INTERIM REPORT

Interim Report on the Environmental Study and Evaluation of the Water and Sewage System

QAMANI'TUAQ, NUNAVUT

PROJECT NO. 1015263

NUNAMI
JACQUES WHITFORD LIMITED

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DRAFT REPORT TO	**Department of Community and Government Services** **Government of Nunavut** **2nd Floor Omilik Building, P.O. Box 490** **Rankin Inlet, NU** **X0C 0G0**
FOR	**Interim Report on the Environmental Study and Evaluation of the Water and Sewage System**
AT	**Qamani'tuaq (Baker Lake), Nunavut**

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EXECUTIVE SUMMARY

The Hamlet of Qamani'tuaq (the Hamlet) draws its drinking water from Baker Lake and pipes or trucks it to users throughout the community. Sewage generated in the community is treated in a natural wetland system (the Tundra Wetland) before eventually flowing into Baker Lake. Leachate from the Hamlet's current and previous solid waste facilities also enters the wetland system. The Tundra Wetland consists of a sewage holding cell, a natural wetland providing sewage treatment, two small lakes, and the channels between them. Residents and regulators are concerned about the effectiveness of the wetland treatment system and potential impacts to their drinking water. As such, the Government of Nunavut's (GN's) Department of Community and Government Services (CGS) retained Nunami Jacques Whitford Limited (NJWL) to investigate wastewater treatment effectiveness in the Tundra Wetland and the water quality of Baker Lake. The overall objectives of the study included:

- Reviewing the performance of the sewage treatment system to determine if it is meeting current Nunavut Water Board (NWB) license requirements and what, if any, modifications may be needed to meet current and future requirements;

- Determining water quality in the area of drinking water intake, identifying actual or potential impacts to drinking water quality and recommending measures to address such impacts; and

- Improving local capacity to both understand the operation of the water and sewage disposal systems; and to undertake monitoring of same.

NJWL visited the community of Qamani'tuaq on two occasions in the summer of 2006. A third visit took place in early October to complete a second round of sampling prior to freeze up. Samples were obtained from Baker Lake and the Tundra Wetland during both sampling events and sent to ALS Laboratories in Winnipeg, MB for analysis.

Analysis of the Tundra Wetland determined that the wetland is able to effectively treat sewage effluent in compliance with licence requirements. There is some concern with leachate from the solid waste facilities as iron levels were above the recommended guideline at the compliance point. Copper also exceed guidelines at the compliance point. However, concentration of these metals were below guidelines by the time effluent reached Baker Lake. Enhancements to the current system are required to meet future sewage volumes.

The water quality of Baker Lake was found to be good for drinking water purposes. No samples analyzed exceeded drinking water guidelines. Elevated levels of cadmium and silver were found during samples collected in August and October, exceeding the CCME Guidelines for the Protection of Freshwater Aquatic Life; however, concentrations of these metals did not exceed drinking water guidelines. The elevated levels of cadmium and silver warrant further investigation into the source and pathway of these metals into Baker Lake.

The following interim report serves to inform CGS and Qamani'tuaq on the progress of the investigation to date. Further work is planned for 2007 with a final report to be prepared in August 2007.

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1.0 INTRODUCTION

1.1 Project Overview

Nunami Jacques Whitford Limited (NJWL) was retained by the Department of Community Government Services (CGS), Government of Nunavut to investigate the effectiveness of the natural wetland sewage treatment facility (the Tundra Wetland) and the quality of the drinking water source in Qamani'tuaq (Baker Lake, the Hamlet), Nunavut. The specific project objectives included:

1) Assessing the Tundra Wetland Area, including:

- reviewing background information about the wetland treatment system;
- estimating the volume of sewage produced by the community over a 20 year period;
- obtaining effluent samples at stations identified in the Water Licence's "Surveillance Network Program" and any other locations required to evaluate wetland treatment performance;
- outlining and mapping the physical limits of the existing Tundra Wetland area;
- conducting a fish habitat and wildlife study on Lagoon Lake, Finger Lake and Airplane Lake and interconnecting creeks to determine what environmental impacts the sewage effluent may be having on the fish and wildlife in the wetlands area;
- determining the capacity of the Tundra Wetland to meet Nunavut Water Board Licence requirements over the 20 year period and identifying any improvements that are necessary to meet such requirements; and
- consulting with the Hamlet and CGS about findings and preparing a capital investment plan and cost estimates for recommended improvements to the Tundra Wetland sewage treatment system.

2) Assessing and Evaluating the Existing Water Supply Source, including:

- evaluating the water currents in Baker Lake in the vicinity of the drinking water source and the final sewage effluent discharge from Garbage Creek;
- conducting a water sampling program in Baker Lake to cover a distance of approximately 2000 m on each side of the drinking water intake;
- conducting a visual survey of the community to identify potential hazards to the drinking water source and developing a water source protection plan;
- consulting with Transport Canada and Nunavut Power to attempt to determine if contamination from their sites is leaching into Baker Lake;
- consulting with Inuit Elders to collect traditional knowledge pertaining to the study; and
- consulting with the Department of Health and Social Services to obtain records of bacteriological analysis of untreated water from Baker Lake water pump house and identifying any historical drinking water quality issues.

The Project commenced with a meeting with Hamlet Council and staff in June 2006 to discuss the purpose and intent of the Project and to identify preliminary concerns for investigation. Two sampling events were undertaken, the first between July 31 and August 4 and the second between October 3 and 6. This report is an interim report based on the activities conducted and results received in 2006. Further work is planned, with a final report to be generated in August 2007.

1.2 Report Organization

The Study's interim findings are presented in ten sections. Section 1 outlines the objectives of the study and provides background information on treatment wetlands. Section 2 provides an overview of the local environment and the water and waste facilities. A summary of available information from previous reports is provided in Section 3. Section 4 presents a description and evaluation of the wetland treatment system. The assessment of water quality in Baker Lake is presented in Section 5.

The results of consultations undertaken to date are documented in Section 6. Interim conclusions and recommendations are presented in Sections 7 and 8, respectively. Future project activities are summarized in Section 9. Report closure is provided in section 10. Appendices include drawings, photographs, laboratory certificates, additional water quality data analysis and the results of the elder consultation.

1.3 Wetlands

Wetlands are defined as lands which are seasonally or permanently inundated by shallow water. In them the presence of abundant water has caused the formation of hydric soils (those which are saturated with water and are anaerobic in nature) and has favored the dominance of either hydrophytic or water- tolerant vegetation. In Canada, 127.2 MM hectares (14% of the surface) are wetlands, most of them peatlands.

Wetlands are dynamic ecosystems which undergo vegetation, microbial and animal species compositional changes, seasonally and annually. Hydrologic changes have the largest effect and some are dry for part of the year, depending on seasonal flooding to maintain their wetland characteristics. The productivity of many wetlands exceeds most fertile farm fields as they receive, hold and recycle nutrients continually washed into them from higher, drier ground.

The ecological functions of wetlands include the control and storage of surface water (and/or the discharge of groundwater); aiding in flood control and conveyance; providing corridors for wildlife movement; protecting shorelines from erosion; supporting complex food chains; providing habitat; trapping sediments; and interacting with dissolved and suspended materials in the water in manners which maintain and improve water quality.

It is these latter attributes which interest engineers. They can be used to remove a variety of contaminants in water including nutrients, undesirable micro-organisms, suspended and dissolved solids, heavy metals, oil & grease, and other organic compounds. Wetland vegetation absorbs and assimilates nutrients from water. Aquatic plants in them also release oxygen as a by-product of their growth, increasing dissolved oxygen content in the water and the soil in the vicinity of plant roots, thereby allowing aerobic microbial reactions to supplement the anaerobic ones normal in hydric soils.

Accordingly, wetlands can treat many kinds of waterborne contaminants. They can remove or convert large quantities of pollutants which enter them as leachates, municipal wastewater from cities, towns and industries, or surface runoff from non-point pollution sources (e.g., mines, agricultural areas, urban streets). The impacts of these discharges on wetlands have been highly variable, but in general they have functioned well as pollution removal mechanisms. For this reason, wetlands are often referred to as Nature's "kidneys".

1.3.1 Wetland Categorization

There are various kinds of wetlands: Natural Wetlands, Created Wetlands and Constructed Wetlands. Created and constructed wetlands are artificial systems, designed and built for specific purposes. Created wetlands are those artificial wetlands built for purposes other than wastewater treatment (e.g., recreation, habitat creation, mitigation). For example, Ducks Unlimited is a major constructor of created wetlands for habitat purposes.

Constructed wetlands consist of two main categories: those for water quantity control (stormwater wetlands) and those for water quality control - wastewater contaminants' removals/mitigations. The latter, to which the term constructed wetlands (CWs) is more generally associated, can be used to treat municipal wastewaters (e.g., raw or partially pre-treated sewage), agricultural wastewaters (e.g., manure pile leachates) or industrial wastewaters (e.g., discharged process water and acid drainages from mining operations).

Both natural and constructed wetlands can be used for wastewater treatment (WWT) and where they do so they also are referred to as treatment wetlands.

Treatment wetlands will remove a variety of materials from any water passing through them. Surfaces under wetland water surfaces are all coated with microbial biofilms made up of complex communities of many kinds of bacteria, fungi and other microbes, and in them the bulk of WWT occurs (although some treatment also occurs by settling/filtration, by direct plant uptake, and via planktonic microorganisms in open water areas). Algae and aquatic plants in wetlands release oxygen as by-products of their growths. This increases the dissolved oxygen content in water and in soil/substrates in the vicinity of plant roots, thereby allowing aerobic microbial reactions to occur in an otherwise anoxic environment, supplementing the anaerobic reactions that also occur. Accordingly, wetlands can be used to treat pollutants which enter them in sewage streams, leachates, and/or surface runoff from non-point pollution sources by involving both aerobic and anaerobic removal mechanisms. Treatment wetlands therefore are kinds of natural, largely solar-powered WWT facilities.

1.3.2 Advantages and Disadvantages of Treatment Wetlands

The use of wetlands for treating or polishing wastewaters has a number of advantages, including that they:

- Provide effective and reliable wastewater treatment;
- Are relatively inexpensive to adapt or even construct;
- Are relatively economical to operate and have low labour requirements;

- Are easy to maintain and have low energy requirements;
- Are able to accept varying quantities and concentrations of pollutants;
- Are quite tolerant of fluctuating hydrologic and contaminant concentration conditions;
- Provide various indirect aesthetic benefits (e.g., habitat, green space, recreation); and
- Can be readily associated with other kinds of natural WWT facilities (e.g., lagoons, detention cells, sedimentation ponds, biofilters) to provide enhanced WWT.

However, using treatment wetlands for wastewater treatment is not a panacea. There are disadvantages to the use of these wetlands for WWT, including that they:

- Require large land areas;
- Are ecologically and hydrologically complex;
- Can lead to pest problems (e.g., mosquitoes);
- May not prove practical in some situations where local conditions (topography, drainage, soils, etc.) are not suitable;
- If constructed, may require some time before optimum efficiency is achieved;
- May be unfamiliar to regulatory authorities who may not have precedents;
- Be subject to erroneous negative perceptions as many early ones were mis-designed;and
- Operate at lower efficiencies during winter.

1.3.3 Natural Wetlands

Natural wetlands are those areas wherein, at least periodically, the land supports predominantly hydrophytes (water-loving plants) and whose substrate is predominantly un-drained hydric (i.e., saturated anoxic) soils, or where the substrates are non-soil and are saturated with water or covered by shallow water at some time during the growing season each year. Flooding-intolerant vegetation is limited or absent in them.

Natural wetlands are found in surface depressions, and alongside streams, lakes and the sea everywhere; they often provide the interfaces between fully aquatic and terrestrial ecosystems. Waters in natural wetlands are generally less than two meters deep (and often very much shallower), and may stand/flow both on the surface and sub-surface in/via soils and substrates. Regular to erratic drying cycles may occur in all or part of natural wetlands. Water level fluctuations are normal in them, and morphologies usually are complex, with many flow channels, backwaters, and other heterogeneous areas.

There are many kinds of natural wetlands. The Canadian Wetland Classification System defines natural wetlands in three hierarchical levels: Classes, Forms and Types. Under it there are five wetland classes: Bogs, Fens, Marshes, Swamps and Shallow Water Wetlands. The former two (bogs and fens) are types of peatlands, as are some other sub-classes. Saturated areas dominated by water-resistant woody plants and trees are called swamps and those dominated by soft-stemmed plants are called marshes.

There are 70 wetland forms: 18 types of bogs (e.g., Collapse Scar bogs, String bogs); 17 forms of fens (e.g., Channel fens, Basin fens); 15 forms of marshes (e.g., Floodplain marshes, Tidal Freshwater marshes); 7 forms of swamps (e.g., Peat Margin swamps, Stream swamps); and 13 forms of shallow water wetlands (e.g., Delta Water wetlands).

There are eight natural wetland types under the Canadian Wetland Classification System: Treed wetlands, Shrub wetlands, Forb wetlands, Graminoid wetlands, Moss wetlands, Lichen wetlands, Aquatic wetlands and Non-Vegetated wetlands.

The U.S. Fish and Wildlife Service categorizes wetlands into five somewhat different classes: Shallow Open Water Wetlands (dominated by rooted, mainly floating vegetation); Emerging Wetlands (typical littoral in transition from deep water habitats or shallow open water wetlands and wet meadow types); Wet Meadow Wetlands (waterlogged soil without standing water but subject to periodic flooding); Scrub-Shrub Wetlands (wet areas dominated by some shrubs, small trees and other woody vegetation); and Forested Woodland Wetlands (wet areas dominated by larger trees). Wetland types are classified according to location: marine (inter-tidal), lacustrine (littoral), riverine, estuarine or palustrine. Others include wetland classes such as ponds, marsh-ponds and trench wetlands as well.

Natural wetlands are biologically extremely diverse. Seasonal and annual variations in a wetland can dramatically alter vegetation, microbial communities and wildlife in and around the wetland. Natural wetlands are ecologically important as they: provide habitat and corridors for wildlife movement; aid in flood control; protect shorelines from erosion; control and store surface water; trap sediments; immobilize contaminants and nutrients; and maintain and improve water quality.

1.3.4 Natural Wetlands for Wastewater Treatment

Natural wetlands are generally used for wastewater treatment only in northern communities and remote areas, although there are exceptions such as the Town of Houghton Lake in Michigan which has used a natural wetland for WWT since the 1970s. In addition natural wetlands are often used as receiving waters for wastewaters that have been treated upstream of them by some other WWT process. In such cases, they usually act in a complementary polishing role. While categorizations of natural wetlands differentiate between vegetated, very shallow water areas such as bogs and marshes, and slightly deeper (up to a metre or so) open water areas such as ponds (and small lakes), real natural wetlands consist of both morphologies and everything in between. They even include islands, internal channels and small streams, mudflat areas, and peripheral wet meadow areas.

Because of their heterogeneous nature, where natural wetlands are used for wastewater treatment, very much larger areas are required for them to ensure adequate treatment. In past, a commonly accepted hydraulic loading rate (wastewater flow rate over wetland area) for natural wetlands treating domestic sewage was 27.6 ha of wetland surface area per 1000 m^3/d of sewage flow introduced, but more recent studies have indicated that as little as 1.4 ha/1000 m^3/d can be appropriate if conditions are right, some pre-treatment has occurred, and/or the wetland has been "engineered" to ensure better contact between the wastewater being treated and the vegetation/microbial biofilm matrices in the wetland. However, a more conservative recommendation for areas outside the Arctic is for 50 ha/1000 m^3/d (0.2 cm/d) for municipal wastewaters, especially where cold weather conditions are encountered and there is untreated ammonia nitrogen in the wastewater being treated. (Kadlec & Knight, 1996).

It is important to note that the addition of a wastewater to a natural wetland will dramatically alter its ecology and biology. Temperature, flow regime, pH, water levels, plant growth/speciation, etc. will change. Nutrient-deficient, standing-water ones such as bogs may be converted into flowing systems and the plants in them will proliferate in the new positively stressed conditions that favour their growth.

1.3.5 Constructed Wetlands

Constructed wetlands (CWs) for WWT represent an environmental/biological technology (ecotechnology) that is now well developed. They are completely artificial wastewater treatment facilities where wastewater treatment is managed in an engineered manner. CWs are literally natural wastewater treatment plants and are usually considered as such by regulators. Unlike the situation with natural wetlands, water flow (and water level) in a CW is controlled, water is almost always present (natural wetlands sometimes dry out), and the plants used in them are often monocultures of herbaceous emergents such as cattails or reeds.

Modern CWs often consist of a number of individual basins (cells) connected in series, and surrounded by berms of earth, clay, rock, or concrete. Although CW cells may be any shape, hydraulic efficiency (ensuring maximum contact between wastewater and the underwater wetland plant roots/microbial biofilm matrix) usually dictates rectilinear cells. Wastewater being treated in CW cells often flows in either a single flow path (train), or in two or more parallel trains of one or more cells. These passive treatment systems also can include a variety of ancillaries (e.g., pumps, ditching, cascades, land treatment fields). Surge ponds and lagoon cells often complement the vegetated CW cells, (both in front and/or behind the CW cells) and are themselves regarded as cells of the CW system. There are many tens of thousands of these natural systems treating wastewaters of all sorts worldwide.

Three types of vegetated cells are used in CW systems: pond cells, free water surface (FWS) cells, and sub-surface flow (SSF) cells.

Pond wetlands, as the name suggests, are simple shallow pools or small shallow lakes, usually vegetated with emergent wetland vegetation (e.g., cattails) around the peripheries (10 - 30% of area) and having some portion of their surface consisting of open water in which submergent and/or floating wetland vegetation may be growing. They are most commonly used in conjunction with other types of wetlands cells (e.g., as re-aeration basins between FWS cells in the common marsh (FWS) -pond-marsh kind of CW treatment system.) Pond wetlands provide quiescent areas where sediments and some of the suspended solids in a wastewater can settle out. Hence, pond wetlands are good methods for dealing with any suspended solids, and the BOD, oil & grease, pesticides & herbicides, fertilizers, heavy metals and other organics which become associated with them in many wastewaters. (Pond wetlands differ from WWT lagoons in that they almost always have wetland plants in them, and most lagoons do not. In addition, they are usually shallower than WWT lagoons (one to two metres or less), and hence tend to be more aerobic than often-deeper, facultative lagoons [due to easier surface re-aeration]).

Free water surface CWs are artificial marsh ecosystems in which water flows on the surface through largely emergent herbaceous wetland vegetation (e.g., cattails). In them, the submerged portions of the wetland plants, as well as the wetland soil/sediment and detritus, act as substrates for microbial biofilms. These biofilms and physical filtration are responsible for much of the removals of contaminants from wastewaters passing through them. FWS constructed wetlands are the most common type of constructed wetland in North America.

With sub-surface flow CWs, the wastewater being treated flows just under the surface of porous materials (substrates) consisting of beds of gravel, sand or rock. SSF wetland cells may be horizontally fed (HSSF cells), or the wastewater may move vertically in the substrates (VSSF cells). With SSF CWS, wetland vegetation grows out of the substrate surfaces (usually gravel) of the wetland cells and it is possible to walk dryshod on their normally dry surfaces if one can get in among the normally dense stands of emergent vegetation. Microbial aerobic and anaerobic biological reactions in the highly porous biofilm/root system matrix in the interstices of the gravel substrate of a SSF CW are responsible for most of the pollutant removals from wastewaters passing through, not the wetland plants.

SSF CWs are smaller and more efficient than FWS ones, but often are more costly to build because of higher design and substrates costs. Full scale, SSF wetlands treating relatively high volumes of influent (>15 L/s) are already operating treating stormwater, and ones treating even larger volumes of water are being designed and built by Jacques Whitford.

The ultimate in constructed wetlands is the engineered wetland. Engineered wetlands (EWs) are advanced forms of CWs that involve more active manipulation of process conditions than is usual for ordinary constructed wetlands (which are largely fully passive systems). For example, EW systems may involve aspects such as cell aeration, the addition of chemicals and/or energy, active phytoremediation, and/or use of specialty substrates that chemically interact with certain wastewater pollutants. Engineered wetland cells can be of the pond, FWS or SSF varieties, but are more commonly SSF ones. Jacques Whitford specializes in SSF EWs.

As mentioned above, the removal of many pollutants such as ammonia in a treatment wetland is dependant on microbially-mediated aerobic transformations. The needed oxygen for such reactions can be supplied by wetland plants which “pump” air to microbes in their root zones but there is only a limited amount of oxygen that can be provided in this way. One way to overcome this limitation is by using submerged perforated or diffuser piping through which air from small blowers is introduced into the water or under the substrates in SSF engineered wetland (EW) cells. By improving aeration, ammonia nitrification rates can be increased to over 99%, and sizes can be reduced by an order-of-magnitude or more. Jacques Whitford is involved with three very large VSSF EW projects: one for treating municipal sewage (5,500 m^3/d), one for treating gold mine tailings pond recycle water (17,000 m^3/d), and one for treat de-icing glycol-contaminated airport runoff (4,800 m^3/d).

1.3.6 Tundra Wetlands in the Arctic

Over 45% of all natural wetlands lie above 45º North Latitude, and these are largely tundra, muskeg, taiga and coastal marsh wetlands. Prior to division of Nunavut from the Northwest Territories, the territories had the second highest total of natural wetland area in Canada, second only to

Ontario. Peatlands of various sorts (bogs, fens) dominate northern natural wetlands. An important northern kind of arctic natural treatment wetland is the tundra wetland, a kind of peatland/pond mixed wetland. Tundra wetlands may be viewed as almost the natural analogues of marsh-pond-marsh constructed wetlands, and consist of combinations of boggy areas, channels, and small ponds/small lakes.

The former are spongy accumulations of living and dead Sphagnum moss, lichens, grasses, small willow shrubs, and other vegetation, as well as dead plants, usually only partly decomposed. Water flow through these wetland areas is partially sub-surface, and partly over the surface and/or via channels. The other aspect of tundra wetlands is numerous shallow ponds/lakes that form parts of them have no drainage to groundwater in the short summers due to underlying permafrost. Frost heaving during winter creates ridges and depressions with unique polygon configurations. In summer in the north, long days lead to the proliferation of algae in tundra wetland ponds and small lakes, and photosynthesis leads to highly oxic conditions in them. Tundra wetlands exhibit pollutant removal rates equal to or better than that expected from an annual storage lagoon. Tundra wetlands are often "engineered" to some extent to improve water flows through them.

As was outlined in Section 1.3.4 above, recommended areas for natural wetlands treating municipal wastewaters ranged from 1.4 – 50 ha/1000 m^3/d. While the latter, more conservative value (50 ha/1000m^3/d) may be suitable for natural treatment wetlands in more southerly regions, it is probably much too high for Arctic wetlands where the bulk of sewage treatment occurs over a very short period (2 – 3 months) under high light conditions. Actual measurements of sewage contaminant concentrations in tundra wetlands at Coral Harbour, Baker Lake, and Chesterfield Inlet indicate very much higher treatment rates, and indicate that values closer to the lower end of the range (1.4 ha/1000 m^3/d) are more realistic for tundra wetlands, especially if they have been engineered to improve water flows. Given that most tundra wetlands also treat some landfill leachate as well as sewage, a value of 5 ha/1000m^3/d is recommended for tundra wetlands.

2.0 FACILITY OVERVIEW

The **Hamlet of Qamani'tuaq** (Baker Lake, the Hamlet) is located north of the mouth of the Thelon River on the northwest side of Baker Lake in the Kivalliq region of Nunavut. The geographic co-ordinates of the community are 64° 18' N, 96° 03' W. The location of the community is illustrated on Drawing 1 in **Appendix A**. Baker Lake itself is the fifth largest lake in Nunavut, totaling 1887 km^2 and measuring approximately 91 km from the mouth of the Thelon River to the Bowell Islands and Narrows in the east end (Natural Resources Canada 2004).

The Hamlet is located in the Wager Bay Plateau Ecoregion of the Northern Arctic Ecozone. The region is characterized by broad sloping uplands, plains and valleys. Soils are primarily silty sand and silty clays overlying boulder till, beach deposits and reworked till. Local topography slopes upward from the lake to a ridge approximately two km to the north. Historically, the community has been subject to extreme snow drifting. A large snow fence has been installed to the north of the community and more snow drift protection is planned. Permafrost is present, with the active layer established at up to 1.5 m in depth. Vegetation in the area is typical tundra vegetation consisting of mosses, lichens, grasses and dwarf shrubs.

The average annual precipitation in Qamani'tuaq consists of 156 mm of rainfall and 1,307 mm of snowfall. The July mean high and low temperatures are 16°C and 6°C, respectively. The January mean high and low temperatures are -29.5°C and -36.4 °C, respectively. Winds are commonly from the north at an average speed of 23 km/h.

The population of the community was estimated at 1,655 in 2006, rising to 2,399 by 2026 (Nunavut Bureau of Statistics, 2000). Economic activities include public services, mineral exploration and arts and crafts. The level of mineral exploration activity around Qamani'tuaq has increased significantly over the last two years. In September 2006, Cumberland Resources announced their intention to construct the Meadowbank Gold Mine, 110 km northwest of the Hamlet.

Electrical services are provided by the Nunavut Power Corporation, while the Hamlet provides trucked water, sewage and waste disposal services. The community has regularly scheduled air service; however most supplies arrive annually by barge during the open water period.

Sewage is collected from the Hamlet's houses and other buildings by truck and discharged into a holding cell located approximately 1.2 km north of the community. Sewage exits the holding cell by exfiltration and/or by overtopping the berms. Sewage flows down a slope approximately 200 m before entering Lagoon Lake. From Lagoon Lake it flows east approximately 300 m to Finger Lake and then another 1000 m from Finger Lake to the entry of Airplane Lake. Compliance with water license effluent criteria is to be achieved at SNP Station BAK-2 at the inflow to Airplane Lake. Airplane Lake drains through Garbage Creek, entering Baker Lake, approximately 1300 m to the south.

Qamani'tuaq presently draws its drinking water from Baker Lake, approximately 170 m from the shore at a depth of 5 m below surface. The water intake is located approximately 2 km west of the discharge of Garbage Creek into Baker Lake. Water is pumped from the intake into storage tanks in the pump house where it is chlorinated and distributed by a small piped distribution system serving the Health Centre, Nurse's Residence, Senior's facility and group home, or more commonly to trucks for distribution to building storage tanks throughout the community. Raw water treatment consists only of chlorination. Residents and regulators have expressed concern about the effectiveness of the wetland treatment system and its potential impact to drinking water quality in the community.

The solid waste facility (landfill) is located on the south shore of Finger Lake (part of the Tundra Wetland). It was originally constructed in 1991 and expanded and modified to meet territorial environmental guidelines in 1998. The solid waste facility accepts household refuse, batteries, appliances, fuel and water tanks, discarded fuel drums, abandoned vehicles, etc. Household refuse is burned on site, as weather permits. Runoff from the solid waste site currently flows into Finger Lake.

3.0 REVIEW OF BACKGROUND INFORMATION

Several documents were made available to NJWL as background to the current study. Key findings from these materials are reported below.

Type “B” Water License for N6L3-1191 (Renewal), Northwest Territories Water Board - September 1993

Licence N6L3-1191, a renewal Type “B” Water Licence was issued to the Hamlet of Baker Lake, for the period of September 1, 1993 to August 31, 1999. A number of general conditions are included in the Licence, as well as specific conditions pertaining to Water Use, Waste Disposal, Abandonment and Restoration, and Operation and Maintenance. The license establishes sewage effluent quality standards to be met at SNP Station 1191-2, identified in the license as “run-off below the Waste Disposal Facilities (exact location to be determined following a study required in the license).” The location of this station was subsequently recommended to be located where water from the wetland enters Airplane Lake. Two Surveillance Network Program (SNP) stations were identified, with one at the pump house (1191-1) and one at the run-off below the waste disposal facility (1191-2). Parameters required to be analyzed on a monthly and annual basis were also specified.

Sewage Treatment Using Tundra Wetlands, Dillon Consulting Limited, 1999

Dillon Consulting Limited (Dillon) undertook a review of three existing wetland sewage treatment systems in Nunavut, including Qamannittuaq, to develop a better understanding of the sewage treatment capabilities of natural wetlands in northern Canada. The study involved a review of pertinent literature, characterization of the three wetlands and collection and analysis of effluent samples. Key findings for Qamanaittuaq are summarized below:

- During the sampling period (spring and summer 1996) the Tundra Wetland achieved removal rates for analyzed parameters equal to or better than expected from an annual storage lagoon;

- When temperatures are below freezing (October to May), a sewage ice pack forms on the slope of the valley walls up-gradient of Lagoon Lake. Observations indicate that the ice pack melts over a period of approximately four weeks;

- The mass of fecal coliforms coming from the melting ice pack was minimal, likely due to die off through freeze/thaw action. Data also suggested a slight reduction of BOD_5 from the melting ice pack;

- The addition of a primary treatment lagoon would hold the melting ice pack and reduce loading to the system during the spring melt period, allowing for a controlled discharge over time;

- Analytical data suggested that nutrient removal increases with treatment distance, time and increased hydraulic retention; and

- There was a perception, as identified in the their Traditional Environmental Knowledge study, that the wetland treatment system will not protect the aquatic environment in the future and, therefore, may impact the flora and fauna of the area.

Baker Lake Sewage and Solid Waste Disposal Operation and Maintenance Manual, Dillon Consulting, 1999

This Manual was prepared as a requirement of the Hamlet's Water Licence and is intended to assist the Hamlet to operate its waste disposal facilities in compliance with its licence. The Manual provides a general overview of the sewage and solid waste disposal systems in the community, including sketches of the general layout of both facilities. The Manual provides general instructions for the operation and maintenance of each facility, including record keeping and effluent sampling according to licence requirements. A spill contingency plan for spills occurring at the landfill is appended to the Manual.

Water Licence for NWB3BAK9904 (Renewal of NWT Licence N6L3 – 1191), Nunavut Water Board June 1999

The Nunavut Water Board issued Water Licence NWB3BAK9904 to the Hamlet of Baker Lake, for a five year period, effective October 1, 1999. This licence is a renewal of Water Licence N6L3-1191, issued by the NWT Water Board prior to territorial division. Licence requirements include the submission of Annual Reports, an Operation and Maintenance (O & M) Manual, a Spill Contingency Plan and an Abandonment and Restoration (A & R) Plan; operating a Surveillance Network Program; posting of signs indicating the location of facilities and sampling locations; and maintenance of all licenced facilities.

Four Surveillance Network Program (SNP) stations were identified - BAK-1 (formerly 1191-1), BAK-2 (formerly 1191-2), BAK-3 (formerly 1191-3) located at the outlet of Airplane Lake, and BAK-4, located at the runoff from the solid waste disposal facility at Finger Lake. Specified sewage effluent quality criteria are to be met at Station BAK-2.

Water Licence Inspection Report, Indian and Northern Affairs Canada (INAC) - November 2001

The Water Resources Division of Indian and Northern Affairs Canada (INAC) conducted a water licence inspection in August of 2001. The inspection reported on five different topics: potable water, sewage lagoon, landfill, waste oil and non-compliance. In addition, a number of water and effluent samples were taken at the Surveillance Network Program (SNP) stations. The water licence inspection report highlighted the following:

- Evidence of erosion of the sewage holding cell berms was observed: preventative maintenance was recommended;

- The solid waste site was reported to be efficiently managed with proper waste segregation being practiced;

- There was a lack of evidence that the former waste oil pit had been properly contained, resulting in the potential for hydrocarbon contamination of water. Hydrocarbon contamination was noted at current waste oil storage site;

- Analysis of an effluent sample from Station BAK2 indicated compliance with all licence and CCME Protection of Freshwater Life parameters, except iron. Furthermore a microtox analysis did not attribute toxicity to runoff from the solid waste facility;

- Analysis of a raw water sample from the vicinity of drinking water supply (Station BAK-1) indicated compliance with all parameters of the Guidelines for Canadian Drinking Water Quality. Due to transportation delays, bacteriological analysis of sample was not undertaken;

- Required signs had not been posted; and

- The licensee had not submitted the required Annual Reports, Operations and Maintenance Plan, Spill Contingency Plan and Abandonment and Restoration Plan.

