GOVERNMENT OF YUKON
DEPARTMENT OF COMMUNITY SERVICES

HYDROGEOLOGICAL ASSESSMENT
MOUNT LORNE WASTE DISPOSAL FACILITY

REPORT

APRIL 2011
ISSUED FOR USE
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EXECUTIVE SUMMARY

The Government of Yukon (Department of Community Services) engaged EBA, A Tetra Tech Company (EBA) to install a groundwater monitoring well network, undertake a groundwater monitoring event and prepare a hydrogeological assessment of the Mount Lorne Solid Waste Disposal Facility.

EBA directed and supervised the drilling and installation of three monitoring wells in October 2010 and undertook a groundwater monitoring event in November 2010. This report has been prepared in accordance with the agreed scope of work and presents conclusions and recommendations based on the hydrogeological conditions encountered during the fall 2010 fieldwork.

The following conclusions are made based on the findings of the hydrogeological assessment:

- Three monitoring wells ML-MW01, ML-MW02 and ML-MW03 were installed in October 2010 to establish a groundwater monitoring network at the Site. All monitoring wells were completed in a sand unit with a slotted section at the well bottom to allow groundwater entry;
- Based on groundwater elevation data, monitoring well ML-MW01 appears to be down-gradient and ML-MW02 and ML-MW03 appear to be up-gradient of the waste disposal area. Due to budget constraints, a fourth monitoring well was not installed to meet the requirement to have two down-gradient wells; however, additional groundwater elevation data are necessary to identify potential seasonal changes and confirm the conceptual hydrogeological model;
- No monitoring or sampling of groundwater is believed to have been conducted at the Site prior to the fall 2010 field program;
- Groundwater flow down-gradient of the Site was determined to be in a northerly direction towards Cowley Lakes;
- Analysis of the rising head hydraulic response test results show that the geometric mean of the hydraulic conductivity of the Quaternary Sediments Aquifer is approximately 2.3×10^{-5} m/s. The maximum hydraulic conductivity of 4.0×10^{-4} m/s was measured at ML-MW03;
- Groundwater from ML-MW01 can be characterized as calcium-bicarbonate type water, while ML-MW02 and ML-MW03 can be characterized as calcium-magnesium-bicarbonate groundwater;
- Concentrations of manganese at monitoring wells ML-MW02 and ML-MW03 exceed the Yukon CSR-DW (aesthetic) criteria;
- All other analytes were below the applicable guideline criteria;
- Organic analytes in all monitoring wells were below the laboratory MDL of 0.1 mg/L with the exception of the HEPH concentration detected in ML-MW02;
- Ammonia, an indicator of leachate contamination, was not detected in any of the three monitoring wells;
- A review of groundwater monitoring results indicates variable concentrations across all wells, with both up and down-gradient wells exhibiting different potential indicators of impacts from landfilling

activities. It is not considered possible to draw a definitive conclusion as to impact to groundwater from the Site on the data set currently available.

The following recommendations are made based on the findings of this 2010 Hydrogeological Assessment report:

- As required by the Site's Solid Waste Disposal Facility Permit, future monitoring programs should be completed once during the spring freshet when the most significant groundwater recharge occurs and once in late summer;
- ML-MW01, ML-MW02 and ML-MW03 should be surveyed by a professional surveyor for location and elevation prior to the next monitoring round. Elevations from the top of the PVC casing and from ground level immediately adjacent to the well should be reported;
- Following the completion of the two further rounds of groundwater monitoring scheduled to be undertaken this year and following interpretation of the results, the impact to groundwater from landfilling activities should be reassessed based on the increased data set.
- Following the next two rounds of groundwater monitoring and interpretation of the results, the need for further investigation into the source of the detectable HEPH concentration at ML-MW02 should be assessed;
- Following the survey of the monitoring wells and the completion of the 2011 groundwater sampling rounds, data should be reviewed by a qualified hydrogeologist and the need for additional up-gradient and down-gradient monitoring wells assessed.

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1.0 INTRODUCTION

1.1 BACKGROUND

EBA, A Tetra Tech Company (EBA) have been retained by the Government of Yukon (YTG), Department of Community Services, to design and install a groundwater monitoring network, undertake a groundwater monitoring event and prepare a Hydrogeological Assessment Report at the Mount Lorne Solid Waste Disposal Facility (SWDF), (the "Site").

These works have been performed in accordance with the approved scope of work detailed in EBA's proposal (Doc. Ref. PW23101317) dated February 2010, accepted by YTG on May 8, 2010 and additional works detailed in EBA's Technical Memo dated April 29, 2010 accepted by YTG on June 21, 2010.

1.2 PURPOSE AND OBJECTIVES

The purpose of this study is to assess the impact of waste disposal at the Site upon local groundwater quality.

The specific objectives of this study were to:

- Design and install a monitoring well network sufficient to provide an assessment of the Site's impact on groundwater quality;
- Assess groundwater quality against relevant Yukon water quality standards;
- Recommend further works to be completed to more comprehensively assess impact to groundwater quality.

1.3 SCOPE AND SEQUENCE OF WORK

The following scope of work was proposed to develop the hydrogeological conceptual model for the Site. This work was performed in accordance with the Site's Solid Waste Disposal Facility Permit (Permit No: 80-009, Effective January 1, 2010 to December 31, 2011), relevant Environment Yukon Protocols and in accordance with the Yukon Environmental & Socioeconomic Assessment Act (YESAA) Decision Document issued for the Site (YESAA File Number: 2008-0272). A copy of the current Solid Waste Disposal Facility Permit is provided in Appendix B.

In summary, the proposed scope of work included a preliminary 'desktop study', followed by a field investigation program consisting of the installation of a groundwater monitoring network, water level monitoring, aquifer testing, groundwater sampling and analysis from the monitoring well network, followed by interpretation of results to provide a comprehensive Hydrogeological Assessment Report detailing the impact to groundwater quality and risk to down-gradient receptors. This work was undertaken in general conformance with relevant Yukon Contaminated Sites Regulation (YCSR) protocols (Yukon Department of Environment, 2007a, 2007b, 2008a, 2008b).

To complete the scope of work, EBA completed the following tasks:

- Background data collation and review;

- Installation of a monitoring well network;
- Development of monitoring wells;
- Sampling and testing of groundwater;
- Aquifer testing (hydraulic conductivity);
- Data review and interpretation of results;
- Reporting.

Table 1-1 summarizes the tasks and sequence of events to arrive at this report.

Table 1-1: Site Assessment and Task Sequence

Date	Activity
8 May 2010	EBA formally appointed by YTG to undertake the work.
4 July 2010	Site inspection by Adam Seeley of EBA
27 - 30 October 2010	Groundwater monitoring wells installed by Geotech Drilling under the supervision of EBA
22 November 2010	Groundwater monitoring event and slug testing of monitoring wells undertaken by EBA
24 March 2011	Report Issued For Use

1.4 QUALIFICATIONS OF ASSESSORS

Mr. Adam Seeley conducted the initial site inspection, coordinated drilling works, and prepared this assessment report. Mr. Seeley is a Hydrogeologist with EBA's Whitehorse Environment Group, with 9 years experience in the environmental and hydrogeological fields and has been involved in groundwater monitoring and reporting programs at over 50 sites in Australia and the Yukon.

Ms. Breanne Waggott supervised drilling works, undertook the groundwater monitoring and aquifer testing event and assisted in the preparation of this assessment report. Ms. Waggott is a Junior Hydrogeologist with EBA's Whitehorse Environment Group, with 1 year experience in the environmental hydrogeology field. Throughout her time at EBA she has assisted multiple field and desktop based hydrogeological assessments.

Ms. Tamra Reynolds reviewed this report. Ms. Reynolds is a Senior Contaminant Hydrogeologist with EBA's Whitehorse Environment Group, with 15 years of experience in the environmental and hydrogeological fields. She has conducted over 100 Environmental Site Assessments, hydrogeological evaluations, and remediations at sites across Canada including the Yukon Territory. Ms. Reynolds has been

registered as a Professional Geoscientist (hydrogeologist) with the Association of Professional Engineers and Geoscientists in British Columbia since 2001.

1.5 AUTHORIZATION

Written authorization and a signed contract to proceed with the works detailed in EBA's proposal (Doc. Ref. PW23101317) dated February 2010 were received from Bill Brown, YTG Program Manager via email on May 19, 2010.

EBA received verbal authorization from Government of Yukon, Department of Community Services on June 21, 2010 to proceed with the work outlined in EBA's Technical Memo dated April 29, 2010. A Change Order signed by both Mr. Marc Perreault, a Director at the Yukon Government, and an EBA representative authorizing additional tasks to complete water sampling and hydrogeological assessments at the project site was received by EBA on July 9, 2010.

2.0 SITE DESCRIPTION AND HISTORY

2.1 LOCATION OF STUDY AREA

The Mt. Lorne Solid Waste Disposal Facility (SWDF) is located at kilometer 143.2 of the South Klondike Highway, approximately 30 km southeast of Whitehorse at a latitude of 60° 28' 42" N and longitude of 134° 51' 42" W. The Site is approximately 15 km south of the Alaska Highway and 35 km north of the community of Carcross. The nearest residential development is the Robinson subdivision approximately 400 m east/southeast of the Site.

The Watson River, McConnell Lake and Cowley Lakes are the closest major water bodies to the Site, 4.5 km south, 3.6 km southwest, and 2 km northwest of the waste disposal facility, respectively. The site location and surrounding features are show in Figure 1.

The Site is located at approximately 765 meters above sea level (m asl) on a leveled bench. In general, natural terrain slopes gently to the southwest towards McConnell Lake. Photo 1 shows a view of the former waste deposition area, which has been covered and semi-rehabilitated with grasses and weeds growing on the capped surface. Timber waste is evident in the foreground and plastic bags and other general rubbish can be seen scattered across this area of the Site.

2.2 SITE HISTORY

Mt. Lorne SWDF (aka Mile 9 Dump or Robinson Dump) opened around the early 1980's, prior to a time when disposal permits were required. Given the operation of the Site prior to the issue of a permit, there is the potential that hazardous items such as batteries, waste oil, and other chemical waste may have been buried with general domestic waste. The facility is owned by the Government of Yukon and used by Robinson subdivision residents and residents along the South Klondike Highway (Bear Creek, Hamlet of Mt. Lorne) and Annie Lake Road.

Photo 1: Mount Lorne Solid Waste Disposal Facility – June 2010 (view west)

Over its operational life, the Site has received waste streams including domestic waste, recyclables and household hazardous wastes such as waste oil and batteries. Scrap metals, tires, wood wastes, construction debris have not been accepted at the facility since at least 2003. It could not be determined if these wastes had been historically deposited at the Site prior to 2003.

Prior to around 1993, domestic waste was typically segregated and incinerated with burned waste deposited in pits excavated into the natural land form on the eastern side of the Site. A "no burn" policy was implemented in approximately 1993, with domestic waste being placed in an enclosed concrete bunker with metal roof, periodically picked up and transferred to the domestic waste trench where it was compacted and covered.

Access (2003) noted the following points in regards to the deposition and storage of waste on site:

- Household hazardous waste (e.g. used oils, propane bottles) were not formally collected and often ended up in the domestic waste trench and buried with other domestic waste.
- Collected waste or used oil or lubricants are presently being stored in controlled manner at the facility (in drums and pails and secure from weather or vandalism) although there is evidence that some used oil has leaked to the environment.

The Site is now classed as a modified transfer station with waste segregated either for recycling or domestic waste temporarily stored prior to being transported to Whitehorse Landfill for burial. The Site is currently maintained by a site supervisor with access controlled by a lockable gate, an electrified 'Texas gate' livestock grate and an electric fence around the operational area perimeter. The potential exists that access to the Site was formally unrestricted, potentially resulting in the uncontrolled deposition of waste.

Copies of site plans dated July 2002 (Access Consulting) and May 2008 (YTG) were provided to EBA and show former and current domestic garbage storage locations, former domestic waste burial locations, locations of the recycling shelters and special waste storage areas. The completeness of the maps provided in regards to the locations and number of former waste burial areas could not be verified. These maps were compiled into the Figure 2 site plan which shows the locations of groundwater monitoring wells, the concrete waste storage bunker, former domestic garbage burial site and other key site features shown.

The Sites Solid Waste Management Plan (SWMP) details a procedure for the formally routine practice of storage, compaction and covering of domestic waste at the Site. Domestic waste was placed in a storage bunker, then periodically transferred to a domestic waste trench where it was compacted to reduce littering by wind and ravens, to reduce odor and limit infiltration of water. Compaction of the garbage was required to be undertaken either every 21 days or as soon as 0.5 m of solid waste had been deposited. After compaction of the waste, soil or another comparable cover material was placed on top of the waste to a minimum depth of 100 mm to cover the active work face. The preferred cover material were the natural glacial-fluvial sand and silty sands excavated from the burial trench. The SWMP states that this material was suitable as an intermediate cover and capping material.

The SWMP detailed that a final cover material was to be placed over all known or potential waste disposal grounds on the Site. The cover material was to have impermeable characteristics to reduce infiltration and subsequent leachate production. The Site was to be graded and ditched to provide run-off from waste disposal areas and prevent ponding and water infiltration. The completed surface was to be covered with a layer of topsoil and seeded with suitable natural vegetation characteristic to the area.

3.0 METHODOLOGY

3.1 PRELIMINARY HYDROGEOLOGICAL ASSESSMENT

The preliminary hydrogeological assessment methodology involved an assessment of existing information and an inspection of the waste disposal facility and surrounding area on July 4, 2010. The purpose of the preliminary hydrogeological assessment was to identify proper monitoring well locations that are likely covering up- and down-gradient areas of the Site.

This component included the following tasks:

- Collation of background information;
- Assessment of the available groundwater data, borehole logs and related hydrogeological information;
- Development of a preliminary conceptual hydrogeological model.

3.1.1 Data Sources

Data used to complete the hydrogeological assessment was obtained from the following sources:

- Site inspection;
- Topographic and geological maps;
- EBA internal database search and review of past EBA assessment reports and maps;

- Operational permits issued by Environment Yukon for the Mount Lorne SWDF site;
- Review of the Mount Lorne Solid Waste Management Plan (Access, 2003);
- Environment Canada Climate Normals (1971-2000) (http://www.climate.weatheroffice.gc.ca/climate_normals/index_e.html);
- Yukon Water Well Registry, Department of Environment, Government of Yukon (http://www.environmentyukon.gov.yk.ca/pdf/YukonWaterWellsSummary.pdf)
- Contaminated Site Registry records at Department of Environment, Government of Yukon; and,
- Interview with Government of Yukon - Community Operator Supervisors.

3.1.2 Site Inspection

A site inspection was undertaken by EBA personnel on July 4, 2010. The purpose of this visit was to review the site location, layout and types of waste, confirm the expected geology and topography, to note aspects of geological and hydrogeological significance and to ascertain drill rig access to the proposed groundwater monitoring well locations.

3.1.3 Background Geological Information

Geological information was obtained through a site visit, review of topographic and geological maps (from the Canadian and Yukon Geological Surveys) and geotechnical reports and maps. Additional subsurface information was gathered through an internal database search of EBA records for boreholes, test pits, monitoring wells, and soil tests completed at or in the vicinity of the site.

3.1.4 Contaminated Sites Registry

Since 2002, when the Yukon Contaminated Sites Regulation came into effect, Environment Yukon has been maintaining records of documented spills and reported contaminated sites throughout the Yukon. This database is known as the Contaminated Site Registry. A request was made to Environment Yukon for a Contaminated Sites Registry search at the Mount Lorne SWDF. Environment Yukon reported to EBA that the registry does not contain a record of any documented spills or contaminated sites within the Site boundary or nearby vicinity. It is noted that there remains a possibility of unreported or un-assessed contamination sources within the vicinity of the Site. Spills documented prior to 2001 can be found through a request from Access to Information & Protection of Privacy Act (ATIP). Such a search was not within the scope of this project.

3.1.5 Interviews with Solid Waste Disposal Facility Personnel

EBA representatives met with Yukon Government, Community Operations Supervisors Mr. Peter Zurachenko and Mr. Jason Doucet on June 23, 2010 to discuss information pertaining to the Mount Lorne SWDF. Information obtained from this interview included:

- Brief site history;
- Historical waste deposition inventory and anecdotal information;

- Most up to date site plans; and,
- Special waste deposition/storage areas.

3.1.6 Review of Solid Waste Disposal Facility Permit and Waste Management Plan

The Site's Solid Waste Disposal Facility Permit (Permit No: 80-009) and Solid Waste Management Plan were reviewed and used in conjunction with relevant background information to assess accepted and potential waste streams, to aid in the assessment of potential contaminant transport mechanisms, to confirm monitoring requirements and develop a monitoring network in compliance with the permit. A summary of the main requirements of the permit in regards to this hydrogeological assessment are outlined in Table 3-1.

Table 3-1: Summary of Current Permit Groundwater Monitoring Requirements

Site	Solid Waste Disposal Facility Permit No.	Solid Waste Management Plan	Permit Requires Groundwater Monitoring	Permit Specifies Groundwater Analysis List	Monitoring Schedule
Mt Lorne Solid Waste Disposal Facility	80-009	Yes (Access, 2003)	Yes	Yes	Twice per year (spring and late summer)

3.1.7 Review of Environment Yukon Information

EBA representatives visited the Yukon Department of Environment on June 18th 2008 to conduct a preliminary review of information pertaining to the Mount Lorne SWDF. Information provided by Yukon Department of Environment (Matthew Nefstead, Contaminated Sites Analyst) for review included:

- Current solid waste disposal facility permits (which included accepted waste streams and acceptance of special waste);
- Historical site reports, site plans, site inspection reports;
- Recorded spills on sites or neighboring contaminated sites; and,
- Other miscellaneous information related to the site.

3.1.8 Review of EBA Internal Database

EBA retains a database of previous reports, which was reviewed for information pertaining to the Mount Lorne SWDF. Relevant information was used to assess geological and hydrogeological conditions and assist in the determination of potential drill sites.

3.2 FIELD INVESTIGATIONS

3.2.1 Scope of Field Investigations

The scope of the hydrogeological assessment field investigation was as follows:

- Adam Seeley (EBA) and Breanne Waggott (EBA) conducted an inspection of the Mount Lorne SWDF on 4 July 2010;
- Three onsite groundwater wells were drilled by Geotech Drilling under the supervision of EBA from October 27 to 30, 2010. Wells were developed immediately following the completion of the well installation.
- The three onsite groundwater wells were sampled by EBA on November 22, 2010. The water levels at each location were measured prior to purging and sampling and physicochemical parameters were tested at each monitoring well during sampling. Groundwater samples were sent to analytical laboratories accredited as conforming to ISO/IEC 17025 for analysis;
- Slug tests were conducted on the three monitoring wells on November 22, 2010 in order to estimate the hydraulic conductivity of the aquifer;
- Field and laboratory results were summarized interpreted and are presented in this report.

3.2.2 Groundwater Monitoring Well Network

Groundwater monitoring well installation was undertaken in general accordance with Yukon Contaminated Site Regulation Protocol 7 (YCSR, 2008).

Three (3) groundwater monitoring wells were proposed to be installed at the Site to assess potential groundwater contamination sourced from the waste disposal facility. ML-MW01 was targeted to characterize up-gradient groundwater conditions while ML-MW02 and ML-MW03 were aimed to assess any impact to the groundwater quality sourced from the landfill. The three monitoring wells were installed in October 2010 under the direction of EBA to establish a groundwater monitoring network.

Locations of the monitoring wells were selected based on aerial photography, review of geological and topographical information, review of site history and a site inspection. A site plan showing the approximate monitoring well locations and key site features is provided in Figure 2. Note that these wells have not been surveyed for location and are only approximate.

The drilling and monitoring well installation was completed by Geotech Drilling of Prince George, British Columbia under the direction of EBA on October 27 to 30, 2010. ML-MW02 and ML-MW03 were both advanced to approximately 21 m below grade (m bg) using an air rotary drilling technique. ML-MW01, located to the north and upgradient of the Site was advanced to 30.5 m bg also using an air rotary technique. Obvious permafrost was not encountered in any borehole during drilling.

Grab samples of the drill cuttings were collected on regular intervals to log the sediments. The borehole logs indicating observed lithology and monitoring well completion details are included in Appendix C, with a summary of well completion details presented in Table 3-2. Groundwater was encountered in ML-MW01 at 27.4 m bg and at ML-MW02 and ML-MW03 at approximately 18 m below grade in a sand aquifer. The lithology encountered was similar at all three locations and consistent with mapped lithological interpretations. Each borehole profile generally consisted of sand with layers of minor silt and gravel to the maximum depth investigated (30.5 m).

Monitoring wells were installed in all three drilled boreholes. Each groundwater monitoring well was completed with the screen installed across the interval where the moisture content of the formation appeared to be transitioning from moist to wet/saturated. Following the installation of the third well, it was deemed that groundwater flow was to the north and there was only one downgradient well installed. Due to budgetary constraints, YG halted the drilling works after the third well was completed.

There were no identified confining or low permeability layers noted on the drill logs, although the drilling method was not conducive to noting thin potential low permeability layers.

Installation details are included on the borehole logs in Appendix C. Typical completion details are:

- All wells were completed in primarily sand aquifers;
- All three wells were drilled and screens placed aiming to intersect the water table;
- Monitoring wells were completed with 50 mm PVC Schedule 40 PVC pipes;
- A 4.5 m long well screen (0.010-slot) was installed at ML-MW01 and ML-MW02 and a 3 m long well screen (0.010-slot) was installed at ML-MW03 with the intent that the observed groundwater table would be approximately 1 m below the top of the well screen;
- A solid un-slotted PVC pipe was installed above the well screen to about 0.9 m above grade;
- A silica sand pack was placed in the annulus between the well screen and the borehole wall. The sand pack was extended from the base of the borehole to about 0.6 m above the well screen;
- Approximately 0.9 m of bentonite was placed in the annulus directly above the sand pack. A second bentonite seal was placed approximately halfway up the borehole in all wells to act as a safeguard against infiltration of surface water to the water table. The remainder of the annulus was filled with native cuttings to around 1.0 m bg.
- A surface seal consisting of approximately 1 m of bentonite and concrete was then installed to bring the borehole to ground level and limit surface water infiltration.
- Each well was capped with a PVC end-cap and the well PVC-standpipe protected and secured with a lockable steel protective casing.
- Each well was developed by removing a minimum of 3 well volumes using a dedicated disposable bailer. Development logs are provided in Appendix D.

