alternating submersible pumps, each pump having a rated capacity of 2.0 L/s at a TDH of 27.3 m with a 0.75 kW electric drive, including a distribution valve assembly per pump set, liquid level and pump timer controls together with 50 mm diameter forcemains to dose recirculation sand filter effluent through the distribution boxes to a subsurface disposal system;

- ten (10) 30 m long by 14.4 m wide raised absorption trench type leaching beds of imported sand with 9 min/cm percolation rate, constructed approximately 6 m north of leaching bed pumping chamber including imported mantle of 9 min/cm percolation rate extending 15 m north from the leaching bed and, each leaching bed consisting of ten (10) 100 mm diameter perforated pipes of 30 m long at 1.6 m interval together with header pipes from the distribution box;

together with piping and associated appurtenances all in accordance with communal septic system design report, final plans and specifications prepared by Neil A. Levac Engineering Ltd., Consulting Engineers.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

1.1 "certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

1.2 "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

1.3 "Ministry" means the Ontario Ministry of the Environment;

1.4 "Regional Director" means the Regional Director of the Eastern Region of the Ministry;

1.5 "District Manager" means the District Manager of the Kingston District Office of the Ministry's Eastern Region;

1.6 "Owner" means the Nation Municipality;

1.7 "Operating Authority" means the Owner or the designated agent of the Owner who is qualified to operate the works.

1.8 "works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate;

1.9 "grab sample" means an individual sample of at least 1000 millilitres collected in the appropriate container at a randomly selected time over a period of time not exceeding 15 minutes;

1.10 "average daily flow" means the cumulative total sewage flow to the sewage works during a particular calendar year divided by the number of days within that year during which sewage was flowing to the sewage works;

1.11 "$CBOD_5$" means five day carbonaceous biochemical oxygen demand measured in an unfiltered sample;

1.12 "quarterly sampling" means sampling conducted on any such day within each consecutive three-month period that the time interval between consecutive quarterly sampling events is not less than 45 days.

2. PERFORMANCE

2.1 The Owner shall ensure that the flow of sewage into the sewage system does not exceed the average daily flow of 97,600 L/d over a period of one (1) calendar year.

3. MONITORING AND RECORDING

3.1 The Owner shall ensure that the following monitoring program is carried out upon commencement of operation of the works:

(a) Average daily flow of effluent being disposed of through the subsurface disposal system shall be measured or estimated, and recorded.

(b) Samples of raw sewage and effluent ahead of the subsurface disposal system shall be collected at locations satisfactory to the District Manager and analyzed for at least the following parameters at the indicated minimum frequencies:

Raw Sewage Parameter	Type of Sample	Minimum Frequency
BOD_5	grab	quarterly
Suspended Solids	grab	quarterly
Total Phosphorus	grab	quarterly
Total Kjeldahl Nitrogen	grab	quarterly

Effluent to Subsurface Disposal System Parameter	Type of Sample	Minimum Frequency
$CBOD_5$	grab	monthly
Suspended Solids	grab	monthly
Total Phosphorus	grab	monthly
Total Kjeldahl Nitrogen	grab	monthly
(Ammonia + Ammonium) Nitrogen	grab	monthly

Nitrate- Nitrogen	grab	monthly
Nitrite-Nitrogen	grab	monthly
Alkalinity	grab	monthly
E. coli	grab	monthly

(c) The Owner shall carry out the monitoring program for groundwater in accordance with the letter of April 7, 1999 (Re: Fournier Communal Septic System, Additional Treatment-Contingency Plan) appended in APPENDIX A and shall analyze for at least the following parameters at the indicated minimum frequencies:

Ground Water Parameter	Type of Sample	Minimum Frequency
(Ammonia + Ammonium) Nitrogen	grab	monthly
Nitrate-Nitrogen	grab	monthly
Nitrite-Nitrogen	grab	monthly
Total Kjeldahl Nitrogen	grab	monthly
pH	grab	monthly
Temperature	grab	monthly
E. coli	grab	monthly
Dissolved Organic Carbon	Grab	monthly
Anions		

NOTE: Prior to the start-up of operation of the works, groundwater samples shall be collected and analyzed to determine background concentrations of the above parameters at the locations established for regular monitoring.

(d) The sampling and analyses required by clause (b) and (c) above shall be performed in accordance with the Ministry's publication "Protocol for the Sampling and Analysis of Industrial - Municipal Wastewater", Ministry of Environment and Energy, August 1994; or as described in "Standard Methods for Examination of Water and Wastewater", 19th Edition, 1995, as amended from time to time by more recently published editions.