Water Licence Inspection Report, Indian and Northern Affairs Canada (INAC) - November 2002
The Water Resources Division of INAC conducted a water licence inspection again in July 2002. The inspection addressed the same items reviewed in 2001. The water licence inspection report highlighted the following:

- Analysis of a raw water sample from the vicinity of drinking water supply (Station BAK-1) indicated compliance with all parameters of the Guidelines for Canadian Drinking Water Quality with the exception of slight exceedences for colour and turbidity;

- The sewage holding cell appeared to be ineffective in reducing total suspended solids from reaching the wetland; however effluent was reported to have undergone considerable treatment prior to reaching Airplane Lake;

- Samples of seepage from the landfill (Station BAK-4), indicated total ammonia, turbidity, total suspended solids and BOD were in excess of Municipal Wastewater Effluent Quality Guidelines;

- Waste oil drums were observed in the ditch and associated leaking of oil had occurred, stained soil was observed;

- Secondary containment for waste batteries was recommended;

- Wastes were poorly segregated in the bulky metal waste area;

- Required signs had not been posted; and

- The licensee has not submitted the required Annual Reports or the Operations and Maintenance Plan.

Water Licence Inspection Report, Indian and Northern Affairs Canada (INAC) - November 2003
The Water Resources Division of INAC conducted a third water licence inspection in August of 2003. The inspection addressed the same items reviewed in 2001 and 2002. The water licence inspection report highlighted the following:

- The drinking water source is not identified with signs: there is a significant amount of traffic on the lake which presents potential for contamination;

- Station BAK-1, the drinking water intake, was sampled and all results were within Licenced Guidelines and the Canadian Council of Ministers of the Environment (CCME) Drinking Water Quality Guidelines;

- There was evidence that the berms on the sewage holding cell had been breached and the holding cell was observed to be discharging continuously, despite the repairs to the berm;

- Stations BAK-2, BAK-3 and BAK-4 were sampled; BAK-2 exceeded guidelines for total iron and phenol, BAK-3 samples were within guidelines (however, iron levels were only slightly less than the guideline), and the results for the BAK-4 sample greatly exceeded the CCME guidelines for iron, suggesting that leachate from the old landfill may be affecting the water quality at this station;

- There is a lack of containment for hazardous materials at the solid waste landfill and runoff into Finger Lake is a concern; and

- Numerous non-compliance issues related to reporting and submission of plans were identified.

Site Investigation Report for the Sewage Disposal System in the Hamlet of Baker Lake, NU – September 2005

Community and Government Services (CGS) completed a site investigation of the sewage wetland system to evaluate its effectiveness and compliance with water licence requirements and federal water quality guidelines. Three sampling events were undertaken in 2005, with sample locations including Lagoon Lake (P1), Finger Lake (P2), Airplane Lake (P3) and the mouth of Garbage Creek at Baker Lake (Pfd). Observations and conclusions of the investigation are summarized below:

- Effluent was observed to seep out of the holding cell, traveling down slope to Lagoon Lake;

- Water in Lagoon Lake and Finger Lake appeared green, likely due to an algal bloom resulting from nutrients in the effluent;

- The wetland area contained thick and abundant vegetation as well as various bird species and small fish in the third lake (Airplane Lake);

- The proximity of the landfill to the wetland raises the potential for leachate from the landfill to enter the wetland and negatively affect effluent quality;

- Analytical results of samples from all three events indicated compliance with water licence effluent quality criteria and most federal criteria by the time effluent reached Finger Lake (P2). The exceptions were elevated copper, iron and zinc, possibly an influence from landfill leachate; and

- Discarded metal drums at the current and previous landfill sites and the lack of signage throughout the wetland were noted as an issue of concern.

Site Investigation Report for the Water Supply System in the Hamlet of Baker Lake, NU – September 2005

CGS completed a site investigation to evaluate the effectives of the water treatment system, and to determine its compliance with federal and territorial water quality guidelines at the water intake and treatment points. Sample locations and analyses were chosen based on requirements for NWB water licences and applicable CCME guidelines. This Site Investigation identified the following:

- Water samples were collected between June and September of 2005 from Baker Lake at the shore of the pump house for analysis of drinking water quality: two additional sample locations were added on the second visit – 100 m west of the final wetland discharge point (mouth of Garbage Creek) on Baker Lake and from a water tap within the community;

- Potable water obtained from Baker Lake is treated with hypochlorite immediately prior to supply to water trucks; chlorine levels are tested every day;

- Since the final wetland discharge point is approximately 2000 m east of the water intake and the prevailing wind is from the north, it is thought that the final discharged sewage effluent has little effect on drinking water quality;

- Results confirmed that water in Baker Lake met CCME Guidelines for Canadian Drinking Water Quality: turbidity appeared to be higher during spring (June) and summer (end of August) run-off; and

- The lack of vegetation around the pump house berm was noted as an issue of concern, as this may contribute to increased turbidity during spring and summer run-off; the lack of signage in the water intake and treatment areas was also noted.

4.0 WETLAND TREATMENT SYSTEM

The following section outlines work completed to date on Part A – “Sewage Treatment” of the study. It includes a summary of future sewage volume generation estimates, a detailed description of the wetland system, results of the effluent sampling program and analysis and conclusions about the effectiveness of the wetland in treating sewage to meet licence requirements.

4.1 Volume Predictions

Future sewage generation volumes are necessary to determine if the current sewage treatment system can meet the demands of the increasing population of Qamani’tuaq and achieve compliance with current and future regulatory requirements. The 2006 Canadian Census data will not be available until 2007. The Nunavut Bureau of Statistics (www.stats.gov.nu.ca) provides population projections from 2000 to 2020 for communities throughout Nunavut. Table 1 extrapolates these population projections for the Hamlet of Qamani’tuaq to 2026, based on an annual increase of approximately 2.0%, as projected by the Bureau of Statistics.

Table 1: Population Projections - Qamani'tuaq, Nunavut

	Population
2006	1655
2011	1808
2016	1996
2021	2188
2026	2399

Projected sewage generation rates for the period between 2006 and 2026 are presented in Table 2. Sewage volumes are anticipated to be equal to water consumption volumes. The annual sewage generation is projected, based on a per capita water consumption rate of 104 Liters per capita per day (L/c/d.). The sewage volume for a ten-month storage period each year (typical lagoon system) is also included in the table.

Table 2: Sewage Generation Projections – Qamani'tuaq, Nunavut

Year	Population	Water Consumption (m^3)	Sewage Volume (m^3)	10-month Sewage Volume (m^3)
2006	1655	62824	62824	52353
2007	1683	63887	63887	53239
2008	1712	64988	64988	54156
2009	1745	66240	66240	55200
2010	1777	67455	67455	56212
2011	1808	68632	68632	57193
2012	1843	69960	69960	58300
2013	1882	71441	71441	59534
2014	1918	72807	72807	60673
2015	1957	74288	74288	61906
2016	1996	75768	75768	63140
2017	2036	77287	77287	64405
2018	2072	78653	78653	65544
2019	2108	80020	80020	66683
2020	2148	81538	81538	67948
2021	2188	83057	83057	69214
2022	2229	84603	84603	70503
2023	2270	86179	86179	71816
2024	2313	87784	87784	73153
2025	2356	89419	89419	74516
2026	2399	91084	91084	75904

Following a typical northern lagoon storage and release regime of ten months storage and release in the fall, the sewage holding cell or lagoon at Baker Lake would be required to have a capacity of 75,904 m^3 to address the 20 year planning horizon ending in 2026.

The dimensions of the current holding cell are approximately 31 m by 6.5 to 9 m, at the cell's widest, with an approximate depth of 1.5 m. Allowing for reduced capacity due to the interior side slopes on the berms, the estimated capacity of the detention cell is approximately 300 m^3. The size of a lagoon required for 10 months of storage to meet the 20 year demand (approximately 76 000 m^3) would be approximately 175 m by 175 m, with a 2.5 m depth. Such a large lagoon might be prohibitively expensive for CGS and Qamani'tuaq.

4.2 The Existing Wetland System

NJWL site visits in 2006 confirmed previous observations about the Tundra Wetland. The Tundra Wetland treatment system consists of the holding cell, and a natural wetland located in a valley bounded to the north and south by rocky hills (Drawing No. 2, **Appendix A**). Lagoon Lake, the channel between Lagoon Lake and Finger Lake, Finger Lake, and the channel from Finger Lake to the monitoring station at its outlet to Airplane Lake, make up the remainder of the Tundra Wetland treatment system. The Tundra Wetland treats both wastewater from the Hamlet and leachate from the landfills.

Sewage is discharged into the holding cell on a slope of the valley located approximately 1.2 km north of the community. Sewage was observed to be flowing continuously through a breach in the top of the berm of the holding cell during the August site visit. After the reconstruction of the holding cell in September, the effluent was observed to exfiltrate through the larger fill at the bottom of the cell berm. Sewage exiting the holding cell flows overland in a northerly direction, down gradient to the mid point of Lagoon Lake, a distance of approximately 180 to 200 m. Although the main flow area between the holding cell and Lagoon Lake is devoid of vegetation, this area and Lagoon Lake are bordered by thick vegetation, comprised mainly of grasses and sedges with some shrubs (e.g., willow). Water in Lagoon Lake was observed to be green due to an algal bloom and a strong sewage odour was present. The area of Lagoon Lake is approximately 2.4 ha with a reported depth of 1.2 m (Dillon 1999).

Water in Lagoon Lake was observed to flow east into Finger Lake, a distance of approximately 300 m. During the site visit, flow was visible through a defined channel. Flows are expected to spread beyond this channel during higher flow periods, such as spring melt. Finger Lake covers an area of approximately 7.2 ha with an average depth of approximately 1.4 m. Water in Finger Lake was also observed to be green in colour and a sewage odour was detected. Both the channel and the lake were bordered by thick vegetation, mainly grasses and sedges with some shrubs. The solid waste facility is located near the southwest shore of Finger Lake, approximately 10 to 15 m away from the lakeshore at its closest point. Drainage from the solid waste facility enters Finger Lake through three culverts installed through the northern berm of the facility. Pools of water were observed inside the berm beneath the level of the culverts during the August and October site visits. A fourth culvert was noted to have been installed along the southern berm of the landfill extension. A large pool of water with a thick layer of algae and debris had accumulated in this area. The outlet of this fourth culvert was not identified as it appeared to have been buried.

A channel approximately 1000 m long, running in a southeast direction, connects Finger Lake with the northwest corner of Airplane Lake. About two-thirds of the way along the channel towards Airplane Lake, the water in the creek was observed to be clear with no apparent odour. The channel has a rocky substrate covered with a thick layer of algae; thick vegetation borders the channel banks. The channel flows through a culvert before emerging and entering Airplane Lake. Algal growth in this area was dense. SNP Station BAK-2, the point at which effluent must comply with the effluent quality criteria specified in the water licence, is located just prior to the entry to Airplane Lake.

Though the sewage treatment facility is considered to end at the entrance to Airplane Lake, water flows from Airplane Lake through Garbage Creek another 1300 m to the shore of Baker Lake. Water in Airplane Lake and Garbage Creek was observed to be clear and without a detectable odour.

Garbage Creek has a rocky substrate with some algal growth throughout; its banks are bordered by thick vegetation, primarily sedges in the upstream area and with increasing density of shrubs downstream toward Baker Lake.

4.2.1 Solid Waste Disposal Facility

There are two solid waste disposal areas, or landfills, within the wetland watershed.

The active landfill is located southeast of the sewage holding cell on the same north-facing slope immediately south of Finger Lake (Drawing No. 2, **Appendix A)**. The landfill was reportedly constructed in 1991 and expanded in 1998 to extend its life and achieve compliance with guidelines for municipal waste disposal. Domestic solid waste is collected from the community and deposited in the landfill on a daily basis. Separate areas are provided for bulky metal wastes, hazardous wastes and waste oil. The landfill drains through culverts into the southwest end of Finger Lake. Previous Water Licence inspection reports have noted concerns with the impact of landfill leachate on Finger Lake and the downstream aquatic system.

In addition to the active landfill there are several other landfills or waste disposal sites in the area around Airplane Lake. A former landfill is located between the south shore of Airplane Lake and the upslope plateau to the south. Hundreds of metal oil drums are stacked just south of the shore, along with numerous scrap metal items. Various types of debris are reported to be buried in the plateau area. The underlying surface and partially buried waste is visible through the cover of grasses, sedges and moss. Waste in this area includes scrap metal, snowmobiles, household garbage, mattresses and animal carcasses. A saturated area located in the middle of the plateau is covered with approximately 30 cm deep rust-coloured water and appears to be lined with plastic and metal debris. It could not be determined if the saturated area drains north into Airplane Lake or south into Baker Lake. Previous water sampling from Airplane Lake has shown that drainage from the these sites may be entering Airplane Lake, though it should be noted that the area immediately down slope in Baker Lake has not been analyzed for the presence of landfill leachate.

Immediately west of the former landfill lies the Transport Canada (TC) laydown site. This laydown area includes heavy equipment storage, abandoned vehicles and a large contaminated soil disposal area. The remedial status of this contaminated soil is currently unknown. During NJWL's October visit, it appeared as though a fence was being erected at this laydown area. A second laydown immediately adjacent to the TC laydown was also being constructed: this new laydown area is lined and is also being fenced, though its ownership is unknown.

4.3 2006 Effluent Sampling Program

Effluent samples were collected at six (6) locations throughout the Tundra Wetland to characterize the effluent as it traveled through the wetland from the holding cell to Airplane Lake and eventually to Baker Lake. Samples were collected in August and October 2006. A seventh station (STN-7) was added in October to replace STN-3. The location of STN-7 is the same location as NWB station 1191-2/BAK-2, considered by the NWB as the end of the sewage treatment facility, where effluent must meet effluent quality guidelines. Wetland sample locations are illustrated in Table 3 and in Drawing No. 3, **Appendix A**.

Table 3: Tundra Wetland Sample Stations

Station Name	Station Location
STN-1	Discharge of Garbage Creek into Baker Lake
STN-2	Outflow of Garbage Creek from Airplane Lake (equivalent to NWB Station 1191-3/BAK-3)
STN-3	Channel between Airplane Lake and Finger Lake, two-thirds of the way down from Finger Lake
STN-4	Mid-south shore of Finger Lake
STN-5	Channel between Finger Lake and Lagoon Lake
STN-6	South shore of Lagoon Lake, between holding cell flow and channel exit
STN-7	Prior to stream inlet into Airplane Lake (equivalent to NWB Station 1191-2/BAK-2)

All sampling was carried out on one day in August and again in October. Samples were collected by immersing the bottles in water at the sample station, upstream from the sampler. Each bottle was triple rinsed, except fecal coliforms, which were collected with pre-sterilized bottles containing preservative from the laboratory. Each sample was also preserved as needed, except where noted.

NJWL collected effluent samples on August 1, 2006 with the assistance of Mr. Gabriel Joedee of Qamani'tuaq. Samples were submitted to **ALS Laboratories** in Winnipeg, MB on August 2, 2006. Lab analyses included routine parameters (TSS, pH, conductivity, etc), biological oxygen demand (BOD), nutrients, phenols, fecal coliforms, total metals, and oil & grease. In total, 42 samples were collected from the sewage treatment wetland, including one duplicate sample. Field measurements were not taken during the August sampling event as the Hydrolab Quanta field analyzer did not arrive to the site on time.

Fall sampling occurred on October 4, 2006, with the assistance of Mr. Nathaniel Kunantnat of Qamani'tuaq. Samples were submitted to ALS Laboratories on October 5, 2006. Lab analyses were similar to those in August, with the addition of total, dissolved and ortho-phosphorus, and kjeldahl nitrogen. Field measurements for pH, temperature, conductivity, salinity, oxidation-reduction potential (ORP) and dissolved oxygen (D.O.) were made using the Hydrolab. All Tundra Wetland *in situ* data for October is available in Table 22, in **Appendix C**.

4.3.1 QA/QC

A number of QA/QC procedures were in place to ensure the collection of high quality effluent data. In summer, NJWL collected duplicate samples for one of every ten samples and carried a travel blank. Duplicate samples are collected to check accuracy of sampling procedures and precision of laboratory methods; duplicate samples can also help describe natural environmental variability. Travel blanks are used to test for contamination from the bottles, or during handling, storage and transport.

During sampling of the sewage wetland in the summer, one duplicate sample was taken at STN-4. Results of the duplicate samples were comparable, thus confirming that sample procedures and analyses were consistent. A duplicate sample was also taken at STN-5 during fall sampling. Similar results between the duplicate samples were obtained, with the exception of aluminum data (421 μg/L and 290 μg/L), perhaps attributable to the omission of preservative from the duplicate sample.

Analysis of the travel blank demonstrated there was no contamination from the bottles, or due to handling, transport or storage. All results were consistent with those of deionized water; pH was 5.71, turbidity was 0.05 NTU, alkalinity (as $CaCO_3$) and bicarbonate (HCO_3) were 2 mg/L, and all other results were less than the detection limits.

Field pH was not measured in the summer, so a comparison between laboratory and field pH was not made. In the fall, when field parameters were measured, laboratory pH was generally higher than field pH. However, it is recognized that it is difficult to obtain accurate pH measurements in the field and the added time between sampling and analysis allows for changes in the chemical characteristics of the water, which can alter the pH of the water as some ions move in and out of solution. Therefore, the differences between pH are not considered to be significant. There was little difference between field and laboratory measurements of conductivity.

Data quality objectives (DQOs) provided by the laboratory showed results were reliable. All parameters were within their acceptable limits of calibration and all laboratory duplicates were below their recommended maximum of relative percent differences. DQOs were acceptable for both summer and fall sampling events.

4.3.2 Analytical Results

Laboratory results from the August and October sampling events are presented in the two following sections. Laboratory Analytical Certificates are included in **Appendix B.**

August

Table 4 presents analytical results for August sampling of the Tundra Wetland, including applicable NWB Water Licence criteria.

Table 4: Analytical Results from the Tundra Wetland at Qamani'tuaq, NU in August 2006

Station	BOD (mg/L)	Fecal Coliforms (CFU/100mL)	Oil & Grease (mg/L)	Total Suspended Solids (mg/L)	Nitrate + Nitrite-N (mg/L)	Ammonia (mg/L)	pH
STN-1	54	1	< 1	< 5	0.019	0.04	7.29
STN-2	6	10	< 1	< 5	0.448	0.024	7.55
STN-3	8	10	< 1	6	0.416	0.049	7.25
STN-4	8	10	< 1	< 5	1.71	0.999	8.07
STN-5	17	640	< 1	93	0.851	2.78	7.59
STN-6	59	2000	1	72	0.417	4.84	**9.38**
Water Licence Effluent Criteria	80	$1X10^4$ (10 000)	No visible sheen	100	-	-	Between 6 and 9

The only parameter to exceed NWB Water Licence Criteria was pH at STN-6 (Lagoon Lake). BOD (59 mg/L), suspended solids (72 mg TSS/L) and fecal coliforms (2000 CFU/100 mL) results were relatively high at STN-6 in August but did not exceed Water Licence criteria, indicating very good effluent treatment in the wetland system.

Under CCME Guidelines for the Protection of Freshwater Aquatic Life (PFAL), the limit for molecular ammonia in wastewater is 19 parts per billion (ppb). This is set well below the generally accepted limit for molecular ammonia toxicity of 200 ppb (0.2 mg/L). As may be seen from Table 4 at station STN-6, the ammonia nitrogen concentration in August was 4.84 mg/L in water of pH 9.38. This is equivalent to a molecular ammonia concentration of 1385 ppb, far above the toxicity limit assuming that water temperature in the lake at this time was about 5 °C. The ammonia nitrogen concentration dropped to 2.78 mg/L at a pH of 7.59 by STN-5 (inlet of Finger Lake), equivalent to a non-toxic level of about 24 ppb of molecular ammonia, just below the CCME PFAL Guideline. By the time the water reached STN-3, just above the Compliance Point at the entrance to Airplane Lake, the ammonia nitrogen level had dropped to 0.049 mg/L.

Results for Tundra Wetland metals are shown in Table 5. Several metals exceeded CCME PFAL Guidelines at STN-6: aluminum, cadmium, iron and copper (see Figures 1 to 3, **Appendix C** for a display of aluminum, iron and copper through the Tundra Wetland). There does appear to be some impact to effluent quality by landfill leachate as concentrations of several metals (aluminum, cadmium, iron, lead, silver and others) increased downstream of STN-6, exceeding CCME Guidelines. Aluminum, iron and copper continued to exceed CCME Guidelines at STN-3, just above the Tundra Wetland Compliance Point. Copper is not thought to be from landfill leachate as it commonly occurs in wastewater systems due to copper piping in domestic systems. No metals were in exceedance at STN-2, the outlet of Airplane Lake or entering Baker Lake at STN-1.

There was previous concern regarding iron and phenols at the Compliance Point. Phenols are aromatic compounds that mainly come from industrial effluents or domestic sewage (CCME 1999). Phenols exceeded applicable guidelines at two stations but were well within compliance by the required point (see Table 5). As previously mentioned, iron did exceed guidelines at STN-3, just above the Compliance Point, so still appears to be a concern.

Table 5: Analytical Results for Metals and Phenols in the Tundra Wetland at Qamani'tuaq in August 2006 (bolded result indicates guideline exceedance)

Total Metals (ug/L)	Station						Applicable Guidelines (ug/L)*
	STN-1	STN-2	STN-3	STN-4	STN-5	STN-6	
Aluminum**	67	11	**200**	94	**337**	**297**	100 [a]
Cadmium**	<0.02	<0.02	<0.02	<0.02	**0.56**	**0.03**	0.017 [b]
Iron**	160	90	**1170**	**1220**	**1020**	**840**	300
Mercury**	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1
Arsenic	0.7	0.7	1.3	1.3	1.4	0.9	5
Boron	<30	<30	<30	<30	50	50	
Barium	34.1	35	30.4	22.2	22.2	17.2	
Beryllium	<1	<1	<1	<1	<1	<1	
Bismuth	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	
Calcium	4500	3900	7800	7200	7400	7500	
Cobalt	<0.2	<0.2	0.4	0.3	1.2	0.6	110 [g]
Chromium	<1	<1	<1	<1	<1	<1	1 [c]
Cesium	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	
Copper	2	2	**4**	**4**	**14**	**16**	2 [d]
Potassium	900	800	2200	2400	4600	5200	
Magnesium	930	820	1460	1640	1620	1710	
Manganese	25.3	7	68.9	72.3	51.9	57.5	
Molybdenum	<0.2	<0.2	<0.2	<0.2	0.8	0.3	73
Sodium	2780	2610	8340	9990	19400	21500	
Nickel	<2	<2	<2	<2	2	<2	25 [e]
Phosphorus	<50	<50	600	760	1860	2080	
Lead	<0.5	<0.5	0.7	<0.5	**1.2**	0.6	1 [f]
Rubidium	0.8	0.6	2.2	2.4	6.2	6.2	
Antimony	<1	<1	<1	<1	1	<1	
Selenium	1	1	**2**	1	<1	<1	1
Tin	<0.6	<0.6	<0.6	<0.6	1	<0.6	
Strontium	17.4	15.5	30.6	29.9	25.5	24.9	
Tellurium	<1	<1	<1	<1	1	<1	
Titanium	2.6	<0.9	5.4	2.4	6.8	3.6	
Thallium	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	0.8
Uranium	<0.1	<0.1	0.1	<0.1	0.7	0.1	
Vanadium	<1	<1	<1	<1	1	<1	
Tungsten	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	
Zirconium	<0.4	<0.4	0.7	0.5	1.4	0.9	
Silver	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	0.1
Zinc	<10	<10	10	<10	10	10	30
Phenols	1	1	2	3	**6**	**10**	4

* CCME Guidelines for the Protection of (Freshwater) Aquatic Life (unless otherwise noted)

** Metal scan with ultra low detection limits

[a] Aluminum = 100 ug/L when pH ≥ 6.5, $[Ca^{2+}]$ ≥ 4 mg/L, DOC ≥ 2 mg/L

[b] Cadmium = 0.017 ug/L when Hardness $[CaCO_3]$ is 1-60 mg/L

[c] Where two guidelines exist (for different valencies), the stricter guideline is given

[d] Copper = 2 ug/L when Hardness $[CaCO_3]$ is < 120 mg/L

[e] Nickel = 25 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

[f] Lead = 1 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

[g] British Columbia Ministry of Environment Guidelines (for comparison)

October

Tables 6 and 7 present results from the October sampling of the Tundra Wetland and include the applicable NWB Water Licence criteria. As previously mentioned, STN-7 was added during this round of sampling to replace STN-3 and serve as the Tundra Wetland Compliance Point.

Table 6: Analytical Results from the Tundra Wetland at Qamani'tuaq, NU in October 2006

Station	BOD (mg/L)	Fecal Coliforms (CFU/100mL)	Oil & Grease (mg/L)	Total Suspended Solids (mg/L)	pH	Dissolved Oxygen (mg/L)
STN-1	6	< 10	< 1	6	7.36	14.76
STN-2	< 6	< 10	< 1	< 5	7.56	14.32
STN-7	< 6	< 10	< 1	< 5	7.56	14.85
STN-3	< 6	< 10	< 1	< 5	7.64	15.22
STN-4	< 6	< 10	< 1	< 5	7.45	12.86
STN-5	< 6	460	1	< 5	7.47	5.87
STN-6	8	2330	2	7	7.51	4.61
Water Licence Effluent Criteria	80	$1X10^4$ (10 000)	No visible sheen	100	Between 6 and 9	-

Table 7: Analytical Results from the Tundra Wetland at Qamani'tuaq, NU in October 2006

Station	Ammonia (mg/L)	Nitrate + Nitrite-N (mg/L)	Nitrate (NO_3) (mg/L)	Nitrite-N (NO_2) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Diss. Phosphorus (mg/L)	Ortho-Phosphorus (mg/L)	Total Phosphate (mg/L)
STN-1	0.003	0.044	0.040	< 0.01	0.400	0.023	0.008	0.003	0.071
STN-2	< 0.003	0.074	0.070	< 0.01	0.400	0.019	0.008	0.002	0.058
STN-7	0.065	2.120	2.100	0.020	0.900	0.249	0.210	0.101	0.763
STN-3	0.066	2.110	2.100	0.010	1.100	0.253	0.236	0.119	0.776
STN-4	1.630	1.960	1.890	0.060	3.000	0.484	0.461	0.305	1.484
STN-5	20.400	0.310	0.260	0.050	20.200	2.250	2.110	2.060	6.899
STN-6	22.400	0.079	0.040	0.040	24.500	2.710	2.470	2.410	8.309

* Total Phosphate is estimated by multiplying Total Phosphorous by a factor of 3.066 (ALS Laboratories 2006)

In comparison to August analytical results, there were no exceedances of the NWB Water Licence criteria in October at any station. At STN-6, BOD (8 mg/L) and suspended solids (7 mg TSS/L) were less than in August, and fecal coliforms (2330 CFU/100 mL) were greater; however, all were compliant with NWB Criteria.

As illustrated in Table 7, the ammonia concentration was 22.4 mg/L in water at Lagoon Lake (STN-6), equivalent to a molecular ammonia concentration of 85 ppb. This level was well above the CCME PFAL guideline for water of pH 7.51, but below toxicity, as the water temperature in Lagoon Lake was approximately 2°C (see **Appendix C**). Phosphorus results (all > 2 mg/L) were also high in Lagoon Lake in October, compared to other sites. Both ammonia nitrogen and phosphorus levels decreased through the Tundra Wetland system and indicate that the Tundra Wetland, as it is currently configured, provides good treatment of the Hamlet's sewage effluent.

October results for the Tundra Wetland metals and phenols are shown in Table 8. Iron, copper and aluminum levels, whether from sewage effluent or landfill leachate, exceeded CCME PFAL Guidelines at sites within the Tundra Wetland in both August and October. Copper and iron still exceeded these guidelines at STN-7, the Compliance Point (see Figures 4 to 6 in **Appendix C**), in October. However, these metals did not exceed the Guidelines further downstream at STN-2. At STN-1, only aluminum exceeded the Guidelines (possibly related to road construction upstream of STN-1). In August, increases in metals downstream of STN-6 were attributed to inputs from landfill leachate; this increase was not noted in October, and was perhaps attributable to reduced runoff during freezing conditions.

Phenols did not exceed CCME PFAL Guidelines at any station in October and were well within compliance at STN-7. Phenols do not appear to be a concern in the Tundra Wetland, based on these results up to this time.

Table 8: Analytical Results for Metals and Phenols from the Tundra Wetland at Qamani'tuaq in October 2006 (bolded result indicates guideline exceedance)

Total Metals (ug/L)	Station							Applicable Guidelines (ug/L)*
	STN-1	STN-2	STN-7	STN-3	STN-4	STN-5	STN-6	
Aluminum**	**285**	48	74	83	**144**	**421**	**601**	100 [a]
Cadmium**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.017 [b]
Iron**	240	120	**640**	**650**	**980**	**1660**	**1910**	300
Mercury**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Arsenic	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	5
Boron	<30	<30	40	30	50	60	70	
Barium	47	<0.3	41.7	40.7	40.7	28.8	33.3	
Beryllium	<1	<1	<1	<1	<1	<1	<1	
Bismuth	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Calcium	6800	<100	12700	12400	11600	11300	11900	
Cobalt	<0.2	<0.2	0.3	0.3	0.4	0.7	0.8	
Chromium	<1	<1	<1	<1	<1	2	3	1 [c]
Cesium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Copper	<2	<1	**3**	**3**	**4**	**8**	**10**	2 [d]
Potassium	1000	<100	3600	3900	4000	7800	8400	
Magnesium	1390	<10	2420	2320	2740	2860	3160	
Manganese	8.4	<1.1	52.5	36	51.7	125	141	800 [g]
Molybdenum	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	73
Sodium	3870	<30	16400	15600	19400	34200	36600	
Nickel	<2	<2	<2	<2	<2	3	3	25 [e]
Phosphorus	60	110	260	250	530	2220	2670	
Lead	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	1 [f]
Rubidium	1	<0.2	2.6	3	3.7	9.4	10	
Antimony	<1	<1	<1	<1	<1	<1	<1	
Selenium	1	<1	<1	**2**	<1	<1	<1	1
Tin	<0.6	<0.6	<0.6	<0.6	<0.6	0.7	<0.6	
Strontium	24.7	<0.1	46.4	44.8	46.1	39.2	40.4	
Tellurium	<1	<1	<1	<1	<1	<1	<1	
Titanium	4.7	1.1	<0.9	1.6	2.3	9.2	17.9	
Thallium	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.8
Uranium	0.1	<0.1	0.2	0.2	0.1	<0.1	0.1	
Vanadium	<1	<1	1	<1	1	1	2	
Tungsten	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Zirconium	<0.4	<0.4	<0.4	<0.4	0.5	1.3	1.8	
Silver	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1
Zinc	<10	<10	<10	<10	<10	20	20	30
Phenols	<1	<1	<1	<1	1	3	2	4

* CCME Guidelines for the Protection of (Freshwater) Aquatic Life

** Metal scan with ultra low detection limits

[a] Aluminum = 100 ug/L when pH ≥ 6.5, $[Ca^{2+}]$ ≥ 4 mg/L, DOC ≥ 2 mg/L

[b] Cadmium = 0.017 ug/L when Hardness $[CaCO_3]$ is 1-60 mg/L

[c] Where two guidelines exist (for different valencies), the stricter guideline is given

[d] Copper = 2 ug/L when Hardness $[CaCO_3]$ is < 120 mg/L

[e] Nickel = 25 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

[f] Lead = 1 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

[g] British Columbia Ministry of Environment Guidelines for the Protection of Freshwater Aquatic Life (for comparison)

4.4 Impact of Effluent on Water bodies

A large effluent sample (60 L) was collected from STN-1 (mouth of Garbage Creek at Baker Lake) in August and submitted for a bioassay. This test determines the acute toxicity of the sample by measuring the number of stressed and/or dead rainbow trout (*Onchorhynchus mykiss*) in a 96-hour period. The method applied by the laboratory is an accepted Environment Canada reference method, outlined in their 2nd Edition of Biological Test Methods (2000). The sample for the bioassay was collected from STN-1 as there was previous concern about the levels of iron entering Baker Lake from the Airplane Lake drainage, given that Baker Lake is the drinking water source for the community and a source for fish for domestic consumption. Though iron was not above guidelines at the time of sampling, there were no stressed or dead fish recorded during the 96-hour test period. Therefore, the effluent from Garbage Creek can be considered non-toxic to fish at the time sampled.