Table 3-2: Well Construction Details

Well ID	Drilled Depth (m bg)	Aquifer Unit Monitored	Casing Diameter (mm)	Screened Interval (m bg)	Filter Pack Interval (m bg)
ML-MW01	30.5	SAND (with trace gravel)	50	25.6 – 30.2	25.0 – 30.2
ML-MW02	21.3	SAND (with gravel and silt)	50	14.3 – 18.9	13.7 – 18.9
ML-MW03	21.0	SAND (with some silt)	50	18.0 – 21.0	17.4 – 21.0

3.2.3 Monitoring Well Surveying

EBA surveyed the vertical elevation of the top of the well PVC standpipe at ML-MW02 and ML-MW03 on October 29, 2010 and ML-MW01 on November 22, 2010. Elevations were surveyed relative to a local benchmark assigned an arbitrary elevation of 100 m. The monitoring wells were not surveyed for location and it is recommended by EBA that this task undertaken at all wells prior to the next monitoring round. Table 3-3 presents survey data and water level measurements.

Table 3-3: Well Survey and Water Level Data

Well ID	GPS Location (UTM NAD83, Zone 8)[1]	Top of PVC Casing Elevation (m)[2]	Standing Water Level (m b TOC) 11/22/2010	Groundwater Elevation (m) 11/22/2010
ML-MW01	6704724N 507653E	108.491	28.375	80.116
ML-MW02	6704644N 507589E	98.821	18.04	80.781
ML-MW-03	6704603N 507657E	100.68	19.674	81.006

[1]GPS locations may include an error of up to 10 – 15 m. [2]Elevation relative to arbitrary local benchmark of 100 m.

3.2.4 Groundwater Monitoring Event

Groundwater monitoring wells ML-MW01, ML-MW02 and ML-MW03 were sampled by EBA on November 22, 2010 using methods in accordance with Contaminated Sites Regulation Protocol No. 7: Groundwater Monitoring Well Installation and Sampling. ML-MW03 was sampled approximately three weeks after the completion of drilling, installation and development. Due to difficulties during the installation process, monitoring wells ML-MW01 and ML-MW02 could not be developed immediately following installation. These two wells were purged thoroughly prior to sampling to allow for sampled groundwater to be representative of groundwater in the aquifer.

Prior to sampling, the standing water level (SWL) was measured in each well, using an electric measuring tape. Each well was purged by removing three well volumes using a dedicated disposal bailer prior to a sample being obtained. During purging, physicochemical parameters (pH, temperature, EC, DO) could only be recorded intermittently due to cold temperatures (-15°C) affecting the electronic instrumentation. Groundwater Purge and Sampling Field Sheets are presented in Appendix D.

Each sample bottle was labeled with the location ID, project number and date. Sample containers and appropriate preservatives for each suite of tests were provided by the primary laboratory. Samples for dissolved metals analysis were field filtered using new, clean 0.45 µm filters and preserved with nitric acid. All samples were stored in coolers containing ice-bricks and delivered to the analytical laboratories (Exova and Maxxam) under Chain of Custody and within appropriate holding times. Both laboratories are certified by the Canadian Association for Laboratory Accreditation and are accredited as conforming to ISO/IEC 17025 for analysis.

3.2.5 Rising Head Hydraulic Response Tests

Rising head tests were undertaken at each monitoring well to estimate the hydraulic conductivity of the aquifer at the specific well location. The rising head test was performed by quickly removing 1 liter of water from the well using 50.8 mm diameter dedicated polyethylene bailers. The recovery response in the well was then monitored closely using the water level sounder until the water level had recovered to at least 80% of its static water level. In addition to the manual data, a Solinst Levelogger® was deployed in the well to automatically record the water level data at one second intervals.

The Levelogger installed in ML-MW01 was damaged and/or faulty and the data recorded during the test could not be downloaded for analysis. The recovery of the well was too quick for the manual data obtained to be meaningfully interpreted.

3.3 LABORATORY TESTING

The laboratory testing completed for the submitted groundwater samples collected on November 22, 2010 is summarized in Table 3-4. This analysis list is in compliance with the requirements of the Site's Solid Waste Disposal Facility Permit (Permit No. 80-009).

Sampling and analysis of groundwater samples were undertaken in general accordance with Yukon Contaminated Site Regulation Protocols 2 and 5 (YCSR, 2007, 2008).

Table 3-4: Laboratory Testing Program – November 2010

Sample ID	Ca, Mg, Na, K, Cl, SO4, NO3, NO2, PO4	Dissolved Metals, Hg, Hardness	Alkalinity, CO3, HCO3, pH, TDS, NH3, DOC	VOCs, COD, TKN, EPHw10-19	VHw6-10, BTEX, PAHs
ML-MW01	✓	✓	✓	✓	✓
ML-MW02	✓	✓	✓	✓	✓
ML-MW03	✓	✓	✓	✓	✓

3.4 QUALITY CONTROL/QUALITY ASSURANCE

This section describes the Quality Assurance (QA) and Quality Control (QC) procedures undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results.

A RPD data validation spreadsheet is provided in Table 2. Data validation is summarized in Table 3-5.

Table 3-5: Review of QA/QC

QA/QC Aspect	Evidence and Evaluation
Data Representativeness	
Sample integrity	All samples were received by the laboratory within appropriate holding times.
Background Samples	Groundwater elevation data from the November 2010 monitoring round indicates that ML-MW03 is hydraulically up gradient of the Site and the groundwater samples from this location can be considered to be representative of background conditions.
Field Procedures	Monitoring wells were developed and sampled using dedicated hand bailers. All equipment that was used in multiple wells was decontaminated using a three stage wash procedure (detergent, tap water, distilled water).
Calibration of Field Equipment	Calibration of field equipment was undertaken prior to each day of field work.
Data Precision and Accuracy	
Blind Duplicates	One blind duplicate sample was collected from ML-MW02 during the November 2010 groundwater monitoring event. Of the 40 analyte pairs tested, RPD values could not be calculated for 13 pairs as both values were below the laboratory method detection limit (MDL). Of the remaining analyte pairs tested, 2 analytes (cadmium and iron) exceeded the RPD acceptance criteria of +/-30%. These exceedances are considered to be generally minor and related to the poor reproducibility of the analytical methods at low analyte concentrations. RPD calculations are presented in Table 2.
Split Duplicates	A split duplicate sample was not collected from any of the wells during the November 2010 groundwater monitoring event due to technician oversight.
Trip Blanks	A trip blank was not collected during the November 2010 groundwater monitoring event.
Laboratory Internal QA/QC	Laboratory internal QA/QC is detailed within the primary laboratory report (Appendix E). Overall, the primary lab showed acceptable testing frequency and results for method blanks, laboratory duplicates and matrix spikes.

Table 3-5: Review of QA/QC

QA/QC Aspect	Evidence and Evaluation
Holding Times	Holding times for samples were in conformance with applicable ASTM and laboratory requirements.
Laboratory Detection Limit	Laboratory reports indicate that the method detection limits were lower than the respective assessment criteria.
Completeness of test program	The scope of work undertaken was generally consistent with that required to characterize the Site and meet the study objective.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection or analysis process for groundwater. Whilst split duplicate and trip blank samples were not obtained during the November 2010 event, the primary laboratory displayed acceptable internal QA/QC and results of the blind duplicate were acceptable and therefore, the data set used as the basis for the groundwater assessment is considered to be valid and complete.

3.5 APPLICATION OF APPLICABLE WATER QUALITY STANDARDS

The *Yukon Contaminated Sites Regulation (YCSR) (Environment Act)* provides standards for the assessment and remediation of contaminated sites in the Yukon. The water quality standards applying to the assessment of groundwater contamination in the Yukon are those specified in Schedule 3 of the YCSR. Protocol 6 of the Yukon Contaminated Sites Regulation describes the appropriate application of these standards.

The four types of water uses outlined in the YCSR, the relevant water quality standards and their applicability to the assessment are presented in Table 3-6.

Table 3-6: Applicable Water Quality Standards

Water Use	Applicable Water Quality Standard	Applicable Plume Radius (km)	Applicability to Assessment[1]
Aquatic Life	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1	Not Applicable
Drinking Water	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Applicable
Irrigation	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Not Applicable
Livestock	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Not Applicable

The following presents an assessment of the applicability of each water use detailed above to this assessment.

Aquatic Life

There are no identified potential Aquatic Life receptors (surface water discharge locations such as wetlands, lakes or rivers) down-gradient of the Site. Therefore, this water use is considered to be **not applicable**.

Drinking Water

A review of the Yukon Water Well Registry by EBA on January 4, 2011 shows there are potentially several wells within a 1.5 km radius of the Mt Lorne waste disposal facility that may be used for drinking water. It is noted that this database is not complete and it is likely that there are more wells than that recorded on the registry in the local vicinity. The nearest identified domestic water well is located at the Mt. Lorne Fire Hall, 200 m south of the Site. Domestic developments that may use groundwater wells as a drinking water source are located at the Robinson subdivision 300 m south of the Site.

As the well at the Mt. Lorne Fire Hall and the domestic developments in Robinson are located within the allotted distances for drinking water use (1.5 km), this water use is considered to be **applicable.**

Irrigation

The Yukon Water Well Registry compiled by the Department of the Environment was review by EBA on January 4, 2011. The registry does not list the use of the wells in the vicinity of the solid waste disposal facility as being for Irrigation use. It is noted that this database is not a complete record of all wells drilled and it is possible that there are irrigation wells in the local vicinity not captured on the registry.

A review of Google Earth images and an inspection of the Mount Lorne area on July 4, 2010 did not identify any crops or farmland that would potentially require irrigation with groundwater sourced from a well. Figure 5 shows that there are no areas within 1.5 km of the Site identified for agricultural land use. Therefore, it is considered that there is very little likelihood of this water use being realized down-gradient and the water use is considered **not applicable**.

Livestock

The Yukon Water Well Registry compiled by the Department of the Environment was review by EBA on January 4, 2011. The registry does not list any of the eight wells in the vicinity of the solid waste disposal facility as being for Livestock use. It is noted that this database is not a complete record of all wells drilled and it is possible that there are Livestock wells in the local vicinity not captured on the registry.

A review of Google Earth images and an inspection of the Mount Lorne area on July 4, 2010 did not identify farmland or livestock that would potentially require groundwater sourced from a well. Figure 5 shows that there are no areas within 1.5 km of the Site identified for agricultural land use. Therefore, it is considered that there is very little likelihood of this water use being realized downgradient and the water use is considered **not applicable**.

4.0 CONCEPTUAL HYDROGEOLOGICAL MODEL

4.1 SETTING

The Site is located approximately 30 km southeast of downtown Whitehorse, approximately 50 m east of the Klondike Highway. The nearest residential area to the Site is the Robinson subdivision 200 m to the east. The Site is roughly rectangular with a length of approximately 150 m and a width approximately 70 m. A site plan is presented in Figure 2.

On a regional scale, as shown on Figure 1, the land surrounding the Site generally slopes southwest towards McConnell Lake. In the immediate vicinity of the Site, the land slopes moderately to the south/southwest. There has been significant disturbance of the natural land surface within the Site boundary. The Site has been cut and filled to construct the level bench that the current waste transfer station is located on. There has also been excavation and leveling of the natural land surface between the transfer station and the former waste burial site. The topography of the former waste burial site resembles that of the local topography.

All large vegetation species have been removed from the Site and there are only shrubs, small trees, grasses and weeds remaining within the site boundaries. The area surrounding the Site has a medium to heavy cover of native vegetation.

4.2 CLIMATE

Climatic data is not recorded in the Mount Lorne area. Data from Whitehorse airport (the closest weather station, 30 km from Mount Lorne), indicates 267 mm of annual precipitation with the majority of precipitation falling as rain between May and October. The average annual temperature at the Whitehorse airport is -0.7°C with the warmest average monthly temperature being July (14.1°C), and the coldest month generally being January with an average temperature of -17.7 °C (Environment Canada, Whitehorse Airport 1971 to 2000). From this information it can be concluded that groundwater recharge through surface water infiltration will be highest from May to October.

4.3 GEOLOGY AND HYDROGEOLOGY

4.3.1 Geological Framework

Figure 3 illustrates the general regional geology (GSC, 2008).

The southern Yukon, including the Mt. Lorne area, has undergone several episodes of glaciation, the most recent being the Quaternary McConnell glaciation. During the period of glaciation, sediment such as glacial till and lacustrine silts were deposited, specifically in areas of low elevation such as the Mt. Lorne SWDF.

The Mt Lorne region is mapped as being underlain by Quaternary aged deposits, described as unconsolidated silt, sand and gravel of glacial, fluvial, aeolian and lacustrine origins; minor volcanic ash. These deposits are mapped as being regionally continuous to the north and south of the Site and generally limited in extent to the west and east by outcropping bedrock. The Whitehorse 1:250,000 Surficial Geology Mapsheet (1990) describes the Site as being underlain by glaciolacustrine deposits consisting of clay, silt

and sand; 5 to 10 m thick. This description of the surficial lithology is generally consistent with the lithology logged during the monitoring well installation works.

Underlying the glacial sediments at the Site is bedrock mapped as the Laberge Group, consisting of Jurassic aged shale, siltstone, sandstone, conglomerate, and dacite tuff (GSC, 2008). The Laberge Group outcrops directly west and east of the Site. Cretaceous aged volcanic batholiths also outcrop west and east of the Site. On a regional scale these batholiths outcrop sporadically (GSC, 2008).

Cross-section A-A', shown as Figure 4, illustrates the interpreted conceptual geological and hydrogeological model of the Mt Lorne Solid Waste Disposal Facility area.

4.3.2 Principal Aquifers

As shown in Figure 4, within the immediate site vicinity groundwater occurs within the glacial/surficial quaternary deposits. Groundwater would be expected to occur in the bedrock underlying the Site.

For the purpose of this report, these units have been named the Quaternary Sediments Aquifer and Bedrock Aquifer for ease of reference.

The principal aquifers in the local region between the Site and Mt Lorne and their type are summarized in Table 4-1.

Table 4-1: Principal Aquifers

Aquifer Name	Location	Aquifer Type	Comment
Quaternary Sand Aquifer	• Mapped underlying and to the west of the Site	Intergranular, porous media	• Unconfined, water table aquifer • Underlies the Site
Bedrock Aquifer	• Underlying and to the east of the Site	Fractured rock	• Deep regional flow in this aquifer • Recharged by infiltration of surface water in outcrop areas and through lateral and vertical inflow from the overlying sand aquifer

4.4 GROUNDWATER FLOW SYSTEMS

Groundwater occurrence and flow can generally be described by a series of interconnected flow systems on a regional, intermediate and local scale with flow from areas of recharge to areas of discharge.

4.4.1 Regional and Intermediate Groundwater Flow

Figure 5 shows the Site to be located on the edge of two regional catchment basins. To the north, the catchment drains towards the Yukon River and to the south towards Lake Bennett. The topographic location of the Site indicates surface water flow at this location would be to the south, and that groundwater flow would most likely also be in this direction on a regional scale.

Regional groundwater flow is expected to be in the deep bedrock aquifer towards major regional discharge locations, while on an intermediate scale, flow would be through both the bedrock aquifer and the

overlying glacial/surficial quaternary deposits, potentially discharging to smaller lakes and rivers in the region.

Groundwater recharge to the bedrock aquifer is expected to be primarily through infiltration of rainfall in high elevation outcrop areas surrounding the Site while recharge to the quaternary deposits is expected through vertical and horizontal leakage from the bedrock and direct infiltration of surface water.

4.4.2 Local Groundwater Flow

Groundwater elevations were measured in each monitoring well during the November 2010 sampling program. At each well, the groundwater elevation, post completion, was within the screened interval, indicating the water table aquifer was intersected.

EBA used the groundwater depth data from November 2010 and well survey elevation information collected in October and November 2010 to calculate the groundwater elevation at each monitoring well. The water level measurements and groundwater elevations as of November 15, 2010 are presented in Table 3-3. Figure 6 presents the groundwater elevations and inferred groundwater contours from November 15, 2010.

The groundwater elevation contours indicate flow to the north towards Cowley Lake. This flow direction differs from that considered by the conceptual hydrogeological model prior to drilling, however is consistent with the Site being located in the northern catchment basin. Using the data presented in Figure 6, the horizontal hydraulic gradient is approximately 0.0096 m/m towards the north.

4.5 RISING HEAD TEST RESULTS

EBA analyzed two rising head test results (one each for ML-MW02 and ML-MW03) using Hvorslev (1951) and Bouwer & Rice (1976) analysis methods implemented in the AquiferTest™ (ver. 3.0) software. As discussed in Section 3.2.5, there was no data available for interpretation from ML-MW01.

The hydraulic conductivity testing results and the plots are attached in Appendix F. The estimated hydraulic conductivities for each well using the two analysis methods are presented in Table 4-2.

Table 4-2: Estimated Hydraulic Conductivity

Monitoring Well ID	Hvorslev Estimate (m/s)	Bouwer & Rice	Hydrogeological Unit	Geometric mean Hydraulic Conductivity (m/s)
	Logger Data	Logger Data		
ML-MW01	Data logger faulty – no data obtained for analysis		Sand and gravel	2.3E-05
ML-MW02	1.6E-05	1.3E-05	Sand, some gravel, some silt	
ML-MW03	4.0E-05	3.1E-05	Sand and silt	

As shown in Table 4-2, the estimated hydraulic conductivity using the Hvorslev and Bouwer & Rice methods ranged from 1.3×10^{-5} to 4.0×10^{-5} m/s, with a geometric mean of 2.3×10^{-5} m/s.

4.6 ESTIMATED AVERAGE LINEAR GROUNDWATER VELOCITY

As described above, the geometric mean hydraulic conductivity of the aquifer at the two locations measured is 2.3×10^{-5} m/s and the maximum hydraulic conductivity was 4.0 $x10^{-5}$ m/s at ML-MW03. The observed hydraulic gradient across the property was 0.0096 m/m towards to the north. Average linear groundwater velocity is calculated using the following equation:

$$V = (K\ i) / n$$

Where: V : is groundwater velocity in metres per second (m/s);

K : is hydraulic conductivity in meters per second (m/s) determined from the site specific slug tests;

i : is horizontal hydraulic gradient in metres/metres (m/m); and,

n : is porosity estimated to be 40% (Freeze and Cherry, 1979) in the silt and sand.

This results in an estimated average groundwater velocity of approximately 17.4 m per year and a maximum velocity of 30.3 m per year in the sand unit. Groundwater downgradient of the Site may travel faster or slower than that calculated depending upon the permeability of the material and the degree of interconnectivity between permeable units.

4.7 POTENTIAL FOR CONTAMINATION OF GROUNDWATER AND TRANSPORT MECHANISMS

The following identified potential sources of groundwater contamination are based on site history and inspection, anecdotal information and processes governing the generation and transport of leachate in landfills. Potential sources identified include:

- Leachate sourced from the former domestic waste disposal trenches and other decomposable matter that may have been historically dumped at the Site (e.g. treated wood, plant matter). These contaminants include heavy metals, nutrients (NH_3, NO_3), organic hydrocarbons (fuels, PAHs, chlorinated hydrocarbons) and salts;
- Leakage and spillage of hydrocarbons from on-site special waste storage areas;
- There were no off-site sources of pollution identified which could be considered to have impacted upon the groundwater flowing beneath the Site.

The main pathways for the transport of contaminants from the sources identified above to groundwater and downgradient receptors are:

- Percolation of leachate from waste deposits and other identified contaminants through underlying soils to the Quaternary Sediments Aquifer. It is considered that the hydraulic conductivity of the Quaternary Sediments Aquifer (1.3×10^{-5} to 4.0×10^{-5} m/s) would not significantly limit contaminants from percolating through the subsurface.
- Transport of contaminants within the Quaternary Sediments Aquifer towards down-gradient discharge locations.

5.0 GROUNDWATER IMPACT ASSESSMENT

5.1 REVIEW OF GROUNDWATER CHEMISTRY

One round of groundwater sampling was conducted as discussed in section 3.2.4. Copies of original laboratory reports and Chain of Custody documentation are included in Appendix E. Tabulated laboratory results are presented in Table 1. Table 5-1 summarizes some of the key water quality results from lab testing along with chemistry results from the Mt Lorne Firehall (EBA, 2006) approximately 180 m to the south. While this well is reported to be 35 m in total depth and deeper than the landfill monitoring wells, it is potentially representative of background conditions and chemistry results from this well have been used in the following discussion for comparative purposes.

Table 5-1: Key Groundwater Chemistry Results

Monitoring Well ID	TDS (mg/L)	Ammonia (mg/L)	Sulphate (mg/L)	HEPH (mg/L)	LEPHw (mg/L)	Benzene (mg/L)	Uranium (mg/L)	Manganese (mg/L)
ML-MW01	308	< 0.05	48.8	< 0.1	< 0.1	< 0.001	0.0054	0.038
ML-MW02	344	< 0.05	39.9	0.2	< 0.1	< 0.001	0.0053	0.239
ML-MW03	610	< 0.05	67.4	< 0.1	< 0.1	< 0.001	0.0111	0.321
Mt Lorne Firehall Well (Oct 2004)	220	NA	32	NA	NA	NA	0.0028	0.004
NA – not analyzed								

Table 5-2 details analytes which exceed the YCSR drinking water standards. Laboratory test results from groundwater samples collected during November 2010 have been used in assessing against criteria values. Table 1 presents all laboratory analytical results and compares all results against applicable standards. Copies of the laboratory reports are included in Appendix E.