3.2 Following review of any of the analytical results required by Condition 3.1 or any of the reports required by Condition 5.2 of this certificate, the District Manager may alter the frequencies and locations of sampling and parameters for analysis required by Condition 3.1 if he/she considers it necessary for proper assessment of the

operation of the sewage system and its impact on the environment or if he/she is requested to do so by the Owner and considers it acceptable by the evidence of information submitted in support of the request.

4. OPERATION AND MAINTENANCE

4.1 The Owner shall use best effort to operate the sewage treatment works with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent ahead of the subsurface disposal system:

Effluent Parameters to Subsurface Disposal System	Concentration
$CBOD_5$	10 mg/L
Suspended Solids	10 mg/L
Nitrate-Nitrogen	20 mg/L

4.2 Based on the operational objectives stipulated above in Condition 4.1, the Owner shall prepare an operation and maintenance manual within six (6) months of introducing sewage to the sewage works and keep it up to date. Upon request, the Owner shall make the manual available for inspection by the Ministry personnel and furnish a copy to the Ministry.

4.3 The Owner shall prepare and make available for inspection by Ministry personnel upon request, a complete set of drawings within one (1) year of substantial completion of the sewage works. The drawings shall show the sewage works as constructed at that time.

4.4 A complete set of the record drawings, incorporating any amendments made from time to time, shall be kept by the Owner at the site of the sewage works for as long as the sewage works are kept in operation.

5. REPORTING

5.1 One week prior to the start up of the operation of the works, the Owner shall notify the District Manager (in writing) of the pending start up date.

5.2 The Owner shall prepare, and upon request, submit to the District Manager annual performance reports for the sewage works. The first such report shall cover the period from the commencement of operation of the sewage works to the end of the calendar year and shall be prepared within the following ninety (90) calendar days. Each subsequent annual report shall be prepared within ninety (90) calendar days following the completion of the calendar year being reported upon. The reports shall contain the following information in a format acceptable to the District Manager:

(a) a tabulation and interpretation of all monitoring and analytical results obtained during the reporting period, including sampling/monitoring locations and dates;

(b) a tabulation and interpretation of daily volumes of effluent disposed of through the subsurface disposal system during the reporting period;

(c) a record of system maintenance undertaken during the reporting period; and

(d) an account of any environmental and operating problems encountered at the site and the mitigative measures taken during the reporting period.

6. CONTINGENCY PLANS

6.1 The Owner shall undertake a Contingency Plan in accordance with the letter of April 7, 1999 (Re: Fournier Communal Septic System, Additional Treatment - Contingency Plan) appended in APPENDIX A to provide additional treatments according to a time schedule as stated in the letter to improve the quality of the recirculation sand filter effluent before being discharged to the subsurface disposal system if the nitrate concentrations exceed the predetermined trigger levels at the designated monitoring locations as outlined in the above-noted letter;

6.2 The Owner shall undertake a Contingency Plan in accordance with the letter of March 8, 1999 (Re: Surface Water Impact - Fournier Communal Septic System, Part of Lot 1, Concession XIII, Former Township of South Plantagenet, Ontario) appended in APPENDIX A to develop a monitoring plan for the municipal drain (receiver) and possible contingency options in consultation with the Regional Director if the surface wate

parameter concentrations exceed the predetermined trigger levels at the designated monitoring locations as outlined in the above-noted letter.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to define terms used in the Certificate.

2. Condition No. 2 is included to ensure that the flow of sewage to the sewage system is within the approved treatment capacity of the works.

3. Condition No. 3 relating to monitoring and recording the quality and quantity of treated effluent discharged to the subsurface disposal system, and the quality of the groundwater and surface water are required to enable the Owner to evaluate the performance of the works and to ensure that it is operated and maintained at a level which is consistent with the design objectives and other requirements of this certificate.

4. Condition No. 4 is included to ensure that the works will be operated and maintained in a manner enabling compliance with the terms and conditions of this certificate, such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented.

5. Condition No. 5 is included to ensure that all pertinent information is available for the evaluation of the performance of the sewage works.