There have been reports of the presence of fish in Airplane Lake. An elder, Ms. Lucy Iyago, confirmed to NJWL that residents used to fish in Airplane Lake for lake trout and grayling; however, fishing stopped once sewage started being deposited in the wetland. The presence of fish in Airplane Lake was confirmed by NJWL during the October site visit, when several small minnows were observed.

Zooplankton species were observed at some sample locations within the Tundra Wetland during the October site visit. Daphnia species (water fleas) and ephippia (egg cases evident of sexual reproduction) were found at three locations, STN-4, STN-5 and STN-6. At STN-6, daphnids were observed swimming on the surface of the water. A copepod was also observed at STN-4.

Wildlife observed in the Tundra Wetland at the time of sampling included ducks, primarily on Finger Lake, where approximately 75 birds were observed, and two sandhill cranes, observed between the holding cell and Lagoon Lake. Most of the wildlife observations were made during the August site visit; however, approximately 20 gulls were observed on Finger Lake during the October visit. This may be due to the proximity of the landfill, as many gulls were also observed at the landfill. Ms. Iyago commented on the noticeable increase of animals, including grizzly bears, near town since the development of the sewage treatment wetland and landfill. Hunting of animals seen in the Tundra Wetland has ceased as people fear they are contaminated as a result of eating within the wetland.

Flora throughout the Tundra Wetland appeared dense, especially around the edges of ponds and streams. This is expected as these are wetter areas with added nutrients. To NJWL's knowledge, flora composition before the establishment of the sewage treatment wetland system was not documented; therefore any change in composition or density cannot be confirmed. However, it is well-known that additions of sewage effluent to a natural wetland can be expected to alter its ecology and biology, including plant growth and species composition. Plants in the Tundra Wetland will proliferate in the new positively stressed conditions, due to the addition of nutrients (nitrogen and phosphorus).

4.5 Preliminary Conclusions and Recommended Improvements to the Tundra Wetland System

Table 9 presents the approximate sizing of the Tundra Wetland at present.

Table 9: Current Area of Qamani'tuaq's Tundra Wetland System

Component	Dimension	Approximate Area (ha)
Holding Cell	31 m by 6 to 9.5 m	0.02
Flow Area below Holding Cell	180 m by a 1 m channel	0.02
Lagoon Lake	-	2.4
Channel, Lagoon Lake to Finger Lake	300 m by 1 m channel	0.03
Finger Lake	-	7.2
Channel, Finger Lake to Airport Lake	1300 m by 2 m	0.3
Total	-	9.7

The above calculations are conservative as they assume that water from the holding cell is restricted to a one metre wide flow channel and that the same holds true for the channels between the lakes. During snowmelt, water in the wetland below the holding cell that overflows the flow channels is being treated in wider natural wetland area. A more realistic estimation of current effective Tundra Wetland area might about 15 ha but a conservative value is approximately 10 ha.

As may be seen from Table 2, the current (2006) estimated 10-month sewage volume is 52,353 m^3. Assuming that all of this sewage is stored as ice during winter and is released evenly during the freshet over a 4 week (30 day) period, the flow rate passing through the Tundra Wetland will be 1745 m^3/d. For a 10 ha Tundra Wetland, this is approximately 5.7 ha/1000 m^3/d, close to the 5.7 ha/1000 m^3/d minimum size recommended in Section 1.9.

By year 2025, 10-month sewage volume for Baker Lake is forecast to rise to 74 516 m^3 (Table 2). This would then be equivalent to 2484 m^3/d during snowmelt and Tundra Wetland loading would then be equivalent to about 4 ha/1000 m^3/d, below that recommended.

There are number of relatively easy ways to increase the effective area of the Tundra Wetland. The holding cell could be increased in size. Re-design of the berms out of the holding cell could inhibit water from flowing to Lagoon Lake only in its current narrow flow channel (assumed to be one metre wide) and instead to flow across the wetland area in a "wide sheet". Judicious design could create a flow pattern up to 100 m wide. Similar design changes (e.g., adding berms perpendicular to flow) could increase the flow pattern from Lagoon Lake to Finger Lake to a similar width, and that from Finger Lake to Lagoon Lake to twice as much. In addition a second holding cell could be constructed down slope from the existing landfill to impound and treat leachate before it overflows into Finger Lake. Table 10 shows the potential impacts on Tundra Wetland Size of all of these suggestions.

Table 10: Potential Area of Qamani'tuaq' Tundra Wetland

Component	Dimensions	Approximate Area (ha)
Enlarged Holding Cell	50 m by 50 m	0.3
Expanded Flow Area below Holding Cell	180 by a 100 m channel	1.8
Lagoon Lake	-	2.4
Channel, Lagoon Lake to Finger Lake	300 m by a 100 m channel	3.0
Finger Lake	-	7.2
Channel, Finger Lake to Airport Lake	1300 m by 200 m	26.0
Landfill Holding Cell	100 m by 50 m	0.5
Total Possible	-	41.2

As may be seen, there are a number of possible ways that the Tundra Wetland could be engineered to increase treatment area, and one of which, or combinations of, would be much more economical than constructing a large sewage lagoon. In addition such improvements would assure better treatment and provide for future sewage flows. Which, if any, of these improvements may be implemented, will be evaluated in later phases of the project.

5.0 ASSESSMENT OF EXISTING WATER SUPPLY SOURCE

The following section outlines work completed to date on Part B "Water Quality" of the study. It includes the identification of hydrological influences on Baker Lake, a discussion of results from the water quality sampling program, an account of potential impacts to the water source, a summary of NJWL's consultation with Environmental Health Officers, and an initial water source protection plan.

5.1 Hydrological Influences on Baker Lake

There are a number of Water Survey of Canada (WSC) hydrologic stations in and around Baker Lake. The WSC has monitored discharge from several watercourses that flow into Baker Lake: Thelon River, Kazan River, Prince River, Qinguq Creek and Akkutuak Creek. Of these, only the Kazan River station is still monitored. Archived data from these stations is available online (www.wsc.ec.gc.ca) and was reviewed to estimate the contributions of different water sources to Baker Lake.

The Thelon and the Kazan Rivers have the largest discharges of all watercourses for which data is available. The Prince River, Qinguq Creek and Akkutuak Creek are ephemeral systems (they are frozen and have no flow for part of the year). As such, their hydrological influence on Baker Lake is expected to be negligible in comparison to that of the Thelon or Kazan Rivers. The approximate mean monthly and annual discharges of these water courses are presented in Table 11.

Table 11: Mean Monthly and Annual Discharge (m^3/s) of Akkutuak Creek, Qinguq Creek, Prince River, Kazan River and Thelon River

Station*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Akkutuak	0	0	0	0	0.037	0.814	0.226	0.129	0.179	0.031	0	0	0.127
Qinguq	0	0	0	0	0.688	16.9	5.61	2.49	3.56	0.571	0.011	0	2.63
Prince	0	0	0	0	0.259	49.5	53.1	25.2	23	7.44	1.3	0.135	11.9
Kazan	134	106	97.5	110	176	864	1240	914	674	466	302	201	447
Thelon	316	259	233	236	349	1950	1980	1100	859	699	541	407	757

Akkutuak (64° 18’ 57” N by 95° 58’ 23” W) from 1978 – 1990
Qinguq (64° 15’ 42” N by 96° 18’ 53” W) from 1969 – 1994
Prince (64° 18’ 8” N by 95° 43’ 31” W) from 1979 – 1990
Kazan (63° 39’ 9” N by 95° 51’ 8” W) from 1965 - present
Thelon (64° 24’ 25” N by 96° 24’ 37” W) from 1973 – 1982

Given the discharge and geographical location of these watercourses (see Figure 7 in **Appendix C**); the Thelon River is believed to have the greatest influence on water quality near Qamani’tuaq. The Thelon contributes 62% of total discharge of these five rivers combined. In October, NJWL discussed with a long-time resident of the community the direction Thelon River water flows take once it enters Baker Lake. NJWL was informed that the water sweeps north-northeast around Hornet Point, then east through Baker Lake, towards Chesterfield Inlet. In Figure 7, a large underwater sand deposit can be seen at the inflow of the Thelon River to Baker Lake. Built up over time, this sand deposit can affect the transport and mixing of the inflow waters (Murthy 1996). Given the current build up of sand, this deposition can direct Thelon waters further towards the community, increasing the potential to influence water quality in front of the community.

5.2 Water Quality Sampling Program

Water quality sampling was carried out from a small boat on August 2 and 3 (summer) and on October 5 (fall), 2006, at stations established in a gradient to the east and west of the drinking water intake (BL-6, equivalent to NWB station 1191-1/BAK-1). Sampling locations in Baker Lake are described in Table 12 and illustrated in Drawing No. 4, **Appendix A**. In August, 25 sampling stations were located at 200 m intervals up to 2 km east and 2 km west of the drinking water intake (BL-6). Two additional stations, BL-11 (1 km west of BL-6, closer to shore) and Thelon (4.5 km south of BL-6 at Hornet Point, where some residents draw drinking water) were added for the October sampling. The eastern most station was at Garbage Creek (STN-1). All station locations were recorded as Universal Transverse Mercator (UTM) points, using a hand-held Garmin GPS 76 unit.

The location of BL-6 was estimated in August by measuring distance from the shore. Subsequently, precise coordinates of the end of the water intake pipe were supplied by Arctic Divers (NWT) Ltd. Arctic Divers replaced the end portion of the intake pipe after it had been damaged. Hence the location differed by approximately 33 m for the October samples from BL-6.

In August, grab samples were collected for analysis of metals, coliforms, nutrients and general water quality parameters at 11 of these stations (BL-1 through BL-10 and STN-1) and in situ water quality was measured at all stations. Grab samples were collected at 0.5 m depth by using a Van Dorn sampler (beta bottle). In addition, samples were collected at 3 m and 5 m depth at BL-6, also using the

Van Dorn sampler, and at 3 m and 6 m in October due to the location change. Samples were placed in a cooler, maintained at 4°C and shipped to ALS Laboratories in Winnipeg, MB.

In situ profiles of temperature, conductivity, pH and dissolved oxygen were measured at 2 m depth intervals using a Hydrolab Quanta meter. During summer, in situ measurements were taken at all stations except BL-11 and Thelon. During fall, in situ and grab samples were collected at three of the stations sampled in August (BL-4, BL-6 at various depths, and BL-9) and at BL-11 and Thelon, to expand on and validate August results (see Section 5.2.2).

Table 12: Water Quality Sample Locations Across Baker Lake, NU

Station	Station Location	August		October	
		grab	*In situ*	grab	*In situ*
BL-1	2000 m southwest of the water intake	0.5 m	X		
Insitu-1	1800 m southwest of the water intake		X		
Insitu-2	1600 m southwest of the water intake		X		
BL-2	1500 m southwest of the water intake	0.5 m	X		
Insitu-3	1400 m southwest of the water intake		X		
Insitu-4	1200 m southwest of the water intake		X		
BL-3	1000 m southwest of the water intake	0.5 m	X		
Insitu-5	800 m southwest of the water intake		X		
Insitu-6	600 m southwest of the water intake		X		
BL-4	500 m southwest of the water intake	0.5 m	X	0.5 m	X
Insitu-7	400 m southwest of the water intake		X		
BL-5	200 m west of the water intake	0.5 m	X		
BL-6	Drinking water intake	0.5 m, 3 m, 5 m	X	0.5 m, 3 m, 6 m	X
BL-7	200 m east of the water intake	0.5 m	X		
Insitu-8	400 m east of the water intake		X		
BL-8	500 m east of the water intake	0.5 m	X		
Insitu-9	600 m east of the water intake		X		
Insitu-10	800 m east of the water intake		X		
BL-9	1000 m east of the water intake	0.5 m	X	0.5 m	X
Insitu-11	1200 m east of the water intake		X		
Insitu-12	1400 m east of the water intake		X		
BL-10	1500 m east of the water intake	0.5 m	X		
Insitu-13	1600 m east of the water intake		X		
Insitu-14	1800 m east of the water intake		X		
STN-1	2000 m east of the water intake	0.5 m	X		
BL-11	Approximately 1 km west of BL-6			0.5 m	X
Thelon	Approximately 4.5 km south of BL-6			0.5 m	X

All samples collected in August from BL-6 to BL-10, were delayed by three days in arriving at the laboratory in Winnipeg, exceeding the specified holding times for some parameters. Results of certain analysis may have been compromised (i.e., coliforms and nitrates may give false negatives or have lower results than actual). October samples were received on time at the laboratory and results were similar to those obtained in August; therefore, it appears that the results of the August sampling event are reliable. Analytical results for the grab samples are provided in Tables 13 through 20, with laboratory analytical certificates included in **Appendix B**. *In situ* measurements taken in August and October, at 0.5 m depth, are provided in Tables 14 and 18, with all data available in Tables 21 and 23 in **Appendix C**.

5.2.1 QA/QC

During summer sampling of Baker Lake, one duplicate sample was taken at BL-8. Differences between the duplicates were small, suggesting low short-term variability in water quality and consistent sampling procedures and laboratory methods. No duplicate sample was taken during fall due to the reduced sampling schedule.

The same travel blank was used for sewage wetland and Baker Lake sampling. The results obtained from the travel blank showed no contamination from the bottles or due to transport, storage or handling; all results were consistent with deionized water.

In both summer and fall, there were some discrepancies between field and laboratory pH; laboratory values for pH were consistently higher than field values for both August and October. These differences are not thought to be significant as some disagreement between lab and field pH is expected. Reasons for this include the inherent difficulty of obtaining accurate pH measurements in the field, and the increased time between sampling and laboratory analysis. Conductivity and dissolved oxygen (D.O.) values were fairly similar between laboratory and field measurements. D.O. samples were collected and submitted to the laboratory during August sampling only.

Data quality objectives (DQOs) provided by the laboratory were met, showing results were reliable. All parameters were within their acceptable limits of calibration and all laboratory duplicates were within applicable relative percent differences. DQOs were acceptable for both summer and fall sampling events.

5.2.2 Summer (August) Results

The analytical results for August (Table 13) showed Baker Lake to be a clear (maximum turbidity 1.3 NTU), relatively soft water (up to 20 mg/L hardness), thermally stratified lake. Temperature was fairly constant across the surface of Baker Lake and decreased with depth through the water column. The mean temperature-depth relationship in August is displayed in Figure 8 (**Appendix C**), with the thermocline occurring between 4 and 6 m. An exception was seen between BL-3 and BL-6, where surface temperature (0.5 m) decreased. Table 14 provides the in situ results for temperature, pH, D.O. and conductivity at 0.5 m depth.

Table 13: Analytical Results from Baker Lake (BL) Stations for August 2006 (0.5 m depth at all stations, plus 3 m and 5 m at BL-6)

Station	Sodium (mg/L)	Chloride (mg/L)	Cond. (uS/cm)	TDS (mg/L)	Turbidity (NTU)	Hardness (mg/L)	pH	Nitrate+ Nitrite-N (mg/L)	D.O. (mg/L)
BL-1	0.79	<9	25.6	10	0.60	9.5	7.22	0.005	11.0
BL-2	0.64	<9	24.4	6	0.55	9.5	7.19	< 0.005	11.5
BL-3	1.89	<9	32.3	10	0.50	10.3	7.18	0.005	11.5
BL-4	6.91	13	67.9	32	0.45	13.2	7.14	0.011	11.9
BL-5	15.6	29	136	66	0.40	20.0	7.29	0.023	12.1
BL-6 (0.5 m)	16.1	32	144	84	0.35	17.4	7.20	0.030	13.2
BL-6 (3.0 m)	18	32	144	68	0.35	18.1	7.20	0.029	13.2
BL-6 (5.0 m)	17.8	32	144	72	0.40	18.3	7.19	0.028	13.0
BL-7	1.66	<9	32.8	18	0.45	8.9	7.30	0.007	11.8
BL-8	1.44	<9	30.7	14	0.40	8.7	7.25	0.007	11.9
BL-9	0.92	<9	26.8	14	0.40	8.5	7.27	0.010	11.5
BL-10	1.92	<9	34.1	16	0.40	9.3	7.26	0.007	11.8
STN-1	2.78	<9	52.8	24	1.30	15.3	7.29	0.019	8.8

Table 14: In Situ Temperature, pH, Dissolved Oxygen (D.O.) and Conductivity at Baker Lake Stations in August 2006 (0.5 m depth)

Station	Temp (C)	pH	D.O. (mg/L)	Cond. (uS/cm)
BL -1	11.01	6.10	13.99	25
BL - 2	10.41	6.14	12.76	25
BL - 3	9.95	6.23	12.17	32
BL - 4	8.64	6.61	12.21	71
BL - 5	5.55	6.58	13.03	141
BL - 6 (0.5)	5.19	6.16	13.80	150
BL - 6 (4)	5.00	6.03	13.52	149
BL - 6 (6)	5.02	6.08	13.48	149
BL - 7	10.60	7.03	12.43	32
BL - 8	10.51	8.14	11.91	29
BL - 9	10.61	8.15	11.95	26
BL - 10	10.26	7.65	12.31	34
STN-1	18.02	*	10.62	63

Hydrolab was not working so pH value could not be obtained

In situ pH values did not vary greatly throughout the water column at a given station but did change across Baker Lake, ranging from 6.1 to 8.1. In contrast, laboratory pH values were fairly constant across Baker Lake (7.1 to 7.3, see also Figure 9, **Appendix C**). Both pH and D.O. values were within the CCME PFAL (Protection of Freshwater Aquatic Life) Guidelines.

Conductivity varied markedly in surface water, with a maximum of approximately 150 µS/cm at BL-5 and BL-6 and decreasing to 25 to 34 µS/cm to the east and the west of these two sites. Similar results were reported for field and laboratory analyses (Tables 13 and 14). Conductivity increased again to approximately 60 µS/cm at STN-1. The increase in conductivity at Garbage Creek would be expected because of the higher amount of dissolved solids in the creek (Dodds 2002), but the spatial trend for the lake was not anticipated.

The spatial trend for maximum conductivity at sites near the water intake (BL-4, BL-5 and BL-6) and near Garbage Creek (STN-1) is reflected in those for sodium, chloride, total dissolved solids (TDS) and nitrate/nitrite (Table 13). This relationship is displayed graphically in Figure 10 (**Appendix C**). Sulphate and total suspended solids (TSS) were less than their detection limits (<9 mg/L and <5 mg/L, respectively) at all stations. At no station did any of these parameters exceed CCME PFAL Guidelines or Health Canada Drinking Water Standards.

The spatial trend for a number of metals was similar to that for conductivity, TDS, sodium, chloride and nitrate/nitrite (Table 15). Between BL-4 and BL-6, cadmium, silver, chromium, lead, selenium and thallium all exceeded CCME PFAL Guidelines at one or more stations. Concentrations of thallium, selenium and lead were relatively close to the corresponding guideline, whereas those for cadmium, silver and chromium were 2 to 46 times higher than their corresponding CCME PFAL Guideline (Figures 11 to 13, Appendix C). For cadmium, it was assumed that values lower than the laboratory detection limits were compliant with the CCME PFAL Guideline even though the detection limit (0.02 µg/L) was higher than the guideline (0.017 µg/L).

The reason for the increase in some metals, sodium, chloride, conductivity, TDS and nitrate/nitrate between BL-4 and BL-6 is not clear. The increases cannot be attributed to the outflow from Garbage Creek as they increase from west to east, in front of the community, up to the location of the water intake at BL-6, then decrease further east (Drawing No. 5, **Appendix A**). Potential sources of these substances include run-off from the community, inputs from other streams in the surrounding area, the outflow of the Thelon River or groundwater flows. At this time, the increases in sodium, TDS, conductivity, hardness and metals do not reach levels in excess of the Health Canada Drinking Water Quality Guidelines, although levels of some metals are higher than their CCME PFAL Guidelines.

Table 15: Analytical Results for Metals (µg/L) at Baker Lake Stations in August 2006 (0.5 m depth at all stations, with 3 m and 5 m at BL-6)

Metals (ug/L)	Station													Applicable Guidelines	
	BL-1	BL-2	BL-3	BL-4	BL-5	BL-6 (0.5 m)	BL-6 (3 m)	BL-6 (5 m)	BL-7	BL-8	BL-9	BL-10	STN-1	CCME [a] (ug/L)	Health Canada [b] (ug/L)
Aluminum[c]	25	28	29	15	17	32	29	26	28	43	31	28	67	100 [d]	100
Cadmium[c]	<0.02	<0.02	<0.02	**0.79**	**0.69**	**0.79**	**0.74**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.017 [e]	5
Iron[c]	70	60	80	100	90	100	130	40	50	40	50	40	160	300	300
Mercury[c]	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	1
Arsenic	<0.5	<0.5	<0.5	1	0.8	1.1	1	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	5	5
Boron	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30		5000
Barium	17.7	17.2	16.8	16.4	16.7	17.6	17.4	16.6	17.1	16.8	16.8	17.6	34.1		1000
Beryllium	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Bismuth	<0.2	<0.2	<0.2	1.2	0.9	0.9	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Calcium	2200	2300	2300	2300	2900	2900	3200	3300	2300	2200	2200	2300	4500		
Cobalt	<0.2	<0.2	<0.2	1.1	1	1.1	1.1	<0.2	0.3	0.2	0.2	0.2	<0.2		
Chromium	<1	<1	<1	**2**	**3**	<1	**10**	<1	<1	<1	<1	<1	<1	1[c]	50
Cesium	<0.1	<0.1	<0.1	1	0.9	0.9	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Copper	<1	<1	2	2	2	2	1	2	2	<1	<1	1	2	2 [d]	1000
Potassium	400	300	400	800	1200	1000	1100	1000	500	400	400	500	900		
Magnesium	950	930	1080	1750	2810	2810	3160	3020	1050	1010	950	1090	930		
Manganese	3.6	3.3	5.6	9.4	11.5	11.5	14.4	12.2	5	4.7	4.8	5.2	25.3		
Molybdenum	<0.2	<0.2	<0.2	1.2	1	1	1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	73	
Sodium	790	640	1890	6910	15600	16100	18000	17800	1660	1440	920	1920	2780		200 000
Nickel	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	25 [e]	
Phosphorus	60	<50	60	70	70	<50	<50	<50	<50	<50	50	<50	<50		
Lead	<0.5	<0.5	<0.5	**1.4**	1	1	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1[f]	10
Rubidium	0.8	0.8	0.8	1.8	1.9	2	1.8	<1	0.8	0.8	0.8	0.8	0.8		
Antimony	<1	<1	<1	2	1	2	1	<1	<1	<1	<1	<1	<1	6 [b]	6
Selenium	<1	<1	<1	**1**	**2**	**1**	**1**	<1	<1	<1	<1	<1	1	1	10
Tin	<0.6	<0.6	<0.6	1	0.8	1.1	2.8	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6		
Strontium	15.6	15.2	16.2	19.7	26.4	26.9	28.5	26.3	16.1	16.4	14.9	16.4	17.4		
Tellurium	<1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	<1	<1		
Titanium	<0.9	0.9	1.2	<0.9	1.6	1.3	1.2	<0.9	<0.9	<0.9	<0.9	<0.9	2.6		
Thallium	<0.1	<0.1	<0.1	**1**	0.8	**1.1**	**0.9**	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.8	
Uranium	<0.1	<0.1	<0.1	1.1	0.9	0.9	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		20
Vanadium	<1	<1	<1	1	2	<1	<1	<1	<1	<1	<1	<1	<1		
Tungsten	<0.2	<0.2	<0.2	1.2	1.1	0.9	1.1	0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Zirconium	<0.4	<0.4	<0.4	1.2	1.2	1	1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4		
Silver	<0.1	<0.1	<0.1	**0.4**	**0.5**	**0.8**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	
Zinc	<10	<10	<10	<10	<10	<10	10	30	<10	<10	<10	<10	<10	30	5000

Bolded results indicate guideline exceedances
[a] CCME Guidelines for the Protection of (Freshwater) Aquatic Life
[b] Health Canada Drinking Water Quality Standards
[c] Metal scan with ultra low detection limits
[d] Aluminum = 100 ug/L when pH ≥ 6.5, [Ca^{2+}] ≥ 4 mg/L, DOC ≥ 2 mg/L
[e] Cadmium = 0.0017 ug/L when Hardness [CaCO3] is < 60 mg/L
[f] Where two guidelines exist (for different valencies), the stricter guideline is given
[g] Copper = 2 ug/L when Hardness [CaCO3] is < 120 mg/L
[h] Nickel = 25 ug/L when Hardness [CaCO3] is < 60 mg/L
[j] Lead = 2 ug/L when Hardness [CaCO3] is < 60 mg/L

As the drinking water intake is located at 5 to 6 m depth at BL-6, it is important to consider chemical characteristics throughout the water column. Water temperature at BL-6 was constant with depth, with no evidence of thermal stratification (Table 14). At present, it is not clear why stratification breaks down here or further east between BL-4 and BL-6. Although suction from the water intake may possibly contribute to localized break down of thermal stratification, it is unlikely to be responsible for the reduced stratification observed at BL-4 and BL-5, 500 m and 200 m away, respectively. Levels of chloride, conductivity, pH, nitrate/nitrite and D.O were also relatively constant with depth at BL-6, corresponding with the temperature profile. Sodium and hardness increased slightly with depth, and TDS decreased slightly with depth (Table 13) at BL-6. Metal concentrations generally were greater at 0.5 m and 3 m than at 5 m. This was notable for cadmium, mercury, selenium, thallium and silver, which exceed CCME PFAL Guidelines at 0.5 m and 3 m, and for chromium, which exceeded the guideline at 3 m. None of the metals or other parameters at any depth exceeded Health Canada Drinking Water Standards, implying the drinking water quality through the water column at BL-6 is acceptable.

Review of the microbiological quality of Baker Lake indicates Escherichia coli (E. coli) and total coliforms were low at all stations (see Table 16 below). E. coli was always reported as one (1) or as less than one (<1) colony forming units per 100 millilitres (CFU/100mL). Total coliforms includes all organisms and E. coli, and ranged from <1 to 4 CFU/100 mL. Although coliforms increased between BL-6 and the outlet of Garbage Creek, this was confounded due to the fact that these samples were analyzed past their holding times (72 hours vs. 24 hour holding time). The actual results for BL-6 through to BL-10 could be over or underestimated.

Table 16: Microbiological Results for Baker Lake Stations in August 2006 (at 0.5 m depth for all stations, with 3 m and 5 m at BL-6)

Station	*E. coli* CFU/100 mL	Total Coliforms CFU/100 mL
BL-1	< 1	< 1
BL-2	< 1	< 1
BL-3	< 1	1
BL-4	< 1	< 1
BL-5	< 1	< 1
BL-6 (0.5 m)	1	1
BL-6 (3.0 m)	< 1	< 1
BL-6 (5.0 m)	< 1	< 1
BL-7	< 1	2
BL-8	< 1	2
BL-9	< 1	2
BL-10	< 1	2
STN-1	< 1	16

The Health Canada Drinking Water Guideline for *E. coli* and total coliforms are zero (0) CFU per 100 mL in water leaving a treatment plant. It is assumed that the addition of hypochlorite to the water is sufficient to eliminate these organisms from the drinking water supply (Health Canada 2005). Though chlorine itself should not be relied upon to remove protozoan cysts from drinking water supplies (Health Canada 2005), no protozoan cysts or oocysts were detected in Baker Lake at the water intake [BL-6 (0.5 m)] in August.

5.2.3 Fall (October) Results

October results further confirmed Baker Lake to be a soft water lake, as hardness was lower than in August, and that it is dimictic, as temperature through the water column and across the surface was stable. The average surface temperature was 4.41 °C, while the average temperature at depth was 4.32 C; therefore no thermocline was present. This signifies the lake was in fall turnover at the time of sampling. Figure 14 (**Appendix C**) depicts the temperature-depth relationship through Baker Lake in October. Table 17 contains the analytical results from Baker Lake stations at 0.5 m depths, while Table 18 contains the *in situ* results for temperature, pH, D.O. and conductivity.

Table 17: Analytical Results from Baker Lake (BL) Stations for October 2006 (0.5 m depth at all stations, with 3 m and 6 m at BL-6)

Station	Sodium (mg/L)	Chloride (mg/L)	Cond. (uS/cm)	TDS (mg/L)	Turbidity (NTU)	Hardness (mg/L)	pH	Nitrate+ Nitrite-N	D.O. (mg/L)
Thelon	0.42	<9	22.8	10	0.26	9.0	7.14	0.011	12.16
BL-11	0.46	<9	22.9	12	0.31	8.9	7.17	0.010	12.13
BL-4	0.46	<9	22.8	18	0.33	9.1	7.12	0.011	12.65
BL-6 (0.5 m)	0.53	<9	23.3	14	0.32	9.3	7.14	0.013	12.37
BL-6 (3.0 m)	0.55	<9	23.7	10	0.3	9.2	7.13	0.008	-
BL-6 (6.0 m)	0.58	<9	23.9	16	0.31	8.9	7.14	0.010	12.14
BL-9	2.17	<9	37.6	20	0.31	9.9	7.14	0.011	12.18
STN-1	3.87	<9	66.6	42	4.2	20.6	7.45	0.038	14.76

Table 18: In Situ pH, Dissolved Oxygen (D.O.) and Conductivity Across Baker Lake in October 2006 (at 0.5 m depth, with 4 m and 6 m for BL-6)

Station	Temp (C)	pH	D.O. (mg/L)	Cond. (uS/cm)
Thelon	4.58	6.81	12.16	22
BL-11	4.38	6.85	12.13	22
BL - 4	4.54	6.35	12.65	22
BL - 6 (0.5)	4.07	6.75	12.37	23
BL-6 (4)	4.05	6.73	12.16	23
BL-6 (6)	4.01	6.72	12.14	24
BL - 9	4.47	6.80	12.18	37
SNP-1	0.86	5.89	14.76	66

A comparison of laboratory and field pH measurements is provided in Figure 15, **Appendix C**. Fall field pH ranged from 5.90 to 6.85, and did not vary as much across the lake as during the summer, although the smaller number of stations sampled in fall can reduce the variability. Laboratory pH was again slightly higher (7.12 to 7.45) than field pH. At BL-4, a slight decrease in pH was noted in both field and laboratory pH in autumn sampling, whereas in summer, a slight increase was noted. The high conductivity reported at BL-4 and BL-6 in August was not observed in fall. Instead, conductivity was constant, aside from a small increase at BL-9 and a larger increase at STN-1. Overall, pH and D.O. values are within CCME recommended ranges.