Table 5-2: Groundwater Results Exceeding Most Stringent YCSR Schedule 3 Criteria

Parameter	Guideline Value	Water Use	Well ID		
			ML-MW01	ML-MW02	ML-MW03
Manganese[1]	0.05	Drinking Water	NE	0.239	0.321
[1]All results in mg/L NE – Guideline Value Not Exceeded					

A discussion of key groundwater parameters that potentially indicate impact of the aquifer from the waste disposal facility and exceedances of relevant water quality guideline criteria are presented below.

Total Dissolved Solids

Total Dissolved Solids (TDS) can indicate groundwater contamination from a waste disposal facility, with dissolved constituents of the degradation of organic waste (typically NO_3, NH_3, Na, K, Mg, Ca, SO_4, Cl, HCO_3) contributing to an increase in TDS concentration. The TDS of the monitoring wells ranged from 308 mg/L (ML-MW01) to 610 mg/L (ML-MW03) across the Site.

ML-MW03, which is inferred to be an upgradient well and would be expected to be representative of background conditions, reported a concentration approximately double that of ML-MW01 and ML-MW02 and three time higher than the Mt Lorne Firehall well. The cause of the elevated concentration at ML-MW03 is unknown, given there is no identified sources of contamination upgradient. While not identified during the site history or inspection, there is a possibility of unrecorded dumping of waste to the south of the landfill which has impacted upgradient groundwater quality at this location. Alternatively, there may be mounding of leachate beneath the landfill area or lateral movement of high TDS leachate in the unsaturated zone, along lower permeability layers of the quaternary deposits that has impacted ML-MW03. While lower permeability layers were not logged during drilling works, this drilling method is not conducive to observing thin layers in a formation. There is also the potential that preferential recharge of low TDS surface water through the disturbed areas of the landfill may have diluted the background TDS reported at ML-MW03, subsequently resulting in the lower concentrations.

Dissolved Organic Carbon

Dissolved Organic Carbon (DOC) concentrations can indicate organic matter sourced from a landfill impacting on groundwater. If a monitoring well is impacted by landfill leachate, DOC concentrations would be expected to show an increase to concentrations potentially in the hundreds or thousands of mg/L.

The DOC concentrations in all wells were relatively low when compared to that typically reported in landfill leachate, although ML-MW02 reported a DOC concentration noticeably higher than the other two onsite wells .

Chloride

Chloride concentrations at ML-MW02 and ML-MW03 were over 30 times higher than that reported at inferred downgradient well ML-MW01. The cause of this inconsistency is not clear, although it is potentially the result of increased infiltration of surface water with low chloride concentrations through higher permeability excavation and/or waste deposition areas.

Ammonia

Ammonia is a typical constituent of landfill leachate and an indicator of contamination sourced from a landfill.

The concentrations of ammonia reported at all three wells were below the laboratory MDL and below applicable guideline criteria.

Sulphate

The sulphate concentration at inferred background well ML-MW03 appears slightly elevated when compared to the concentrations reported at ML-MW01 and ML-MW02 and inferred natural background concentration in the Mt Lorne Firehall well. Sulphate concentrations are typically elevated in landfill leachate, which may indicate impact from landfill operations at this.

Metals

Heavy metals concentrations are generally consistent across all wells on site.

Uranium was detected in all monitoring wells on site although concentrations were below the applicable Drinking Water guideline criteria. The reported concentrations are considered to be naturally occurring, with uranium detected in groundwater in the Mt Lorne Firehall well, as well as being typically detected at similar concentrations in other areas across the Yukon such as Deep Creek, Haines Junction, Champagne, Tagish and Copper Ridge. Concentrations of uranium may be attributed to the element occurring naturally in intrusive granodiorite, which is mapped as being present in the region or it may be sourced from ground granodiorite in glacial deposits underlying the Site.

Manganese has been reported in municipal solid waste leachate at concentrations up to 31 mg/L (Fetter, 1999). Manganese was detected in all monitoring wells and exceeded the applicable guideline criteria for aesthetic Drinking Water at ML-MW02 and ML-MW03. The concentrations reported at on-site wells were 1 to 2 orders of magnitude higher than that reported in the Mt Lorne Firehall well. ML-MW02 and ML-MW03, inferred to be upgradient wells, reported concentrations an order of magnitude higher than down-gradient well ML-MW01.

Organics

All organics results were reported at concentrations below the laboratory method detection limits (MDLs) with the exception of the Heavy Extractable Petroleum Hydrocarbons (HEPH) result at ML-MW02, which was detected at a concentration slightly above the MDL. While the detection of HEPH may indicate impact from landfilling operations, given it is not typically considered to be found naturally in groundwater and that the well is considered to be up-gradient of the landfill, further investigation into the source of the detectable HEPH should be undertaken following the confirmation of detectable HEPH concentrations in subsequent rounds of groundwater monitoring to be conducted in 2011, and interpretation of the results.

5.2 INTERPRETATION OF GROUNDWATER CHEMISTRY

A comparison of groundwater chemistry for major ions for each well is displayed in the Schoeller Plot (Figure 7) and Piper Diagram (Figure 8). Stiff Diagrams provide a plot of major ions that can be easily interpreted in terms of relative percentages of cations and anions. Stiff Diagrams for each of the sample locations are presented in plan format as Figure 9, as an aid to interpretation of the spatial distribution of groundwater chemistry.

Groundwater from ML-MW01 can be characterized as calcium-bicarbonate type water, while ML-MW02 and ML-MW03 can be characterized as calcium-magnesium-bicarbonate groundwater. The Piper Plot, Schoeller diagram and Stiff diagrams indicate that the three wells have similar chemistry with relative proportions of major ions in each well almost matching each other, other than the chloride concentration at ML-MW01.

Overall, groundwater chemistry at ML-MW01, ML-MW02 and ML-MW03 are quite similar and there is no significantly elevated analytes indicating impact from landfill leachate at any one monitoring well. While TDS and sulphate concentrations at ML-MW01 are noticeably higher than the other two on-site wells, the ammonia concentration reported in all wells is below the laboratory MDL. Manganese in the up-gradient

wells reported higher concentrations than the downgradient well which may indicate dilution of background concentrations. It is considered possible that there may be a degree of preferential recharge to groundwater through more permeable areas of the Site such as the former waste deposit burial location, and general increased infiltration due to the Site being cleared of vegetation.

It is not considered possible to draw a definitive conclusion of the impact to groundwater from the Site based on the data set currently available. Following the completion of the two additional rounds of groundwater monitoring scheduled to be undertaken this year and following interpretation of the results, the impact to groundwater from landfilling activities should be reassessed based on the increased data set.

6.0 CONCLUSIONS

The fieldwork for the 2010 Monitoring Well Program at the Mount Lorne Solid Waste Disposal Facility was completed between July 4, 2010 and November 22, 2010. The current water sampling network includes three groundwater monitoring wells.

The following conclusions are made based on the findings of the 2010 hydrogeological assessment:

- Three monitoring wells ML-MW01, ML-MW02 and ML-MW03 were installed in October 2010 to establish a groundwater monitoring network at the Site. All monitoring wells were completed in a sand unit with a slotted section at the well bottom to allow groundwater entry;
- Based on groundwater elevation data, monitoring well ML-MW01 appears to be down-gradient and ML-MW02 and ML-MW03 appear to be up-gradient of the waste disposal area. Due to budget constraints, a fourth monitoring well was not installed to meet the requirement to have two down-gradient wells; however, additional groundwater elevation data are necessary to identify potential seasonal changes and to confirm the conceptual hydrogeological model;
- No monitoring or sampling of groundwater is believed to have been conducted at the Site prior to the fall 2010 field program;
- Groundwater flow down-gradient of the Site was determined to be in a northerly direction towards Cowley Lakes;
- Analysis of the rising head hydraulic response test results show that the geometric mean of the hydraulic conductivity of the Quaternary Sediments Aquifer is approximately 2.3×10^{-5} m/s. The maximum hydraulic conductivity of 4.0×10^{-4} m/s was reported at ML-MW03;
- Groundwater from ML-MW01 can be characterized as calcium-bicarbonate type water, while ML-MW02 and ML-MW03 can be characterized as calcium-magnesium-bicarbonate groundwater;
- Concentrations of manganese at monitoring wells ML-MW02 and ML-MW03 exceed the YCSR-DW (aesthetic) criteria;
- All other analytes were below the applicable guideline criteria;
- Organic analytes in all monitoring wells were below the laboratory MDL of 0.1 mg/L with the exception of the HEPH concentration detected in ML-MW02;

- Ammonia, an indicator of leachate contamination, was not detected in any of the three monitoring wells;
- A review of groundwater monitoring results indicates variable concentrations across all wells, with both up and down-gradient wells exhibiting different potential indicators of impacts from landfilling activities. It is not considered possible to draw a definitive conclusion as to the impact to groundwater from the Site based on the data set currently available.

7.0 RECOMMENDATIONS

The following recommendations are made based on the findings of the 2011 hydrogeological assessment:

- As required by the Site's Solid Waste Disposal Facility Permit, future monitoring programs should be completed once during the spring freshet when the most significant groundwater recharge occurs and once in late summer;
- ML-MW01, ML-MW02 and ML-MW03 should be surveyed by a professional surveyor for location and elevation prior to the next monitoring round. Elevations from the top of the PVC casing and from ground level immediately adjacent to the well should be reported;
- Following the completion of the two further rounds of groundwater monitoring scheduled to be undertaken this year and following interpretation of the results, the impact to groundwater from landfilling activities should be reassessed based on the increased data set.
- Following the next two rounds of groundwater monitoring and interpretation of the results, the need for further investigation into the source of the detectable HEPH concentration at ML-MW02 should be assessed;
- Following the survey of the monitoring wells and the completion of the 2011 groundwater sampling rounds, data should be reviewed by a qualified hydrogeologist and the need for additional up-gradient and downgradient monitoring wells assessed.

8.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

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REFERENCES

1. Contaminated Sites Regulation (2002) Yukon. O.I.C. 2002/171. September 2002.
2. Yukon Department of Environment (2002). O.I.C. 2002/171. Schedule 3 – Generic Numerical Water Standards for Protection of Freshwater Aquatic Life, Drinking Water, Irrigation Water and Livestock Water. September 2002.
3. Yukon Department of Environment (2010). Solid Waste Disposal Facility – Permit No: 80-009. 2010.
4. Yukon Department of Environment (2007). Protocol No. 2: Analysis of Samples Taken in Relation to the *Contaminated Sites Regulation.* December 2007.
5. Yukon Department of Environment (2008). Protocol No. 5: Petroleum Hydrocarbon Analytical Methods and Standards. March 2008.
6. Yukon Department of Environment (2007). Protocol No. 6: Water Quality Standards .November 2007.
7. Yukon Department of Environment (2008). Protocol No. 7: Groundwater Monitoring Well Installation and Sampling. March 2008.
8. Yukon Government (2009). Yukon Environmental & Socioeconomic Assessment Act Decision Document – Mt Lorne – Solid Waste Facility (File Number: 2008-0272). February 2009.
9. Environment Canada – Climate Normal Data – website.
10. Access, et al. (2003). Solid Waste Management Plan Mt. Lorne. June 2003.
11. Geological Survey of Canada. Department of Energy Mines and Resources. 1991. Surficial Geology, Whitehorse, Yukon Territory.
12. Canada Department of Mines and Technical Surveys. Geological Survey of Canada. 1957. Geological Map of Yukon Territory.
13. Natural Resources Canada. Geological Survey of Canada. 2008. Bedrock Geology Whitehorse (105D) Yukon.
14. EBA (2006), Small Public Water System Assessment Yukon Government Maintained Buildings, Whitehorse Region, March 2006
15. Freeze, R. Allan and Cherry, A. John, (1979). '*Groundwater*', Prentice Hall, 1979
16. Fetter (1979), 'Contaminant Hydrogeology', Prentice Hall, 1999
17. Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, bul. no. 26, Waterways Experiment Station, Corps of Engineers, U.S. Army, Vicksburg, Mississippi

18. Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

TABLES

LocCode	ML-MW01	ML-MW02	ML-MW02	ML-MW03
Field_ID	ML-MW01	ML-MW02	ML-MW02 Duplicate	ML-MW03
Sampled_Date-Time	11/22/2010	11/22/2010	11/22/2010	11/22/2010
Lab_Report_Number	1399567	1399567	1399567	1399567

ChemName	Units	EQL	CSR Schedule 3 - Drinking Water				
Dissolved Organic Carbon	mg/L	0.5		1	9.1	-	0.9
tellurium	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
BTEX							
Benzene	µg/L	1	5	<1	<1	-	<1
Ethylbenzene	µg/L	1	2.4[#2]	<1	<1	-	<1
Toluene	µg/L	1	24[#2]	<1	<1	-	<1
Xylene (m & p)	µg/L	1		<1	<1	-	<1
Xylene (o)	µg/L	1		<1	<1	-	<1
Xylene Total	µg/L	1	300[#2]	<1[#6]	<1[#6]	-	<1[#6]
Chlorinated Hydrocarbons							
1,1,1-trichloroethane	µg/L	1		<1	<1	-	<1
1,1,2,2-tetrachloroethane	µg/L	1		<1	<1	-	<1
1,1-dichloroethane	µg/L	1		<1	<1	-	<1
1,1-dichloroethene	µg/L	1	14	<1	<1	-	<1
1,2-dichloroethane	µg/L	1	5	<1	<1	-	<1
1,2-dichloropropane	µg/L	1		<1	<1	-	<1
Bromodichloromethane	µg/L	1		<1	<1	-	<1
Bromoform	µg/L	1		<1	<1	-	<1
Carbon tetrachloride	µg/L	1	5	<1	<1	-	<1
Chlorodibromomethane	µg/L	1		<1	<1	-	<1
Chloroethane	µg/L	10		<10	<10	-	<10
Chloroform	µg/L	1	100	<1	<1	-	<1
Chloromethane	µg/L	10		<10	<10	-	<10
cis-1,2-dichloroethene	µg/L	1		<1	<1	-	<1
cis-1,3-dichloropropene	µg/L	1		<1	<1	-	<1
Dichloromethane	µg/L	5	50	<5	<5	-	<5
Trichloroethene	µg/L	1	50	<1	<1	-	<1
Tetrachloroethene	µg/L	1	30	<1	<1	-	<1
trans-1,2-dichloroethene	µg/L	1		<1	<1	-	<1
trans-1,3-dichloropropene	µg/L	1		<1	<1	-	<1
Vinyl chloride	µg/L	2	2	<2	<2	-	<2
Halogenated Benzenes							
1,2-dichlorobenzene	µg/L	1	3[#2]	<1	<1	-	<1
1,3-dichlorobenzene	µg/L	1		<1	<1	-	<1
1,4-dichlorobenzene	µg/L	1	1[#2]	<1	<1	-	<1
Chlorobenzene	µg/L	1	30[#2]	<1	<1	-	<1
Halogenated Hydrocarbons							
Bromomethane	µg/L	10		<10	<10	-	<10
Trichlorofluoromethane	µg/L	1		<1	<1	-	<1
Inorganics							
ORTHOPHOSPHATE (PO4-P	mg/L	0.01		0.08	0.06	-	0.08
Alkalinity (Bicarbonate)	mg/L	5		310	290	-	540
Alkalinity (Hydroxide) as CaC	µg/L	5000		<5,000	<5,000	-	<5,000
Alkalinity (total) as CaCO3	mg/L	5		255	238	-	446
Ammonia as N	µg/L	10		<50	<50	<10	<50
Chloride	mg/L	0.02	250[#2]	0.85	31.8	-	30.4
Kjeldahl Nitrogen Total	mg/L	0.06		0.66	0.3	-	0.73
Nitrate (as N)	mg/L	0.01	10[#1]	0.07	1.3	1.1	1.9
Nitrite (as N)	mg/L	0.005	3.2	<0.005	0.128	-	<0.005
Nitrogen (Total Oxidised)	mg/L	0.01	10[#1]	0.07	1.43	-	1.9
Ortho phosphate (as P)	mg/L	0.01		0.08	0.06	-	0.08
Sodium	mg/L	0.1	200[#2]	4.6	6	6.1	7.6
Sulphate	mg/L	0.05	500[#2]	48.8	39.9	-	67.4
Sulphur as S	mg/L	0.2		16.8	13.6	14	24.9
Thorium	µg/L	0.4		<0.4	<0.4	<0.4	<0.4
Hardness as CaCO3	mg/L	5		268	296	288	577
Total Solids	µg/L	5000		308,000	344,000	-	610,000
Lead							
Lead	mg/L	0.0001	0.01	<0.0001	<0.0001	<0.0001	<0.0001
MAH							
Styrene	µg/L	1		<1	<1	-	<1

LocCode	ML-MW01	ML-MW02	ML-MW02	ML-MW03
Field_ID	ML-MW01	ML-MW02	ML-MW02 Duplicate	ML-MW03
Sampled_Date-Time	11/22/2010	11/22/2010	11/22/2010	11/22/2010
Lab_Report_Number	1399567	1399567	1399567	1399567

ChemName	Units	EQL	CSR Schedule 3 - Drinking Water				
Metals							
Aluminium	mg/L	0.005	0.2	<0.005	<0.005	<0.005	<0.005
Antimony	mg/L	0.0002	0.006	<0.0002	0.0002	0.0002	<0.0002
Arsenic	mg/L	0.0002	0.025	0.0003	0.0009	0.0009	0.0006
Barium	mg/L	0.001	1	0.042	0.064	0.062	0.094
Beryllium	mg/L	0.00004		<0.00004	<0.00004	<0.00004	<0.00004
Bismuth	mg/L	0.001		<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.004	5	<0.004	0.013	0.014	0.005
Cadmium	mg/L	0.00001	0.005	0.00002	0.00004	0.00006	0.00006
Calcium	mg/L	0.1		84.1	90	87.5	176
Chromium (III+VI)	mg/L	0.0004	0.05	0.0008	0.001	0.0009	0.0013
Cobalt	mg/L	0.00002		0.00031	0.00084	0.0009	0.00188
Copper	mg/L	0.001	1 [#2]	0.002	0.002	0.002	0.003
Iron	mg/L	0.01	0.3 [#2]	<0.005	<0.005	0.013	<0.005
Lithium	mg/L	0.001		0.003	0.003	0.003	0.006
Magnesium	mg/L	0.1	100 [#2]	14.2	17.3	16.9	33.1
Manganese	mg/L	0.005	0.05 [#2]	0.038	0.209	0.239	0.321
Mercury	mg/L	0.00001	0.001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	0.0001	0.25	0.0014	0.0114	0.0132	0.004
Nickel	mg/L	0.001		0.003	0.003	0.004	0.008
Phosphorus	mg/L	0.01		<0.01 - 4.23	<0.01 - 5.5	<0.01	<0.01 - 5.14
Potassium	mg/L	0.1		1.9	2.7	2.7	3.9
Selenium	mg/L	0.0006	0.01	0.0008	<0.0006	0.0008	0.0011
Silicon	µg/L	50		4,510	4,150	4,160	5,880
Silver	mg/L	0.00001		<0.00001	<0.00001	<0.00001	<0.00001
Strontium	mg/L	0.001		0.431	0.479	0.472	0.926
Thallium	mg/L	0.00001		0.00001	<0.00001	<0.00001	0.00002
Tin	mg/L	0.0001		0.0001	0.0002	0.0002	0.0006
Titanium	mg/L	0.0004		0.0004	<0.0004	0.0005	0.0009
Uranium	µg/L	0.4	100	5.4	5.3	5.3	11.1
Vanadium	mg/L	0.0001		0.0002	0.0002	0.0002	0.0004
Zinc	mg/L	0.001	5 [#2]	0.003	0.002	0.002	0.005
Zirconium	µg/L	0.1		<0.1	<0.1	<0.1	0.1
Organic							
Alkalinity (Carbonate)	mg/L	6		<6	<6	-	<6
PAH							
Acridine	mg/L	0.00005		<0.00005	<0.00005	-	<0.00005
Quinoline	µg/L	3.4		<3.4	<3.4	-	<3.4
PAH/Phenols							
Acenaphthene	µg/L	0.1		<0.1	<0.1	-	<0.1
Acenaphthylene	µg/L	0.1		<0.1	<0.1	-	<0.1
Anthracene	µg/L	0.1		<0.1	<0.1	-	<0.1
Benz(a)anthracene	µg/L	0.01		<0.01	<0.01	-	<0.01
Benzo(a) pyrene	µg/L	0.01	0.01	<0.01	<0.01	-	<0.01
Benzo(b)fluoranthene	µg/L	0.01		<0.01	<0.01	-	<0.01
Benzo(g,h,i)perylene	µg/L	0.1		<0.1	<0.1	-	<0.1
Benzo(k)fluoranthene	µg/L	0.02		<0.02	<0.02	-	<0.02
Chrysene	µg/L	0.1		<0.1	<0.1	-	<0.1
Dibenz(a,h)anthracene	µg/L	0.01		<0.01	<0.01	-	<0.01
Fluoranthene	µg/L	0.1		<0.1	<0.1	-	<0.1
Fluorene	µg/L	0.1		<0.1	<0.1	-	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<0.1	<0.1	-	<0.1
Naphthalene	µg/L	0.1		<0.1	<0.1	-	<0.1
Phenanthrene	µg/L	0.1		<0.1	<0.1	-	<0.1
Pyrene	µg/L	0.02		<0.02	<0.02	-	<0.02
TPH							
HEPH	µg/L	100		<100	200	-	<100
LEPHw	µg/L	100		<100	<100	-	<100
VPH C6-C10	µg/L	50	15000 [#4]	<50	<50	<50	<50
VPHw	µg/L	50		<50	<50	<50	<50
VOCs							
2-Chloroethylvinyl ether	mg/L	0.001		<0.001	<0.001	-	<0.001
Trihalomethanes	mg/L			<0.004 [#6]	<0.004 [#6]	-	<0.004 [#6]

Comments
#1 Where nitrate and nitrite are present, ttal nitrate plus nitrite-nitrogen should not exceed this value
#2 Standard to protect against taste and odour concerns.
#3 Standard is specific for total chloramines.
#4 Includes volatile petroleum hydrocarbons, standards applicable at all sites regardless of water use
#5 Includes light extractable petroleum hydrocarbons, standards applicable at all sites regardless of water use
#6 ESDAT Combined.