6. Condition No. 6 is included to ensure that the quality of the treated sewage discharged from the sewage works will produce nitrate levels in the groundwater to meet the Reasonable Use requirements at the downgradient property boundary.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the sewage works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
2300 Yonge Street, 12th Floor,
P.O. Box 2382,
Toronto, Ontario.
M4P 1E4

AND

The Director,
Section 53, *Ontario Water Resources Act*,
Ministry of the Environment,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 11th *day of* June, 1999.

M. Dhalla, P.Eng.,
Director,
Section 53,
Ontario Water Resources Act.

GL/tm

c:-Ms. M. McCuaig, Clerk, Nation Municipality
-District Manager, MOE Kingston District Office
-Neil A. Levan Engineering Ltd.

APPENDIX A

1) April 7, 1999 letter "Re: Fournier Communal Septic System, Additional Treatment - Contingency Plan" addressed to Mrs. Vicki Mitchell of Ministry of the Environment by Louis LeMay, P. Eng. of Neil A. Levac Engineering Ltd.

2) March 8, 1999 letter "Re: Surface Water Impact - Fournier Communal Septic System, Part of Lot 1, Concession XIII, Former Township of South Plantagenet, Ontario" addressed to Mrs. Vicki Mitchell of Ministry of the Environment by Louis LeMay, P. Eng. of Neil A. Levac Engineering Ltd.

NEIL A. LEVAC ENGINEERING LTD / LTÉE
consulting engineers / ingénieurs conseils

Our File Ref: S9510

April 7, 1999

Ministry of the Environment
133 Dalton Avenue
P.O. Box 820
Kingston, Ontario K7L 4X6

Attention: **Mrs. Vicki Mitchell**
Environmental Assessment Evaluator
Environmental Approvals and Plan Review
Technical Support Section, Eastern Region

RE: Fournier Communal Septic System
Additional Treatment – Contingency Plan

Dear Ms. Mitchell:

Further to your fax dated March 30, 1999, we are providing the following comments concerning the proposed groundwater triggers and a revised version of the Contingency Plan reiterating the reason for the contingency measure of adding PAC.

In the Contingency Plan, we have proposed a trigger of 3.7 mg/L nitrate at monitoring well MW99-8 located on the north side of the municipal drain. It was stated that the proposed trigger is not acceptable because it provides no time for the construction/addition of an upflow bio-filter and the associated "lag time" for the system to become effective at denitrifying wastewater to 10 mg/L nitrate.

Based on grain size analysis performed on samples taken at the site, the silt deposit is considered to have a medium to low permeability and the estimated hydraulic conductivity of the deposit is in the order of 10^{-4} cm/s. Therefore, once the trigger level is met at monitoring well MW99-8, which is about 120 m from the property boundary, an estimated delay of about 1380 days (or 3.8 years) is expected before the contamination plume reaches the property boundary. The proposed Contingency Plan allows for a one (1) year delay period to monitor the effectiveness of the first phase of the contingency. If we allow an estimated maximum of nine (9) months for the design and construct of the upflow bio-filter, a total delay of 1.75 years would past before implementing the second phase of the contingency. There is at least two (2) years left to ensure that the powdered activated carbon (PAC) is installed and operational.

We believe that the proposed trigger level of 3.7 mg/L nitrate is adequate to implement both phases of the contingency and that sufficient time delay is provided to insure that the sewage system upgrades are installed and operational.

E-mail: levaceng@istar.ca
D:\Documents\FILES95\S9510\contingencies MOE 99-4-7.doc
1-2884 rue Laporte Street, Rockland, Ontario, K4K 1M6 Fax (613) 446-1427 Tel (613) 446-7777
178 rue Main Street, Hawkesbury, Ontario, K6A 1A3 Tel (613) 632-4583
170 rue Broadway Street, Gatineau, Québec, J8P 3V3 Tel (819) 663-7194

Revised version of the Contingency Plan.

CONTINGENCY PLAN

The purpose of the Contingency Plan is to ensure that the proposed wastewater treatment system will meet the Reasonable Use requirements (Guideline B7) at all times. As part of the Contingency Plan a compliance monitoring program will be implemented with predetermined triggers that will activate contingency measures to upgrade the treatment process and improve the quality of the wastewater being discharged before exceeding the Reasonable Use requirements at the downgradient property.

Compliance Monitoring

As part of the phasing-in of the proposed sewage disposal system, it is recommended to monitor the groundwater quality through the installation of eight (8) new monitors. Five (5) monitors will be installed to assess the performance of the treatment system, two (2) monitors will be installed up gradient of the system to establish a baseline and one (1) monitor will be installed on the north side of the Nicholas Municipal Drain to serve as a compliance monitor to prompt contingency measures.