In fall, there was less variability in levels of nutrients and metals compared to summer results. Again, sulphates and TSS were below detection limits, with the exception of STN-1 (TSS 6 mg/L). The substantial increases in sodium, nitrate/nitrite, chloride and TDS levels noted for stations BL-4 through BL-6 in August were not reported in October, although there were small increases in TDS at BL-4, and sodium and nitrate/nitrite at BL-6. Concentrations of all parameters were relatively constant with depth at BL-6 and the drinking water quality at BL-6 met applicable drinking water standards.

At BL-9, sodium, TDS and hardness levels were higher than the other sites sampled in October and higher than BL-9 in the summer; these variations are displayed in Figures 16 and 17, **Appendix C**. A potential source may be the barge stationed at the landing platform to the west during the sampling. At no time did the increase in any of these parameters exceed CCME PFAL Guidelines or Health Canada Drinking Water Guidelines.

In contrast to the summer, when increases in levels of several metals accompanied the increased TDS, conductivity, sodium, and nitrate/nitrite levels at BL-4 through BL-6, there were no spatial trends for metals consistent with the smaller increases in TDS, etc. in the fall. The majority of metals were at or below their detection levels. However, silver, aluminum and cadmium were present at levels higher than CCME PFAL Guidelines (Table 19) at one or more stations. No metals exceeded Health Canada Drinking Water Standards.

Silver was below detection (< 0.1 µg/L) at all sites, with the exception of BL-6 (6.0 m), where the value of 0.9 µg/L exceeded the Guideline of 0.1 µg/L (Figure 18, **Appendix C**). Silver primarily enters aquatic systems through run-off, though the source of silver within the community is not known.

Aluminum exceeded the Guideline of 100 μg/L at STN-1, by a factor of 2.85. Elevated aluminum levels were not reported at other stations in Baker Lake and levels of aluminum at Baker Lake stations were lower in the fall than the summer. Therefore, aluminum does not appear to have a negative effect on the water quality of Baker Lake, west of Garbage Creek. Dilution and the probable southern movement of the creek water are the likely reasons for this.

Cadmium levels were higher than the CCME PFAL Guideline (0.017 μg/L) at all stations but one. The values ranged from 0.04 to 0.12 μg/L in surface water (0.5 m), with a maximum at BL-6. The exception was STN-1, with a value of < 0.02 μg/L. In addition, the sample from 6 m at BL-6 had a cadmium concentration of 0.98 μg/L. Differences in the distribution of cadmium with depth at BL-6 between August and October suggests a re-suspension of sediment during fall turnover as the deep water level of cadmium in August was < 0.02 μg/L and 0.98 μg/L in October. Despite this, cadmium levels through the water column at BL-6 in October did not exceed the Health Canada Drinking Water Standard.

The origin of elevated cadmium levels is not clear. Cadmium has a high affinity for negatively charged particles so tends to settle out bound to the sediment (CCME 1999), and can be remobilized during spring and fall turnovers, thereby increasing concentrations within the epilimnion, or surface waters (CCME 1996). The elevated cadmium levels across Baker Lake in October may be related to Lake Turnover, which was occurring at the time of sampling. However, there may be additional sources of cadmium to the lake, given that the Guideline was also exceeded at several sites in summer during thermal stratification and that maximum levels were reported at the same sites in both summer and fall. Furthermore, other sediment-bound metals (i.e. lead, iron), nitrate/nitrites and phosphorous did not notably increase during overturn, as they tend to during lake turnovers. This implies that there is either a large store of cadmium in the sediments, in comparison to other sediment-bound metals, indicating a history of cadmium inputs to the lake, or an increase in cadmium inputs to the lake since August.

Major pathways for cadmium to enter aquatic systems are from atmospheric deposition and industrial and municipal waste discharge, e.g., from smelting effluents (Health Canada 1986, CCME 1999). Atmospheric deposition would most likely result in constant levels across the study area, rather than the spatial trend noted for Baker Lake, there are no smelters or mines in the general area, and levels are lowest near Garbage Creek (STN-1), so do not appear to be influenced by municipal waste. Other sources of cadmium are nickel cadmium batteries, pigments and coatings, alloys, television picture tubes, motor oils and automobile radiators (CCME 1999); it may also be found unintentionally in galvanized products (Health Canada 1986), any of which could be potential sources for some of the cadmium entering Baker Lake, either directly or from contaminated run-off from the community. See Figure 19, **Appendix C** for a graphical display of the change in cadmium concentrations across Baker Lake in the fall and Figure 20, **Appendix C** for a comparison of summer and fall levels of cadmium.

Table 19: Analytical Results for Metals Across Baker Lake stations in October 2006 (0.5 m depth for all stations, with 3.0 and 6.0 m for BL-6)

Total Metals (ug/L)	Station								Applicable Guidelines	
	Thelon	BL-11	BL-4	BL-6 (0.5 m)	BL-6 (3 m)	BL-6 (6 m)	BL-9	STN-1	CCME [a] (ug/L)	Health Canada [b] (ug/L)
Aluminum[c]	22	20	15	19	27	32	15	**285**	100 [d]	100
Cadmium[c]	**0.04**	**0.04**	**0.09**	**0.12**	**0.12**	**0.98**	**0.04**	<0.02	0.017 [e]	5
Iron[c]	20	40	30	20	40	100	30	240	300	300
Mercury[c]	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	1
Arsenic	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	5	5
Boron	<30	<30	<30	<30	<30	<30	<30	<30		5000
Barium	14.7	15	14.7	14.7	14.6	15.8	15	47		1000
Beryllium	<1	<1	<1	<1	<1	<1	<1	<1		
Bismuth	<0.2	<0.2	<0.2	<0.2	<0.2	0.9	<0.2	<0.2		
Calcium	1800	1900	1900	2100	2000	1900	2200	6800		
Cobalt	<0.2	<0.2	<0.2	<0.2	<0.2	1	<0.2	<0.2		
Chromium	<1	<1	<1	<1	<1	1	<1	<1	1[c]	50
Cesium	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1		
Copper	<1	<1	<1	<1	<1	1	<1	<2	2 [d]	1000
Potassium	<100	200	100	200	200	100	200	1000		
Magnesium	780	820	830	870	860	870	1050	1390		
Manganese	2.1	1.9	2	5	1.7	2.5	2.2	8.4		
Molybdenum	<0.2	<0.2	<0.2	<0.2	<0.2	0.9	<0.2	<0.2	73	
Sodium	420	460	460	530	550	580	2170	3870		200 000
Nickel	<2	<2	<2	<2	<2	<2	<2	<2	25 [e]	
Phosphorus	<50	<50	<50	<50	<50	<50	<50	60		
Lead	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	1[f]	10
Rubidium	0.4	0.5	<0.2	<0.2	<0.2	1.3	0.5	1		
Antimony	<1	<1	<1	<1	<1	1	<1	<1	6 [b]	6
Selenium	<1	<1	<1	<1	<1	<1	<1	1	1	10
Tin	<0.6	<0.6	<0.6	<1	<0.6	0.9	<0.6	<0.6		
Strontium	12.3	12.7	12.4	13.2	13.1	13.3	14.7	24.7		
Tellurium	<1	<1	<1	<1	<1	<1	<1	<1		
Titanium	<0.9	<0.9	<0.9	<0.9	<0.9	1.3	<0.9	4.7		
Thallium	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	0.8	
Uranium	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	0.1		20
Vanadium	<1	<1	<1	<1	<1	<1	<1	<1		
Tungsten	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2		
Zirconium	<0.4	<0.4	<0.4	<0.4	<0.4	1.1	<0.4	<0.4		
Silver	<0.1	<0.1	<0.1	<0.1	<0.1	**0.9**	<0.1	<0.1	0.1	
Zinc	<10	<10	<10	<10	<10	<10	<10	<10	30	5000

Bolded results indicate guideline exceedances

[a] CCME Guidelines for the Protection of (Freshwater) Aquatic Life

[b] Health Canada Drinking Water Quality Standards

[c] Metal scan with ultra low detection limits

[d] Aluminum = 100 ug/L when pH ≥ 6.5, $[Ca^{2+}]$ ≥ 4 mg/L, DOC ≥ 2 mg/L

[e] Cadmium = 0.02 ug/L when Hardness [CaCO3] is < 60 mg/L

[f] Where two guidelines exist (for different valencies), the stricter guideline is given

[g] Copper = 2 ug/L when Hardness [CaCO3] is < 120 mg/L

[h] Nickel = 25 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

[j] Lead = 2 ug/L when Hardness $[CaCO_3]$ is < 60 mg/L

Generally, the microbiological quality of Baker Lake was good and changed little from August to October. *E. coli* was reported as < 1 CFU/100 mL at all stations and total coliforms were generally < 1 CFU/100 mL, with only BL-6 (0.5 m) reporting 1 CFU/100 mL total coliforms (see Table 20). Protozoans were not assessed during October.

Table 20: Microbiological Results for Baker Lake Stations in October 2006 (at 0.5 m depth for all stations, with 3 m and 6 m at BL-6).

Station	*E. coli* CFU/100 mL	Total Coliforms CFU/100 mL
Thelon	< 1	< 1
BL-11	< 1	< 1
BL-4	< 1	< 1
BL-6 (0.5 m)	< 1	1
BL-6 (3.0 m)	< 1	< 1
BL-6 (6.0 m)	< 1	< 1
BL-9	< 1	< 1
STN-1	< 1	< 1

5.2.4 Summary of Baker Lake Water Quality

NJWL sampled the water of Baker Lake to assess its quality as a source of potable water for the community. In the summer, samples were collected from ten (10) locations on the lake, off-shore from the community. All results from summer sampling showed the water of Baker Lake to be of good quality for drinking water purposes and none of the samples collected exceeded the Health Canada Drinking Water Guidelines, including STN-1 at the mouth of Garbage Creek.

Sampling in the fall was conducted at five (5) stations, two of which had not been sampled during the summer sampling event. All results from the fall sampling demonstrated that Baker Lake is an acceptable source of drinking water; none of the samples exceeded Health Canada Drinking Water Standards.

Cadmium and silver levels, however, were found to be elevated in the vicinity of the water intake during both summer and fall sampling events; chromium was slightly elevated in the summer. These metals did not exceed Health Canada Drinking Water Guidelines. However, they were higher than the CCME Guidelines for the Protection of Freshwater Aquatic Life and their elevated levels through two seasonal sampling events does warrant further investigation into the source of these metals.

Additionally, at the mouth of Garbage Creek (STN-1), elevated levels of aluminum were present at concentrations close to the Health Canada Drinking Water Standard, in October. This higher level is most likely due to the construction that was occurring upstream; the building of a road over the creek. Thus, the elevated level of aluminum is thought to be episodic in nature. The increased aluminum entering Baker Lake also did not appear to affect water quality west of Garbage Creek as aluminum concentrations in samples collected west of Garbage Creek were below guidelines.

Overall, it appears that the water from Garbage Creek, the ultimate drainage of the Tundra Wetland, does not affect drinking water quality at the community water intake.

5.2.5 Potential Impacts to Drinking Water Source

The drinking water intake for the community is located approximately 120 m offshore in Baker Lake, directly off-shore of the built-up area of the community. NJWL staff walked along the lakeshore in front of the community from Garbage Creek to where the shore turns south towards the airport in August and again in October. A number of potential impacts to the water quality of Baker Lake were observed on the beach on both occasions, including scattered garbage, small fuel spills, abandoned batteries and vehicles.

Debris observed on the shoreline included drink bottles, plastic bags, large and small pieces of Styrofoam insulation, discarded oil and camp fuel containers, pieces of metal siding, cardboard boxes and animal carcasses. A number of areas of stained soil were noted on the lakeshore, likely from spills of fuel or oil during the re-fueling of engines. A larger stained area was observed: the source appeared to be a container of camp fuel. Also observed were a large number of engine batteries, fuel cans, snowmobiles, boat motors and vehicles. Many of these objects contain hazardous materials that could negatively affect water quality. Among those, engine batteries are known to contain cadmium and lead, oil bottles and fuel cans contain hydrocarbons and other compounds and old vehicles can contain any number of compounds from oils, fuels, solvents and antifreezes to metals leaching from the vehicles. All of the materials observed and noted above can contribute contaminants to Baker Lake. The majority of observed impacts would require minimal clean-up efforts, but a continual effort to keep the shoreline clean and free of potential contaminants.

The solid waste landfill provides a facility for the disposal of many of the materials observed to be deposited along the shore of Baker Lake. There are sites for waste oil and fuel, disposal of household garbage and animal carcasses, disposal/storage of old vehicles and snowmobiles, and disposal/storage of batteries. All of these items along the shore should be removed and disposed of at the solid waste site.

In addition to the materials noted above, a number of dogs were observed to be tied up along the shoreline. Dog waste is a source of fecal coliforms, E. coli and protozoans, and also of nutrients, all of which are easily transported to the lake through runoff. This could result in degraded drinking water quality and localized eutrophication. The shore of Baker Lake near the community was covered with relatively dense algal growth, which appeared to be heavier in areas down gradient from where dogs were present.

Due to local topography, all surface drainage from the community flows directly to Baker Lake. Waste or contaminants from locations throughout the community can be carried by surface drainage to Baker Lake, further affecting water quality. Drawing No. 6, **Appendix A**. illustrates the location of surface drainage routes within the community. Future sampling and analysis of water from the surface drainage channels and streams flowing in or near the community could be undertaken to determine if contaminants are present in these drainages.

Additionally, there was a lack of signage on the shore, indicating Baker Lake as a source of drinking water for the community. The lake front, including the area around the drinking water intake, can be heavily used by boats in the summer. Signage should be erected near the water intake and traffic in this area should be minimized to reduce the potential for pollution of the drinking water source.

No information is currently available from the Nunavut Power Corporation or Transport Canada regarding the potential impacts to water quality in Baker Lake resulting from contaminated soil on their properties in the community.

5.2.6 Consultation with Environmental Health Officer

Prior to the visit to Qamani'tuaq in August, NJWL attempted unsuccessfully to contact Mr. Bob Hanley, the Kivalliq Region Environmental Health Officer. Mr. Fred O'Brien, Environmental Health Specialist in Iqaluit, was later contacted and asked about any previous sampling results and concerns regarding drinking water quality in Baker Lake. Mr. O'Brien reported that all samples taken at the water intake between 2003 and 2005 were satisfactory. Coliforms were not detected at the raw water supply and results of samples from Garbage Creek were satisfactory.

Mr. Hanley was contacted again in September once NJWL became aware of a public health concern about pathogens in the community. Mr. Hanley verified that there was a gastrointestinal-like illness reported in Qamani'tuaq and commented that it appeared to be spread through person-to-person contact and that the analyses did not confirm a pathogen nor whether it could be food or water-borne. Mr. Hanley further confirmed that bacteriological quality of the drinking water in the community has been satisfactory.

5.2.7 Water Source Protection Plan

NJWL is postponing development of this plan until further sampling and analysis has been conducted. Only two (2) rounds of sampling have been completed and NJWL feels it is important to incorporate as much data as we can into development of the protection plan. Further sampling and data collection are tentatively scheduled for spring of 2007. For discussion purposes the future Water Source Protection Plan is expected to address maintaining a clean shoreline, removing risks associated with contaminated sites, surface drainage controls, future community development, and improvements to the solid waste facility and waste management throughout the community.

6.0 CONSULTATIONS

6.1 Consultation with Elders

During the visit to Qamani'tuaq in August, NJWL met with one Elder selected by the Hamlet. The purpose of the meeting was to discuss past and current conditions in the wetland treatment area, traditional use of the wetland area, and to document any changes they've seen and concerns they may have.

NJWL met with Ms. Lucy Iyago, who has been in the area of Baker Lake for many years and is also a member of the Hamlet Council. Mr. Michael Haqpi was also present and provided interpretive services. The series of questions asked and responses are included in **Appendix E**.

In general, Ms. Iyago expressed concern regarding the sewage treatment wetland and the effect it may be having on the water of Baker Lake and on the animals that feed there. Ms. Iyago reported that people used to fish in Airplane Lake for lake trout and grayling; however, fishing has stopped due to concern about the effects of sewage effluent. She also commented that animals (including grizzly bears) come closer to town since the establishment of the sewage wetland and solid waste facility and that people are worried about hunting animals that feed in the sewage wetland area for fear they are contaminated from sewage. She is also concerned with how the Tundra Wetland will be cleaned up and restored to its natural state.

Ms. Iyago reported that algae have always been present along the shore of Baker Lake; however, it is different now, which she believes is a result of the sewage effluent. In the area around the community, Ms. Iyago mentioned that she has noticed less water flowing through the wetland and that Baker Lake is reduced in size. She also stated that she has observed a difference in the atmosphere, weather and melting today from what it was years ago - specifically noticing more melting and thawing of snow and ice.

6.2 Consultation with Officials

A number of officials have been consulted during the water and wastewater study in Qamani'tuaq. During visits in July and August, NJWL met with some key Hamlet officials to discuss their concerns and to collect and verify information. Hamlet officials consulted with include Mr. David Aksawnee, Mayor of Qamani'tuaq; Mr. Gary Perkinson, Hamlet Foreman; and Mr. Sam Ittilik, Economic Development Officer. Mr. Hugh Ikoe, Settlement Maintainer and Mr. Willie Tapatai, Public Works Foreman of CGS were also consulted.

Public Health Officers with the Government of Nunavut, Mr. Bob Hanley and Mr. Fred O'Brien, were contacted to identify any past or current concerns with drinking water quality in the community.

7.0 CONCLUSION

7.1 Sewage Treatment

The Tundra Wetland was determined to be effective at treating most contaminants in the sewage effluent. All Nunavut Water Licence Criteria were met at the Compliance Point at STN-7. Concerns were raised over the levels of iron and copper that exceeded CCME Protection of Freshwater Aquatic Life Guidelines through the Tundra Wetland and at STN-7; aluminum also exceeded these guidelines at STN-7 in August only. Landfill leachate also appeared to be impacting effluent quality within the Tundra Wetland, when run-off was present, as many metals increased in concentration after Lagoon Lake in August. However no contaminants exceeded any guidelines at the head of Garbage Creek, nor entering Baker Lake in August and October. Aluminum at .the outlet of Garbage Creek was an exception, though this was considered periodic in nature due to road construction upstream.

Additionally, given the current size of the Tundra Wetland, the increasing discharge rate within the next 20 years would cause the loading rate of the Tundra Wetland to decrease below the recommended loading rate for tundra wetlands. A number of options were supplied that could increase the effective size of the Tundra Wetland, to increase current and future loading rates. These included construction of a larger holding cell, widening the flow area through the wetland, and the addition of a landfill holding cell. Which improvement, if any, could be implemented will be evaluated in later phases of the Project.

7.2 Water Quality

The water quality of Baker Lake was found to be acceptable for drinking water purposes and the discharge from Garbage Creek does not appear to affect drinking water quality at the intake during the two seasons sampled. None of the stations sampled exceeded Health Canada Drinking Water Standards; this was observed for both summer and fall. However, a few metals were found to exceed CCME Protection of Freshwater Aquatic Life Guidelines, namely cadmium and silver in the vicinity of the water intake, during both summer and fall sampling events. The relative consistency of the elevated levels of cadmium and silver warrants further investigation into the cause and the source of these metals.

The shoreline of Baker Lake contained many potential impacts that could reduce the water quality of Baker Lake, in the vicinity of the community. These potential impacts ranged from scattered garbage and debris, to animal carcasses, small oil/fuel spills and abandoned vehicles. It was recommended that the shoreline be cleaned to reduce the potential for contamination of run-off or leaching of contaminants into Baker Lake.

8.0 RECOMMENDATIONS

Preliminary recommendations provided in this Interim Report include:

- Cleaning the shoreline of the community, to reduce the potential for pollution of the drinking water source; and
- Erecting signs in the area of the water intake, identifying Baker Lake as a drinking water source for the community.

After discussion of interim results with CGS and the Hamlet of Qamani'tuaq and the collection of additional data during 2007, NJWL will provide a final set of recommendations to address sewage treatment and drinking water quality in the community.

9.0 FUTURE ACTIVITIES

This Interim Report presents the results of activities conducted during 2006. Additional sampling and effluent analysis is planned for spring and summer of 2007, primarily to determine the effectiveness of sewage treatment during spring and early summer. Sampling in the spring will provide a more complete data set combined with the summer and fall data. Additionally, sampling in the spring will allow NJWL to comment on residents' concerns regarding the water quality of Baker Lake during spring. Our understanding is that residents' concerns relate to the discharge of sewage effluent in spring while ice is still present, resulting in effluent flowing on top of the ice and not receiving the full benefit of wetland treatment. Residents are concerned that the sewage effluent is not being adequately treated, flows directly into Baker Lake and toward the drinking water intake through a channel melted in the ice along the shore.

In addition to further sampling, NJWL will consult with the Hamlet and CGS to explain the results of the study to date and discuss issues and opportunities related to sewage treatment, waste management and protection of drinking water quality. While outside of the scope of this current assignment, the Hamlet is currently involved in the re-licensing of its water supply and waste disposal facilities by the NWB. The results of NJWL consultations and issues arising during the re-licensing process are expected to affect future project activities and recommendations to be delivered in the final report.

10.0 CLOSURE

This Report has been prepared for the sole benefit of the Department of Community and Government Services (CGS) of the Government of Nunavut and the Hamlet of Qamani'tuaq. The report may not be used by any other person or entity without the express written consent of Nunami Jacques Whitford Limited and CGS.

Any use which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Jacques Whitford accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report was prepared by Nick Lawson, B.Sc., and senior review was completed by Karen Munro, M.Sc., R.P.Bio. and Jim Higgins, PhD., P.Eng. We trust that this information meets your requirements at this time. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,

NUNAMI JACQUES WHITFORD LIMITED

Nick Lawson, B.Sc.
Senior Environmental Scientist
Operations Manager

NL/dlk

R:\Other Offices - Projects\Manitoba & West\Yellowknife\1015263\R01_dft_Nov-29-06_1015263_REVIEWED.doc

11.0 REFERENCES

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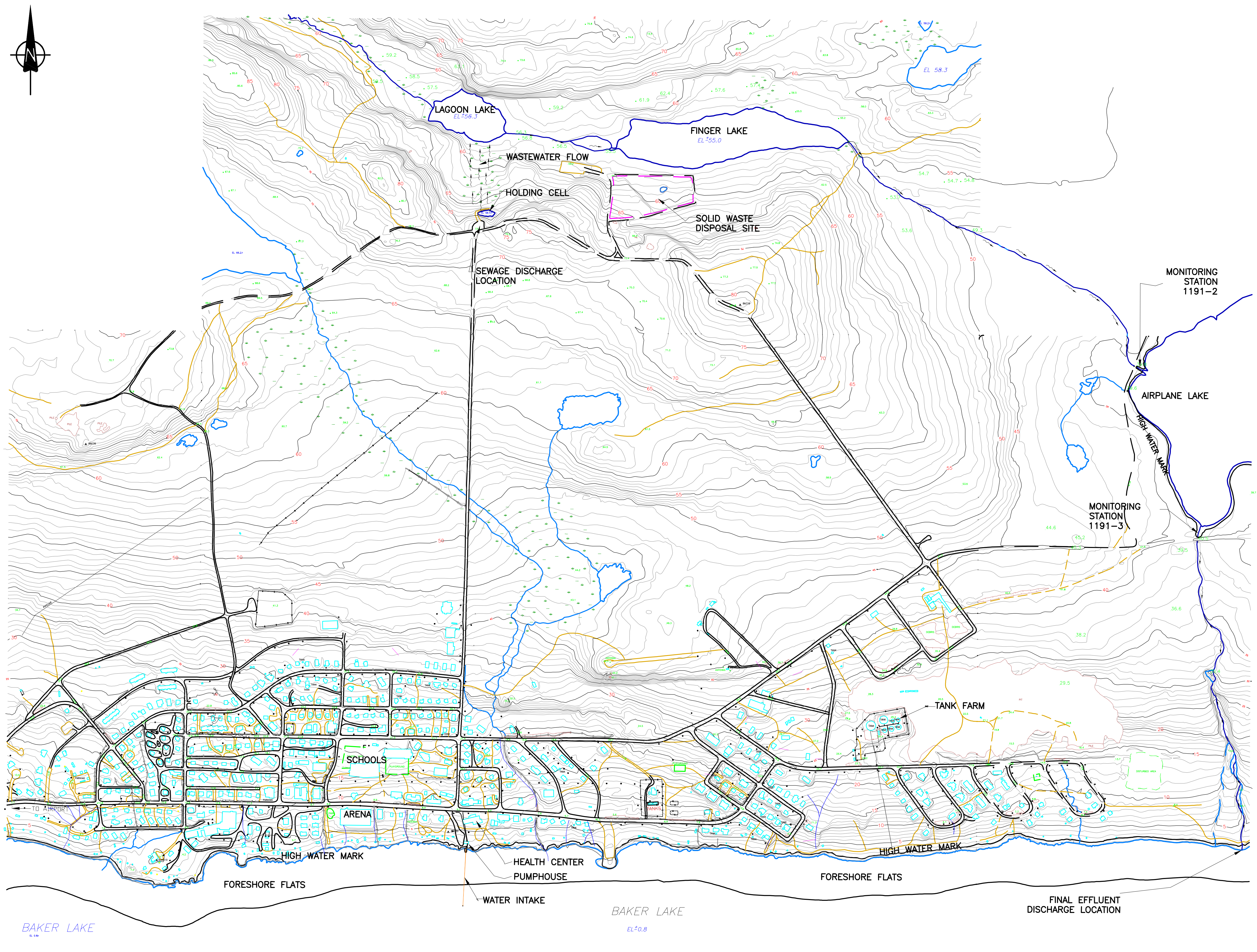
APPENDIX A

Drawings

*IMAGE REFERENCE: MAPART PUBLISHING, ALBERTA ROAD ATLAS, 2003
**THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

Jacques Whitford AXYS	SCALE: 1 : 5 000 000	CLIENT : COMMUNITY AND GOVERNMENT SERVICES GOVERNMENT OF NUNAVUT	DRAWING NO. 1
	DATE: 14/11/06	TITLE : SITE LOCATION PLAN QAMANI'TUAQ, NU	
	DRAWN BY: SEA		
	APPROVED BY:		

\\CMIC\1015263\CAD\1015263-6.dwg 14/11/06



LEGEND :

- PREVIOUS SEWAGE LAGOON
- FUEL RE–SUPPLY PIPELINE
- DRAINAGE
- WATER INTAKE
- SOLID WASTE FACILITY

*THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

REFERENCE:

DRAWING REFERENCE: GOVERNMENT OF NUNAVUT

Jacques Whitford AXYS

CLIENT:

COMMUNITY AND GOVERNMENT SERVICES
GOVERNMENT OF NUNAVUT

TITLE:

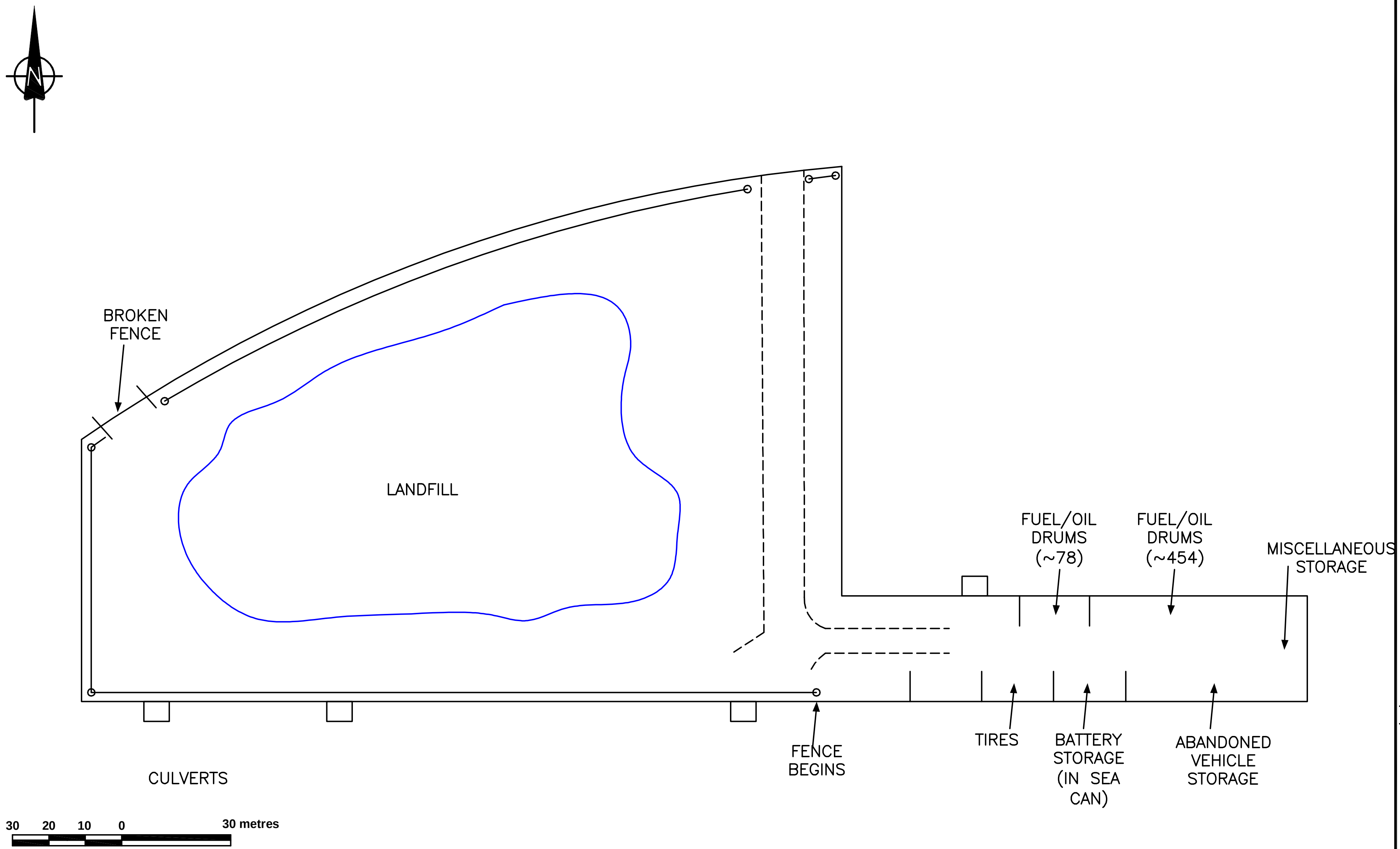
SITE OVERVIEW
QAMANI'TUAQ, NU

SCALE : 1 : 10000		DRAWING NO.: 2
DATE : 14/11/06		
DRAWN BY : SEA		
APPROVED :		

\\CMIC\1015263\CAD\1015263-3.dwg 01/11/06

Prepared By:	Prepared For:	Scale: 1 : 15 000	Client: Community and Government Services, Government of Nunavut	Spatial Information:	Figure No.:
Jacques Whitford AXYS		Date: 19/10/06	Title: Significant Features and Sample Locations throughout the Sewage Treatment Wetland, Qamani'tuaq, NU	UTM Zone 15 NAD83	3
		Drawn by: SEA		References:	
		Approved by:			