SDG	11/22/2010	11/22/2010	
Field_ID	ML-MW02	ML-MW02 Duplicate	**RPD**
Sampled_Date-Time	11/22/2010	11/22/2010	

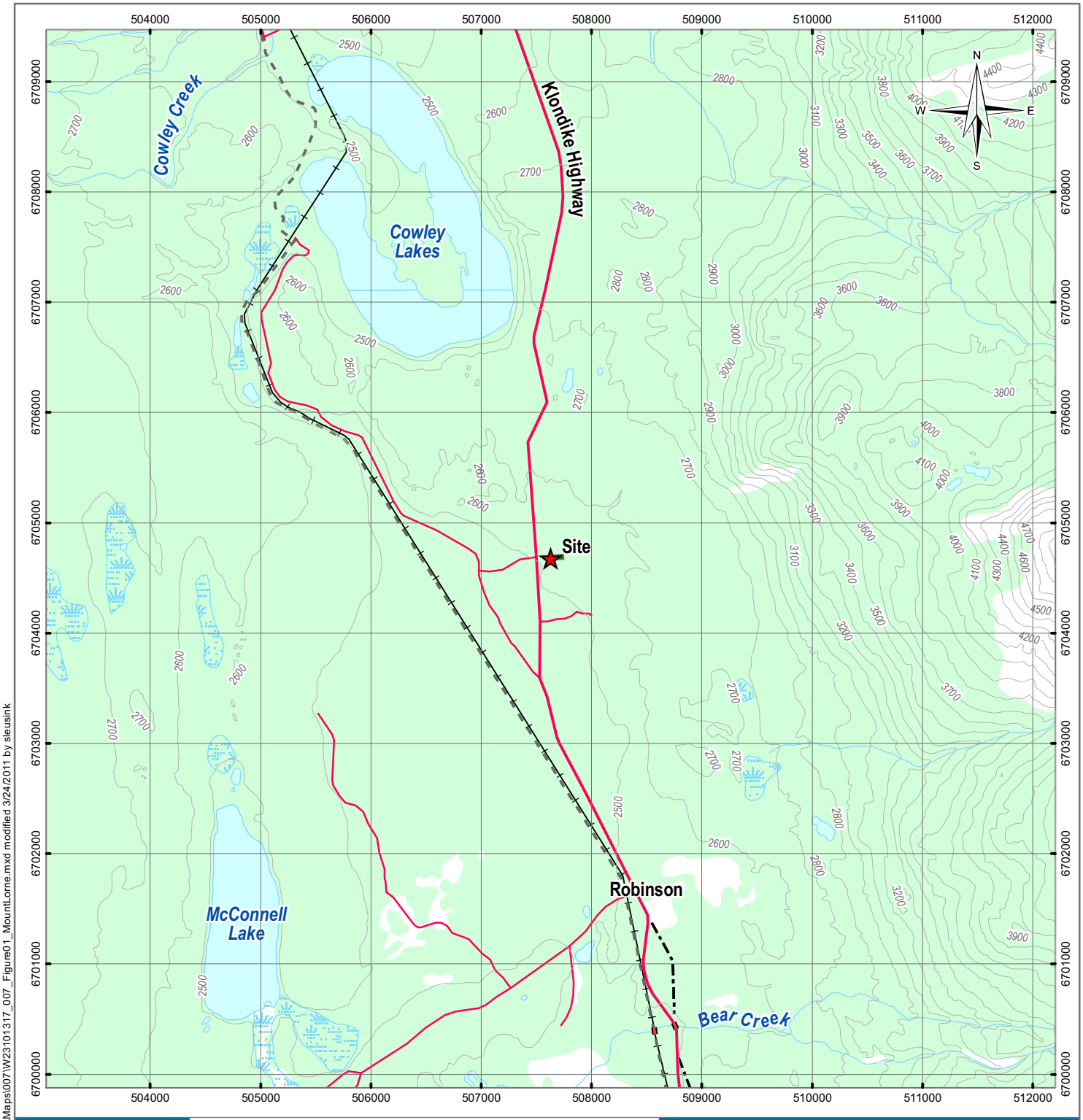
ChemName	**Units**	**EQL**			
tellurium	µg/L	0.1	<0.1	<0.1	0
Inorganics					
Sodium	mg/l	0.1	6.0	6.1	2
Sulphur as S	mg/l	0.2	13.6	14.0	3
Thorium	µg/L	0.4	<0.4	<0.4	0
Hardness as CaCO3	mg/l	5	296.0	288.0	3
Lead					
Lead	mg/l	0.0001	<0.0001	<0.0001	0
Metals					
Aluminium	mg/l	0.005	<0.005	<0.005	0
Antimony	mg/l	0.0002	0.0002	0.0002	0
Arsenic	mg/l	0.0002	0.0009	0.0009	0
Barium	mg/l	0.001	0.064	0.062	3
Beryllium	mg/l	0.00004	<0.0	<0.0	0
Bismuth	mg/l	0.001	<0.001	<0.001	0
Boron	mg/l	0.004	0.013	0.014	7
Cadmium	mg/l	0.00001	**0.0**	**0.0001**	**40**
Calcium	mg/l	0.1	90.0	87.5	3
Chromium (III+VI)	mg/l	0.0004	0.001	0.0009	11
Cobalt	mg/l	0.00002	0.0008	0.0009	7
Copper	mg/l	0.001	0.002	0.002	0
Iron	mg/l	0.01	<0.005	0.013	89
Lithium	mg/l	0.001	0.003	0.003	0
Magnesium	mg/l	0.1	17.3	16.9	2
Manganese	mg/l	0.005	0.209	0.239	13
Mercury	mg/l	0.00001	<0.0	<0.0	0
Molybdenum	mg/l	0.0001	0.0114	0.0132	15
Nickel	mg/l	0.001	0.003	0.004	29
Phosphorus	mg/l	0.01	<0.01	<0.01	0
Potassium	mg/l	0.1	2.7	2.7	0
Selenium	mg/l	0.0006	<0.0006	0.0008	29
Silicon	µg/l	50	4150.0	4160.0	0
Silver	mg/l	0.00001	<0.0	<0.0	0
Strontium	mg/l	0.001	0.479	0.472	1
Thallium	mg/l	0.00001	<0.0	<0.0	0
Tin	mg/l	0.0001	0.0002	0.0002	0
Titanium	mg/l	0.0004	<0.0004	0.0005	22
Uranium	µg/L	0.4	5.3	5.3	0
Vanadium	mg/l	0.0001	0.0002	0.0002	0
Zinc	mg/l	0.001	0.002	0.002	0
Zirconium	µg/L	0.1	<0.1	<0.1	0
TPH					
VPH C6-C10	µg/L	50	<50.0	<50.0	0
VPHw	µg/L	50	<50.0	<50.0	0

*RPDs have only been considered where a concentration is greater than 5 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (5-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

FIGURES



LEGEND

- Site Location
- Contour (100 ft)
- Transmission Line
- Pipeline
- Bridge
- Limited Use Road
- Road
- Railway
- Dump
- Watercourse
- Waterbody
- Wetland
- Vegetation

NOTES
Base data source:
NTS 1:50,000 (Sheet 105D07 & 105D10)

STATUS
ISSUED FOR USE

HYDROGEOLOGICAL ASSESSMENT
MOUNT LORNE WASTE DISPOSAL FACILITY

Site Location

PROJECTION	DATUM	CLIENT
UTM Zone 8	NAD83	Yukon Government

Scale: 1:50,000
1 0.5 0 1
Kilometres

FILE NO. W23101317_007_Figure01_MountLorne.mxd

PROJECT NO.	DWN	CKD	APVD	REV
W23101317.007	SL	CB	CB	0

OFFICE	DATE
EBA-VANC	March 24, 2011

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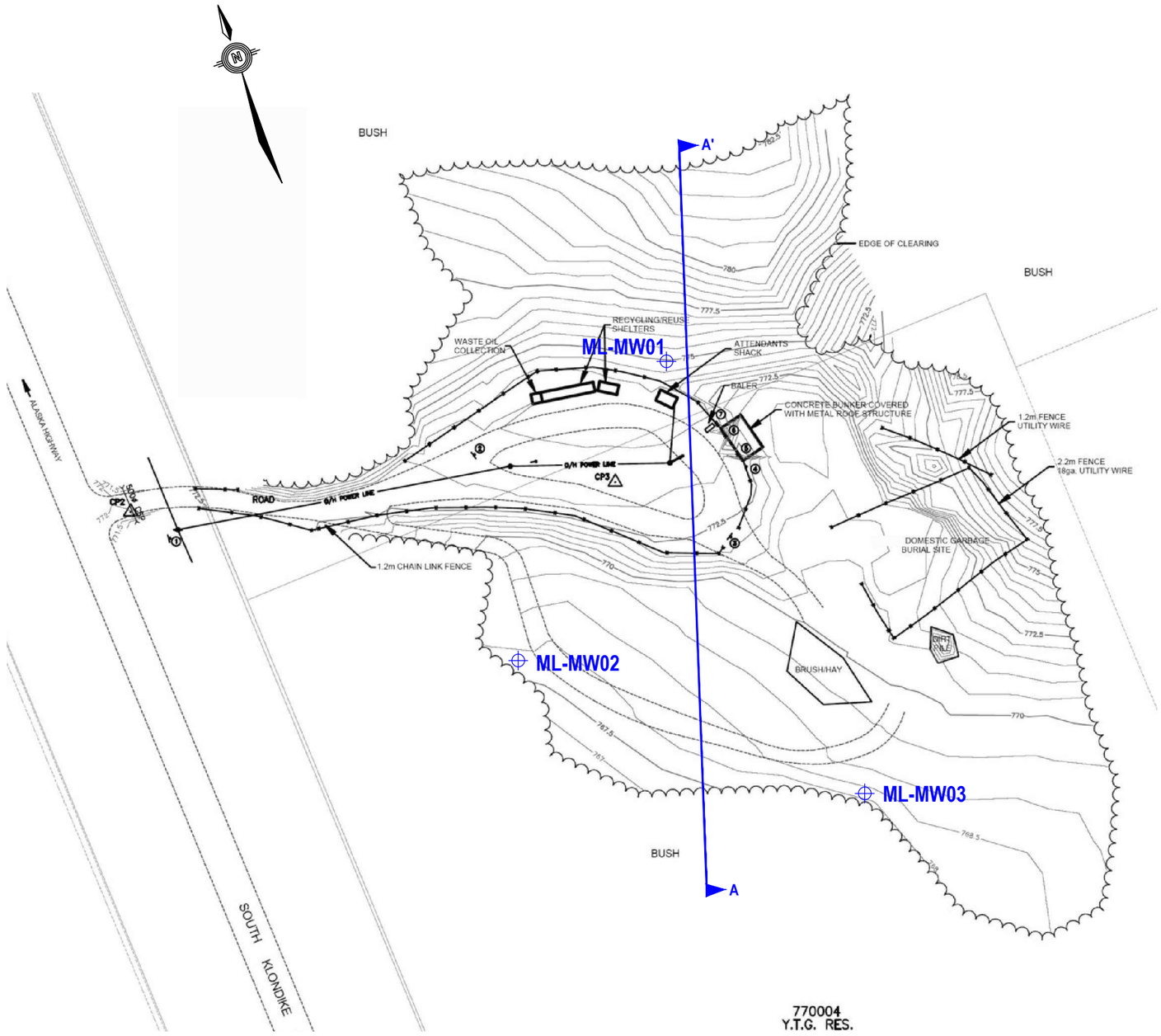
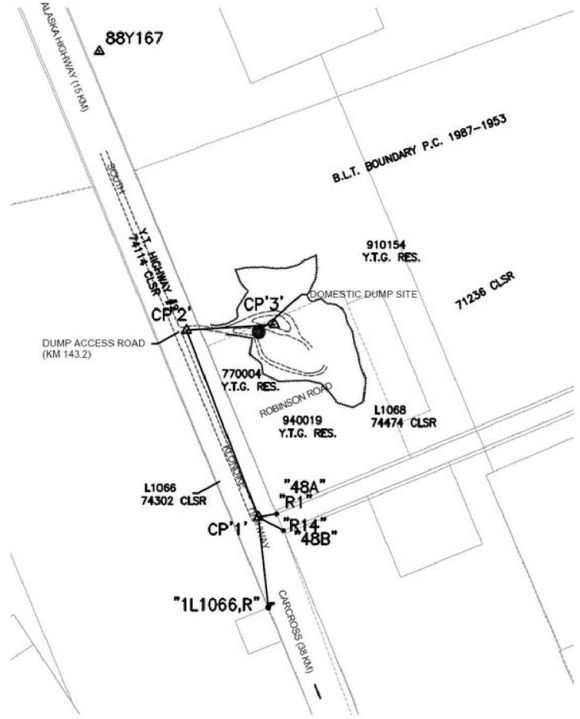
Figure 1

Q:\Vancouver\GIS\ENVIRONMENTAL\W23\W23101317_MWProgramMaps\007\W23101317_007_Figure01_MountLorne.mxd modified 3/24/2011 by sleusink

Q:\Whitehorse\Data\0201drawings\Mt. Lorne\W23101317.007 Hydro Assessment\W23101317.007 Fig.2_R0.dwg [FIGURE 2] March 21, 2011 - 11:21:57 am (BY: BUCHAN, CAMERON)





KEY PLAN

LEGEND

- ⊕ - GROUNDWATER MONITORING WELL LOCATION (SHOWN BLUE)
- ▲—▲ - CROSS SECTION ALIGNMENT A - A' (SHOWN BLUE)
- —770— - GROUND ELEVATION CONTOUR

NOTES :

1. THIS PLAN IS NOT TO SCALE
2. THE INFORMATION CONTAINED ON THIS PLAN WAS TAKEN FROM MT. LORNE SOLID WASTE MANAGEMENT PLAN PROVIDED BY ACCESS CONSULTING GROUP IN JULY 2002 AND PRESENTED FOR INFORMATION PURPOSES ONLY. ALL ADDITIONAL INFORMATION WAS ADDED BY EBA AND IS SHOWN IN COLOR.

CLIENT

Yukon Government Community Services

HYDROGEOLOGICAL ASSESSMENT MT LORNE WASTE DISPOSAL FACILITY

SITE PLAN AND CROSS SECTION ALIGNMENT A - A'

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 23, 2011

Figure 2

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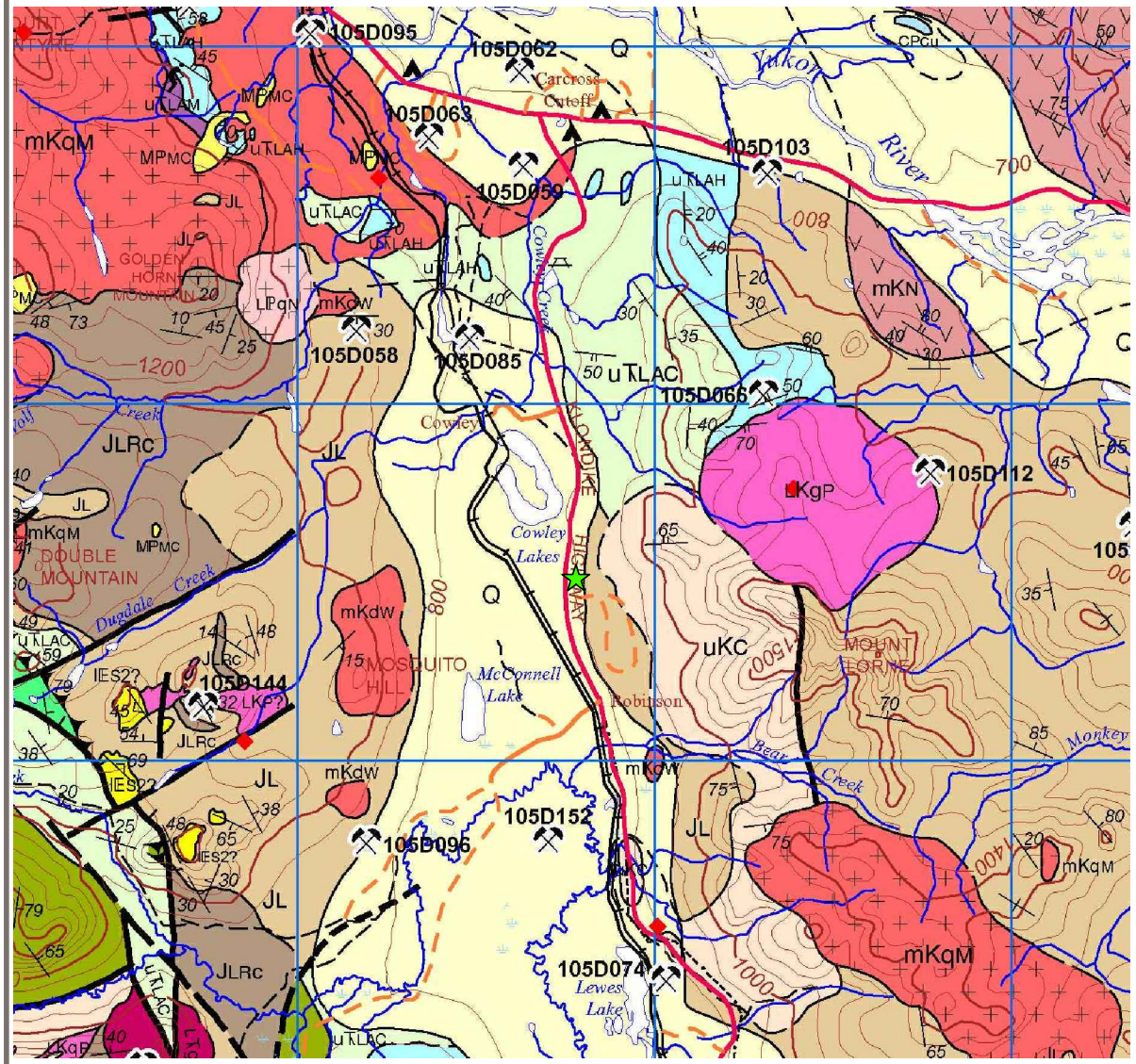

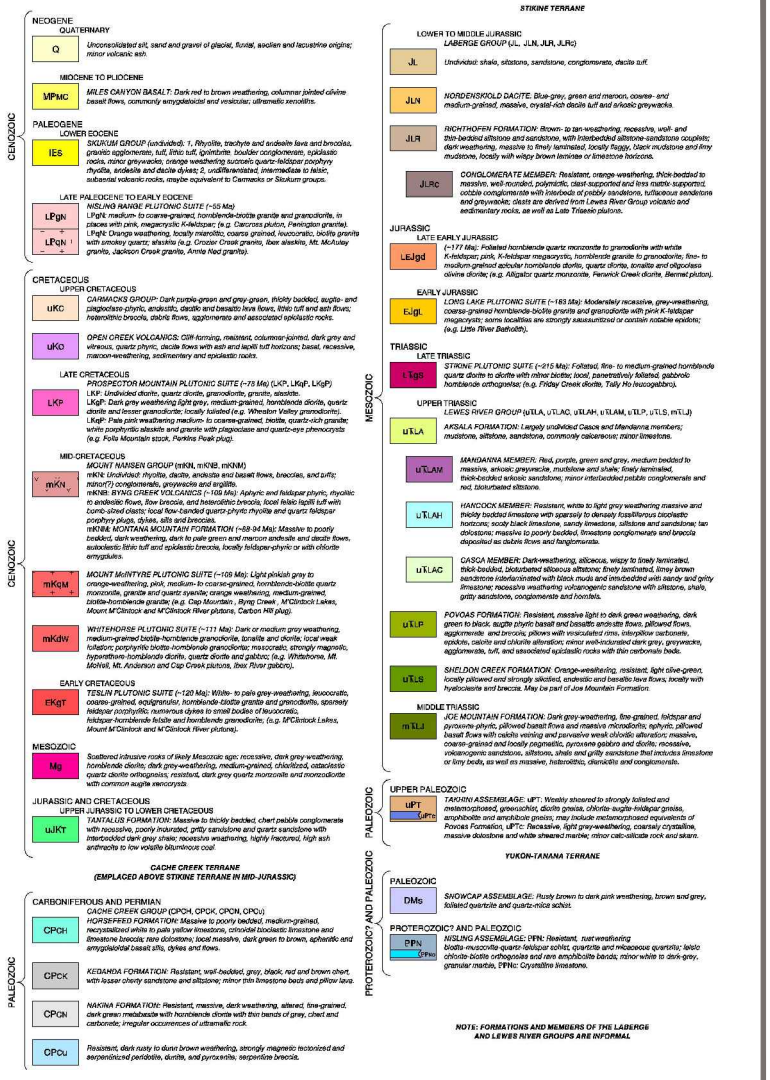

LEGEND

★ - APPROXIMATE SITE LOCATION

0 10 000

Scale: 1: 200 000 (metres)