Monitor MW99-1 will be located in or near the disposal area installed into the silt aquifer. MW99-2 and MW99-3 will be located 25 metres downgradient from the disposal area and MW99-4 and MW99-5 will be located 100 metres downgradient from the disposal area. Monitors MW99-6 and MW99-7 will be located near the south property boundary up-gradient of the sewage system and MW99-8 will be located on the north side of the municipal drain. Refer to attached drawing S9510-03 for proposed location of monitors.

The screened portions of these monitors will be in the upper four metres of the saturated silt. The monitors will be sampled on a monthly basis for pH, nitrate, nitrite, TKN, organic nitrogen, ammonia, DOC and anions. Monitors MW99-4 and MW99-5 will also be tested for total phosphorus, total ammonia (with the ionized component calculated) and temperature for potential surface water impact.

Trigger Levels

The proposed monitoring network will be used to verify the predictions made in *Groundwater Impact Assessment* report. The use of MW99-4 and MW99-5 at a distance of 100 metres from the beds will provide sufficient warning of possible non-compliance. MW99-8 located on the north side of the municipal drain will be used as a non-compliance trigger.

In order to meet the Reasonable Use criteria at the downgradient property boundary, the nitrate concentration at monitoring well MW99-8 should not exceed 3.7 mg/L nitrate, based on zero background nitrate. If the concentration in MW99-8 does not exceed 3.7 mg/L, sufficient treatment is being realised. If this concentration is exceeded and coherent with concentrations measured in MW99-4 and MW99-5 for two consecutive test periods, the first phase of the contingency measures will be implemented.

The nitrate trigger level to implement the second phase of the contingency measures remains the same as for the first phase at 3.7 mg/L nitrate at monitoring well MW99-8. This is the theoretical maximum nitrate concentration allowed at MW99-8 in order to meet the Reasonable Use criteria at the property boundary based on infiltration dilution calculations only. The intent is that once additional treatment is implement and time is allowed for the groundwater quality to stabilize, the nitrate levels should be less then 3.7 mg/L.

Contingency Measures

Should the trigger level in monitoring well MW99-8 be reached, it is recommended to construction an anaerobic upflow bio-filter downstream for the RSF units. The upflow bio-filter would be designed to have a hydraulic retention time of 48 hours. Effluent discharging from the upflow bio-filter will reduce nitrate concentrations by a minimum of 50%, resulting in nitrate levels of less then 10 mg/L.

A six (6) month adjustment period should be allowed for the anaerobic upflow bio-filter to develop effective treatment. Also during this six (6) month period, it is expected that the groundwater quality will have been able to stabilize under the new treatment process and that monitoring results at MW99-8 should be representative of the performance of the system.

After the six (6) month adjustment period, an additional six (6) month period should be allowed to accurately evaluate the performance of the upgraded treatment process. During this time, it is expected that nitrate concentration at monitoring well MW99-8 will return to less then 3.7 mg/L.

If the nitrate concentration does not return to less then 3.7 mg/L, a supplemental carbon source will be added to the anaerobic upflow bio-filter to improve denitrification to less then 6 mg/L nitrate prior to disposal.

E-mail: levaceng@istar.ca
D:\Documents\FILES95\S9510\contingencies MOE 99-4-7.doc
1-2884 rue Laporte Street, Rockland, Ontario, K4K 1M6
Fax (613) 446-1427 Tel (613) 446-7777
178 rue Main Street, Hawkesbury, Ontario, K6A 1A3
Tel (613) 632-4683
170 rue Broadway Street, Gatineau, Québec, J8P 3V3
Tel (819) 663-7194

We trust that the information provided meets with your requirements. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours truly,
Neil A Levac Engineering Ltd.

Louis LeMay, P.Eng.