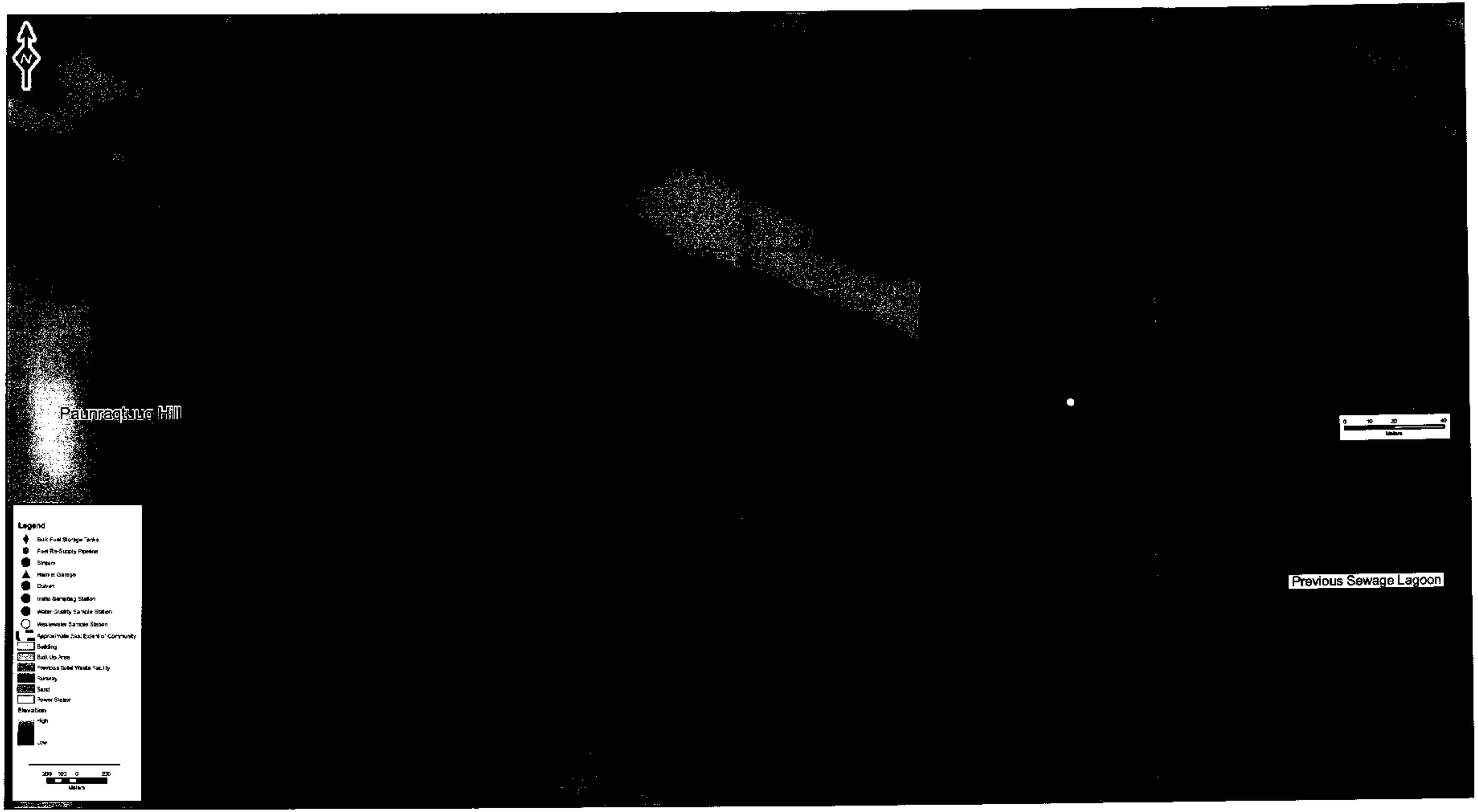
\\CMIC\1015263\1015263-1.mxd 10/10/06



*THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

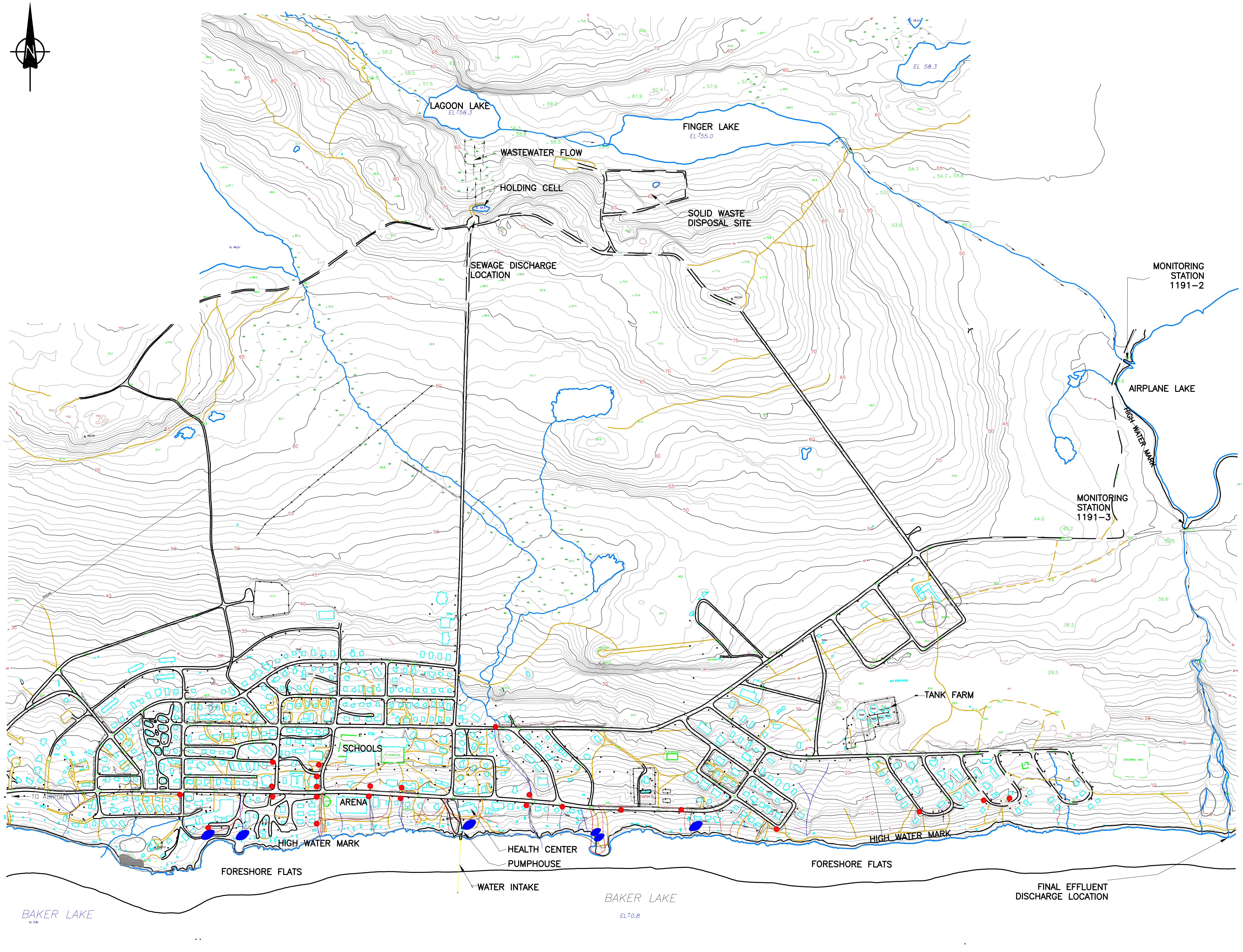
Jacques Whitford AXYS	SCALE: 1: 1500 DATE: 14/11/06 DRAWN BY: SEA APPROVED BY:	CLIENT : COMMUNITY AND GOVERNMENT SERVICES, GOVERNMENT OF NUNAVUT TITLE : **SOLID WASTE FACILITY DETAIL**, QAMANI'TUAQ, NU DRAWING: 4

\\cmic\1015263\CAD\1015263-7.dwg 14/11/06



Prepared By:	Prepared For:	Scale: 1 : 25 000	Client: Community and Government Services, Government of Nunavut	Spatial information: UTM Zone 15, NAD83	Figure No.:
Jacques Whitford AXYS		Date: 19/10/06	Title: Significant Features and Sample Locations for Water Quality Analysis on Baker Lake NU	References:	5
		Drawn by: SEA			
		Approved by:			

\\CMIC\1015263\1015263-2.mxd 10/10/06



LEGEND :

- CULVERT
- PREVIOUS SEWAGE LAGOON
- FUEL RE–SUPPLY PIPELINE
- ROADS/TRAILS
- DRAINAGE
- NEW ROAD
- WET/SATURATED AREA

*THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

REFERENCE:

DRAWING REFERENCE: GOVERNMENT OF NUNAVUT

Jacques Whitford AXYS

CLIENT:

COMMUNITY AND GOVERNMENT SERVICES
GOVERNMENT OF NUNAVUT

TITLE:

POTENTIAL IMPACTS TO WATER SOURCE
QAMANI'TUAQ, NU

SCALE :	1 : 10000	DRAWING NO.:	6
DATE :	14/11/06		
DRAWN BY :	SEA		
APPROVED :			

\\CMIC\1015263\CAD\1015263-5.dwg 01/11/06

APPENDIX B

Laboratory Certificate of Analysis

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

PRELIMINARY RESULTS

JACQUES WHITFORD
ATTN: CAREY SIBBALD
201, 5103 - 51ST AVE
YELLOWKNIFE NT X1A 2P3

Reported On: 23-AUG-06 08:33 AM

Lab Work Order #: **L418704**

Date Received: **04-AUG-06**

Project P.O. #:
Job Reference: 1015263
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

APPROVED BY: ______________________

GAIL HILL
Project Manager

Manitoba Technology Centre Ltd.
Part of the **ALS Laboratory Group**
1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4
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Now part of the ALS Laboratory Group

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-1 BL-1								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.025	RAMB	0.005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Iron (Fe)-Total	0.07		0.02	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Boron (B)-Total	<0.03		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Barium (Ba)-Total	0.0177		0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Beryllium (Be)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Calcium (Ca)-Total	2.2		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Chromium (Cr)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Copper (Cu)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Potassium (K)-Total	0.4		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Magnesium (Mg)-Total	0.95		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Manganese (Mn)-Total	0.0036	RAMB	0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Sodium (Na)-Total	0.79		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Nickel (Ni)-Total	<0.002		0.002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Phosphorus (P)-Total	0.06	RAMB	0.05	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Lead (Pb)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Antimony (Sb)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Selenium (Se)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tin (Sn)-Total	<0.0006		0.0006	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Strontium (Sr)-Total	0.0156	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tellurium (Te)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Uranium (U)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Vanadium (V)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tungsten (W)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Silver (Ag)-Total	<0.0001	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Oxygen, Dissolved	11.0		0.1	mg/L		04-AUG-06	LJH	R427390
Total Dissolved Solids	10		5	mg/L		08-AUG-06	CXZ	R428779
Total Suspended Solids	<5		5	mg/L		08-AUG-06	CXZ	R428779
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		08-AUG-06	SXB	R428269
Bicarbonate (HCO3)	12		2	mg/L		08-AUG-06	SXB	R428269
Carbonate (CO3)	<0.6		0.6	mg/L		08-AUG-06	SXB	R428269
Hydroxide (OH)	<0.4		0.4	mg/L		08-AUG-06	SXB	R428269
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
Conductivity								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-1 BL-1								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
ROU4W Extractable								
Conductivity								
Conductivity	25.6		0.4	umhos/cm		04-AUG-06	SXB	R427845
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		09-AUG-06	LDE	R428543
Hardness (as CaCO3)	9.5		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.005	RAMB	0.005	mg/L		04-AUG-06	LDE	R427877
Routine Metals								
Calcium (Ca)-Extractable	2.22		0.05	mg/L		09-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.37		0.05	mg/L		09-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.96		0.01	mg/L		09-AUG-06	DAG	R428922
Sodium (Na)-Extractable	0.83		0.02	mg/L		09-AUG-06	DAG	R428922
Iron (Fe)-Extractable	0.09		0.01	mg/L		09-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0044		0.0002	mg/L		09-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.60		0.05	NTU		04-AUG-06	SXG	R427977
pH								
PH	7.22		0.01	pH units		04-AUG-06	SXB	R427845
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
L418704-2 BL-2								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.028	RAMB	0.005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Iron (Fe)-Total	0.06		0.02	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Boron (B)-Total	<0.03		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Barium (Ba)-Total	0.0172		0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Beryllium (Be)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Calcium (Ca)-Total	2.3		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Chromium (Cr)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Copper (Cu)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Potassium (K)-Total	0.3		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Magnesium (Mg)-Total	0.93		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Manganese (Mn)-Total	0.0033	RAMB	0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Sodium (Na)-Total	0.64		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Nickel (Ni)-Total	<0.002		0.002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-2 BL-2								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Lead (Pb)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Antimony (Sb)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Selenium (Se)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tin (Sn)-Total	<0.0006		0.0006	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Strontium (Sr)-Total	0.0152	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tellurium (Te)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Titanium (Ti)-Total	0.0009		0.0009	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Uranium (U)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Vanadium (V)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tungsten (W)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Silver (Ag)-Total	<0.0001	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Oxygen, Dissolved	11.5		0.1	mg/L		04-AUG-06	LJH	R427390
Total Dissolved Solids	6		5	mg/L		08-AUG-06	CXZ	R428779
Total Suspended Solids	<5		5	mg/L		08-AUG-06	CXZ	R428779
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		08-AUG-06	SXB	R428269
Bicarbonate (HCO3)	12		2	mg/L		08-AUG-06	SXB	R428269
Carbonate (CO3)	<0.6		0.6	mg/L		08-AUG-06	SXB	R428269
Hydroxide (OH)	<0.4		0.4	mg/L		08-AUG-06	SXB	R428269
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
Conductivity								
Conductivity	24.4		0.4	umhos/cm		04-AUG-06	SXB	R427845
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		09-AUG-06	LDE	R428543
Hardness (as CaCO3)	9.5		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	<0.005	RAMB	0.005	mg/L		04-AUG-06	LDE	R427877
Routine Metals								
Calcium (Ca)-Extractable	2.23		0.05	mg/L		09-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.39		0.05	mg/L		09-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.96		0.01	mg/L		09-AUG-06	DAG	R428922
Sodium (Na)-Extractable	0.69		0.02	mg/L		09-AUG-06	DAG	R428922
Iron (Fe)-Extractable	0.09		0.01	mg/L		09-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0041		0.0002	mg/L		09-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.55		0.05	NTU		04-AUG-06	SXG	R427977
pH								
PH	7.19		0.01	pH units		04-AUG-06	SXB	R427845
Total Coliform and E. Coli by MColi Blue								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-2 BL-2								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
L418704-3 BL-3								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.029	RAMB	0.005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Iron (Fe)-Total	0.08		0.02	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Boron (B)-Total	<0.03		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Barium (Ba)-Total	0.0168		0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Beryllium (Be)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Calcium (Ca)-Total	2.3		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Chromium (Cr)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Copper (Cu)-Total	0.002		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Potassium (K)-Total	0.4		0.1	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Magnesium (Mg)-Total	1.08		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Manganese (Mn)-Total	0.0056	RAMB	0.0003	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Sodium (Na)-Total	1.89		0.03	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Nickel (Ni)-Total	<0.002		0.002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Phosphorus (P)-Total	0.06	RAMB	0.05	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Lead (Pb)-Total	<0.0005		0.0005	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Antimony (Sb)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Selenium (Se)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tin (Sn)-Total	<0.0006		0.0006	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Strontium (Sr)-Total	0.0162	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tellurium (Te)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Titanium (Ti)-Total	0.0012		0.0009	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Uranium (U)-Total	<0.0001		0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Vanadium (V)-Total	<0.001		0.001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Tungsten (W)-Total	<0.0002		0.0002	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Silver (Ag)-Total	<0.0001	RAMB	0.0001	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	20-AUG-06	DAG	R432647
Oxygen, Dissolved	11.5		0.1	mg/L		04-AUG-06	LJH	R427390
Total Dissolved Solids	10		5	mg/L		08-AUG-06	CXZ	R428779
Total Suspended Solids	<5		5	mg/L		08-AUG-06	CXZ	R428779
ROU4W Extractable								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-3 BL-3								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		08-AUG-06	SXB	R428269
Bicarbonate (HCO3)	12		2	mg/L		08-AUG-06	SXB	R428269
Carbonate (CO3)	<0.6		0.6	mg/L		08-AUG-06	SXB	R428269
Hydroxide (OH)	<0.4		0.4	mg/L		08-AUG-06	SXB	R428269
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
Conductivity								
Conductivity	32.3		0.4	umhos/cm		04-AUG-06	SXB	R427845
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		09-AUG-06	LDE	R428543
Hardness (as CaCO3)	10.3		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.005	RAMB	0.005	mg/L		04-AUG-06	LDE	R427877
Routine Metals								
Calcium (Ca)-Extractable	2.28		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.46		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	1.11		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	1.83		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	0.10		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0063		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
TDS (Calculated)	11		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.50		0.05	NTU		04-AUG-06	SXG	R427977
pH								
PH	7.18		0.01	pH units		04-AUG-06	SXB	R427845
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
Total Coliform mcoli blue MF								
Total Coliforms	1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
L418704-4 BL-4								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.015	RAMB	0.005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cadmium (Cd)-Total	0.00079		0.00002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Iron (Fe)-Total	0.10		0.02	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Metal scan								
Arsenic (As)-Total	0.0010		0.0005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Boron (B)-Total	<0.03		0.03	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Barium (Ba)-Total	0.0164		0.0003	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Beryllium (Be)-Total	0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Bismuth (Bi)-Total	0.0012		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Calcium (Ca)-Total	2.3		0.1	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cobalt (Co)-Total	0.0011		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Chromium (Cr)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cesium (Cs)-Total	0.0010		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-4 BL-4								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Copper (Cu)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Potassium (K)-Total	0.8		0.1	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Magnesium (Mg)-Total	1.75		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Manganese (Mn)-Total	0.0094		0.0003	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Molybdenum (Mo)-Total	0.0012		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Sodium (Na)-Total	6.91		0.03	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Nickel (Ni)-Total	<0.002		0.002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Phosphorus (P)-Total	0.07	RAMB	0.05	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Lead (Pb)-Total	0.0014		0.0005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Rubidium (Rb)-Total	0.0018		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Antimony (Sb)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Selenium (Se)-Total	0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tin (Sn)-Total	0.0010		0.0006	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Strontium (Sr)-Total	0.0197		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tellurium (Te)-Total	0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Thallium (Tl)-Total	0.0010		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Uranium (U)-Total	0.0011		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Vanadium (V)-Total	0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tungsten (W)-Total	0.0012	RAMB	0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Zirconium (Zr)-Total	0.0012		0.0004	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Silver (Ag)-Total	0.0004	RAMB	0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Oxygen, Dissolved	11.9		0.1	mg/L		04-AUG-06	LJH	R427390
Total Dissolved Solids	32		5	mg/L		08-AUG-06	CXZ	R428779
Total Suspended Solids	<5		5	mg/L		08-AUG-06	CXZ	R428779
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	10		1	mg/L		08-AUG-06	SXB	R428269
Bicarbonate (HCO3)	12		2	mg/L		08-AUG-06	SXB	R428269
Carbonate (CO3)	<0.6		0.6	mg/L		08-AUG-06	SXB	R428269
Hydroxide (OH)	<0.4		0.4	mg/L		08-AUG-06	SXB	R428269
Chloride Soluble								
Chloride (Cl) - Soluble	13		9	mg/L		09-AUG-06	LDE	R428543
Conductivity								
Conductivity	67.9		0.4	umhos/cm		04-AUG-06	SXB	R427845
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		09-AUG-06	LDE	R428543
Hardness (as CaCO3)	13.2		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.011	RAMB	0.005	mg/L		04-AUG-06	LDE	R427877
Routine Metals								
Calcium (Ca)-Extractable	2.47		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.66		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	1.71		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	7.36		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	0.08		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0085		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-4 BL-4								
Sampled By: CS/JQ on 02-AUG-06 @ 15:00								
Matrix: GRAB WATER								
ROU4W Extractable								
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
TDS (Calculated)	31		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.45		0.05	NTU		04-AUG-06	SXG	R427977
pH								
PH	7.14		0.01	pH units		04-AUG-06	SXB	R427845
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
L418704-5 BL-5								
Sampled By: CS/JQ on 02-AUG-06 @ 19:30								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.017	RAMB	0.005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cadmium (Cd)-Total	0.00069		0.00002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Iron (Fe)-Total	0.09		0.02	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Metal scan								
Arsenic (As)-Total	0.0008		0.0005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Boron (B)-Total	<0.03		0.03	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Barium (Ba)-Total	0.0167		0.0003	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Beryllium (Be)-Total	<0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Bismuth (Bi)-Total	0.0009		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Calcium (Ca)-Total	2.9		0.1	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cobalt (Co)-Total	0.0010		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Chromium (Cr)-Total	0.003		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Cesium (Cs)-Total	0.0009		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Copper (Cu)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Potassium (K)-Total	1.2		0.1	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Magnesium (Mg)-Total	2.81		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Manganese (Mn)-Total	0.0115		0.0003	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Molybdenum (Mo)-Total	0.0010		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Sodium (Na)-Total	15.6		0.03	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Nickel (Ni)-Total	<0.002		0.002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Phosphorus (P)-Total	0.07	RAMB	0.05	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Lead (Pb)-Total	0.0010		0.0005	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Rubidium (Rb)-Total	0.0019		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Antimony (Sb)-Total	0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Selenium (Se)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tin (Sn)-Total	0.0008		0.0006	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Strontium (Sr)-Total	0.0264		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tellurium (Te)-Total	<0.001		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Titanium (Ti)-Total	0.0016		0.0009	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Thallium (Tl)-Total	0.0008		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Uranium (U)-Total	0.0009		0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Vanadium (V)-Total	0.002		0.001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Tungsten (W)-Total	0.0011		0.0002	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418704-5 BL-5								
Sampled By: CS/JQ on 02-AUG-06 @ 19:30								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Zirconium (Zr)-Total	0.0012		0.0004	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Silver (Ag)-Total	0.0005	RAMB	0.0001	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Zinc (Zn)-Total	<0.01		0.01	mg/L	18-AUG-06	19-AUG-06	DAG	R432531
Oxygen, Dissolved	12.1		0.1	mg/L		04-AUG-06	LJH	R427390
Total Dissolved Solids	66		5	mg/L		08-AUG-06	CXZ	R428779
Total Suspended Solids	<5		5	mg/L		08-AUG-06	CXZ	R428779
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	10		1	mg/L		08-AUG-06	SXB	R428269
Bicarbonate (HCO3)	12		2	mg/L		08-AUG-06	SXB	R428269
Carbonate (CO3)	<0.6		0.6	mg/L		08-AUG-06	SXB	R428269
Hydroxide (OH)	<0.4		0.4	mg/L		08-AUG-06	SXB	R428269
Chloride Soluble								
Chloride (Cl) - Soluble	29		9	mg/L		09-AUG-06	LDE	R428543
Conductivity								
Conductivity	136		0.4	umhos/cm		04-AUG-06	SXB	R427845
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		09-AUG-06	LDE	R428543
Hardness (as CaCO3)	20.0		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.023	RAMB	0.005	mg/L		04-AUG-06	LDE	R427877
Routine Metals								
Calcium (Ca)-Extractable	3.04		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	1.12		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	3.02		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	17.6		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	0.10		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0121		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		09-AUG-06	LDE	R428543
TDS (Calculated)	60		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		04-AUG-06	SXG	R427977
pH								
PH	7.29		0.01	pH units		04-AUG-06	SXB	R427845
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	04-AUG-06	05-AUG-06	AOB	R427589

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

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L418722-1 BL-5 Sampled By: CS/JQ on 02-AUG-06 @ 19:30 Matrix: GRAB WATER								
Total Oil and Grease	<1		1	mg/L	10-AUG-06	11-AUG-06	IML	R429391

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

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-1 BL-6-0.5M								
Sampled By: CS/JU on 03-AUG-06 @ 09:40								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.032		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	0.00079		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.10		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	0.0002		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	0.0011		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0176		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	0.0009		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.9		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0011		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	0.0009		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	0.002		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	1.0		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	2.81		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0115		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	0.0010		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	16.1		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	0.0010		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0020		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	0.002		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	0.0011		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0269		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	0.0013		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	0.0011		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	0.0009		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	0.0009		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	0.0010		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	0.0008		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	13.2		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	84		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	10		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	12		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	32		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-1 BL-6-0.5M								
Sampled By: CS/JU on 03-AUG-06 @ 09:40								
Matrix: GRAB WATER								
ROU4W Extractable								
Conductivity								
Conductivity	144		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	17.4		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.030		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.73		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.92		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	2.58		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	15.3		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0102		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	60		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.35		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.20		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-2 BL-7								
Sampled By: CS/JU on 03-AUG-06 @ 11:15								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.028		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.05		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0171		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.3		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0003		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	0.002		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	0.5		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	1.05		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0050		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	1.66		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-2 BL-7								
Sampled By: CS/JU on 03-AUG-06 @ 11:15								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0161		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	11.8		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	18		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	12		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	32.8		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	8.9		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.007		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.03		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.32		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.93		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	1.51		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0043		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.45		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.30		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-2 BL-7								
Sampled By: CS/JU on 03-AUG-06 @ 11:15								
Matrix: GRAB WATER								
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	2		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-3 BL-8								
Sampled By: CS/JU on 03-AUG-06 @ 11:30								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.043		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.04		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0168		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.2		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	0.4		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	1.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0047		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	1.44		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0164		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	11.9		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	14		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-3 BL-8								
Sampled By: CS/JU on 03-AUG-06 @ 11:30								
Matrix: GRAB WATER								
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	11		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	30.7		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	8.7		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.007		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	1.98		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.32		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.91		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	1.30		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0044		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.25		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	2		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-4 BL-9								
Sampled By: CS/JU on 03-AUG-06 @ 14:40								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.031		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.05		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0168		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.2		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-4 BL-9								
Sampled By: CS/JU on 03-AUG-06 @ 14:40								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Copper (Cu)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	0.4		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	0.95		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0048		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	0.92		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0149		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	11.5		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	14		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	11		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	26.8		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	8.5		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.010		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.00		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.32		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.86		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	0.85		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0038		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-4 BL-9								
Sampled By: CS/JU on 03-AUG-06 @ 14:40								
Matrix: GRAB WATER								
ROU4W Extractable								
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.27		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	2		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-5 BL-10								
Sampled By: CS/JU on 03-AUG-06 @ 15:45								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.028		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.04		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0176		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.3		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	0.5		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	1.09		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0052		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	1.92		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0164		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-5 BL-10								
Sampled By: CS/JU on 03-AUG-06 @ 15:45								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	11.8		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	16		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	11		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	34.1		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	9.3		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.007		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.11		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.37		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.99		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	1.76		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0046		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	11		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.26		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	2		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-6 BL-11								
Sampled By: CS/JU on 03-AUG-06 @ 11:50								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.031		0.005	mg/L	21-AUG-06	22 AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.04		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-6 BL-11								
Sampled By: CS/JU on 03-AUG-06 @ 11:50								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0171		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	2.2		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	0.4		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	1.00		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0047		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	1.45		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0008		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0157		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	11.9		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	14		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	12		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	30.8		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	9.1		0.2	mg/L		10-AUG-06		

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-6 BL-11								
Sampled By: CS/JU on 03-AUG-06 @ 11:50								
Matrix: GRAB WATER								
ROU4W Extractable								
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.006		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.08		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	0.36		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	0.95		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	1.37		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0045		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	10		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.26		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	4		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-7 BL-6-3M								
Sampled By: CS/JU on 03-AUG-06 @ 10:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.029		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	0.00074		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.13		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	0.0010		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0174		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	0.0010		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	3.2		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	0.0011		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	0.010		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	0.0008		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	1.1		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	3.16		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0144		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	0.0011		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	18.0		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	0.0009		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0018		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-7 BL-6-3M								
Sampled By: CS/JU on 03-AUG-06 @ 10:00								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Metal scan								
Tin (Sn)-Total	0.0028		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0285		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	0.0012		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	0.0009		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	0.0008		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	0.0011		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	0.0010		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	0.0007		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	13.2		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	68		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	10		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	12		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	32		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	144		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	18.1		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.029		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.75		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	1.02		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	2.74		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	16.0		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0125		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	60		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.35		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.20		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-8 BL-6-5 M								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.026		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Iron (Fe)-Total	0.04		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	0.0166		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	3.3		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	0.002		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	1.0		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	3.02		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	0.0122		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	17.8		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	0.0010		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	0.0263		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	0.03		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	0.03		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Oxygen, Dissolved	13.0		0.1	mg/L		10-AUG-06	LJH	R428757
Total Dissolved Solids	72		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	10		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	12		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	32		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-8 BL-6-5 M								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
ROU4W Extractable								
Conductivity								
Conductivity	144		0.4	umhos/cm		08-AUG-06	SXB	R428269
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	18.3		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.028		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	2.84		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	1.03		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	2.72		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	15.9		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	0.0109		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	60		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.40		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	7.19		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
L419171-9 BL-6-P								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
Crypto and Giardia								
Cryptosporidium								
Cryptosporidium	0		0	oocyst/10L		14-AUG-06	ODY	R430178
Cryptosporidium Volume Filtered	10		0	L		08-AUG-06	ODY	R430118
Viable oocysts	0					14-AUG-06	ODY	R430178
Nonviable Crypto	0					14-AUG-06	ODY	R430178
Amorphous Crypto	0					14-AUG-06	ODY	R430178
Pellet Volume Crypto	0.5 mL					14-AUG-06	ODY	R430178
Giardia								
Giardia	0		0	cysts/10 L		14-AUG-06	ODY	R430178
Giardia Volume Filtered	10		0	L		08-AUG-06	ODY	R430118
Viable cysts	0.0					14-AUG-06	ODY	R430178
Nonviable Giardia	0.0					14-AUG-06	ODY	R430178
Amorphous Giardia	0.0					14-AUG-06	ODY	R430178
Pellet Volume Giardia	0.5 mL					14-AUG-06	ODY	R430178
L419171-10 TRAVEL BLANK								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.008		0.005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cadmium (Cd)-Total	<0.00002		0.00002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-10 TRAVEL BLANK								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
Metal scan, total with ultras								
Iron (Fe)-Total	<0.02		0.02	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Boron (B)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Barium (Ba)-Total	<0.0003		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Beryllium (Be)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Calcium (Ca)-Total	<0.1		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Chromium (Cr)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Copper (Cu)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Potassium (K)-Total	<0.1		0.1	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Magnesium (Mg)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Manganese (Mn)-Total	<0.0003		0.0003	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Sodium (Na)-Total	<0.03		0.03	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Nickel (Ni)-Total	<0.002		0.002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Lead (Pb)-Total	<0.0005		0.0005	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Rubidium (Rb)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Antimony (Sb)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Selenium (Se)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tin (Sn)-Total	<0.0006		0.0006	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Strontium (Sr)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tellurium (Te)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Uranium (U)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Vanadium (V)-Total	<0.001		0.001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Tungsten (W)-Total	<0.0002		0.0002	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Silver (Ag)-Total	<0.0001		0.0001	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Zinc (Zn)-Total	<0.01		0.01	mg/L	21-AUG-06	22-AUG-06	DAG	R433414
Phenols (4AAP)	<0.001		0.001	mg/L		10-AUG-06	MRR	R429053
Total Dissolved Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
Total Suspended Solids	<5		5	mg/L		10-AUG-06	CXZ	R429027
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	2		1	mg/L		09-AUG-06	SXB	R428766
Bicarbonate (HCO3)	2		2	mg/L		09-AUG-06	SXB	R428766
Carbonate (CO3)	<0.6		0.6	mg/L		09-AUG-06	SXB	R428766
Hydroxide (OH)	<0.4		0.4	mg/L		09-AUG-06	SXB	R428766
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
Conductivity								
Conductivity	<0.4		0.4	umhos/cm		09-AUG-06	SXB	R428768
Fluoride Soluble								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419171-10 TRAVEL BLANK								
Sampled By: CS/JU on 03-AUG-06 @ 10:15								
Matrix: GRAB WATER								
ROU4W Extractable								
Fluoride Soluble								
Fluoride (F) - Soluble	<0.1		0.1	mg/L		10-AUG-06	LDE	R429030
Hardness (as CaCO3)	<0.2		0.2	mg/L		10-AUG-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	<0.005		0.005	mg/L		08-AUG-06	LDE	R428305
Routine Metals								
Calcium (Ca)-Extractable	<0.05		0.05	mg/L		10-AUG-06	DAG	R428922
Potassium (K)-Extractable	<0.05		0.05	mg/L		10-AUG-06	DAG	R428922
Magnesium (Mg)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Sodium (Na)-Extractable	<0.02		0.02	mg/L		10-AUG-06	DAG	R428922
Iron (Fe)-Extractable	<0.01		0.01	mg/L		10-AUG-06	DAG	R428922
Manganese (Mn)-Extractable	<0.0002		0.0002	mg/L		10-AUG-06	DAG	R428922
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		10-AUG-06	LDE	R429030
TDS (Calculated)	<5		5	mg/L		10-AUG-06		
Turbidity								
Turbidity	0.050		0.05	NTU		08-AUG-06	SXB	R428272
pH								
PH	5.71		0.01	pH units		08-AUG-06	SXB	R428269
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428579