CLIENT

Yukon Government
Department of Community Services

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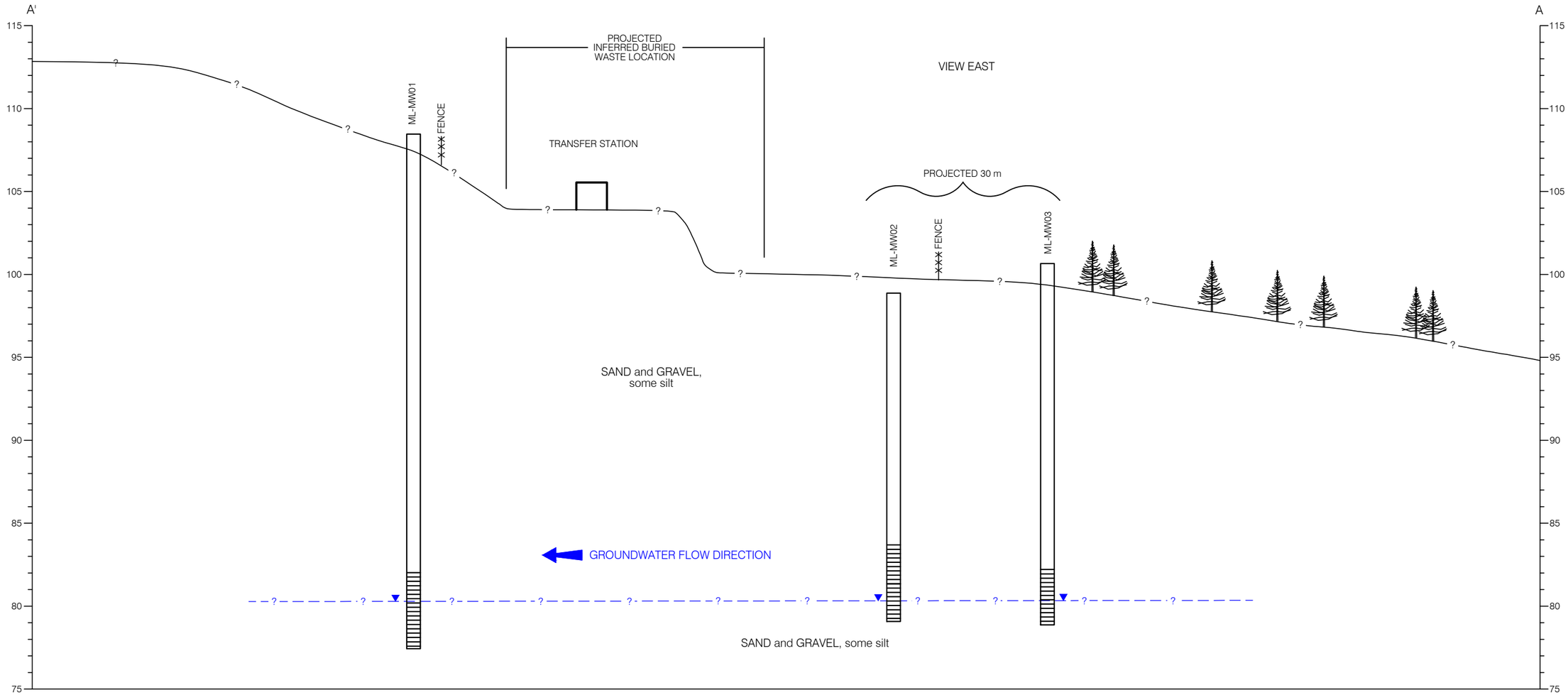
HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

REGIONAL GEOLOGY

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 22, 2011

Figure 3



LEGEND

- MONITORING WELL

- - - GROUNDWATER TABLE

CLIENT

Yukon Government
Department of Community Services

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HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

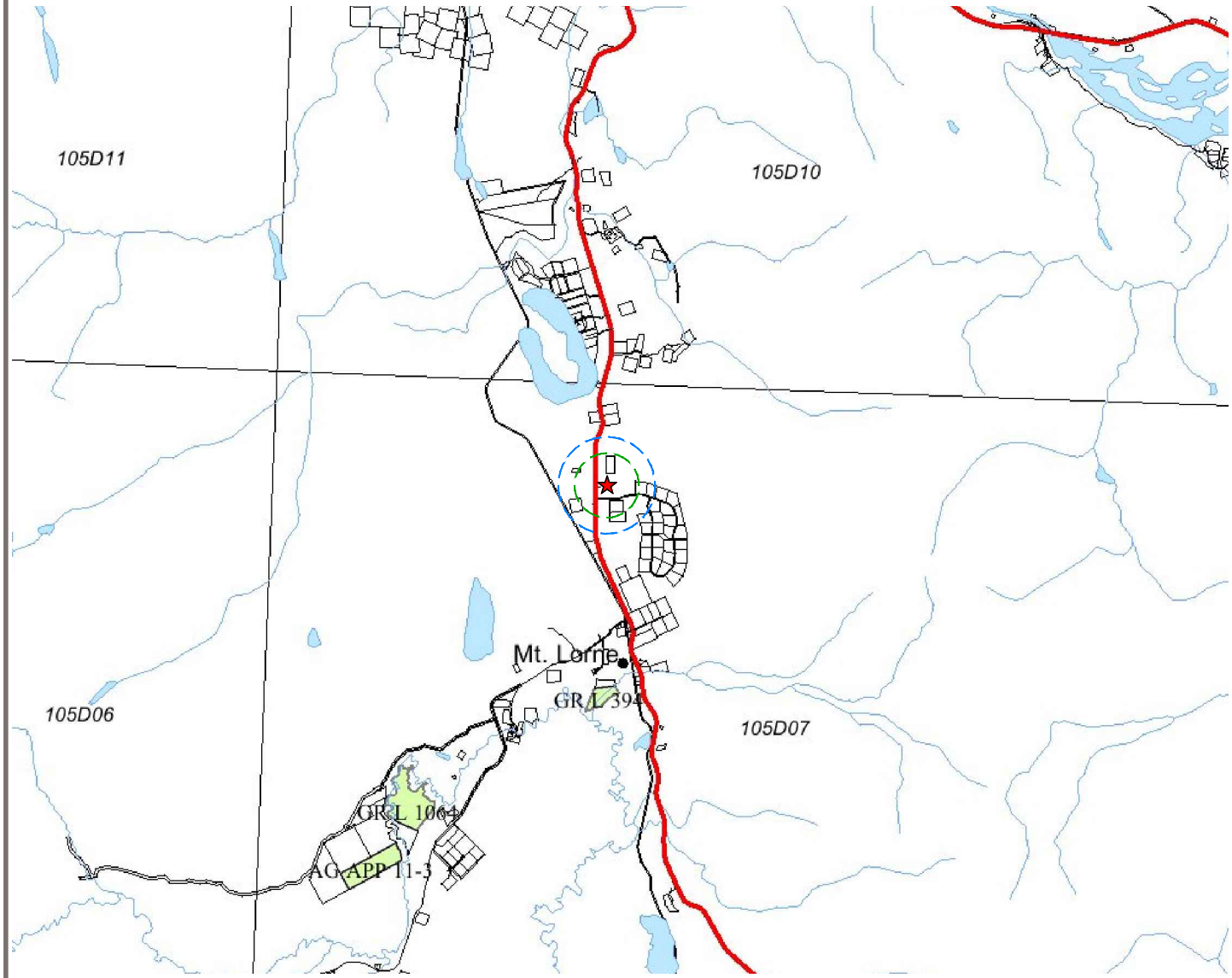
CONCEPTUAL HYDROGEOLOGICAL CROSS SECTION A - A'

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 23, 2011

Figure 4

Q:\Whitehorse\Data\0201drawings\Mt. Lorne\W23101317.007 Hydro Assessment\W23101317.007 Fig.5_R0.dwg [FIGURE 5] March 08, 2011 - 1:19:55 pm (BY: BUCHAN, CAMERON)



Legend

- Yukon Border - Surveyed
- National Road Network - All Roads
- Expressway / Highway
- Arterial
- Collector
- Ramp
- Resource / Recreation
- Local / Street
- Local / Strata
- Local / Unknown
- Alley or Service Lane
- Service Lane
- Winter
- Watercourses (250k)
- Places (All)
- City
- Town
- Municipality
- Village
- Community
- Settlement
- Native Settle
- Hamlet
- Historic Site
- Surveyed Land Parcels
- Agricultural Disposition (CSW)
- Agricultural Application (CSW)

0 10 000

Scale: 1: 200 000 (metres)

LEGEND

- ★ - APPROXIMATE SITE LOCATION
- ◌ - CSR AQUATIC LIFE APPLICABLE RADIUS (1.0 km)
- ◌ - CSR DRINKING, IRRIGATION AND LIVESTOCK WATER USE APPLICABLE RADIUS (1.5 km)

CLIENT

Yukon Government
Department of Community Services

eba
A TETRA TECH COMPANY

HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

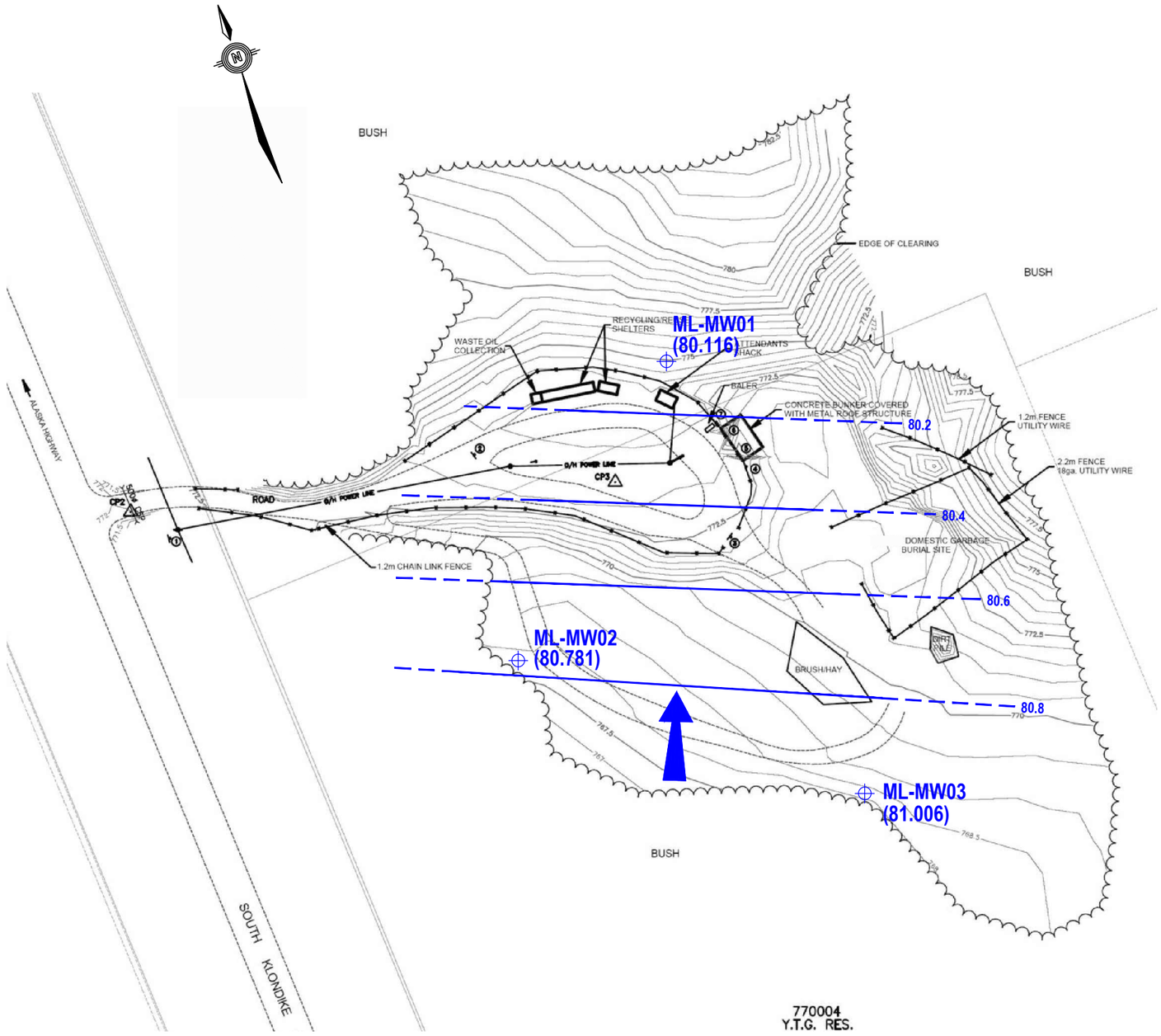
REGIONAL DRAINAGE AND LAND ZONING

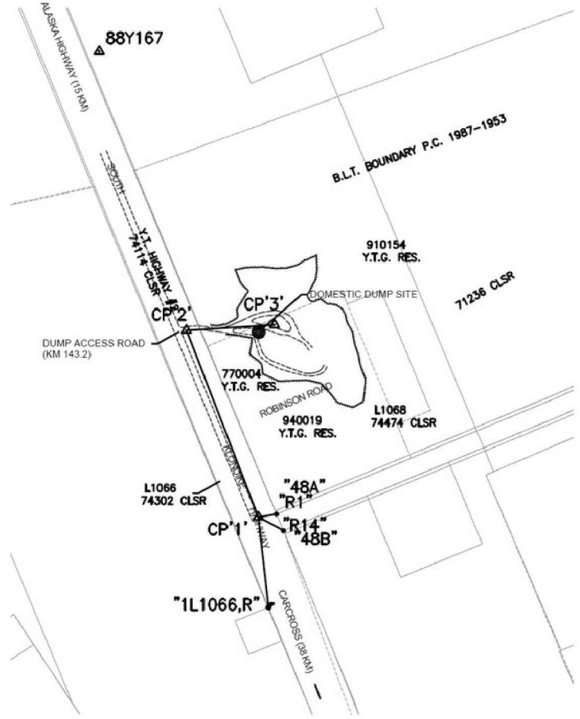
PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 22, 2011

Figure 5

Q:\Whitehorse\Data\0201drawings\Mt. Lorne\W23101317.007 Hydro Assessment\W23101317.007 Fig.6_R0.dwg [FIGURE 6] March 21, 2011 - 11:22:48 am (BY: BUCHAN, CAMERON)





KEY PLAN

LEGEND

- ⌖ - GROUNDWATER MONITORING WELL LOCATION (SHOWN BLUE)
- (86.301) - GROUNDWATER ELEVATION - NOVEMBER 2010
- —86.25— - INFERRED GROUNDWATER ELEVATION CONTOUR
- ➡ - INFERRED GROUNDWATER FLOW DIRECTION

NOTES :

1. THIS PLAN IS NOT TO SCALE
2. THE INFORMATION CONTAINED ON THIS PLAN WAS TAKEN FROM MT. LORNE SOLID WASTE MANAGEMENT PLAN PROVIDED BY ACCESS CONSULTING GROUP IN JULY 2002 AND PRESENTED FOR INFORMATION PURPOSES ONLY. ALL ADDITIONAL INFORMATION WAS ADDED BY EBA AND IS SHOWN IN COLOR.

CLIENT

Yukon Government Community Services

A TETRA TECH COMPANY

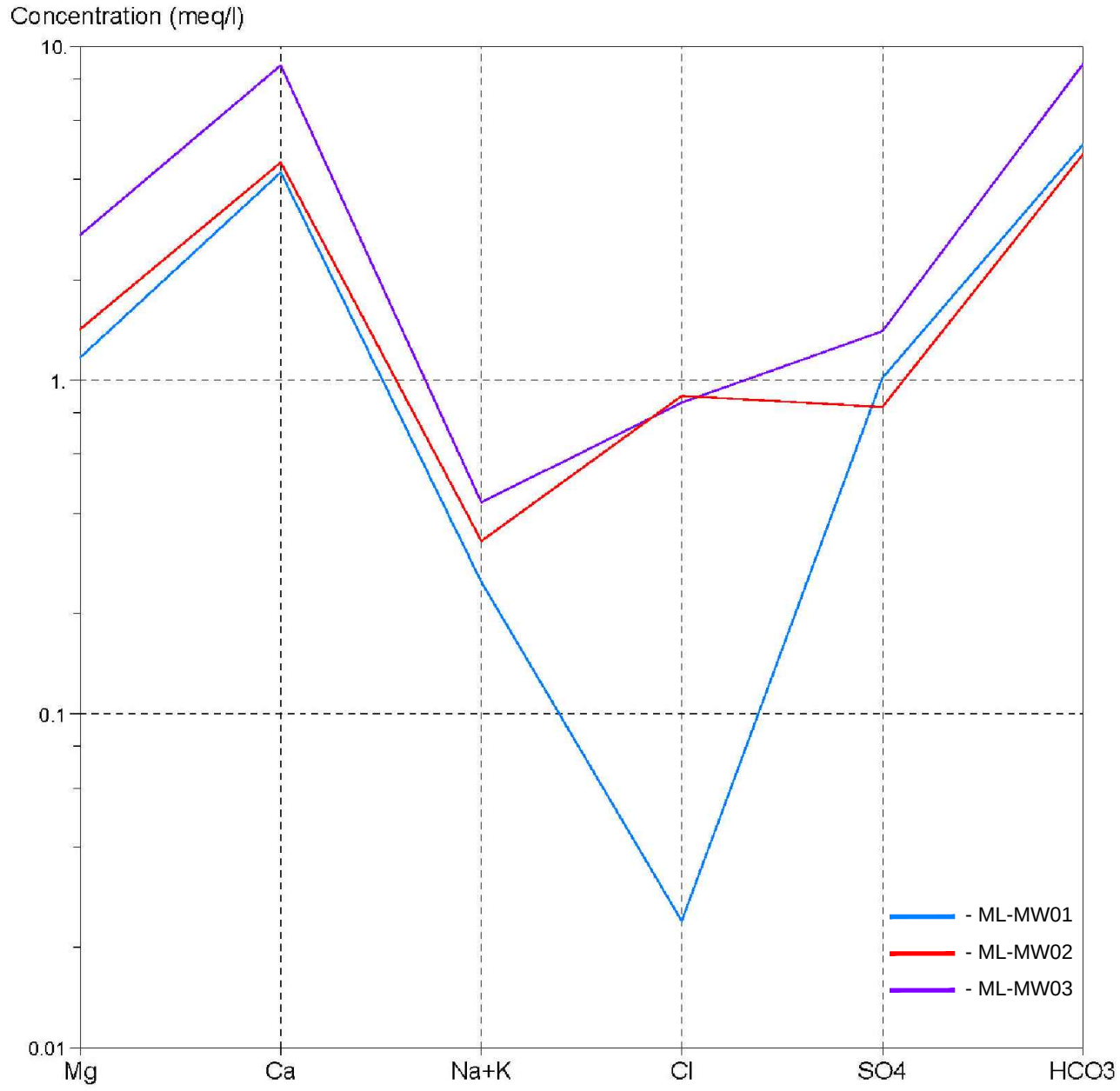
HYDROGEOLOGICAL ASSESSMENT MT LORNE WASTE DISPOSAL FACILITY

GROUNDWATER ELEVATION CONTOURS (NOVEMBER 2010)

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 17, 2011

Figure 6



LEGEND

- ML-MW01
- ML-MW02
- ML-MW03

CLIENT

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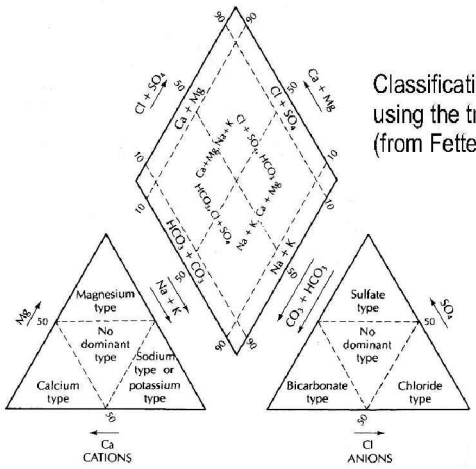
HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