E-mail: levaceng@istar.ca
1-2884 rue Laporte Street, Rockland, Ontario, K4K 1M6
178 rue Main Street, Hawkesbury, Ontario, K6A 1A3
170 rue Broadway Street, Gatineau, Québec, J8P 3V3

Fax (613) 446-1427 Tel (613) 446-7777
Tel (613) 632-4583
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NEIL A. LEVAC ENGINEERING LTD / LTÉE
consulting engineers / ingénieurs conseils

Our File Ref: S9510

March 8, 1999

Ministry of the Environment
133 Dalton Avenue
P.O. Box 820
Kingston, Ontario K7L 4X6

Attention: **Mrs. Vicki Mitchell**
Environmental Assessment Evaluator
Environmental Approvals and Plan Review
Technical Support Section, Eastern Region

RE: Surface Water Impact - Fournier Communal Septic System
Part Lot 1, Concession XIII
Former Township of South Plantagenet, Ontario

Dear Mrs. Mitchell:

Further to comments from Mr. Conrad de Barros, Surface Water Evaluator, on our letter of January 28, 1999, we are providing a revised copy of our drawing and the following comments.

The disposal fields are geometrically arranged to maximize dilution by spreading the contamination plume as wide as possible. This approach reduces the impact of the sewage disposal system by spreading the pollutants over a wider area.

The revised drawing was modified to indicate the location of the diversion swales or ditches at a minimum distance of 20 metres from the disposal fields. The drawing also indicates all existing ditches to be filled with native material (silt) to match the properties of the surrounding soil. The distance for backfilling the existing ditches has been increased to 60 metres downgradient from the disposal field.

Additional parameters will be included as part of the monitoring program to monitor possible surface water impact. The monitoring wells MW99-4 and MW99-5 will be sampled for pH, nitrate, nitrite, TKN, organic nitrogen, ammonia, DOC, anions, total phosphorus, total ammonia (with the ionized component calculated) and temperature. A proposed trigger for possible surface water impact at monitoring MW99-4 and MW99-5 would be 1800 µg/L for total ammonia (at 10°C & pH 8) and 5 mg/L for total phosphorous.

We trust that this meets with your requirements, should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours truly,
Neil A Levac Engineering Ltd.

Louis LeMay, P.Eng.

E-mail: levaceng@istar.ca
\\PHILL\CAD FILES\Documents\FILES95\S9510\Fournier Surface Water Impact 2.doc
1-2884 rue Laporte Street, Rockland, Ontario, K4K 1M6 Fax (613) 446-1427 Tel (613) 446-7777
178 rue Main Street, Hawkesbury, Ontario, K6A 1A3 Tel (613) 632-4583
170 rue Broadway Street, Gatineau, Québec, J8P 3V3 Tel (819) 663-7194

APPENDIX E

2002 CORRESPONDENCE WITH MINISTRY OF ENVIRONMENT

Golder Associates Ltd.

1796 Courtwood Crescent
Ottawa, Ontario, Canada K2C 2B5
Telephone (613) 224-5864
Fax (613) 224-9928

March 27, 2002

021-2735

Ministry of the Environment
Kingston District Office
Box 820
133 Dalton Ave.
Kingston, Ontario
K7L 4X6

Attention: V. Huggard, District Manager

RE: REQUEST FOR MODIFICATIONS TO THE GROUNDWATER MONITORING PROGRAM FOR THE FOURNIER COMMUNAL SEWAGE SYSTEM MINISTRY CERTIFICATE OF APPROVAL NUMBER 3-0436-99-006 PART OF LOT 1, CONCESSION XIII, GEOGRAPHIC TOWNSHIP OF SOUTH PLANTAGENET, NATION MUNICPALITY, ONTARIO

Dear Sir,

Please find enclosed one copy of the report entitled *2001 Groundwater Monitoring Program, Communal Sewage System, Nation Municipality, Fournier, Ontario* which was prepared by Golder Associates Ltd. in January 2002 to address the requirements of Condition 5.2(a) of the above referenced Certificate of Approval ("C of A"). It is noted that Condition 5.2 of the C of A requires the preparation of an annual report but does not require that the report be submitted to the Ministry of Environment ("MOE") unless requested to do so by the MOE. A copy of the C of A is included in Appendix D of the enclosed report.

Monthly groundwater monitoring conducted by Golder Associates between August 2000 and December 2001 has allowed for the determination of baseline groundwater quality conditions at the Fournier communal sewage system site. Based on the physical and groundwater quality conditions at the site (as discussed in Sections 4.0 and 5.0 of the enclosed report), a revised groundwater monitoring program has been proposed in Section 7.0 of the enclosed report.

Approval of the MOE District Manager is required to implement the proposed changes to the monitoring program as per Condition 3.2 of the C of A. As such, the purpose of this submission is to formally request MOE approval for the proposed revised monitoring program. Your timely attention to this matter would be greatly appreciated as the Nation Municipality would like to implement the revised groundwater monitoring program as soon as possible.