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

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L419205-1 SNP-5 Sampled By: CS/JV on 03-AUG-06 @ 18:00 Matrix: GRAB WATER								
Fecal Coliform	120		10	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428688
L419205-2 SNP-6 Sampled By: CS/JV on 03-AUG-06 @ 18:00 Matrix: GRAB WATER								
Fecal Coliform	OVERGROWN		10	CFU/100mL	08-AUG-06	09-AUG-06	RCV	R428688
L419205-3 BL-7 Sampled By: CS/JV on 03-AUG-06 @ 11:15 Matrix: GRAB WATER								
Total Oil and Grease	<1		1	mg/L	10-AUG-06	11-AUG-06	IML	R429391

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
RAMB	Result Adjusted For Method Blank

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
AG-TOT-ULTRA-WP	Water	Silver (Ag)-Total		EPA 200.8 Rev 5.4 May 1994
AL-TOT-ULTRA-WP	Water	Aluminum (Al)-Total		EPA 200.8 Rev 5.4 May 1994
ALK-TOT-WP	Water	Alkalinity		APHA 2320B

Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
ALK-TOT-WP	Water	Alkalinity		APHA 4500B, 2510B, 2320B, 1998

Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
CD-TOT-ULTRA-WP	Water	Cadmium (Cd)-Total		EPA 200.8 Rev 5.4 May 1994
CL-SOL-WP	Water	Chloride Soluble		APHA4500/LACHAT

Chloride - Colourimetric using Mercuric Thiocyanate

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
CL-SOL-WP	Water	Chloride Soluble		APHA4500;1998/LACHAT;MAR 1997

Chloride - Colourimetric using Mercuric Thiocyanate

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
CRYPTO-WP	Water	Cryptosporidium		EPA-821-R-01-025 Method 1623
EC-MCOLIMF-WP	Water	Escherichia Coli mcoli blue MF		APHA 9222B and HACH #10029

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis can be performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC
(2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase
and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
EC-MCOLIMF-WP	Water	Escherichia Coli mcoli blue MF		APHA 9222B and HACH 10029

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis can be performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC
(2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase
and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
EC-WP	Water	Conductivity		APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
EC-WP	Water	Conductivity		APHA 4500B, 2510B, 2320B, 1998

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
ETL-HARDNESS-EXT-WP	Water	Hardness Calculated		Calculated
F-SOL-WP	Water	Fluoride Soluble		APHA4500/LACHAT

Fluoride - Ion selective electrode

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
F-SOL-WP	Water	Fluoride Soluble		APHA4500;1998/LACHAT;MAR 1997

Fluoride - Ion selective electrode

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
FE-TOT-ULTRA-WP	Water	Iron (Fe)-Total		EPA 200.8 Rev 5.4 May 1994
GIARDIA-WP	Water	Giardia		EPA-821-R-01-025 Method 1623

Reference Information

HG-TOT-ULTRA-WP	Water	Mercury (Hg)-Total	EPA 200.8 Rev 5.4 May 1994
IONBALANCE-OP05-WP	Water		APHA 1030E
MET-SCNOU-TOT-LOW-WP	Water	Metal scan	EPA 200.8 Rev 5.4 May 1994
MET2-EXT-LOW-WP	Water	Routine Metals	EPA 200.8 Rev 5.4 May 1994
N2N3-SOL-WP	Water	Nitrate + Nitrite Soluble	APHA4500;1998/LACHAT;MAR 1997
N2N3-SOL-WP	Water	Nitrate + Nitrite Soluble	APHA4500;2005/LACHAT;1997,1999
O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C

Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate.

O2-DIS-WP	Water	Dissolved Oxygen	APHA 4500-O-C, 1998

Manganous sulphate reacts with potassium or sodium hydroxide to give a white precipitate of manganous hydroxide. In the presence of oxygen, brown manganic hydroxide is formed. Addition of sulfuric acid dissolves the manganic hydroxide, yielding manganic sulfate which reacts with iodide, releasing iodide in an amount equivalent to the original DO content. The iodide is then titrated with a standard solution of thiosulphate.

PH-WP	Water	pH	APHA 4500B, 2510B, 2320B, 1998

pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

PH-WP	Water	pH	APHA 4500H

pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

PHENOLS-4AAP-TB	Water	Phenols (4AAP)	APHA 5530 B,D Colourimetry
PHENOLS-4AAP-TB	Water	Phenols (4AAP)	APHA 5530 B,D-Colourimetry
PHENOLS-4AAP-TB	Water	Phenols (4AAP)	APHA 5530 D-Colourimetry
SO4-SOL-WP	Water	Sulphate Soluble	APHA4500/LACHAT

Sulphate - Turbidimetric

SO4-SOL-WP	Water	Sulphate Soluble	APHA4500;1998/LACHAT;MAR 1997

Sulphate - Turbidimetric

SOLIDS-TDS-WP	Water	Total Dissolved Solids	APHA 2540

The residue remaining in a prepared casserole after passing the sample through a 1.2 um Whatman GF/C glass microfibre filter and drying at 180 degrees C. Samples may be dried at 105 degrees C if the client specifically requests this drying temperature.

SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540

The residue retained by a prepared 1.5 um Whatman 934-AH glass microfibre filter dried at 105 degrees C.

TC-MCOLIMF-WP	Water	Total Coliform mcoli blue MF	APHA 9222B and HACH 10029

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis is performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC
(2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

TC-MCOLIMF-WP	Water	Total Coliform mcoli blue MF	HACH METHOD #10029,REV 2

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis is performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are

Reference Information

incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC (2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

TURBIDITY-WP	Water	Turbidity	APHA, 1998, 2130B

A strong light beam is sent through a transparent tube containing the sample. Light that is reflected at 90 degrees to the axis by suspended particles is detected by the photocell. The electrical response is proportional to the sample turbidity.

ZN-TOT-LOW-WP	Water	Zinc (Zn)-Total	EPA 200.8 Rev 5.4 May 1994

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

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

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
TB	ALS LABORATORY GROUP - THUNDER BAY, ONTARIO, CANADA	WP	ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory control limits are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million.
mg/L (units) - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

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

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
OGG-IR-WP	Water	Total Oil and Grease		APHA METHOD 5520C

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

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

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

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency. The Laboratory control limits are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million.
mg/L (units) - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

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

ETL Enviro-Test M-C

Manitoba Technology Centre Ltd.

745 Logan Avenue, Winnipeg, Manitoba
9936 - 67th Avenue, Edmonton, Alberta
Edmonton Toll Free Line
1313 - 44 Avenue N.E., Calgary, Alberta
General Purpose Bldg., 124 Veterinary Road, Saskatoon, Sask. S7N 5E3
1081 Barton Street, Thunder Bay, Ontario

W1196

CHAIN OF CUSTODY
ANALYTICAL REQUEST FORM

Fax: (807) 623-7598

DATE SUBMITTED: Aug 3/06 DATE REQUIRED: ASAP

[redacted]

PRICING (CHECK ONE):
AS PER QUOTE #: Q 13012 ☑
AS PER LIST PRICE: ☐

ANALYSIS REQUESTED:

LAB USE ONLY

SAMPLE RECEIVED (Y OR N)
SAMPLE BROKEN (Y OR N)

L418722

SAMPLE ID	SAMPLED BY	DATE / TIME SAMPLED	SAMPLE TYPE	[redacted]	LAB SAMPLE NO.
BL-S (oil+grease)	CS/JA	Aug 2/06 1930	Grab	✓	1
			PRESERVED / FILTERED		

NOTES & CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. All hazardous samples submitted must be labeled to comply with WHMIS regulations. This must include the nature of the hazard, as well as a contact name and phone number that the lab can contact for further information.
3. ETL's liability limited to cost of analysis.

NOTE: Failure to properly complete all portions of this form may delay analysis.

NOTE: Shaded areas MUST be completed by client for sample processing.

NO. SAMPLES SUBMITTED: 1
NO. BOTTLES/SAMPLES: 1

CLIENT: Jacques Wh[illegible]
CONTACT: Carey S[illegible]
ADDRESS: P.O. [illegible]
Yellowknife NT [illegible]
BILLING ADDRESS: Same

PHONE/FAX: [redacted]

E-MAIL: YES ☑ NO ☐
E-MAIL ADDRESS: cwhitde@jacqueswhitford.com
PO NO.:
JOB NO.: 1015263

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
CS	DATE: Aug 2/06 TIME: 2030	[illegible] ETL LAB:	DATE: 04 Aug TIME: 1030
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY: ETL LAB:	DATE: TIME:

SAMPLE CONDITION UPON RECEIPT: ☐ ACCEPTABLE ☐ NON ACCEPTABLE
FROZEN: ___ COLD: ___ AMBIENT: ___
OTHER (BREAKAGE, LEAKAGE, ETC.): ___

WHITE - File Copy
GREEN - Final Report
PINK - Invoicing
BLUE - Client Support
YELLOW - Customer

REV. JUNE / 9[illegible]

ETL Enviro-Test MTC

Manitoba Technology Centre Ltd.

745 Logan Avenue, Winnipeg, Manitoba R3E 3L5 — Telephone: (204) 945-3705 — Fax: (204) 945-
9936 - 67th Avenue, Edmonton, Alberta T6E 0P5 — Telephone: (780) 413-5227 — Fax: (780) 437-
Edmonton Toll Free Line — Telephone: 1-800-668-9878 — Fax: 1-800-286-
1313 - 44 Avenue N.E., Calgary, Alberta T2E 6L5 — Telephone: (403) 291-9897 — Fax: (403) 291-
General Purpose Bldg., 124 Veterinary Road, Saskatoon, Sask. S7N 5E3 — Telephone: (306) 668-8370 — Fax: (306) 668-
1081 Barton Street, Thunder Bay, Ontario P7B 5N3 — Telephone: (807) 623-6463 — Fax: (807) 623-

W1196

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

DATE SUBMITTED: Aug 4/06 DATE REQUIRED: ASAP

PRICING (CHECK ONE):
AS PER QUOTE #: Q13013
AS PER LIST PRICE: ☐

ANALYSIS REQUESTED: LAB USE ONLY

L419171

SAMPLE ID	SAMPLED BY	DATE / TIME SAMPLED		SAMPLE TYPE	Analyses	LAB SAMPLE NO.
BL-6-0.5m	CS/JU	Aug 3/06	0940	Grab	1 1 1 1 1	1
BL-7	"	"	1115	"	1 1 1 1 1	2
BL-8	"	"	1130	"	1 1 1 1 1	3
BL-9	"	"	1440	"	1 1 1 1 1	4
BL-10	"	"	1545	"	1 1 1 1 1	5
BL-11	"	"	1150	"	1 1 1 1 1	6
BL-6-3m	"	"	1000	"	1 1 1 1 1	7
BL-6-5m	"	"	1015	"	1 1 1 1 1	8
BL-6-9	"	"	1030	"	2	9
TRAVEL Blank	"	"	"		✓ ✓ ✓ 1	10

PRESERVED — FILTERED

Sample(s) for ? part — holding time. [illegible]

NOTES & CONDITIONS:

1. Quote number must be provided to ensure proper pricing.
2. All hazardous samples submitted must be labeled to comply with WHMIS regulations. This must include the nature of the hazard, as well as a contact name and phone number that the lab can contact for further information.
3. ETL's liability limited to cost of analysis.

NOTE: Failure to properly complete all portions of this form may delay analysis.

NO. SAMPLES SUBMITTED: 10
NO. BOTTLES/SAMPLES: 42
PHONE:
FAX:
E-MAIL: YES ☑ NO ☐
E-MAIL ADDRESS: Gibbald@jacqueswhitford.com
P.O. NO.:
JOB NO.: 1015263
BILLING ADDRESS: Same

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
CS	DATE: Aug 3/06 TIME: 20:00	ETL LAB:	DATE: TIME:
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY: AK ETL LAB:	DATE: Aug 4/06 TIME: 1:52

SAMPLE CONDITION UPON RECEIPT: ☑ ACCEPTABLE ☐ NON ACCEPTABLE

FROZEN: ___ COLD: ✓ AMBIENT: ___

OTHER (BREAKAGE, LEAKAGE, ETC.):

WHITE - File Copy
GREEN - Final Report
PINK - Invoicing
BLUE - Client Support
YELLOW - Customer

REV. JUNE/99

ETL Enviro-Test MTC
Manitoba Technology Centre Ltd.

745 Logan Avenue, Winnipeg, Manitoba R3E 3L5 — Telephone: (204) 945-3705 — Fax: (204) 945-0763
9936 - 67th Avenue, Edmonton, Alberta T6E 0P5 — Telephone: (780) 413-5227 — Fax: (780) 437-2311
Edmonton Toll Free Line — Telephone: 1-800-668-9878 — Fax: 1-800-668-7819
1313 - 44 Avenue N.E., Calgary, Alberta — Telephone: (403) 291-9897 — Fax: (403) 291-0298
General Purpose Bldg., 124 ..., Saskatoon, Sask. S7N 5E8 — Telephone: (306) 668-8370 — Fax: (306) 668-8383
1081 Barton Street, Thunder Bay, Ontario — Telephone: (807) 623-6463 — Fax: (807) 623-7598

W1196

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

DATE SUBMITTED: Aug 3/06 DATE REQUIRED: ASAP

[redacted]

PRICING CONDITIONS: WORKING QUOTE #: Q13013 ☑ OTHER LAB QUOTE ☐

ANALYSIS REQUESTED:

LAB USE ONLY

SAMPLE RECEIVED (Y OR N) SAMPLE BROKEN (Y OR N)

L418704

SAMPLE ID	SAMPLED BY	DATE / TIME SAMPLED	SAMPLE TYPE	[redacted]	LAB SAMPLE NO.
BL-1	CS/JQ	Aug 2/06 1800	Grab		1
BL-2	CS/JQ	"	"		2
BL-3	CS/JQ	"	"		3
BL-4	CS/JQ	"	"		4
BL-5	CS/JQ	" 1930	"		5
			PRESERVED / FILTERED		

NOTES & CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. All hazardous samples submitted must be labeled to comply with WHMIS regulations. This must include the nature of the hazard, as well as a contact name and phone number that ETL can contact for further information.
3. ETL's liability limited to cost of analysis.
NOTE: Failure to properly complete all portions of this form may delay analysis.

[redacted]

NO. SAMPLES SUBMITTED: 5
NO. BOTTLES/SAMPLES: 25

[redacted]

E-MAIL: YES ☑ NO ☐
E-MAIL ADDRESS: [illegible] 4.com
P.O. NO.:
JOB NO.: 1015263

RELINQUISHED BY:	DATE	RECEIVED BY:	DATE
CS	DATE: Aug 2/06 TIME: 2030	ETL LAB: [signature]	DATE: 04 Aug 06 TIME: 1030
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY: ETL LAB:	DATE: TIME:

SAMPLE CONDITION UPON RECEIPT: ☐ ACCEPTABLE ☐ NON ACCEPTABLE
FROZEN ____ COLD ____ AMBIENT ____
OTHER (BREAKAGE, LEAKAGE, ETC.):

WHITE - File Copy
GREEN - Final Report
PINK - Invoicing
BLUE - Client Support
YELLOW - Customer

REV. JUNE / 9[illegible]

ETL EnviroTest MTC

Manitoba Technology Centre Ltd.

745 Logan Avenue, Winnipeg, Manitoba R3E 3L5
9936 - 67th Avenue, Edmonton, Alberta T6E 0P5
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General Purpose Bldg., 124 Veterinary Road, Saskatoon, Sask. S7N 5E3
1081 Barton Street, Thunder Bay, Ontario P7B 5N3

W1196

CHAIN OF CUSTODY ANALYTICAL REQUEST FORM

Telephone: (204) 945-3705 Fax: (204) 945-0763
Telephone: (780) 413-5227 Fax: (780) 437-2311
Telephone: 1-800-668-9878 Fax: 1-800-668-7319
Telephone: (403) 291-9897 Fax: (403) 291-0298
Telephone: (306) 668-8370 Fax: (306) 668-8383
Telephone: (807) 623-6463 Fax: (807) 623-7598

DATE SUBMITTED: Aug 4/06 DATE REQUIRED: ASAP

PRICING (CHECK ONE): AS PER QUOTE #: 013012 ☑ AS PER LIST PRICE ☐

ANALYSIS REQUESTED: LAB USE ONLY

SAMPLE RECEIVED (Y OR N) SAMPLE BROKEN (Y OR N)

L419205

SAMPLE ID	SAMPLED BY	DATE / TIME SAMPLED	SAMPLE TYPE	Coliforms	+ Grease	LAB SAMPLE NO.
SNP-5	CS/JU	Aug 3/06 1800	Grab	1		
SNP-6	"	" 1800	"	1		
BL-7	"	" 1115	"		1	
			PRESERVED / FILTERED			

Analysed (?) past holding time. Client notified. MC

NOTES & CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. All hazardous samples submitted must be labeled to comply with WHMIS regulations. This must include the nature of the hazard, as well as a contact name and phone number that the lab can contact for further information.
3. ETL's liability limited to cost of analysis.
NOTE: Failure to properly complete all portions of this form may delay analysis.

Shaded areas MUST be completed by client for sample processing to occur.

CLIENT: Jacques Whitford
CONTACT: Darcy Sibbald
REPORT ADDRESS: P.O. Box 1660, Yellowknife, NT X1A 2P3
INVOICE ADDRESS: Same

NO. SAMPLES SUBMITTED: 3
NO. BOTTLES/SAMPLES: 3
PHONE: (867) 920-2216
FAX: (867) 920-2278
E-MAIL: YES ☑ NO ☐
E-MAIL ADDRESS: dsibbald@jacqueswhitford
P.O. NO.:
JOB NO.: 1015263

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
CS	DATE: Aug 3/06 TIME: 20:00	ETL LAB	DATE: TIME:
RELINQUISHED BY:	DATE: TIME:	RECEIVED BY: MK ETL LAB	DATE: Aug 4/06 TIME: 9:50

SAMPLE CONDITION UPON RECEIPT: ☐ ACCEPTABLE ☐ NON ACCEPTABLE
FROZEN ☐ COLD ☐ AMBIENT ☐
OTHER (BREAKAGE, LEAKAGE, ETC.) Hand over

WHITE - File Copy
GREEN - Final Report
PINK - Invoicing
BLUE - Client Support
YELLOW - Customer

REV. JUNE / 99

PRELIMINARY RESULTS

JACQUES WHITFORD
ATTN: CAREY SIBBALD
201, 5103 - 51ST AVE
YELLOWKNIFE NT X1A 2P3

Reported On: 19-OCT-06 03:18 PM

Lab Work Order #: **L441336**

Date Received: **06-OCT-06**

Project P.O. #:
Job Reference: 1015263
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

APPROVED BY: ______________________________
PAUL NICOLAS
Project Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-1 BL-4								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.015		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00009		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.03		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0147		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	1.9		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	0.1		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.83		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0020		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	0.46		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	<0.0006		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0124		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	18		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		16-OCT-06	ALW	R454143
Conductivity								
Conductivity	22.8		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-1 BL-4								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
ROU4W Extractable								
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	9.1		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.011		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.13		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.34		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.92		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.51		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.06		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0041		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452759
TDS (Calculated)	9		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.33		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.12		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
L441336-2 BL-6-0.5 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.019		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00012		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.02		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0147		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	2.1		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	0.2		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.87		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0050		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	0.53		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-2 BL-6-0.5 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Metal scan								
Rubidium (Rb)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	0.0010		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0132		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	14		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	23.3		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	9.3		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.013		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.18		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.42		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.93		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.60		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.02		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0018		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	10		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.32		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.14		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-2 BL-6-0.5 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Total Coliform and E. Coli by MColi Blue								
L441336-3 BL-6-3 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.027		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00012		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.04		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0146		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	2.0		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	0.2		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.86		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0017		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	0.55		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	<0.0006		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0131		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	10		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-3 BL-6-3 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
ROU4W Extractable								
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	23.7		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	9.2		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.008		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.20		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.34		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.91		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.59		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.02		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0023		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	10		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.30		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.13		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
L441336-4 BL-6-6 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.032		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00098		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.10		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	0.0008		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0158		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	0.0009		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	1.9		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	0.0010		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	0.0009		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	0.1		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.87		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0025		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	0.0009		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-4 BL-6-6 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Metal scan								
Sodium (Na)-Total	0.58		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	0.0008		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	0.0013		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	0.0009		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0133		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	0.0013		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	0.0008		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	0.0009		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	0.0008		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	0.0011		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	0.0009		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	16		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	23.9		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	8.9		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.010		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.05		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.34		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.92		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.62		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.03		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0018		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	9		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.31		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.14		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-4 BL-6-6 M								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
L441336-5 BL-9								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.015		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00004		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.03		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0150		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	2.2		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	0.2		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	1.05		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0022		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	2.17		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	0.0005		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	<0.0006		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0147		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	20		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-5 BL-9								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
ROU4W Extractable								
Alkalinity								
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	37.6		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	<0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	9.9		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.011		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.11		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.40		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	1.13		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	2.46		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.02		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0022		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	12		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.31		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.14		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
L441336-6 BL-11								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.020		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00004		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.04		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0150		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	1.9		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-6 BL-11								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
Metal scan, total with ultras								
Metal scan								
Potassium (K)-Total	0.2		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.82		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0019		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	0.46		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	0.0005		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	<0.0006		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0127		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Total Dissolved Solids	12		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	22.9		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	0.2		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	8.9		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.010		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.06		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.36		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.92		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.52		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.03		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0019		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	9		5	mg/L		18-OCT-06		
Turbidity								

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-6 BL-11								
Sampled By: CS / NK on 05-OCT-06 @ 09:30								
Matrix: WATER								
ROU4W Extractable								
Turbidity								
Turbidity	0.31		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.17		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
L441336-7 THELAN								
Sampled By: CS / NK on 05-OCT-06 @ 12:15								
Matrix: WATER								
Metal scan, total with ultras								
Aluminum (Al)-Total	0.022		0.005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cadmium (Cd)-Total	0.00004		0.00002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Iron (Fe)-Total	0.02		0.02	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Mercury (Hg)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Metal scan								
Arsenic (As)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Boron (B)-Total	<0.03		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Barium (Ba)-Total	0.0147		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Beryllium (Be)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Bismuth (Bi)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Calcium (Ca)-Total	1.8		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cobalt (Co)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Chromium (Cr)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Cesium (Cs)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Copper (Cu)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Potassium (K)-Total	<0.1		0.1	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Magnesium (Mg)-Total	0.78		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Manganese (Mn)-Total	0.0021		0.0003	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Molybdenum (Mo)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Sodium (Na)-Total	0.42		0.03	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Nickel (Ni)-Total	<0.002		0.002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Phosphorus (P)-Total	<0.05	RAMB	0.05	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Lead (Pb)-Total	<0.0005		0.0005	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Rubidium (Rb)-Total	0.0004		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Antimony (Sb)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Selenium (Se)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tin (Sn)-Total	<0.0006		0.0006	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Strontium (Sr)-Total	0.0123		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tellurium (Te)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Titanium (Ti)-Total	<0.0009		0.0009	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Thallium (Tl)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Uranium (U)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Vanadium (V)-Total	<0.001		0.001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Tungsten (W)-Total	<0.0002		0.0002	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zirconium (Zr)-Total	<0.0004		0.0004	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Silver (Ag)-Total	<0.0001		0.0001	mg/L	12-OCT-06	13-OCT-06	DAG	R452883
Zinc (Zn)-Total	<0.01		0.01	mg/L	12-OCT-06	13-OCT-06	DAG	R452883

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L441336-7 THELAN								
Sampled By: CS / NK on 05-OCT-06 @ 12:15								
Matrix: WATER								
Total Dissolved Solids	10		5	mg/L		12-OCT-06	CXZ	R452850
Total Suspended Solids	<5		5	mg/L		12-OCT-06	CXZ	R452850
ROU4W Extractable								
Alkalinity								
Alkalinity, Total (as CaCO3)	9		1	mg/L		11-OCT-06	SXB	R452133
Bicarbonate (HCO3)	11		2	mg/L		11-OCT-06	SXB	R452133
Carbonate (CO3)	<0.6		0.6	mg/L		11-OCT-06	SXB	R452133
Hydroxide (OH)	<0.4		0.4	mg/L		11-OCT-06	SXB	R452133
Chloride Soluble								
Chloride (Cl) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
Conductivity								
Conductivity	22.8		0.4	umhos/cm		06-OCT-06	SXB	R451386
Fluoride Soluble								
Fluoride (F) - Soluble	0.1		0.1	mg/L		12-OCT-06	ALW	R452766
Hardness (as CaCO3)	9.0		0.2	mg/L		18-OCT-06		
Nitrate + Nitrite Soluble								
Nitrate+Nitrite-N - Soluble	0.011		0.005	mg/L		10-OCT-06	CLM	R451757
Routine Metals								
Calcium (Ca)-Extractable	2.08		0.05	mg/L		17-OCT-06	MEB	R454804
Potassium (K)-Extractable	0.36		0.05	mg/L		17-OCT-06	MEB	R454804
Magnesium (Mg)-Extractable	0.92		0.01	mg/L		17-OCT-06	MEB	R454804
Sodium (Na)-Extractable	0.52		0.02	mg/L		17-OCT-06	MEB	R454804
Iron (Fe)-Extractable	0.02		0.01	mg/L		17-OCT-06	MEB	R454804
Manganese (Mn)-Extractable	0.0019		0.0002	mg/L		17-OCT-06	MEB	R454804
Sulphate Soluble								
Sulphate (SO4) - Soluble	<9		9	mg/L		12-OCT-06	ALW	R452766
TDS (Calculated)	9		5	mg/L		18-OCT-06		
Turbidity								
Turbidity	0.26		0.05	NTU		06-OCT-06	SXG	R451319
pH								
PH	7.14		0.01	pH units		06-OCT-06	SXB	R451386
Total Coliform and E. Coli by MColi Blue								
Escherichia Coli mcoli blue MF								
E. Coli	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080
Total Coliform mcoli blue MF								
Total Coliforms	<1		1	CFU/100mL	06-OCT-06	07-OCT-06	ARC	R451080

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

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
RAMB	Result Adjusted For Method Blank

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
AG-TOT-ULTRA-WP	Water	Silver (Ag)-Total		EPA 200.8 Rev 5.4 May 1994
AL-TOT-ULTRA-WP	Water	Aluminum (Al)-Total		EPA 200.8 Rev 5.4 May 1994
ALK-TOT-WP	Water	Alkalinity		APHA 2320B

Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

CD-TOT-ULTRA-WP	Water	Cadmium (Cd)-Total		EPA 200.8 Rev 5.4 May 1994
CL-SOL-WP	Water	Chloride Soluble		APHA4500/LACHAT

Chloride - Colourimetric using Mercuric Thiocyanate

EC-MCOLIMF-WP	Water	Escherichia Coli mcoli blue MF		APHA 9222B and HACH 10029

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis can be performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC (2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

EC-WP	Water	Conductivity		APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

ETL-HARDNESS-EXT-WP	Water	Hardness Calculated		Calculated
F-SOL-WP	Water	Fluoride Soluble		APHA4500/LACHAT

Fluoride - Ion selective electrode

FE-TOT-ULTRA-WP	Water	Iron (Fe)-Total		EPA 200.8 Rev 5.4 May 1994
HG-TOT-ULTRA-WP	Water	Mercury (Hg)-Total		EPA 200.8 Rev 5.4 May 1994
IONBALANCE-OP05-WP	Water			APHA 1030E
MET-SCNOU-TOT-LOW-WP	Water	Metal scan		EPA 200.8 Rev 5.4 May 1994
MET2-EXT-LOW-WP	Water	Routine Metals		EPA 200.8 Rev 5.4 May 1994
N2N3-SOL-WP	Water	Nitrate + Nitrite Soluble		APHA4500;2005/LACHAT;1997,1999
PH-WP	Water	pH		APHA 4500H

pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

SO4-SOL-WP	Water	Sulphate Soluble		APHA4500/LACHAT

Sulphate - Turbidimetric

SOLIDS-TDS-WP	Water	Total Dissolved Solids		APHA 2540

The residue remaining in a prepared casserole after passing the sample through a 1.2 um Whatman GF/C glass microfibre filter and drying at 180 degrees C. Samples may be dried at 105 degrees C if the client specifically requests this drying temperature.

SOLIDS-TOTSUS-WP	Water	Total Suspended Solids		APHA 2540

The residue retained by a prepared 1.5 um Whatman 934-AH glass microfibre filter dried at 105 degrees C.

TC-MCOLIMF-WP	Water	Total Coliform mcoli blue MF		APHA 9222B and HACH 10029

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis is performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC (2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

Reference Information

TURBIDITY-WP	Water	Turbidity	APHA, 1998, 2130B

A strong light beam is sent through a transparent tube containing the sample. Light that is reflected at 90 degrees to the axis by suspended particles is detected by the photocell. The electrical response is proportional to the sample turbidity.

ZN-TOT-ULTRA-WP	Water	Zinc (Zn)-Total	EPA 200.8 Rev 5.4 May 1994

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

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

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

GLOSSARY OF REPORT TERMS

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

The reported surrogate recovery value provides a measure of method efficiency. The Laboratory control limits are determined under column heading D.L.

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

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

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.

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

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

ETL Enviro-Test MTC

Manitoba Technology Centre Ltd.

745 Logan Avenue, Winnipeg, Manitoba R3E 3L5
9936 - 67th Avenue, Edmonton, Alberta T6E 0P5
Edmonton Toll Free Line
1313 - 44 Avenue N.E., Calgary, Alberta T2E 6L5
General Purpose Bldg., 124 Veterinary Road, Saskatoon, Sask. S7N 5E3
1081 Barton Street, Thunder Bay, Ontario P7B 5N3

Telephone: (204) 945-3705 Fax: (204) 945-0763
Telephone: (780) 413-5227 Fax: (780) 437-2311
Telephone: 1-800-668-9878 Fax: 1-800-286-7319
Telephone: (403) 291-9897 Fax: (403) 291-0298
Telephone: (306) 668-8370 Fax: (306) 668-8383
Telephone: (807) 623-6463 Fax: (807) 623-7598

CHAIN OF CUSTODY ANALYTICAL REQUEST FORM

DATE SUBMITTED: Oct 6/06 DATE REQUIRED: ASAP

PRICING (CHECK ONE): AS PER QUOTE #: Q13013 ✓ AS PER LIST PRICE: ☐

ANALYSIS REQUESTED: Routine, Nutrient, Metals (+HNO3), Bacteria (TC/EC) — SAMPLE RECEIVED (Y OR N) — SAMPLE BROKEN (Y OR N)

L441336

SAMPLE ID	SAMPLED BY	DATE / TIME SAMPLED	SAMPLE TYPE	[redacted]				LAB SAMPLE NO.
BL-4	CS/NK	Oct 5/06 / 0930	Grab	1	1	1	1	1
BL-6-0.5m	"	"	"	1	1	1	1	2
BL-6-3m	"	"	"	1	1	1	1	3
BL-6-6m	"	"	"	1	1	1	1	4
BL-9	"	"	"	1	1	1	1	5
BL-11	"	"	"	1	1	1	1	6
Thelon	"	" / 1215	"	1	1	1	1	7

PRESERVED / FILTERED

NOTES & CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. All hazardous samples submitted must be labeled to comply with WHMIS regulations. This must include the nature of the hazard, as well as a contact name and phone number that the lab can contact for further information.
3. ETL's liability limited to cost of analysis.