SCHOELLOR PLOT

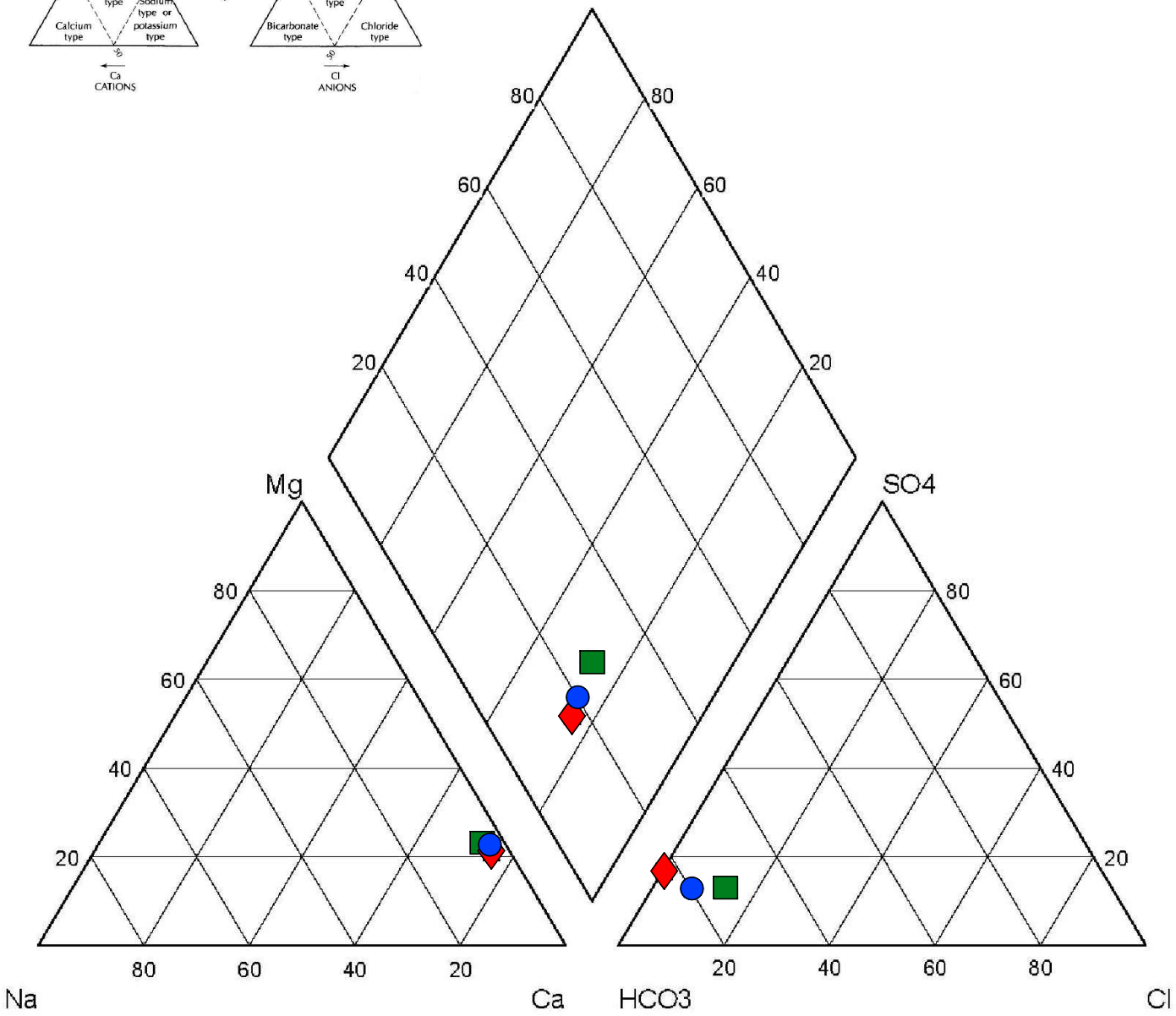
PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 23, 2011

Figure 7



Classification of hydrogeochemical water types using the trilinear Piper diagram (from Fetter, 2001)



LEGEND

- ML-MW01
- ML-MW02
- ML-MW03

CLIENT

Yukon Government
Department of Community Services

eba
A TETRA TECH COMPANY

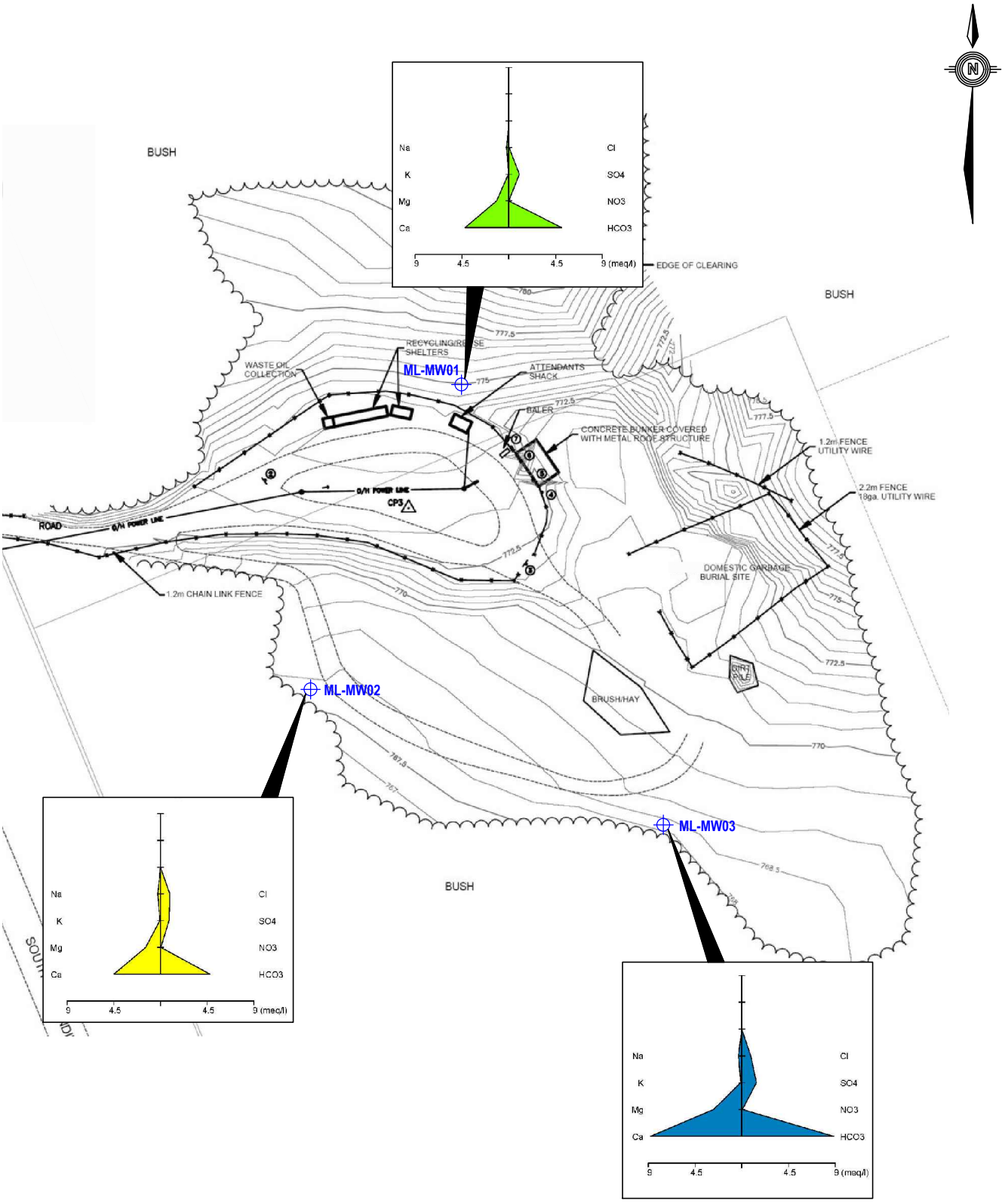
HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

PIPER DIAGRAM

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 23, 2011

Figure 8



LEGEND

⊕ - GROUNDWATER MONITORING WELL LOCATION

CLIENT

Yukon Government Community Services

eba A TETRA TECH COMPANY

HYDROGEOLOGICAL ASSESSMENT
MT LORNE WASTE DISPOSAL FACILITY

STIFF DIAGRAMS

PROJECT NO.	DWN	CKD	REV
W23101317.007	CB	AJS	0

OFFICE	DATE
EBA-WHSE	February 23, 2011

Figure 9

APPENDIX A

APPENDIX A EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA’s client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

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2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

APPENDIX B MOUNT LORNE SOLID WASTE DISPOSAL FACILITY PERMIT

Yukon
Environment

Permit No: 80-009

WASTE DISPOSAL FACILITY PERMIT

Issued for the Operation of Waste Disposal Facilities Pursuant to
Part 6 of the *Environment Act*, s. 8 of the *Solid Waste Regulations*, s. 12 of the
Air Emissions Regulations, and s. 8 of the *Special Waste Regulations*

Permittee: Department of Community Services, Government of Yukon

Mailing Address: P.O. Box 2703 (C-9), Whitehorse, YT, Y1A 2C6

Site Locations: Waste disposal facilities listed in Schedule A

Phone/Fax: (867) 667-8684 / (867) 393-6216

Authorized Representative: Paul Moore

Email: paul.moore@gov.yk.ca

Effective Date: January 1, 2010

Expiry Date: December 31, 2011

Scope of Authorization: In accordance with your application, you are authorized to:

a. operate a waste disposal facility;
b. operate a special waste management facility for the acceptance, storage, and transportation of special waste generated by households, waste oil, waste batteries, waste paints, waste solvents, and waste fuels; and
c. open burn solid waste in an amount greater than 5 kilograms per day

at the above site locations (the "site" or "sites"), as set out in the terms and conditions of this permit.

Dated this ____ day of _____, 2010

_____
Director, Environmental Programs Branch
Environment Yukon

PART 1. GENERAL PROVISIONS

1.1 DEFINITIONS

1. In this permit,

"Act" means the *Environment Act*, R.S.Y. 2002, c. 76;

"approved plan" means a plan that is submitted by the permittee and approved by an environmental protection officer under this permit and includes any terms and conditions specified by the environmental protection officer in the approval;

"associated personnel" means all employees, contractors and volunteers involved in the permitted activities;

"Branch" means the Environmental Programs Branch, Environment Yukon;

"burning vessel" means a container or structure used for burning solid waste where air intake and combustion temperature are not controlled;

"cell" means a discrete area of a facility into which solid waste is deposited for permanent disposal and includes such areas that are no longer used for that purpose;

"dangerous wildlife" means wildlife so defined in the *Wildlife Act*, R.S.Y. 2002, c. 229;

"landfill" means a facility authorized to accept waste for final disposal, and does not include transfer stations or modified transfer stations;

"facility" means a special waste management facility and any of the following waste disposal facilities: a landfill, a modified transfer station, and a transfer station;

"groundwater receptor" means a well or receiving water body into which groundwater flows;

"head office" means the office of the permittee located in Yukon;

"listed special waste" means special waste generated by a household, waste oil, waste batteries, waste paints, waste solvents, and waste fuels;

"modified transfer station" means a waste disposal facility where construction and demolition waste and/or animal carcasses are permanently disposed on site and all other material is removed from the site for recycling or disposal at another location;

"Regulations" means the *Air Emissions Regulations*, O.I.C. 1998/207, the *Solid Waste Regulations*, O.I.C. 2000/11, and the *Special Waste Regulations*, O.I.C. 1995/047;

"service area" means the population that is anticipated to be served by a facility;

"texas gate" means an electrified metal grid on the ground that can be passed over by vehicles but will prevent entry by animals;

"transfer station" means a waste disposal facility where no solid waste is permanently disposed on site, and where all solid waste is removed from the site for recycling or disposal at another location;

"vehicle" has the same meaning as in the *Motor Vehicles Act*, R.S.Y. 2002, c. 153; and

"waste manifest" means the shipping document required to be completed by the permittee as set out in this permit in the form approved by an environmental protection officer.

2. Any term not defined in this permit that is defined in the Act or the Regulations has the same meaning as in the Act or the Regulations.

3. Schedule A forms part of this permit and may be amended in writing by an environmental protection officer from the Branch.

1.2 PLANS

1. The permittee shall develop and maintain a fire safety/emergency plan for each facility which includes notification procedures and a list of emergency phone numbers relevant to each site. All associated personnel involved with the handling or management of any wastes covered by this permit shall be familiar with this plan.

2. The permittee shall submit the following plans for approval no later than March 31, 2010:
   a) an open burning transition plan for each facility where open burning is authorized as set out in Schedule A, which plan shall detail how the permittee will phase out open burning at each site as soon as possible or by January 1, 2012 at the latest; and
   b) a plan for conducting hydrogeological assessments at each facility listed in Schedule A, which plan shall include timelines by which the hydrogeological assessment at each site will be completed.

3. The permittee shall submit the following plans for approval no later than June 30, 2010:
   a) a site inspection and maintenance plan for each facility; and
   b) a spill response plan for each facility.

4. For each facility constructed on permafrost, the permittee shall submit for approval a ground temperature monitoring plan for that facility with the hydrogeological assessment report. For those facilities not constructed on permafrost, the permittee shall submit a statement to that effect with the hydrogeological assessment report.

5. Prior to constructing a new cell at any facility, the permittee shall submit a new cell plan for approval.

6. No later than six months prior to the planned closure of a facility the permittee shall submit a facility closure plan for approval.

7. Prior to undertaking any work toward the partial or full closure of a cell, including progressive capping and reclamation of active cells, the permittee shall submit a cell closure plan for approval.

8. When the permittee is required to submit a plan under this permit, the permittee shall:
   a) ensure the plan meets the requirements for that type of plan as directed by an environmental protection officer from the Branch in writing;
   b) submit the plan in writing to an environmental protection officer from the Branch;
   c) not undertake any of the activities described in the plan until the plan is approved in writing by an environmental protection officer from the Branch; and
   d) implement the plan as of the date it is approved in writing by an environmental protection officer from the Branch.

9. If the permittee wants to amend an approved plan, the permittee shall submit the proposed amendment to an environmental protection officer from the Branch as if the amendment were a plan under paragraph 1.2.8 of this permit.

10. If an environmental protection officer from the Branch directs in writing and with reasons that an approved plan be amended, the permittee must prepare the required amendment and submit it as if it were a plan referred to in paragraph 1.2.8 of this permit.

1.3 RECORDS

1. The permittee shall keep all records required under this permit in a format acceptable to an environmental protection officer for a minimum of three years and make them available for inspection by an environmental protection officer upon request.

2. The permittee shall keep the following records at the head office:
   a) a copy of each plan submitted under this permit, and any amendments to and approvals of each plan;
   b) all inspections carried out for each facility under this permit (including the name of the person conducting the inspection, the date of each inspection, any observations recorded during the inspection, actions taken as a result of those observations, and the date each action was taken);
   c) results of surface water and groundwater testing conducted at each facility, where applicable (including interpretations of monitoring results to determine trends in contaminant levels over time);
   d) results of hydrogeological assessments undertaken at each facility;
   e) any spills or leaks occurring at any facility, including substance involved, estimated quantity, date of observation of the spill or leak, and clean-up procedures implemented;
   f) the types of special wastes segregated at each facility, their estimated volumes, and their storage location(s) at each facility;
   g) any and all deficiencies remedied in accordance with paragraph 1.4.4, and how and when they were remedied; and
   h) a copy of any waste manifests used to transport special wastes to or from the facilities.

3. The permittee shall permanently retain at the head office an updated, detailed site plan for each facility showing the locations of all active and closed cells and segregation

areas at the facility and shall produce this site plan upon request for inspection by an environmental protection officer.

1.4 OTHER

1. The permittee shall ensure that all associated personnel at each facility:
   a) have access to a copy of this permit;
   b) are knowledgeable of the terms and conditions of this permit; and
   c) receive the appropriate training for the purposes of carrying out the requirements of this permit.

2. The permittee shall provide notice in writing to an environmental protection officer from the Branch prior to any significant change of circumstances at the sites, including without limitation:
   a) closure of a facility;
   b) change of ownership of the site;
   c) the opening of a new cell;
   d) changing from a burn to a no-burn or from a no-burn to a burn operation; and
   e) change to the mailing address or phone number of the permittee.

3. Where conflicts exist between this permit, the permit application or any plans, this permit shall prevail.

4. If an inspection reveals that a facility is in any way not in compliance with this permit or approved plans, or that surface water run-off is negatively affecting the structure or physical integrity of a facility, the permittee shall repair the damage or take other actions as required to bring the facility into compliance.

PART 2. SOLID WASTE

2.1 OPERATIONS

1. The permittee shall not operate a landfill for a service area greater than 13,000 people.

2. The permittee shall ensure that all solid waste left at a facility that is not separated for recycling or transfer off-site is deposited into a cell.

3. The permittee shall ensure that all domestic waste left at a transfer station or modified transfer station is deposited into a transfer bin.

4. No solid waste shall be burned or buried at a transfer station.

5. The permittee shall ensure that the bottoms and sides of all transfer bins at transfer stations and modified transfer stations are sealed and maintained to prevent the release of solid waste into the natural environment.

6. The permittee shall divert surface water run-off away from any area of a facility where waste is stored or deposited.

7. The permittee shall ensure that animal carcasses and animal parts are buried at a landfill or modified transfer station at least 2 metres below the surface of the land. If animal carcasses or parts are discovered at a transfer station, the permittee shall ensure that they are immediately removed and transported to a landfill or modified transfer station.

2.2 SIGNAGE AND SEGREGATION

1. The permittee shall install and maintain signs at each facility containing the following information:
   a) entrance and exit location(s) for the facility; and
   b) telephone contact numbers for the facility manager, the local fire protection services, and the district conservation officer.

2. The permittee shall:
   a) establish and maintain separate areas for the deposit of each type of solid waste accepted at each facility;
   b) install and maintain appropriate signs identifying each of these areas; and
   c) ensure that each facility is maintained to enable vehicles to access each of these areas.

2.3 FENCING AND SECURITY

1. The permittee shall install and maintain, in accordance with the manufacturer's operating and maintenance instructions and recommendations, an electric exclusion fence(s) and gates that encompass the putrescibile waste disposal areas at each facility and any other areas of the facilities that become or may become an attractant to animals. The fence and gates shall be adequate to prevent dangerous wildlife from entering the encompassed areas of the facility.

2. The fences and gates referenced in paragraph 2.3.1 above must be:
   a) activated continuously from May 1 to October 31 of each year;
   b) activated between November 1 and April 30 of each year if there are tracks or other signs of dangerous wildlife attempting to access the facility; and
   c) activated upon the written request of an environmental protection officer.

3. For those facilities that are open to the public when staff are not on site, the permittee shall install and maintain a texas gate at each entrance and exit of each facility.

4. For those facilities that are closed to the public when staff are not on site, the permittee shall install and maintain either a texas gate or an electrified rigid swinging gate at each entrance and exit of each facility. Any rigid swinging gates are to be closed and secured every time staff leave the facility.

5. The permittee shall install and maintain fencing or other comparable measures at each facility to prevent the release of solid waste from the facility.

6. The permittee shall install and maintain signs marking the areas, if any, of each facility that are not to be accessed by the public and erect or construct fencing, gates or other similar structures to prevent public access to these areas.

2.4 WASTE COVER

1. At any facility where solid waste is burned or incinerated outside of a burning vessel or incinerator, the permittee shall cover burned solid waste:
   a) every month for facilities with service areas of 100 or more people; or
   b) every two months for facilities which with service areas of less than 100 people,
   with soil or other comparable material to a depth of 0.1 metres, or any other depth that an environmental protection officer considers necessary to prevent windblown solid waste and attraction of birds.

2. At any facility where solid waste is burned in a burning vessel or incinerated, when the permittee removes unburned solid waste and ash from the burning vessel or incinerator after burning, it shall be placed in a cell at the facility and immediately covered with soil or other comparable material to a depth of 0.1 metres, or any other depth that an environmental protection officer considers necessary to prevent windblown solid waste and attraction of birds.

3. At any facility where solid waste will not be burned or transferred off-site, the permittee shall cover any exposed solid waste with soil or other comparable material to a depth of 0.1 metres or any other depth that an environmental protection officer considers necessary to prevent windblown solid waste and attraction of birds:
   a) every day the facility is used if the facility has a service area of more than 5,000 people;
   b) every seven days if the facility has a service area of 500 to 5,000 people;
   c) every 21 days if the facility has a service area of less than 500 people; or
   d) after every 0.5 metres of solid waste is deposited,
   whichever occurs first.

4. Paragraphs 2.4.1, 2.4.3 and 2.4.3 do not apply between November 15 and April 15 of each year if soil or other comparable cover material cannot reasonably be obtained.

2.5 OPEN BURNING OF SOLID WASTE

1. The permittee shall ensure that solid wastes are only burned at those facilities where open burning is specifically authorized as set out in Schedule A.

2. At those facilities where open burning is permitted as set out in Schedule A , the permittee shall:

a) ensure, to the extent practicable, that solid waste to be open burned is dry and shall only burn wet solid waste when to delay such burning may result in attraction of animals or creation of a fire hazard;
b) prior to open burning the solid waste, separate combustible solid waste from any underlying grass or peat layer;
c) not allow solid waste to smoulder (burn and smoke without flame) during an open burn;
d) not use waste oil, tires or aviation gasoline to assist with the incineration of solid waste during an open burn;
e) not use any waste petroleum products to assist with the open burning of solid waste without prior approval to do so in writing by an environmental protection officer from the Branch;
f) prevent runoff water from entering the active open burning area; and
g) not open burn tires or treated wood products, including wood products that have been treated with creosote, chromium copper arsenate (CCA), pentachlorophenol (PCP), or any type of paint.

2.6 MONITORING

1. The permittee shall ensure that samples are taken from all active groundwater monitoring wells at each facility in accordance with protocols for groundwater sampling approved by the Branch. The water level in all monitoring wells shall be recorded at each sampling event. Samples shall be taken twice each year the permit is in effect, once in the spring and once in the late summer, or as otherwise directed in writing by an environmental protection officer.

2. The permittee shall ensure that samples are taken, using generally-accepted sampling practice, from all downgradient surface water bodies within 1 km of each facility that are identified in the hydrogeological assessment as being potentially impacted by the facility. Samples shall be taken concurrently with each groundwater sampling event or as otherwise directed in writing by an environmental protection officer.

3. All groundwater samples shall be analyzed for the following parameters:
   - Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Nitrate Nitrogen, Nitrite Nitrogen, Phosphate)
   - Dissolved metals
   - Mercury
   - Hardness
   - Alkalinity
   - Carbonate
   - Bicarbonate
   - pH
   - Total dissolved solids
   - Ammonia
   - Dissolved organic carbon
   - Volatile organic compounds

- Chemical oxygen demand
- Total Kjeldahl nitrogen
- EPH_{W10-19} (Extractable Petroleum Hydrocarbons in Water, C10-C19)
- VH_{W6-10} (Volatile Petroleum Hydrocarbons in Water, C6-C10)
- BTEX (Benzene, Toluene, Ethylbenzene, and Total Xylenes)
- PAHs (Polycyclic Aromatic Hydrocarbons)
- Faecal coliforms (for those sites at which biosolids or liquids are deposited)

4. All surface water samples shall be analyzed for the following parameters:
   - Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Nitrate Nitrogen, Nitrite Nitrogen, Phosphate)
   - Total metals
   - Mercury
   - Hardness
   - Alkalinity
   - Carbonate
   - Bicarbonate
   - pH
   - Total dissolved solids
   - Ammonia
   - Dissolved organic carbon
   - Chemical oxygen demand
   - Biochemical oxygen demand
   - Total Kjeldahl nitrogen
   - EPH_{W10-19} (Extractable Petroleum Hydrocarbons in Water, C10-C19)
   - VH_{W6-10} (Volatile Petroleum Hydrocarbons in Water, C6-C10)
   - BTEX (Benzene, Toluene, Ethylbenzene, and Total Xylenes)
   - PAHs (Polycyclic Aromatic Hydrocarbons)
   - Faecal coliforms (for those sites at which biosolids or liquids are deposited)

5. All water samples required by this permit shall be analyzed at a laboratory that is accredited as conforming to ISO/IEC 17025 by an accrediting body that conforms to ISO/IEC 17011.