If you have any questions pertaining to this request or the enclosed report, do not hesitate to contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

M.A. Venhuis, M.Sc.
Environmental Geochemist

K.A. Marentette, M.Sc.
Senior Hydrogeologist/Associate

MAV:KAM:cr:ml
n:\active\2700\021-2735 nation mun. sewage system fournier\let-001 02 march 22 request to moe.doc

Encl.

cc. Mrs. Mary McCuaig, AMCT, Clerk, Nation Municipality

Ministry of the Environment
133 Dalton Avenue
P O Box 820
Kingston ON K7L 4X6

Ministère de l'Environnement
133 avenue Dalton
C P 820
Kingston ON K7L 4X6

Ontario

1-613/549-4000 1-800/267-0974 Fax: 613/548-6908

MEMORANDUM

June 14, 2002

TO: Marc Robert
Senior Environmental Officer
Cornwall Area Office
Eastern Region

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Village of Fournier
Communal Sewage Works
2000 and 2001 Annual Monitoring Reports
Certificate of Approval # 3-0436-99-006
Township of South Plantagenet

Certificate of Approval # 3-0436-99-006 refers to Contingency Plans outlined in letters dated April 7, 1999 and March 8, 1999 written by Neil A. Levac Engineering Ltd. that sets out groundwater triggers for sewage work upgrades aimed at meeting the requirements of Ministry Guideline B7 (Reasonable Use) and surface water impacts.

The nitrate trigger for upgrades to the sewage works is 3.7 mg/L at MW99-8 based on Guideline B7 requirements. If this trigger limit is exceeded it must be coherent with concentrations measured in MW99-4 and MW99-5 for two consecutive test periods, before the first phase of contingency measures are implemented.

A proposed trigger "for possible surface water impact" at monitors MW99-4 and MW99-5 is 1800 ug/L for total ammonia (at 10 ^{0}C and ph 8) and 5 mg/L for total phosphorous. Action(s) to be taken if the trigger is exceeded are not specified. Groundwater Unit staff were not involved in setting these limits.

The 2000 annual report prepared by Golder Associates Ltd. (GA) reveals that nitrate trigger levels were not exceeded. However, total ammonia and total phosphorous levels at monitor BH99-4 approached or exceeded the trigger concentration during at least one sampling session in 2000. We will discuss the pertinent compliance issues below in our discussion of the 2001 annual report.

Based on an assessment of data included in the 2001 annual report, it is clear that MW-4, MW-5 and MW-6 are being impacted by sources of pollution other than that originating from the new Fournier Sewage System since the data is **not coherent** with data collected from monitors located hydraulically upgradient of these monitors. Nevertheless the trigger limit for nitrate at MW99-8 was not exceeded in 2001. Total ammonia and total phosphorous exceeded trigger limits at MW-4 and MW-5 and may be a result of other pollution sources.

The consultant suggests that the trigger mechanism be re-evaluated. We agree. Changes in trigger limits can only be done by the Section 53 OWRA Director. Given the need to better understand the impact of these other pollution sources on MW99-4, MW99-5 and MW99-8 until such times as a revised trigger mechanism can be agreed upon, we **do not support any changes to the current monitoring program at this time.**

Bob Holland
RWH/sh

c: Frank Crossley/File GW-07-07, Village of Fournier, Communal Water Supply, Township of South Plantagenet
Victor Castro
Bob Holland

Corporation de la Municipalité de La Nation
Corporation of The Nation Municipality

April 16, 2003

Golder Associates Ltd.
Attention: Kris Marentette
1796 Courtwood Crescent
Ottawa, Ontario
K2C 2B5

Dear Sir:

RE: Fournier communal sewage system

Please be advised that Council of The Nation Municipality adopted resolution number 179-2003 at the special meeting held on March 31st, 2003.

"Be it resolved that Council authorizes Golder Associates to proceed with an application for an amendment to the Certificate of Approval for the Fournier sewer system in accordance with their recommendations in their report dated March 21, 2003."

Should you require additional information, please do not hesitate to contact the undersigned.

Yours truly,

Mary J. McCuaig, A.M.C.T.
Clerk

MJM/md

958 route 500 ouest, Road 500 West, Casselman Ontario K0A 1M0 • Tél.: (613) 764-5444 • Fax: (613) 764-3310
1-800-475-2855 • www.nationmun.ca