NOTE: Failure to properly complete all portions of this form may delay analysis.

NO. SAMPLES SUBMITTED: 7
NO. BOTTLES/SAMPLES: 28

CLIENT: Jacques Whitford
CONTACT: Corey Sibbald
REPORT ADDRESS: PO Box [illegible]
Yellowknife, NT [illegible]
PHONE: (867) [illegible]
FAX: (867) [illegible]
E-MAIL: YES ☒ NO ☐
EMAIL ADDRESS: csibbald@jacqueswhitford.com
P.O. NO.:
JOB NO.: 1015263

RELINQUISHED BY:	DATE: Oct 5/06	RECEIVED BY:	DATE: Oct 6/06
	TIME:	ETL LAB:	TIME: 16:15
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:	ETL LAB:	TIME:

SAMPLE CONDITION UPON RECEIPT: ☒ ACCEPTABLE ☐ NON ACCEPTABLE
FROZEN: COLD: ✓ AMBIENT:
OTHER (BREAKAGE, LEAKAGE, ETC.):

WHITE - File Copy
GREEN - Final Report
PINK - Invoicing
BLUE - Client Support
YELLOW - Customer

REV. JUNE / 99

APPENDIX C

Analytical Summary Figures & *In Situ* Data

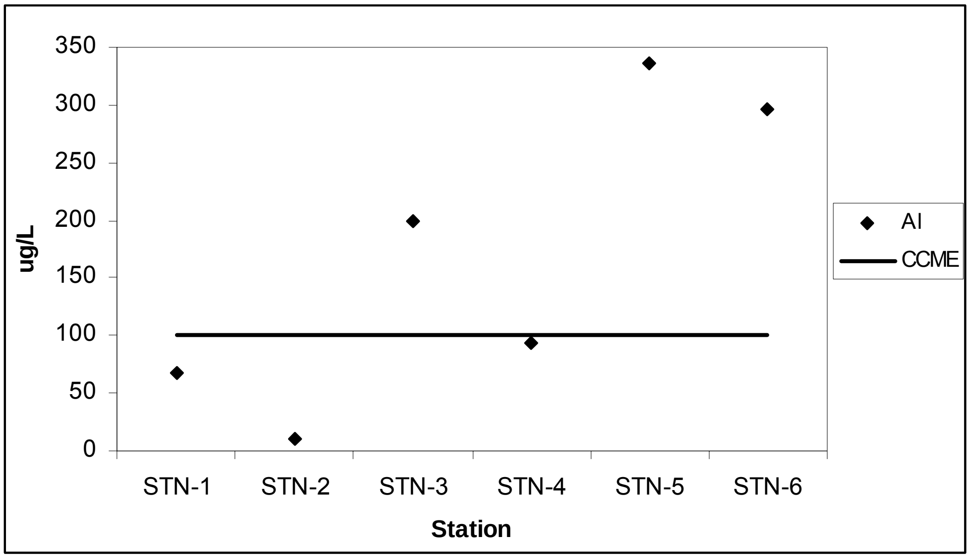

Figure 1: Changing aluminum (Al) levels through the Tundra Wetland at Qamani'tuaq, NU in August 2006; CCME PFAL Guideline included.

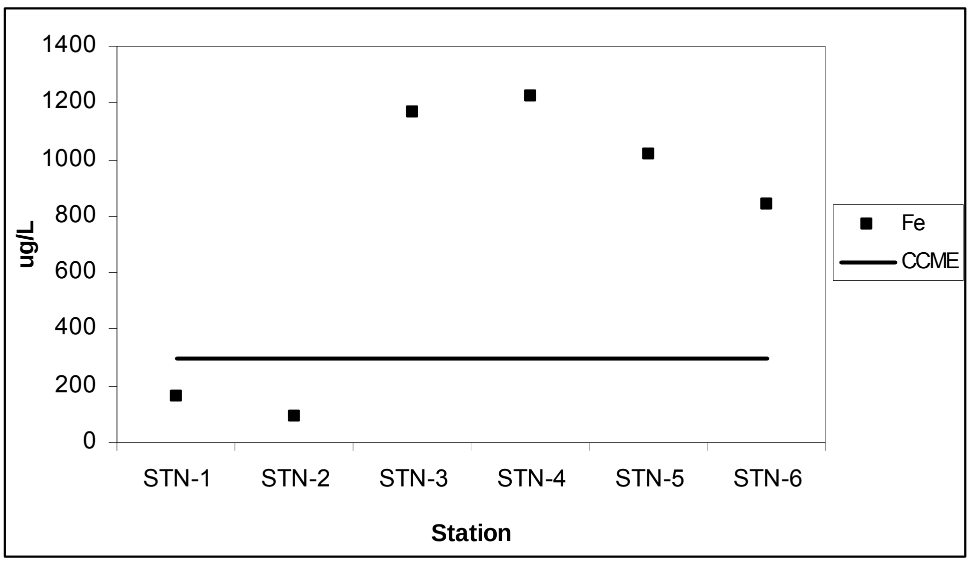

Figure 2: Changing iron (Fe) levels through the Tundra Wetland at Qamani'tuaq, NU in August 2006; CCME PFAL Guideline included.

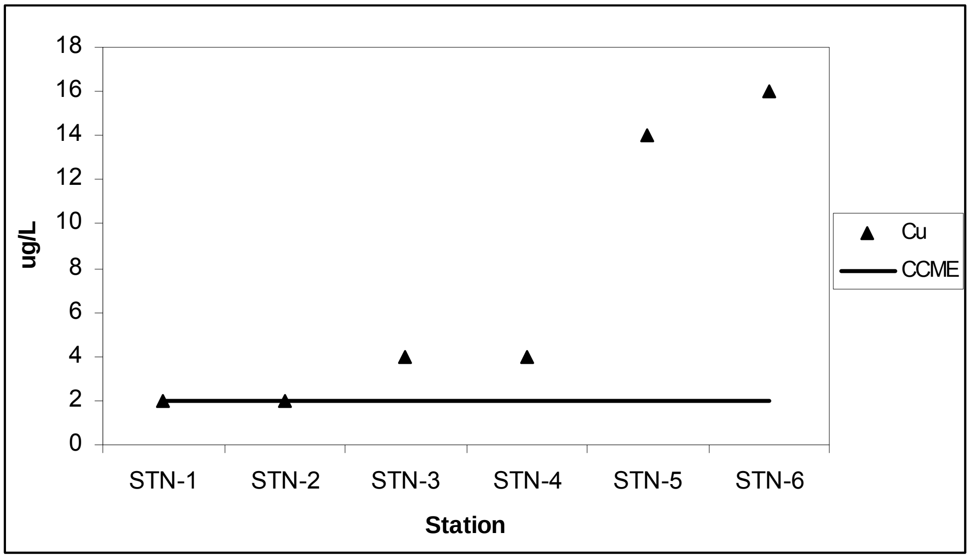

Figure 3: Changing copper (Cu) levels through the Tundra Wetland at Qamani'tuaq, NU in August 2006; CCME PFAL Guideline included.

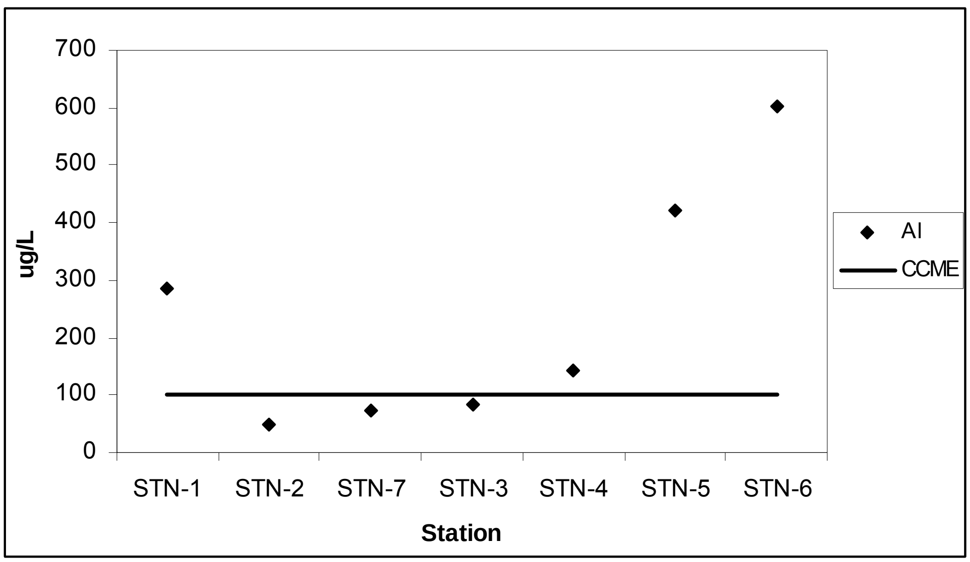

Figure 4: Changing aluminum (Al) levels through the Tundra Wetland at Qamani'tuaq, NU in October 2006; CCME PFAL Guideline included.

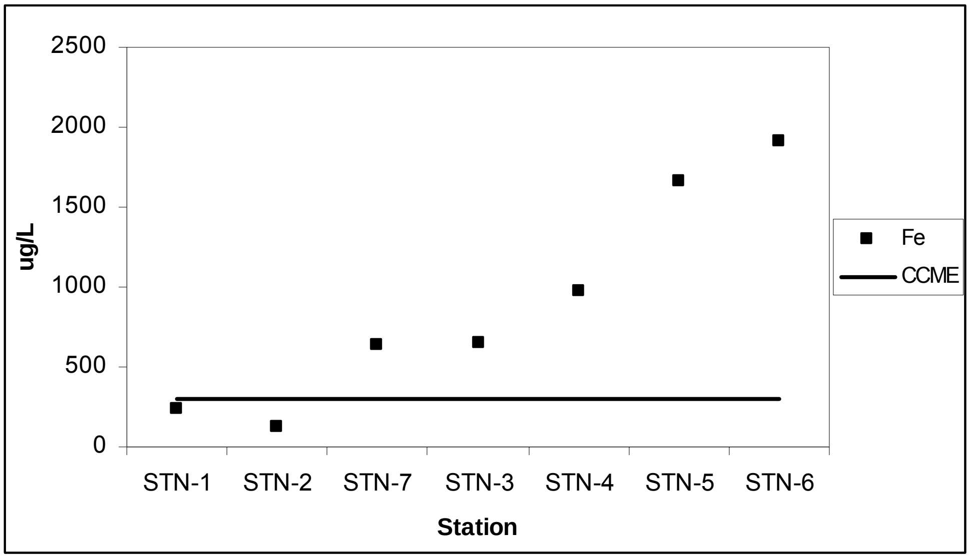

Figure 5: Changing iron (Fe) levels through the Tundra Wetland at Qamani'tuaq, NU in October 2006; CCME PFAL Guideline included.

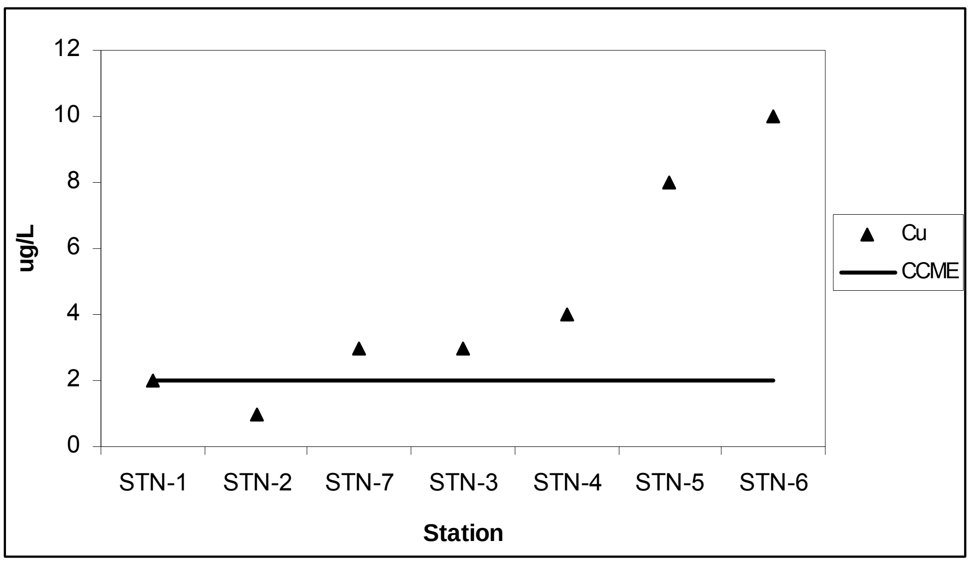

Figure 6: Changing copper (Cu) levels through the Tundra Wetland at Qamani'tuaq, NU in October 2006; CCME PFAL Guideline included.

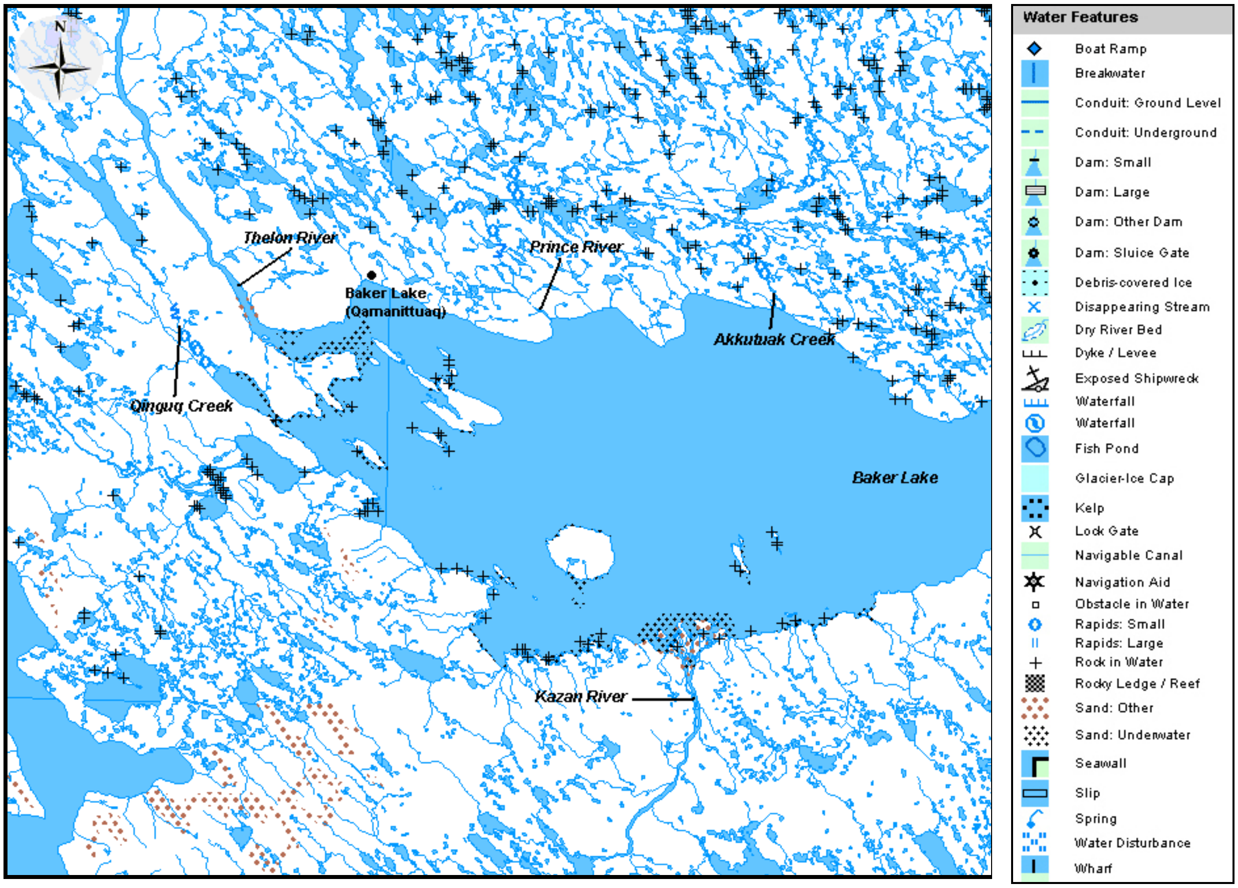

Figure 7: Hydrological Influences on Baker Lake, NU (Topographic Map and Legend © Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.)

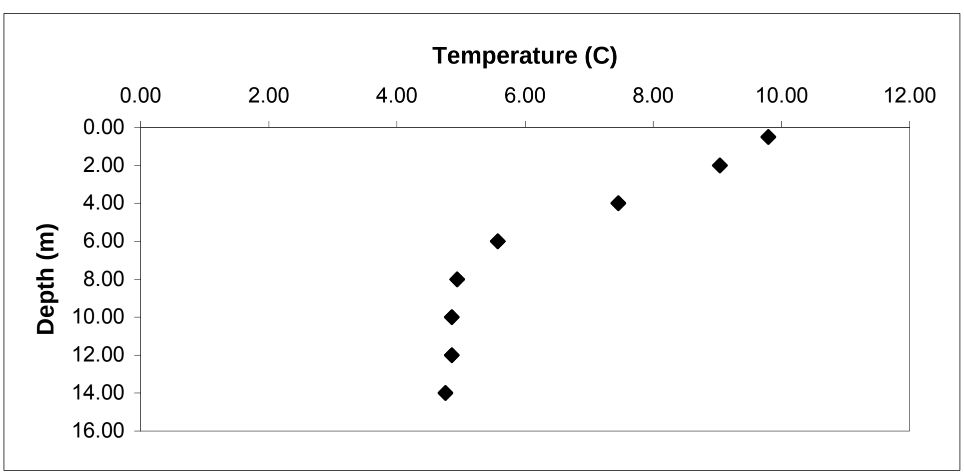

Figure 8: Mean temperature-depth profile in Baker Lake in August 2006.

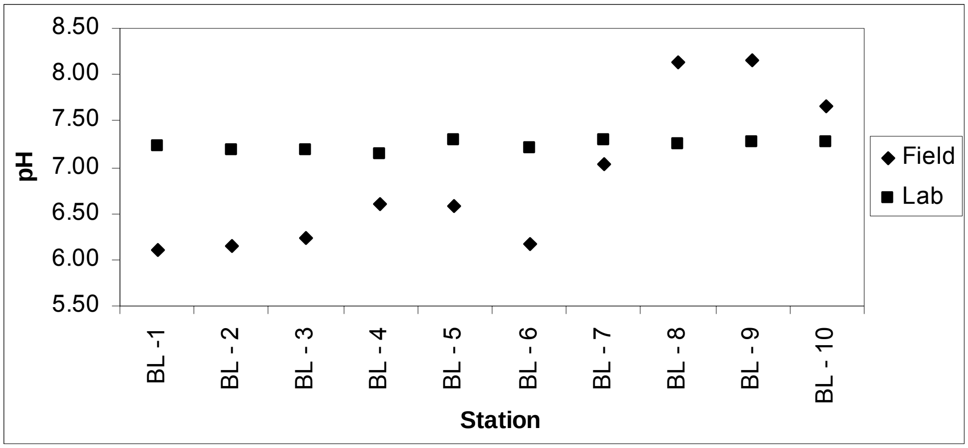

Figure 9: Comparison of laboratory and field pH across Baker Lake stations in August 2006.

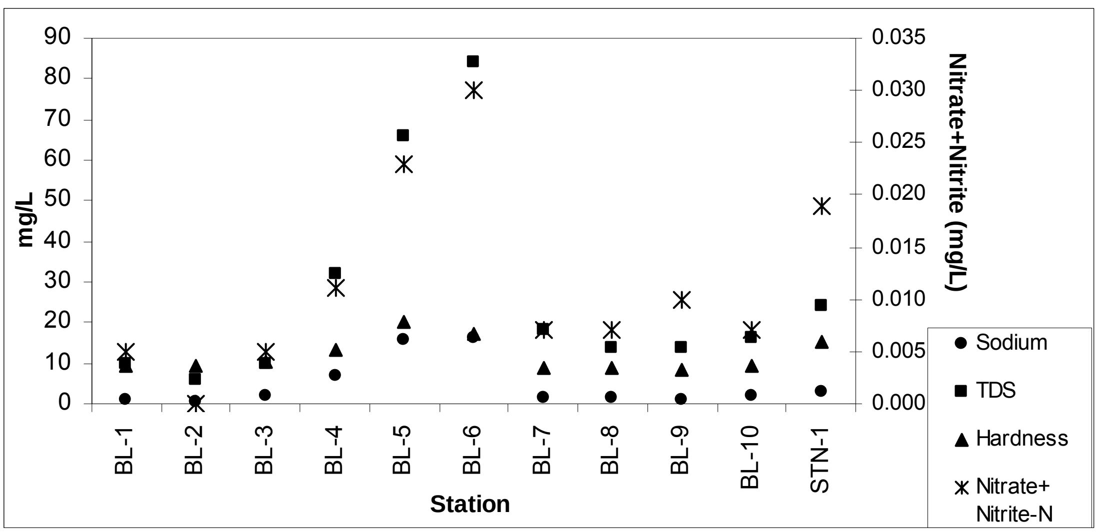

Figure 10: Analytical results for sodium, total dissolved solids (TDS), hardness and nitrate+nitrite, at 0.5 m depth, across Baker Lake and at STN-1 in August 2006

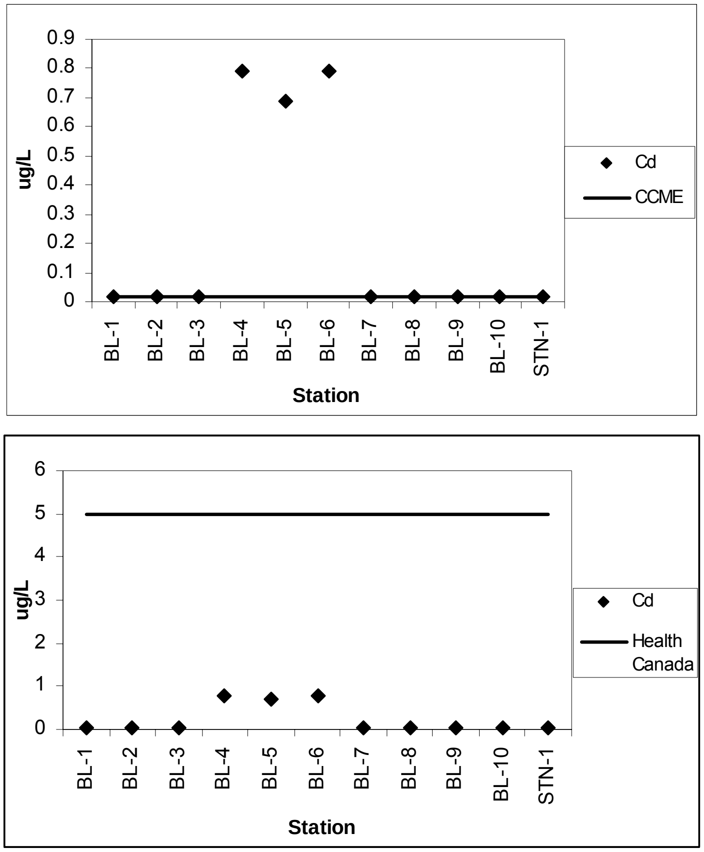

Figure 11: Changing cadmium (Cd) levels across Baker Lake, at 0.5 m depth, in August 2006; CCME PFAL Guideline and Health Canada Drinking Water Standard included.

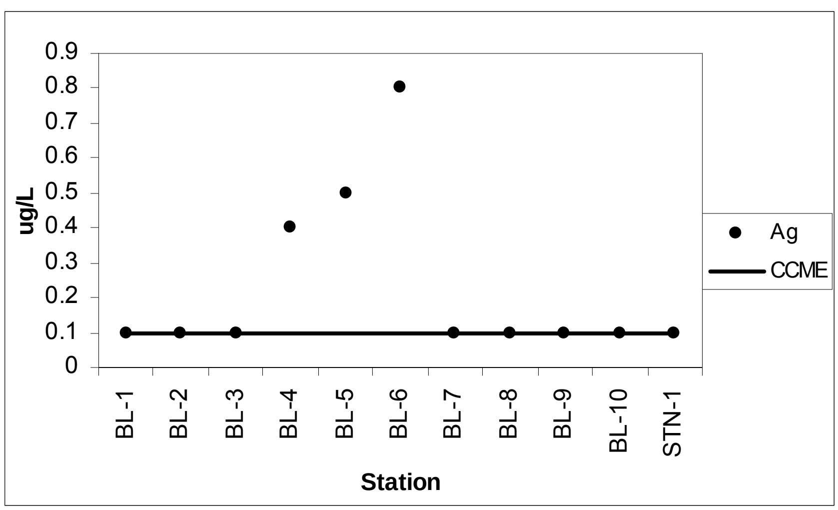

Figure 12: Changing silver (Ag) levels across Baker Lake, at 0.5 m depth, in August 2006; CCME PFAL Guideline included (no applicable Health Canada Drinking Water Standard).

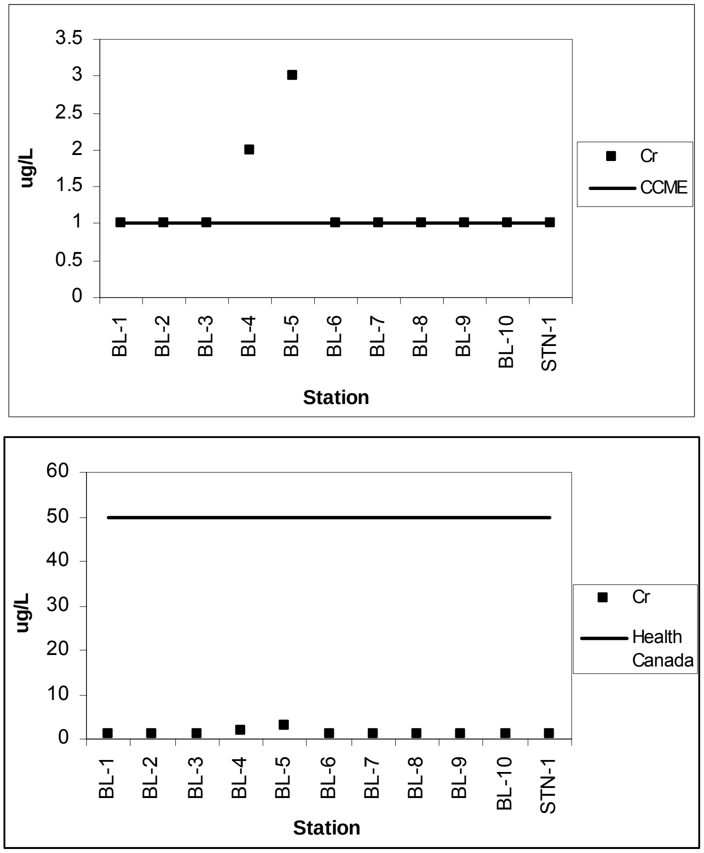

Figure 13: Changing chromium (Cr) levels across Baker Lake, at 0.5 m depth, in August 2006; CCME PFAL Guideline and Health Canada Drinking Water Guideline included.

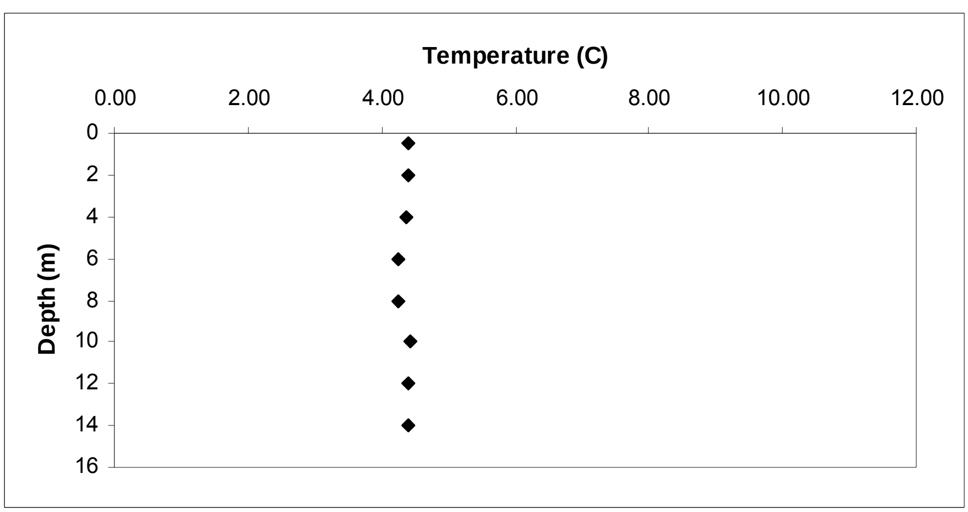

Figure 14: Mean temperature-depth profile in Baker Lake in October 2006.

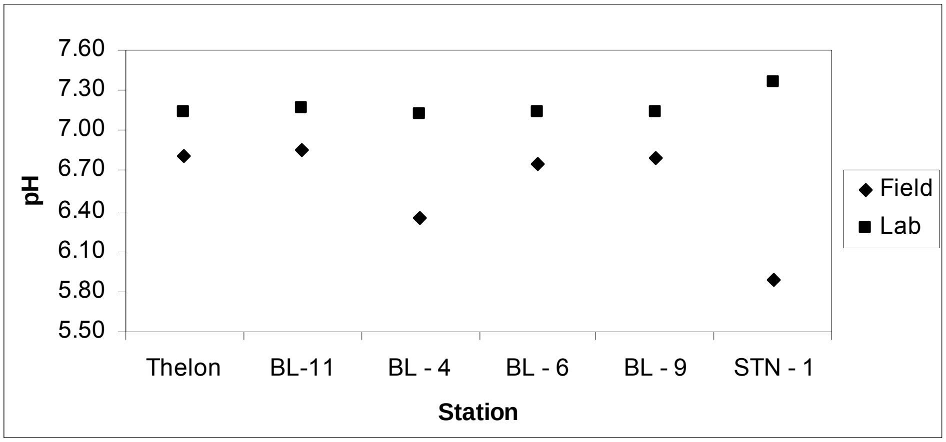

Figure 15: Comparison of laboratory and field pH across Baker Lake stations in October 2006.