6. The results of the analyses required under sections 2.6.3 and 2.6.4 shall be submitted to the Branch by January 31st of the year following that in which the samples were taken.

7. If water quality monitoring reveals that surface or groundwater downgradient of the facility contains contaminants in excess of the standards in the *Contaminated Sites Regulation*, the permittee shall conduct additional monitoring or develop and implement an adaptive management plan to address the contamination, as directed in writing by an environmental protection officer.

PART 3. SPECIAL WASTE

3.1 STORAGE AND HANDLING

1. The permittee shall not handle special wastes other than listed special wastes.

2. The permittee shall not discard, destroy, treat, process, incinerate, or recycle special wastes, except for mixing or dilution authorized by an environmental protection officer pursuant to section 3.1.3(k) below.

3. At facilities where special wastes are accepted, the permittee shall:
   a) cover or store out of inclement weather all drums and other portable containers containing special wastes;
   b) store all drums and other portable containers containing special wastes off the ground;
   c) immediately remove all special wastes stored in leaking containers or transfer them to intact containers;
   d) to the extent practicable, handle and store special wastes separately from solid waste;
   e) store special wastes in a manner that will prevent incompatible substances from reacting adversely with each other;
   f) post signs identifying examples of common special wastes and phone number(s) and/or website(s) with information on appropriate disposal options for those materials, whether or not those materials are collected onsite;
   g) ensure that all containers used for the storage of special waste are clearly marked to identify what special waste the container is intended to hold;
   h) ensure that containers used for the storage of special waste are made of materials that will not adversely react with the special waste;
   i) not allow any residue at the bottom of a container used for the storage of special wastes to be released to the environment. Such residue shall be collected by the permittee, separated from other waste and treated as a special waste until proven by testing to not be special waste;
   j) not mix waste oil from piston engine aircraft with other waste oil;
   k) only mix or dilute a special waste with any other material where such mixing or dilution is authorized by an environmental protection officer from the Branch as an acceptable treatment/disposal option for the special waste;
   l) keep all containers used to store special waste closed at all times during storage and shall not open, handle or store the container in a manner which may cause it to leak or rupture; and
   m) shall have every closed container that
      (i) has a capacity of more than 230 litres;
      (ii) is designed to be installed in a fixed location; and
      (iii) will contain special waste

      certified by a testing agency recognized by the Standards Council of Canada prior to putting special waste in the container.

3.2 TRANSPORT AND TRANSFER

1. The permittee shall complete a waste manifest documenting each shipment of special wastes from each site. The permittee shall distribute copies of the waste manifest in the manner described thereon.

2. The permittee shall ensure that special wastes are transported to a permitted special waste management facility in the Yukon or another jurisdiction by a carrier permitted in the Yukon to receive and transport the special wastes.

3. The permittee shall ensure that all vehicles operated by the permittee and carrying any special wastes are secured to prevent access by unauthorized persons.

I, **Paul Moore**, certify that I am an authorized representative of the **Department of Community Services**, and that I have read and understood the terms and conditions of this permit.

Paul Moore, Authorized Representative
Department of Community Services

Date

Schedule A: List of Permitted Waste Disposal Facilities

Table 1. Landfills

Site name	Location	Permitted to open burn solid waste
Beaver Creek	Reservation 115K07-038 140°50'17"W, 62°25'18"N	Yes, in burning vessel
Braeburn	Reservation 105E05-015 Lot 1063 Quad 105E/05, 86969 CLSR YT 135°45'34"W, 61°26'7"N	Yes, in burning vessel
Burwash Landing	Reservation 13462 138°53'4"W, 61°18'25"N	Yes, in burning vessel
Canyon	Lot 1042 Quad 115A/14, 85493 CLSR YT 137°9'21"W, 60°50'58"N	Yes, in burning vessel
Champagne	Reservation 115A16-007 Lot 1039 Quad 115A/16, 87076 CLSR YT 136°27'32"W, 60°47'25"N	Yes, in burning vessel
Johnson's Crossing	Lot 1040 Quad 105C/06, 86853 CLSR YT 133°17'9"W, 60°29'34"N	Yes, in burning vessel
Horsecamp Hill	Reservation 115K02-010 140°37'32"W, 62°2'50"N	Yes, in burning vessel
Keno City	135°19'18"W, 63°54'33"N	Yes, in burning vessel
Old Crow	Reservation 116O12-024 139°52'14"W, 67°34'9"N	Yes, in burning vessel
Pelly Crossing	Reservation 115I15-030 136°35'56"W, 62°46'18"N	Yes, in burning vessel
Ross River	Reservation 105F16-008 132°26'40"W, 61°57'44"N	Yes, in burning vessel
Silver City	Reservation 2007-0498 138°20'1"W, 61°1'25"N	Yes, in burning vessel
Stewart Crossing	Reservation 115P07-020 Lot 1026 Quad 115P/07, 86830 CLSR YT 136°39'33"W, 63°20'23"N	Yes, in burning vessel
Upper Liard	Reservation 105A02-120 Lot 1109 Quad 105A/02, 86882 CLSR YT 128°56'56"W 60°3'14"N	Yes, in burning vessel

Table 2. Modified Transfer Stations

Site name	Location	Permitted to open burn solid waste
Carcross	Kilometre 50.7 Tagish Road 134°40'25"W, 60°11'37"N	No
Deep Creek	Reservation 105E03-031 135°13'48"W, 61°4'56"N	No
Destruction Bay	Reservation 115G07-012 138°51'33"W, 61°17'25"N	No
Marsh Lake	Reservation 105D09-030 Lot 1061 Quad 105D/09, 86854 CLSR YT 134°25'46"W, 60°33'53"N	Yes, C&D waste without burning vessel
Mount Lorne	Reservation 770004 134°51'38"W, 60°28'41"N	No
Tagish	Lot 1100 Quad 105D/08 134°17'29"W, 60°16'28"N	No

Table 3. Transfer Stations

Site name	Location	Permitted to open burn solid waste
(N/A)		

APPENDIX C

APPENDIX C MONITORING WELL LOGS

2010 Monitoring Well Program	CLIENT: YG - Department of Community Services	PROJECT NO. - BOREHOLE NO.
Mount Lorne Landfill	DRILL: Geotech MST-Odex	W23101317-ML-MW01
Whitehorse, YT	6704724N; 507653E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	NOTES & COMMENTS	Monitoring well	Depth (ft)
0	SAND - trace gravel, some to trace silt, uniformly graded, very fine to medium grained sand, gravel is 20 mm, subrounded, damp, very loose, orange brown		G1	- cement seal from 0 to 0.3 m		0
1	- no gravel, light brown		G2			5
2	- some silt					
3	- sand is very fine to fine grained					10
4			G3			
5	- moist					15
6						20
7						
8						25
9	- sand is very fine to medium grained		G4			30
10	SAND - trace silt, trace gravel, well graded sand, gravel is 5-10 mm		G5			
11	SAND AND SILT - very fine to medium grained sand, moist, light brown		G6			35
12	SAND - some gravel, well graded sand, gravel is 5-15 mm, moist, medium brown		G7			40
	- no gravel, some silt, uniformly graded, very fine to fine grained sand, light brown					
13	SAND and SILT- trace gravel, poorly graded, very fine to fine grained sand, gravel is 5-10 mm, subrounded, moist, medium brown		G8			45
14						
15	SAND - some silt, some gravel, very fine to coarse grained sand, gravel is 5-15 mm, subrounded, moist, medium brown					50
16	SAND and GRAVEL - trace silt, very fine to coarse grained sand, gravel is 5-15 mm, subrounded, moist, medium brown		G9			
17	GRAVEL - some sand, well graded sand, gravel is 5-20 mm, subrounded to angular, damp, medium brown		G10			55
18						59

EBA Engineering Consultants Ltd.

LOGGED BY: BW	COMPLETION DEPTH: 30.4m
REVIEWED BY: RMM	COMPLETE: 10/29/2010
DRAWING NO:	Page 1 of 2

2010 Monitoring Well Program	CLIENT: YG - Department of Community Services	PROJECT NO. - BOREHOLE NO.
Mount Lorne Landfill	DRILL: Geotech MST-Odex	W23101317-ML-MW01
Whitehorse, YT	6704724N; 507653E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	NOTES & COMMENTS	Monitoring well	Depth (ft)
18	SAND - some gravel, fine to coarse grained sand, gravel is 5-10 mm, subrounded,moist-wet, medium brown		G11			60
19	- very fine to coarse grained sand, light brown		G12			
20						65
21	SAND and GRAVEL - well graded sand, gravel is 5-20 mm, wet, medium brown		G13			
	SAND - gravelly, well graded sand, gravel is 5-20 mm, wet, medium brown					70
22	SAND and GRAVEL - well graded, very fine to coarse grained sand, gravel is 5-20 mm, wet, medium brown					
23						75
24						
	SAND - poorly graded, very fine to medium grained sand, moist, medium brown		G14			80
25	- some gravel, poorly graded, very fine to coarse grained sand, gravel is 5-20 mm, subrounded to angular, moist to wet		G15			
26	SAND and GRAVEL - well graded, very fine to very coarse grained sand, gravel is 5-20 mm, subrounded to angular, moist		G16			85
27						
	SAND - trace gravel, poorly graded, very fine to coarse grained sand, gravel is 5-20 mm, saturated, dark brown		G17			90
28	- saturated		G18			
29						95
30						
	END OF BOREHOLE @ 30.4 m (Hole collapsed to 30.2 m)					100
31	*NOTE:These logs reflect disturbed material recovered from drill return. Particle sizes and shapes (particularly gravel) are affected by drilling process. Cobbles and boulders if present are not indicated through this drilling method. Moisture content is effected by the use of air to recover drill material.*					
32						105
33						
34						110
35						115
36						118

2010 Monitoring Well Program	CLIENT: YG - Department of Community Services	PROJECT NO. - BOREHOLE NO.
Mount Lorne Landfill	DRILL: Geotech MST-Odex	W23101317-ML-MW02
Whitehorse, YT	6704644N; 507589E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	NOTES & COMMENTS	Depth (ft)
0	SAND - uniformly graded, very fine to medium grained sand, damp, very loose, orange brown		G1	- cement seal from 0 to 0.3 m	0
1	- well graded, damp to moist, light brown				
2					5
3	- trace to some silt, moist				10
4	- some silt		G2		
5	- some silt to silty, trace gravel, gravel is 2-10 mm, loose, orange brown		G3		15
6	- SAND and SILT				20
7	SAND and SILT - trace gravel, poorly graded, very fine to medium grained sand, moist, loose, orange brown				
8	- some silt, trace gravel, well graded sand, gravel 5-15 mm		G4		25
9					30
10	- silty, no gravel, very fine to medium grained sand - some silt, some gravel, well graded sand, gravel is 5-30 mm		G5		
11	- light brown				35
12					40
13	SAND and SILT - uniformly graded, very fine to fine grained sand, moist, light brown		G6		
14	SAND - some silt, some gravel, well graded sand, gravel is 5-20 mm, rounded to subangular, wet, orange brown		G7		45
15					50
16			G8		
17	SAND - some gravel, some to trace silt, well graded sand, gravel is 5-20 mm, rounded to angular, wet, orange brown - light brown		G9		55
18					60
19	- saturated		G10		
20	SAND and GRAVEL - some silt, well graded sand, gravel is 2-20 mm, rounded to subangular, saturated		G11		65
21	SAND - some silt, trace gravel, poorly graded, very fine to medium grained sand, gravel is 5-20 mm, rounded to subangular, saturated - silty, trace to no gravel		G12 G13		70
22	END OF BOREHOLE @ 21.3 m (Hole collapsed to 18.9 m)				
23	*NOTE:These logs reflect disturbed material recovered from drill return. Particle sizes and shapes (particularly gravel) are affected by drilling process. Cobbles and boulders if present are not indicated through this drilling method. Moisture content is effected by the use of air to recover drill material.*				75
24					80
25					82

Monitoring well

EBA Engineering Consultants Ltd.

LOGGED BY: BW	COMPLETION DEPTH: 21.3m
REVIEWED BY: RMM	COMPLETE: 10/28/2010
DRAWING NO:	Page 1 of 1

2010 Monitoring Well Program	CLIENT: YG - Department of Community Services	PROJECT NO. - BOREHOLE NO.
Mount Lorne Landfill	DRILL: Geotech MST-Odex	W23101317-ML-MW03
Whitehorse, YT	6704603N; 507657E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	NOTES & COMMENTS	Monitoring well	Depth (ft)
0	SAND - trace silt, poorly graded, medium to very coarse grained sand, compact, damp, yellow brown		G1	SEASONALLY FROZEN - cement seal from 0 to 0.3 m		0
1	SILT - sandy, poorly graded, very fine to medium grained sand, firm, moist, orange-brown to dark brown		G2			5
2	SAND - poorly graded, very fine to medium grained sand, loose, moist to wet, yellow brown					
3	- trace gravel, gravel is 5-20 mm, subrounded to angular					10
4	- becomes wet					
5	- some silt		G3			15
6						
7	- some gravel		G4			20
8	- no gravel, trace silt, uniformly graded					25
9						
10	- some gravel to gravelly, well graded, very fine to very coarse grained sand, medium brown		G5			30
11						35
12			G6			40
13	SAND and GRAVEL - trace silt, well graded, very fine to very coarse grained sand, subrounded to angular, gravel is 5-15 mm, wet, medium brown					
14						45
15	SAND - some gravel, very fine to medium grained sand, gravel is 5-15 mm, subrounded to angular, wet medium brown, medium brown					50
16	- very fine to very coarse grained sand					
17	SAND and GRAVEL - well graded, very fine to very coarse grained sand, gravel is 5-25 mm, subrounded to subangular, wet, medium brown		G7			55
18	- very fine to medium grained sand					60
19	SAND - well graded sand, wet to saturated, medium brown					
20	SAND and SILT -poorly graded, very fine to medium grained sand, wet, medium brown		G8			65
21						
	END OF BOREHOLE 21.0 m					70
22						
23	*NOTE:These logs reflect disturbed material recovered from drill return. Particle sizes and shapes (particularly gravel) are affected by drilling process. Cobbles and boulders if present are not indicated through this drilling method. Moisture content is effected by the use of air to recover drill material.*					75
24						80
25						82

EBA Engineering Consultants Ltd.	LOGGED BY: BW	COMPLETION DEPTH: 21m
	REVIEWED BY: RMM	COMPLETE: 10/29/2010
	DRAWING NO:	Page 1 of 1

APPENDIX D

APPENDIX D GROUNDWATER WELL DEVELOPMENT AND SAMPLING LOGS

Groundwater Development and Purging/Sampling Sheet

☑ Development
☐ Purge/Sample

WELL NO.: ML-MW03
LOCATION: Mount Lorne
WEATHER: Cloudy
TEMPERATURE: 2°C

JOB NO.: W2310317.004
COMPLETED BY: Breanne
DATE: Oct 29
TIME: 9:30 am

MONITORING WELL INFORMATION

One well volume: 4.5

Depth to Water Below Top of Casing: A 21.63 (metres) (B-A)*2.0 = 10.3 litres -for a 51mm (2.0 inch) diameter well
Depth to Bottom of Well Below Top of Casing: B 18.74 (metres) (B-A)*1.1 = — litres -for a 38mm (1.5 inch) diameter well
Diameter Standpipe: C 2" (mm) Product Thickness: — (by probe or paste?)

EQUIPMENT LIST

pH and Temp. Meter: Model 1 EBA Serial No. — Calibration Buffers: ☐ 4 ☐ 7 ☑ 10
Conductivity Meter: Model — Serial No. — Calibration Solutions: — and —
Dissolved Oxygen Meter: Model 1 EBA Serial No. —
Turbidity Meter: Model — Serial No. —

Pump:	☐ none	☐ Waterra	☐ Peristaltic	☐ Submersible
Bailer:	☐ none	☐ Stainless Steel	☐ Teflon	☑ PVC
Filter:	☐ none	☐ Waterra in-line	☐ Vacuum (disposal)	☐ Vacuum (re-usable)

WELL DEVELOPMENT/PURGING

Purge volume: Well vol x 3 10 volumes = 30 litres Method: Hand bailer
Flow Rate — L/min Volume: — Start: — Finish: —
multimeter wont turn on

TIME	VOLUME REMOVED (L)	ORG. VAP. (PPM)	TEMP (oC)	pH (UNITS)	COND. (uS/cm)	TURBIDITY (NTU)	DIS.02 (mg/L) or %	REMARKS (colour, odour, sheen, brittle film, etc.)
12:00	1L		3.8	7.63	1082	—	1.57/4.7	slight brown
12:15	10L		3.2	7.85	795		1.9/3.7	very brown
12:27	20L		3.1	7.77	784		2.19/3.7	"
12:40	30		3.1	7.89	757		2.34/3.3	"

Comments (Recovery rate, etc.):

SAMPLING Water Odour: ☐ no ☐ yes (describe) Sheen ☐ no ☐ yes (describe)
Turbidity: NTU Clear: 1 2 3 4 5 6 7 8 9 10 Very Silty
or 1 – 10 relative scale (circle as appropriate):
Other:
NAPL Information (odour, colour, etc.)

BOTTLE				Size:	40ml	100mL	250mL	500mL	1L	2L	4L	Filtered		Preservatives
1	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
2	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
3	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
4	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
5	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
6	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
7	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—
8	☐	Plastic	☐ Glass		—	—	—	—	—	—	—	☐ Yes	☐ No	—

Groundwater Development and Purging/Sampling Sheet

☐ Development
☑ Purge/Sample

WELL NO.: ML-MW01
LOCATION: Mount Lorne
WEATHER: cold, clear
TEMPERATURE: -15

JOB NO.: W2301317.007
COMPLETED BY: Breanne / Kristen
DATE: Nov 22
TIME: 2:45 pm

MONITORING WELL INFORMATION

Depth to Water Below Top of Casing: A 28.375 (metres) — hard to tell
Depth to Bottom of Well Below Top of Casing: B 30.94 (metres)
Diameter Standpipe: C 2" (mm) ~ 2.5

One well volume: 4.5 <
(B-A)*2.0 = 11 litres -for a 51mm (2.0 inch) diameter well
(B-A)*1.1 = — litres -for a 38mm (1.5 inch) diameter well
Product Thickness: — (by probe or paste?)

EQUIPMENT LIST

pH and Temp. Meter: Model EBA 1 Serial No. — Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Conductivity Meter: Model — Serial No. — Calibration Solutions: — and —
Dissolved Oxygen Meter: Model — won't turn on Serial No. —
Turbidity Meter: Model — Error Serial No. —

Pump: ☐ none ☐ Waterra ☐ Peristaltic ☐ Submersible
Bailer: ☐ none ☐ Stainless Steel ☐ Teflon ☐ PVC ☑ plastic
Filter: ☐ none ☐ Waterra in-line ☐ Vacuum (disposal) ☐ Vacuum (re-usable)

WELL DEVELOPMENT/PURGING

Purge volume: Well vol x 3 volumes = 33L litres Method: Hand bail
Flow Rate — L/min Volume: — Start: — Finish: —

TIME	VOLUME REMOVED (L)	ORG. VAP. (PPM)	TEMP (oC)	pH (UNITS)	COND. (uS/cm)	TURBIDITY (NTU)	DIS.O2 (mg/L) or %	REMARKS (colour, odour, sheen, brittle film, etc.)
2:15	1L		0	8.9	1	—		brown
3:19	11L		NR	8.16	NR			"
3:50	22L		1.7	8.17	362			"
4:00	33		1.9	8.11	NR			"
								NR No results, multimeter cold

Comments (Recovery rate, etc.):

SAMPLING Water Odour: ☑ no ☐ yes (describe) ____ Sheen ☑ no ☐ yes (describe) ____
Turbidity: — NTU Clear: 1 2 3 4 5 6 7 (8) 9 10 Very Silty
or 1 – 10 relative scale (circle as appropriate):
Other:
NAPL Information (odour, colour, etc.)

BOTTLE					Size:	40ml	100mL	250mL	500mL	1L	2L	4L	Filtered		Preservatives
1	☐	Plastic	☑	Glass		3							☐ Yes	☐ No	—
2	☐	Plastic	☑	Glass						1			☐ Yes	☐ No	—
3	☑	Plastic	☐	Glass					1				☐ Yes	☐ No	—
N 4	☑	Plastic	☐	Glass				1					☑ Yes	☐ No	HNO_3
N 5	☑	Plastic	☐	Glass									☐ Yes	☐ No	HCl
DOC 6	☑	Plastic	☐	Glass									☐ Yes	☐ No	—
N 7	☑	Plastic	☐	Glass									☐ Yes	☐ No	H_2SO_4
COD 8	☐	Plastic	☐	Glass									☐ Yes	☐ No	H_2SO_4

Groundwater Development and Purging/Sampling Sheet

☐ Development
☑ Purge/Sample

WELL NO.: ML-MW02
LOCATION: Mount Lorne
WEATHER: cold, clear
TEMPERATURE: -15

JOB NO.: W2310 1317.007
COMPLETED BY: NOV 22, 2010
DATE: Breanne / Kristen
TIME: 1:00

MONITORING WELL INFORMATION

Depth to Water Below Top of Casing: A 18.04 (metres)
Depth to Bottom of Well Below Top of Casing: B 19.35 (metres)
Diameter Standpipe: C 2" (mm)
B-A = 1.31

One well volume:
(B-A)*2.0 = ~6 litres -for a 51mm (2.0 inch) diameter well
(B-A)*1.1 = — litres -for a 38mm (1.5 inch) diameter well
Product Thickness: — (by probe or paste?)