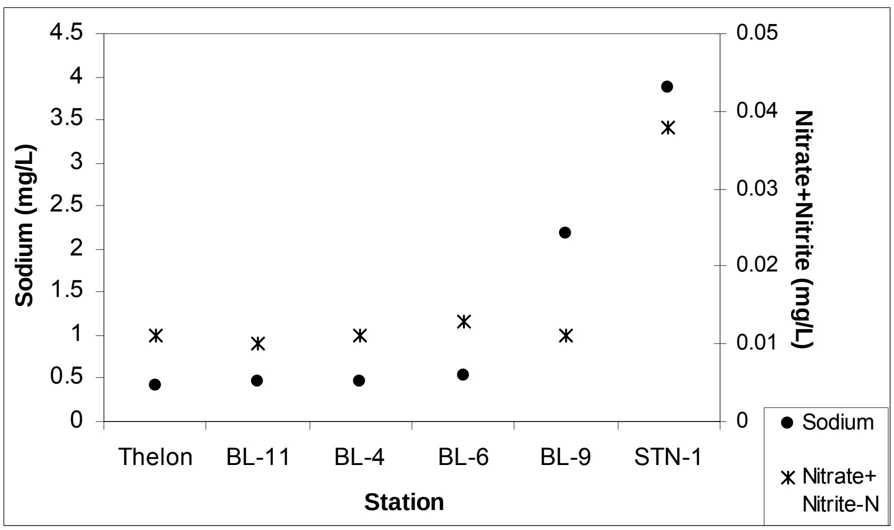

Figure 16: Analytical results for sodium and nitrate+nitrite, at 0.5 m depth, across Baker Lake and at STN-1 in October 2006.

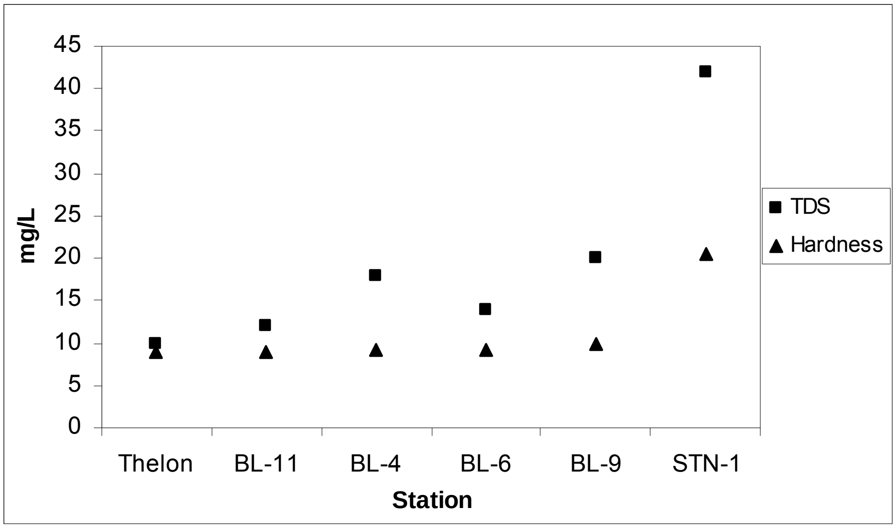

Figure 17: Analytical results for hardness and total dissolved solids (TDS), at 0.5 m depth, across Baker Lake and at STN-1 in October 2006.

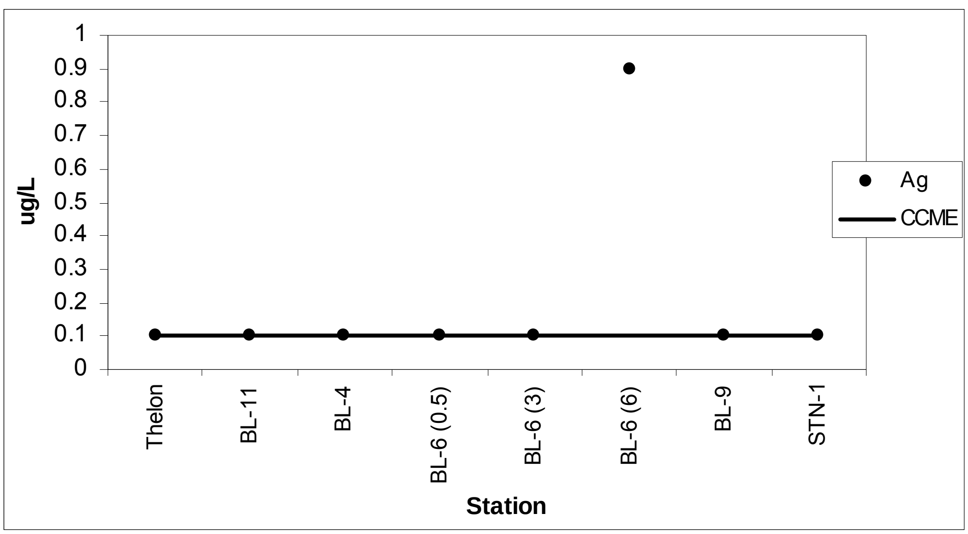

Figure 18: Changing silver (Ag) levels across Baker Lake, at 0.5 m depth, in October 2006; CCME PFAL Guideline included.

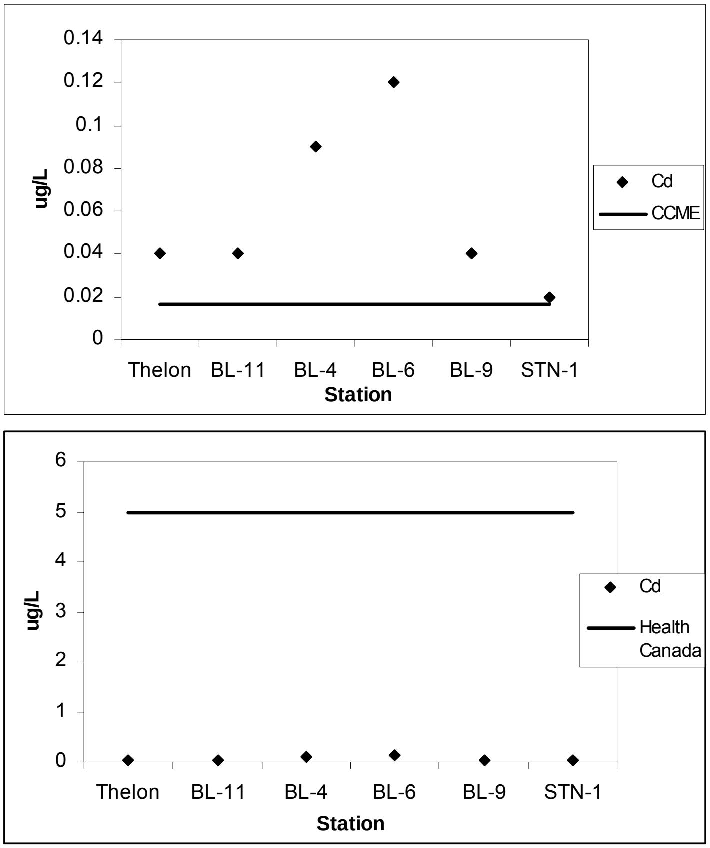

Figure 19: Changing cadmium (Cd) levels across Baker Lake, at 0.5 m depth, in October 2006; CCME PFAL Guideline and Health Canada Drinking Water Standard included.

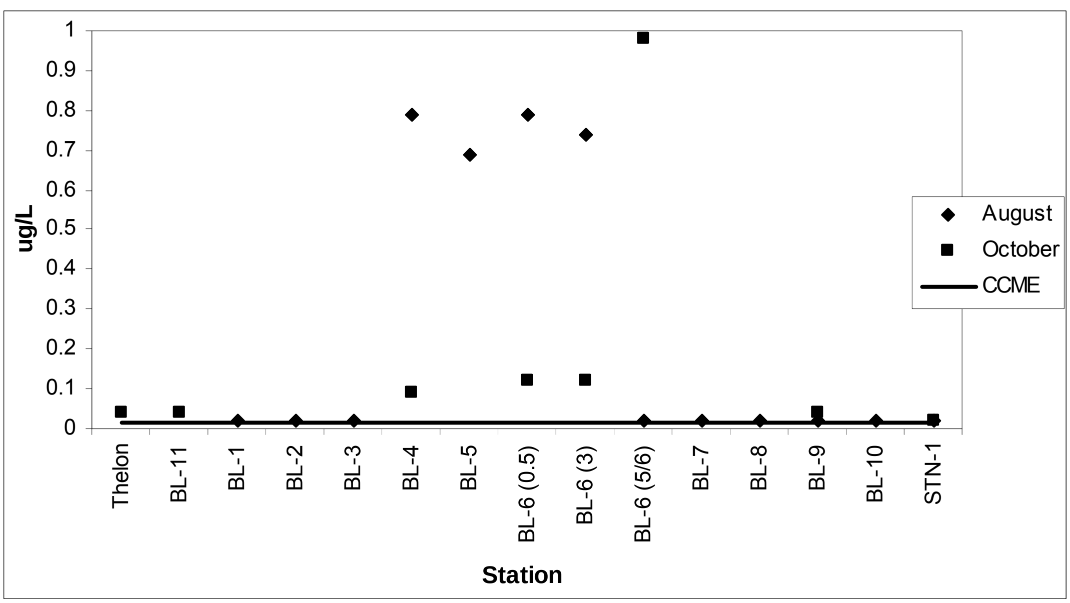

Figure 20: Comparison of August and October 2006 cadmium (Cd) levels across Baker Lake stations, at 0.5 m depth; CCME PFAL Guideline included.

Table 21: Baker Lake *In Situ* Data from August 2006 Sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
8/2/06	BL -1	6.10	0.50	11.01	6.10	13.99	0.025	25	199	0.02
			2.00	10.96	6.13	13.66	0.025	25	202	0.01
			4.00	10.85	6.15	13.42	0.025	25	200	0.01
			5.85	10.71	6.26	13.21	0.023	23	201	0.01
8/2/06	Insitu - 1	3.10	0.50	10.45	6.19	14.09	0.030	30	165	0.02
			2.00	10.26	6.13	13.62	0.032	32	168	0.02
			2.90	9.78	6.17	13.69	0.032	32	167	0.02
8/2/06	Insitu - 2	5.30	0.50	10.39	6.01	13.06	0.028	28	169	0.02
			2.00	10.43	5.98	13.08	0.027	27	174	0.02
			4.00	10.10	5.95	13.06	0.027	27	177	0.01
			5.00	9.85	6.07	13.08	-	-	177	0.02
8/2/06	BL - 2	5.80	0.50	10.41	6.14	12.76	0.025	25	165	0.01
			2.00	10.37	6.14	12.76	0.024	24	169	0.01
			4.00	10.18	6.18	12.77	0.023	23	174	0.01
			5.60	9.85	6.20	12.81	0.023	23	175	0.01
8/2/06	Insitu - 3	9.20	0.50	10.51	6.35	12.34	0.024	24	146	0.01
			2.00	10.37	6.08	12.38	0.024	24	162	0.01
			4.00	9.81	6.06	12.40	0.023	23	164	0.01
			6.00	8.34	6.26	12.63	0.058	58	164	0.03
			8.00	4.92	6.33	13.34	0.147	147	164	0.07
			8.80	4.91	6.33	13.41	0.147	147	164	0.07
8/2/06	Insitu - 4	10.50	0.50	10.23	6.15	12.15	0.025	25	164	0.01
			2.00	10.20	6.18	12.20	0.025	25	166	0.01
			4.00	10.04	6.21	12.21	0.026	26	168	0.01
			6.00	7.12	6.32	12.74	0.089	89	168	0.04
			8.00	4.78	6.37	13.37	0.151	151	168	0.07
			10.00	4.79	6.37	13.43	0.151	151	169	0.07
8/2/06	BL - 3	10.80	0.50	9.95	6.23	12.17	0.032	32	173	0.02
			2.00	9.89	6.24	12.14	0.031	31	174	0.02
			4.00	8.70	6.29	12.15	0.053	53	175	0.03
			6.00	5.06	6.38	12.85	0.146	146	175	0.06
			8.00	4.72	6.41	13.28	0.154	154	176	0.07
			10.00	4.63	6.41	13.26	0.156	156	176	0.07
8/2/06	Insitu - 5	12.80	0.50	9.89	6.30	12.31	0.043	43	174	0.02
			2.00	9.83	6.29	12.13	0.042	42	174	0.02
			4.00	9.08	6.33	12.23	0.055	55	177	0.03
			6.00	6.32	6.41	13.05	0.126	126	177	0.06
			8.00	4.75	6.43	13.31	0.152	152	177	0.07
			10.00	4.60	6.41	13.29	0.156	156	177	0.07
			12.00	4.58	6.40	13.19	0.156	156	178	0.07
8/2/06	Insitu - 6	> 15.00	0.50	9.10	6.57	12.37	0.060	60	132	0.03
			2.00	8.77	6.41	12.33	0.063	63	134	0.03
			4.00	6.27	6.38	12.88	0.123	123	132	0.06
			6.00	5.49	6.35	13.16	0.135	135	133	0.06

Table 21: Baker Lake *In Situ* Data from August 2006 Sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
			8.00	4.90	6.34	13.15	0.148	148	136	0.07
			10.00	4.69	6.33	13.26	0.155	155	138	0.07
			12.00	4.63	6.33	13.30	0.156	156	140	0.07
			14.00	4.62	6.31	13.27	0.156	156	141	0.07
			15.00	4.58	6.28	13.25	0.157	157	142	0.07
8/2/06	BL - 4	14.85	0.50	8.64	6.61	12.21	0.071	71	111	0.03
			2.00	6.64	6.61	12.80	0.117	117	110	0.05
			4.00	5.73	6.40	13.05	0.134	134	110	0.06
			6.00	5.42	6.38	13.12	0.139	139	113	0.06
			8.00	5.09	6.31	13.19	0.147	147	114	0.07
			10.00	4.67	6.28	13.22	0.156	156	117	0.07
			12.00	4.63	6.24	13.30	0.155	155	118	0.07
8/3/06	Insitu - 7	11.20	0.50	9.83	7.32	12.45	0.044	44	44	0.02
			2.00	9.25	7.18	12.45	0.060	60	52	0.03
			4.00	5.82	7.15	13.31	0.129	129	50	0.06
			6.00	5.47	6.97	13.45	0.135	135	53	0.06
			8.00	5.16	7.52	13.53	0.143	143	43	0.06
			10.00	4.68	7.88	13.59	0.154	154	36	0.07
			14.00	4.62	6.22	13.26	0.156	156	119	0.07
8/2/06	BL - 5	8.00	0.50	5.55	6.58	13.03	0.141	141	75	0.06
			2.00	5.46	6.46	13.08	0.142	142	79	0.06
			4.00	5.20	6.44	13.08	0.143	143	81	0.07
			6.00	4.78	6.43	13.16	0.151	151	86	0.07
			7.50	4.78	6.34	13.10	0.151	151	90	0.07
8/3/06	BL - 6	6.10	0.50	5.19	6.16	13.80	0.150	150	84	0.07
			2.00	5.06	6.03	13.52	0.149	149	96	0.07
			4.00	5.00	6.08	13.48	0.149	149	94	0.07
			6.00	5.02	6.62	13.48	0.149	149	84	0.07
8/3/06	BL - 7	7.00	0.50	10.60	7.03	12.43	0.032	32	52	0.02
			2.00	9.81	7.03	12.14	0.035	35	49	0.02
			4.00	6.96	7.14	12.84	0.114	114	50	0.05
			6.00	5.70	7.14	13.15	0.136	136	55	0.06
8/3/06	Insitu - 8	7.30	0.50	10.49	8.21	11.94	0.030	30	15	0.02
			2.00	9.89	8.34	11.95	0.032	32	12	0.02
			4.00	7.68	8.33	12.54	0.093	93	4	0.04
			6.00	5.55	8.21	13.05	0.141	141	4	0.06
8/3/06	BL - 8	8.20	0.50	10.51	8.14	11.91	0.029	29	7	0.02
			2.00	9.52	8.25	12.00	0.048	48	13	0.02
			4.00	7.93	8.31	12.35	0.090	90	2	0.04
			6.00	5.42	8.28	13.15	0.144	144	7	0.07
			8.00	5.26	8.11	13.10	0.146	146	12	0.07
8/3/06	Insitu - 9	9.10	0.50	10.57	6.53	11.91	0.030	30	80	0.02
			2.00	9.80	6.76	11.91	0.037	37	77	0.02
			4.00	7.94	6.82	12.48	0.090	90	70	0.04
			6.00	5.23	6.83	13.20	0.144	144	74	0.07

Table 21: Baker Lake *In Situ* Data from August 2006 Sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
			8.00	5.10	7.23	13.17	0.148	148	72	0.07
8/3/06	Insitu - 10	10.20	0.50	10.65	7.25	12.18	0.032	32	44	0.02
			2.00	9.13	7.89	12.13	0.045	45	34	0.02
			4.00	7.74	8.05	12.64	0.093	93	32	0.04
			6.00	5.42	8.19	13.14	0.143	143	34	0.07
			8.00	5.14	8.23	13.23	0.147	147	34	0.07
			10.00	5.04	8.23	13.25	0.148	148	34	0.07
8/3/06	BL - 9	> 15.00	0.50	10.61	8.15	11.95	0.026	26	-	0.01
			2.00	10.06	8.00	11.98	0.023	23	19	0.01
			4.00	7.75	8.39	12.75	0.095	95	8	0.04
			6.00	5.25	8.46	13.28	0.145	145	7	0.07
			8.00	5.00	8.60	13.22	0.146	146	9	0.07
			10.00	4.96	8.59	13.30	0.147	147	10	0.07
			12.00	4.92	8.65	13.33	0.148	148	10	0.07
			14.00	4.76	8.56	13.36	0.151	151	10	0.07
			15.00	4.76	8.61	13.25	0.152	152	13	0.07
8/3/06	Insitu - 11	> 15.00	0.50	10.48	7.35	12.05	0.028	28	11	0.02
			2.00	9.07	7.48	12.16	0.049	49	10	0.02
			4.00	7.21	7.61	12.62	0.106	106	11	0.05
			6.00	5.23	7.48	13.11	0.144	144	17	0.07
			8.00	5.02	7.63	13.20	0.146	146	28	0.07
			10.00	5.03	7.63	13.13	0.146	146	34	0.07
			12.00	5.00	7.61	13.10	0.146	146	31	0.07
			14.00	4.93	7.38	13.13	0.147	147	27	0.07
			15.00	4.92	6.67	13.07	0.147	147	45	0.07
8/3/06	Insitu - 12	> 15.00	0.50	10.48	7.06	11.75	0.029	29	18	0.02
			2.00	8.40	7.06	12.16	0.066	66	27	0.03
			4.00	5.50	7.22	13.04	0.139	139	27	0.06
			6.00	5.23	7.37	12.77	0.146	146	24	0.07
			8.00	5.03	7.43	13.04	0.148	148	24	0.07
			10.00	5.02	7.25	12.81	0.148	148	24	0.07
			12.00	4.97	7.02	12.82	0.149	149	41	0.07
			14.00	4.72	7.10	12.80	0.152	152	39	0.07
			15.00	4.68	7.21	12.94	0.152	152	37	0.07
8/3/06	BL - 10	14.80	0.50	10.26	7.65	12.31	0.034	34	13	0.02
			2.00	8.52	7.67	12.66	0.063	63	10	0.03
			4.00	5.63	7.74	13.35	0.140	140	11	0.06
			6.00	5.14	7.73	13.53	0.147	147	9	0.07
			8.00	4.95	7.87	13.51	0.149	149	10	0.07
			10.00	4.97	7.94	13.48	0.150	150	10	0.07
			12.00	4.94	7.97	13.49	0.149	149	11	0.07
			14.00	4.77	7.99	13.42	0.150	150	10	0.07
8/3/06	Insitu - 13	14.20	0.50	10.04	7.46	12.70	0.036	36	26	0.02
			2.00	8.41	6.84	12.74	0.066	66	39	0.03
			4.00	5.37	6.63	13.35	0.144	144	76	0.07

Table 21: Baker Lake *In Situ* Data from August 2006 Sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
			6.00	5.00	7.13	13.34	0.149	149	60	0.07
			8.00	4.96	7.24	13.37	0.148	148	56	0.07
			10.00	4.93	6.58	13.39	0.148	148	80	0.07
			12.00	4.90	6.90	13.38	0.149	149	72	0.07
			14.00	4.77	7.04	13.39	0.151	151	62	0.07
8/3/06	Insitu - 14	10.70	0.50	9.31	7.70	12.24	0.065	65	17	0.03
			2.00	6.84	7.10	12.94	0.133	133	52	0.06
			4.00	4.99	7.11	13.44	0.148	148	52	0.07
			6.00	4.84	7.32	13.37	0.151	151	51	0.07
			8.00	4.80	7.27	13.40	0.151	151	50	0.07
			10.00	4.73	7.23	13.44	0.152	152	59	0.07
8/3/06	STN - 1	0.30	0.20	18.02	-	10.62	0.063	63	54	0.03

Table 22: Tundra Wetland *In Situ* Data from October 2006 Sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
10/4/06	STN-1	0.2	0.1	0.86	5.89	14.76	0.066	66	86	0.03
10/4/06	STN-2	0.17	0.15	2.79	6.70	14.32	0.055	55	90	0.02
10/4/06	STN-7	0.3	0.2	0.20	6.70	14.85	0.183	183	106	0.08
10/4/06	STN-3	0.25	0.2	0.44	6.51	15.22	0.184	184	110	0.08
10/4/06	STN-4	0.5	0.3	1.17	6.86	12.86	0.212	212	111	0.1
10/4/06	STN-5	0.25	0.2	2.06	7.01	5.87	0.43	430	128	0.2
10/4/06	STN-6		0.3	1.86	7.32	4.61	0.462	462	127	0.22

Table 23: Baker Lake *in situ* data from October 2006 sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
10/5/06	BL - 4	13.8	0.5	4.54	6.35	12.65	0.022	22	165	0.01
			2	4.50	6.41	12.35	0.022	22	162	0.01
			4	4.40	6.45	12.31	0.024	24	162	0.01
			6	4.31	6.48	12.23	0.024	24	162	0.01
			8	4.31	6.49	12.23	0.029	29	163	0.01
			10	4.38	6.51	12.15	0.033	33	163	0.01
			12	4.37	6.57	11.97	0.034	34	163	0.02
			13	4.38	6.60	11.89	0.033	33	162	0.01
10/5/06	BL - 6	7.5	0.5	4.07	6.75	12.37	0.023	23	146	0.01
			2	4.08	6.72	12.25	0.023	23	149	0.01
			4	4.05	6.73	12.16	0.023	23	151	0.01
			6	4.01	6.72	12.14	0.024	24	152	0.01
			7	3.98	6.75	12.09	0.024	24	152	0.01
10/5/06	BL - 9	> 15	0.5	4.47	6.80	12.18	0.037	37	148	0.02
			2	4.46	6.77	12.17	0.038	38	149	0.02
			4	4.47	6.79	12.05	0.038	38	152	0.02

Table 23: Baker Lake *in situ* data from October 2006 sampling (using a Hydrolab Quanta).

Date	Location	Total Depth (~ m)	Depth (m)	Temperature (C)	pH	D.O. (mg/L)	Conductivity (mS/cm)	Conductivity (uS/cm)	ORP (mV)	Salinity (PSS)
			6	4.47	6.80	11.85	0.038	38	151	0.02
			8	4.46	6.81	11.88	0.038	38	152	0.02
			10	4.47	6.82	11.85	0.038	38	153	0.02
			12	4.45	6.82	11.89	0.038	38	154	0.02
			14	4.42	6.81	11.8	0.038	38	155	0.02
			15	4.42	6.82	11.76	0.038	38	155	0.02
10/5/06	BL - 11	5.5	0.5	4.38	6.85	12.13	0.022	22	152	0.01
			2	4.38	6.80	12.09	0.022	22	154	0.01
			4	4.31	6.77	12.1	0.022	22	156	0.01
			5	4.25	6.81	12.07	0.022	22	155	0.01
10/5/06	Thelon	3.8	0.5	4.58	6.81	12.16	0.022	22	154	0.01
			2	4.58	6.80	12.05	0.022	22	155	0.01
			3	4.58	6.79	12.07	0.022	22	155	0.01

APPENDIX D

Photographs

Photo 1 – Holding Cell looking to Lagoon Lake, main discharge is through breach in berm.

Photo 2 - Holding Cell in October 2006, after berm repaired, discharge by exfiltration.

Photo 3 - Main discharge channel from Holding Cell to Lagoon Lake (August 2006).

Photo 4 – Close-up of discharge between Holding Cell and Lagoon Lake (August 2006).

Photo 5 - Effluent flow between Holding Cell and Lagoon Lake (October 2006).

Photo 6 - Effluent flow between Holding Cell and Lagoon Lake (October 2006).

Photo 7 - East end of Lagoon Lake, outlet to Finger Lake in centre of picture (August 2006).

Photo 8 - Water in creek between Lagoon Lake and Finger Lake (August 2006).

Photo 9 - Wetland vegetation between Lagoon and Finger Lakes (August 2006)


Photo 10 - Finger Lake looking east from southwest end (August 2006).


Photo 11 - Vegetation and Algae in Finger Lake (August 2006).


Photo 12 - Finger Lake, looking west from east end of Lake towards Landfill.


Photo 13 - STN 3, along creek between Finger and Airplane Lakes (August 2006).


Photo 14 - Creek flowing from Finger Lake, before entering Airplane Lake (August 2006).


Photo 15 - Landfill with Finger Lake in Background (August 2006).

Photo 16 - Drainage from landfill to Finger Lake (October 2006).

Photo 17 - Sample collection at mouth of Garbage Creek (August 2006).

Photo 18 - Water Sampling on Baker Lake (October 2006).

Photo 19 - Algae on shore of Baker Lake (August 2006).

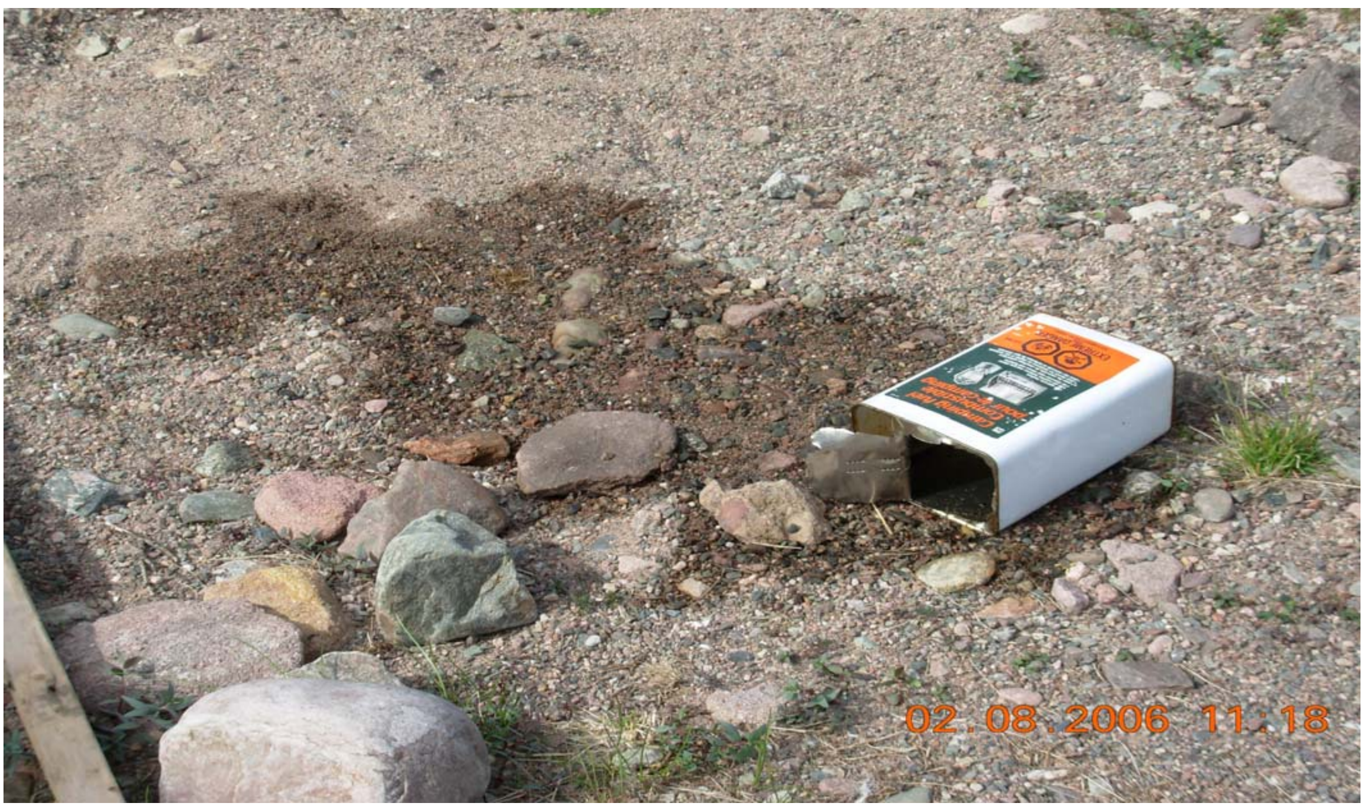

Photo 20 - Spilled camping fuel along shore of Baker Lake.

APPENDIX E

Elder Interview Notes

Meeting with Ms. Lucy Iyago (Elder) in Qamani'tuaq, NU

August 4, 2006
Also present was Mr. Michael Haqpi (Interpreter)

1) Do you know what the past activity was in the wetland area, before the sewage was there?

- Yes, she knows the area
- A few lakes behind (north of) the sewage area where people fished; fished in lake where old dump was/is (Airplane Lake)
- Catch lake trout, grayling; mostly lake trout in Airplane Lake
- Area was mainly used for fishing, all along the river system there and behind
- People would jig when it started to melt and after (in the summer)

2) Have you seen any changes in the land around the community? In the wildlife or fish?

- Yes, quite a few changes since the sewage system was there
- More animals around and closer to town – noticeable change in this
- Now people don't want to catch or hunt those animals (seen in the sewage wetland) because they might have diseases if eating (vegetation, etc) from the sewage area
- (Asked about bears) More grizzlies coming around since sewage and landfill – before those sorts of animals never came that close to town
- (Asked about change in taste of fish at Airplane Lake – heard that people still fish there) Maybe some people fish there, maybe kids, but no one really does anymore
- (She also mentioned) There used to be more water flowing through the area before

3) Any concerns/worries that you have (regarding sewage wetland and/or water quality)?

- She is on the Hamlet Council
- Have to do something about the sewage dump site – concerned for future generations
- Concerned Lake (Baker) is getting smaller
- (Asked what must be done?) She answered with a question – If the sewage wetland area is changed, how will the area be cleaned? How will it be returned to its natural state?
- (Concerned that) the amount of water flowing into Lagoon Lake has decreased – Lagoon Lake is fed from lakes North, by VOR area - it's a system

4) Asked how long in the community/area?

- Doesn't remember when came here but she has been here for awhile

5) Asked about the algae on the shore of Baker Lake, has it always been here?

- Yes, algae has always been here but not always like what it is now
- There is a different growth of the algae – called it 'sewage growth'
- Can smell the sewage in town sometimes if the wind blows the right way

6) Any ideas why water flowing through the system has decreased? Has it happened before (i.e. natural cycle) or is it something new?

- Has noticed, in atmosphere, land, melting and weather, a complete difference from way back to recent years
- More thawing of snow and ice – used to see snow & ice all year round (on hills by town), but now (there is) nothing

7) Asked where she got her water from? (As many people in town get their drinking water from other sources)

- Gets her water from the Prince River system, by bridge
- Before the sewage wetland system, people used to get water right outside, on the shore of Baker Lake – now people don't, but still do in the winter (drill hole in ice)

8) Any concern/worry about the current landfill and things/contaminants running into the wetland?

- Both (sewage & landfill) contributing to pollution in water system
- When burn garbage, can smell it in town
  (Asked if at the old dump site, were people worried about it affecting the water?) – Can't really comment on the old dump site, but can say the community was not consulted before the sewage dump and current landfill was installed.