EQUIPMENT LIST

pH and Temp. Meter: Model EBA 1 Serial No. — Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Conductivity Meter: Model — Serial No. — Calibration Solutions: — and —
Dissolved Oxygen Meter: Model EBA 1 Serial No. —
Turbidity Meter: Model Error Serial No. —

Pump: ☐ none ☐ Waterra ☐ Peristaltic ☐ Submersible
Bailer: ☐ none ☐ Stainless Steel ☐ Teflon ☐ PVC / plastic
Filter: ☐ none ☐ Waterra in-line ☐ Vacuum (disposal) ☐ Vacuum (re-usable)

WELL DEVELOPMENT/PURGING

Purge volume: Well vol x 6 3 volumes = 18 litres Method: Bailing
Flow Rate — L/min Volume: — Start: — Finish: —

TIME	VOLUME REMOVED (L)	ORG. VAP. (PPM)	TEMP (oC)	pH (UNITS)	COND. (uS/cm)	TURBIDITY (NTU)	DIS.O2 (mg/L) or %	REMARKS (colour, odour, sheen, brittle film, etc.)
1:39	1L		1.4	8.80	not working			Turbid. brown
1:45	7L		1.5	8.70	"			
	12L		1.4 ~~6.88~~	8.89	"			
1:58	18L		1.7	8.66	"			
			~~8.66~~			~27 not working		

Comments (Recovery rate, etc.):

SAMPLING Water Odour: ☑ no ☐ yes (describe) ____ Sheen ☑ no ☐ yes (describe) ____
Turbidity: — NTU Clear: 1 2 3 4 5 6 7 (8) 9 10 Very Silty
or 1 – 10 relative scale (circle as appropriate):
Other:
NAPL Information (odour, colour, etc.)

BOTTLE					Size:	40ml	100mL	250mL	500mL	1L	2L	4L	Filtered		Preservatives
1	☑	Plastic	☐	Glass		—	—	—	1	—	—	—	☐ Yes	☐ No	
M 2	☑	Plastic	☐	Glass		—	—	1	—	—	—	—	☑ Yes	☐ No	
N 3	☑	Plastic	☐	Glass		—	—	1	—	—	—	—	☐ Yes	☑ No	H_2SO_4
COD 4	☑	Plastic	☐	Glass		—	—	1	—	—	—	—	☐ Yes	☐ No	"
N 5	☑	Plastic	☐	Glass		—	—	1	—	—	—	—	☐ Yes	☐ No	HCL
c-N 6	☐	Plastic	☐	Glass		—	—	1	—	—	—	—	☐ Yes	☐ No	
7	☐	Plastic	☑	Glass		2	—	—	—	—	—	—	☐ Yes	☐ No	BTEX
8	☐	Plastic	☑	Glass		—	—	—	—	1	—	—	☐ Yes	☐ No	

Blind dup.

Groundwater Development and Purging/Sampling Sheet

☐ Development
☑ Purge/Sample

WELL NO.: ML - 03
LOCATION: Mount Lorne
WEATHER: Sunny, clear, cold
TEMPERATURE: -15°C
JOB NO.: W2310317
COMPLETED BY: Breanne & Kristie
DATE: Nov 22, 2010
TIME: —

MONITORING WELL INFORMATION

Depth to Water Below Top of Casing: A 19.674 (metres)
Depth to Bottom of Well Below Top of Casing: B 21.60 (metres)
Diameter Standpipe: C 2" (mm)

One well volume: 8.5
(B-A)*2.0 = ~~3.847~~ litres -for a 51mm (2.0 inch) diameter well
(B-A)*1.1 = — litres -for a 38mm (1.5 inch) diameter well
Product Thickness: — (by probe or paste?)

EQUIPMENT LIST

pH and Temp. Meter: Model EBA 1 Serial No. — Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Conductivity Meter: Model — Serial No. — Calibration Solutions: — and —
Dissolved Oxygen Meter: Model EBA 1 Serial No. —
Turbidity Meter: Model error Serial No. —

Pump: ☐ none ☐ Waterra ☐ Peristaltic ☐ Submersible
Bailer: ☐ none ☐ Stainless Steel ☐ Teflon ☐ PVC Plastic ☑
Filter: ☐ none ☐ Waterra in-line ☐ Vacuum (disposal) ☐ Vacuum (re-usable)

WELL DEVELOPMENT/PURGING

Purge volume: Well vol x 3 volumes = ~24 litres Method: Bail
Flow Rate — L/min Volume: — Start: — Finish: —

TIME	VOLUME REMOVED (L)	ORG. VAP. (PPM)	TEMP (oC)	pH (UNITS)	COND. (uS/cm)	TURBIDITY (NTU)	DIS.02 (mg/L) or %	REMARKS (colour, odour, sheen, brittle film, etc.)
11:15	2 L		1.1	7.76	14	Error		brown, murky
11:24	10 L		1.6	7.87	53	"	won't turn on	"
11:35	24 L		2.1	7.81	267	"	"	"

Comments (Recovery rate, etc.):

SAMPLING Water Odour: ☐ no ☐ yes (describe) — Sheen ☑ no ☐ yes (describe) —
Turbidity: — NTU
or 1 – 10 relative scale (circle as appropriate): Clear: 1 2 3 4 5 6 7 (8) 9 10 Very Silty
Other:
NAPL Information (odour, colour, etc.)

BOTTLE					Size:	40ml	100mL	250mL	500mL	1L	2L	4L	Filtered		Preservatives
N	1	☑ Plastic	☐ Glass			—	—	1	—	—	—	—	☐ Yes	☑ No	HCl
M	2	☑ Plastic	☐ Glass			—	—	1	—	—	—	—	☐ Yes	☐ No	NO_3
N	3	☑ Plastic	☐ Glass			—	—	1	—	—	—	—	☐ Yes	☐ No	H_2SO_4
COD	4	☑ Plastic	☐ Glass			—	—	1	—	—	—	—	☐ Yes	☐ No	H_2SO_4
	5	☑ Plastic	☐ Glass			—	—	—	1	1	—	—	☐ Yes	☐ No	—
	6	☐ Plastic	☑ Glass			—	—	—	—	1	—	—	☐ Yes	☐ No	—
	7	☐ Plastic	☑ Glass			3	—	—	—	—	—	—	☐ Yes	☐ No	BTEX
DOC	8	☑ Plastic	☐ Glass			—	—	1	—	—	—	—	☐ Yes	☐ No	—

APPENDIX E

APPENDIX E LABORATORY ANALYTICAL RESULTS

Exova
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W: www.exova.com

Report Transmission Cover Page

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Contact & Affiliation	Address	Delivery Commitments
Adam Seeley EBA Engineering Consultants Ltd -	Unit 6, 151 Industrial Road Whitehorse, Yukon Territory Y1A 2V3 Phone: (867) 668-3068 Fax: (867) 668-4349 Email: aseeley@eba.ca	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Multiple Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (Test Report) by Email - Multiple Reports On [Report Approval] send (Test Report) by Email - Multiple Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (Test Report) by Email - Multiple Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

- Report was issued to include QA/QC data and to report nitrate and nitrite analysis separately as requested by Adam Seeley on Jan. 5/11. Report 1399567 is an addendum to report 1391265.
- pH analysis was performed past the recommended holding time of 15 minutes from sample collection.

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W: www.exova.com

Sample Custody

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Sample Disposal Date: March 02, 2011

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the top of this page.

☐ Extend Sample Storage Until _____ (MM/DD/YY)

The following charges apply to extended sample storage:

Storage for an additional 30 days	$ 2.50 per sample
Storage for an additional 60 days	$ 5.00 per sample
Storage for an additional 90 days	$ 7.50 per sample

☐ Return Sample, collect, to the address below via:

- ☐ Greyhound
- ☐ DHL
- ☐ Purolator
- ☐ Other (specify) _____

Name _____
Company _____
Address _____
_____
Phone _____
Fax _____

Signature _____

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Exova

Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**776095**
Report To:	EBA Engineering Consultants	ID:	W23101317	Control Number:	
	Unit 6, 151 Industrial Road	Name:		Date Received:	Nov 24, 2010
	Whitehorse, YT, Canada	Location:	Mt. Lorne	Date Reported:	Jan 6, 2011
	Y1A 2V3	LSD:		Report Number:	1399567
Attn:	Adam Seeley	P.O.:			
Sampled By:	S. Sternbergh	Acct code:			
Company:	EBA				

Reference Number	776095-1	776095-2	776095-3	
Sample Date	Nov 22, 2010	Nov 22, 2010	Nov 22, 2010	
Sample Time	NA	NA	NA	
Sample Location				
Sample Description	ML-MW01	ML-MW02	ML-MW03	
Matrix	Water	Water	Water	
Analyte	**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Aggregate Organic Constituents					
Chemical Oxygen Demand	mg O2/L	80	200	310	10
Inorganic Nonmetallic Parameters					
Ammonium - N	mg/L	<0.05	<0.05	<0.05	0.05
Kjeldahl Nitrogen Total	mg/L	0.66	0.30	0.73	0.06
Phosphorus Total	mg/L	4.23	5.50	5.14	0.05
Orthophosphate-P Dissolved	mg/L	0.08	0.06	0.08	0.01
Organic Carbon Dissolved Nonpurgeable	mg/L	1.0	9.1	0.9	0.5
Metals Dissolved					
Sulfur Dissolved	mg/L	16.8	13.6	24.9	0.2
Physical and Aggregate Properties					
Solids Total Dissolved	mg/L	308	344	610	5
Routine Water					
Nitrate - N	mg/L	0.07	1.30	1.90	0.01
Nitrite - N	mg/L	<0.005	0.128	<0.005	0.005
Nitrate and Nitrite - N	mg/L	0.07	1.43	1.90	0.01
pH @ 25 °C		7.58	7.87	7.43	
Calcium Dissolved	mg/L	84.1	90.0	176	0.1
Magnesium Dissolved	mg/L	14.2	17.3	33.1	0.1
Phosphorus Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Potassium Dissolved	mg/L	1.9	2.7	3.9	0.1
Silicon Dissolved	mg/L	4.51	4.15	5.88	0.05
Sodium Dissolved	mg/L	4.6	6.0	7.6	0.1
Bicarbonate	mg/L	310	290	540	5
Carbonate	mg/L	<6	<6	<6	6
Hydroxide	mg/L	<5	<5	<5	5
T-Alkalinity as CaCO3	mg/L	255	238	446	5
Chloride Dissolved	mg/L	0.85	31.8	30.4	0.02
Sulfate (SO4) Dissolved	mg/L	48.8	39.9	67.4	0.05
Hardness as CaCO3	mg/L	268	296	577	5
Salinity Dissolved	g/L	0.011	0.015	0.019	0.0001
Volatile Petroleum Hydrocarbons - Water					
VHw6-10	ug/L	<50	<50	<50	50
VPHw (VHw6-10 minus BTEX)	ug/L	<50	<50	<50	50
Extractable Petroleum Hydrocarbons - Water					
LEPHw	ug/L	<100	<100	<100	100
HEPHw	ug/L	<100	200	<100	100

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**776095**
Report To:	EBA Engineering Consultants	ID:	W23101317	Control Number:	
	Unit 6, 151 Industrial Road	Name:		Date Received:	Nov 24, 2010
	Whitehorse, YT, Canada	Location:	Mt. Lorne	Date Reported:	Jan 6, 2011
	Y1A 2V3	LSD:		Report Number:	1399567
Attn:	Adam Seeley	P.O.:			
Sampled By:	S. Sternbergh	Acct code:			
Company:	EBA				

	Reference Number	776095-1	776095-2	776095-3	
	Sample Date	Nov 22, 2010	Nov 22, 2010	Nov 22, 2010	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	ML-MW01	ML-MW02	ML-MW03	
	Matrix	Water	Water	Water	
Analyte	**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Water					
Acenaphthene	ug/L	<0.1	<0.1	<0.1	0.1
Acenaphthylene	ug/L	<0.1	<0.1	<0.1	0.1
Acridine	ug/L	<0.05	<0.05	<0.05	0.05
Anthracene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(a)pyrene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(b)fluoranthene	ug/L	<0.01	<0.01	<0.01	0.01
Benzo(g,h,i)perylene	ug/L	<0.1	<0.1	<0.1	0.1
Benzo(k)fluoranthene	ug/L	<0.02	<0.02	<0.02	0.02
Chrysene	ug/L	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	ug/L	<0.01	<0.01	<0.01	0.01
Fluoranthene	ug/L	<0.1	<0.1	<0.1	0.1
Fluorene	ug/L	<0.1	<0.1	<0.1	0.1
Indeno(1,2,3-c,d)pyrene	ug/L	<0.1	<0.1	<0.1	0.1
Naphthalene	ug/L	<0.1	<0.1	<0.1	0.1
Phenanthrene	ug/L	<0.1	<0.1	<0.1	0.1
Pyrene	ug/L	<0.02	<0.02	<0.02	0.02
Quinoline	ug/L	<3.4	<3.4	<3.4	3.4
PAH - Water - Surrogate Recovery					
2-Fluorobiphenyl PAH - Surrogate	%	82	94	94	30-130
Nitrobenzene-d5 PAH - Surrogate	%	75	87	88	23-130
p-Terphenyl-d14 PAH - Surrogate	%	85	93	95	18-137
VOC Screen - Water					
Benzene	ug/L	<1	<1	<1	1
Bromodichloromethane	ug/L	<1	<1	<1	1
Bromoform	ug/L	<1	<1	<1	1
Bromomethane	ug/L	<10	<10	<10	10
Carbon Tetrachloride	ug/L	<1	<1	<1	1
Chlorobenzene	ug/L	<1	<1	<1	1
Chloroethane	ug/L	<10	<10	<10	10
2-Chloroethyl Vinyl Ether	ug/L	<1	<1	<1	1
Chloroform	ug/L	<1	<1	<1	1
Chloromethane	ug/L	<10	<10	<10	10
Dibromochloromethane	ug/L	<1	<1	<1	1
1,2-Dichlorobenzene	ug/L	<1	<1	<1	1
1,3-Dichlorobenzene	ug/L	<1	<1	<1	1

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**776095**
Report To:	EBA Engineering Consultants	ID:	W23101317	Control Number:	
	Unit 6, 151 Industrial Road	Name:		Date Received:	Nov 24, 2010
	Whitehorse, YT, Canada	Location:	Mt. Lorne	Date Reported:	Jan 6, 2011
	Y1A 2V3	LSD:		Report Number:	1399567
Attn:	Adam Seeley	P.O.:			
Sampled By:	S. Sternbergh	Acct code:			
Company:	EBA				

Reference Number	776095-1	776095-2	776095-3	
Sample Date	Nov 22, 2010	Nov 22, 2010	Nov 22, 2010	
Sample Time	NA	NA	NA	
Sample Location				
Sample Description	ML-MW01	ML-MW02	ML-MW03	
Matrix	Water	Water	Water	

Analyte		Units	Results	Results	Results	Nominal Detection Limit
VOC Screen - Water - Continued						
1,4-Dichlorobenzene		ug/L	<1	<1	<1	1
1,1-Dichloroethane		ug/L	<1	<1	<1	1
1,2-Dichloroethane		ug/L	<1	<1	<1	1
1,1-Dichloroethene		ug/L	<1	<1	<1	1
1,2-Dichloroethene(cis)		ug/L	<1	<1	<1	1
1,2-Dichloroethene(trans)		ug/L	<1	<1	<1	1
1,2-Dichloropropane		ug/L	<1	<1	<1	1
1,3-Dichloropropene(cis)		ug/L	<1	<1	<1	1
1,3-Dichloropropene(trans)		ug/L	<1	<1	<1	1
Ethylbenzene		ug/L	<1	<1	<1	1
Methylene Chloride		ug/L	<5	<5	<5	5
Styrene		ug/L	<1	<1	<1	1
1,1,2,2-Tetrachloroethane		ug/L	<1	<1	<1	1
Tetrachloroethene		ug/L	<1	<1	<1	1
Toluene		ug/L	<1	<1	<1	1
1,1,1-Trichloroethane		ug/L	<1	<1	<1	1
1,1,2-Trichloroethane		ug/L	<1	<1	<1	1
Trichloroethene		ug/L	<1	<1	<1	1
Trichlorofluoromethane		ug/L	<1	<1	<1	1
Vinyl Chloride		ug/L	<2	<2	<2	2
Xylene-m&p		ug/L	<1	<1	<1	1
Xylene-o		ug/L	<1	<1	<1	1
Total Xylenes (m,p,o)		ug/L	<1	<1	<1	1
VOC - Water - Surrogate Recovery						
Dibromofluoromethane	EPA Surrogate	%	111	112	106	86-118
Toluene-d8	EPA Surrogate	%	100	100	102	85-115
Bromofluorobenzene	EPA Surrogate	%	111	109	105	86-115
Trace Metals Dissolved						
Aluminum	Dissolved	µg/L	<5	<5	<5	5
Antimony	Dissolved	µg/L	<0.2	0.2	<0.2	0.2
Arsenic	Dissolved	µg/L	0.3	0.9	0.6	0.2
Barium	Dissolved	µg/L	42	64	94	1
Beryllium	Dissolved	µg/L	<0.04	<0.04	<0.04	0.04
Bismuth	Dissolved	µg/L	<1	<1	<1	1
Boron	Dissolved	µg/L	<4	13	5	4
Cadmium	Dissolved	µg/L	0.02	0.04	0.06	0.01

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID: **776095**
Control Number:
Date Received: Nov 24, 2010
Date Reported: Jan 6, 2011
Report Number: 1399567

Reference Number	776095-1	776095-2	776095-3
Sample Date	Nov 22, 2010	Nov 22, 2010	Nov 22, 2010
Sample Time	NA	NA	NA
Sample Location			
Sample Description	ML-MW01	ML-MW02	ML-MW03
Matrix	Water	Water	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Chromium	Dissolved	µg/L	0.8	1	1.3	0.4
Cobalt	Dissolved	µg/L	0.31	0.84	1.88	0.02
Copper	Dissolved	µg/L	2	2	3	1
Iron	Dissolved	ug/L	<5	<5	<5	10
Lead	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Lithium	Dissolved	µg/L	3	3	6	1
Manganese	Dissolved	ug/L	38	209	321	5
Mercury	Total Dissolved	ug/L	<0.01	<0.01	<0.01	0.01
Molybdenum	Dissolved	µg/L	1.4	11.4	4.0	0.1
Nickel	Dissolved	µg/L	3	3	8	1
Selenium	Dissolved	µg/L	0.8	<0.6	1.1	0.6
Silver	Dissolved	µg/L	<0.01	<0.01	<0.01	0.01
Strontium	Dissolved	µg/L	431	479	926	1.0
Tellurium	Dissolved	µg/L	<0.1	<0.1	<0.1	0.1
Thallium	Dissolved	µg/L	0.01	<0.01	0.02	0.01
Thorium	Dissolved	µg/L	<0.4	<0.4	<0.4	0.4
Tin	Dissolved	µg/L	0.1	0.2	0.6	0.1
Titanium	Dissolved	µg/L	0.4	<0.4	0.9	0.4
Uranium	Dissolved	µg/L	5.4	5.3	11.1	0.4
Vanadium	Dissolved	µg/L	0.2	0.2	0.4	0.1
Zinc	Dissolved	µg/L	3	2	5	1
Zirconium	Dissolved	µg/L	<0.1	<0.1	0.1	0.1

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**776095**
Report To:	EBA Engineering Consultants	ID:	W23101317	Control Number:	
	Unit 6, 151 Industrial Road	Name:		Date Received:	Nov 24, 2010
	Whitehorse, YT, Canada	Location:	Mt. Lorne	Date Reported:	Jan 6, 2011
	Y1A 2V3	LSD:		Report Number:	1399567
Attn:	Adam Seeley	P.O.:			
Sampled By:	S. Sternbergh	Acct code:			
Company:	EBA				

Reference Number	776095-4
Sample Date	Nov 22, 2010
Sample Time	NA
Sample Location	
Sample Description	ML-MW02 Duplicate
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Ammonia - N		mg/L	<0.01			
Nitrate - N		mg/L	1.10			0.01
Metals Dissolved						
Sulfur	Dissolved	mg/L	14.0			0.2
Routine Water						
pH	@ 25 °C		7.84			
Calcium	Dissolved	mg/L	87.5			0.1
Magnesium	Dissolved	mg/L	16.9			0.1
Phosphorus	Dissolved	mg/L	<0.01			0.01
Potassium	Dissolved	mg/L	2.7			0.1
Silicon	Dissolved	mg/L	4.16			0.05
Sodium	Dissolved	mg/L	6.1			0.1
Hardness	as CaCO3	mg/L	288			5
Salinity	Dissolved	g/L	0.015			0.0001
Volatile Petroleum Hydrocarbons - Water						
VHw6-10		ug/L	<50			50
VPHw (VHw6-10 minus BTEX)		ug/L	<50			50
Trace Metals Dissolved						
Aluminum	Dissolved	µg/L	<5			5
Antimony	Dissolved	µg/L	0.2			0.2
Arsenic	Dissolved	µg/L	0.9			0.2
Barium	Dissolved	µg/L	62			1
Beryllium	Dissolved	µg/L	<0.04			0.04
Bismuth	Dissolved	µg/L	<1			1
Boron	Dissolved	µg/L	14			4
Cadmium	Dissolved	µg/L	0.06			0.01
Chromium	Dissolved	µg/L	0.9			0.4
Cobalt	Dissolved	µg/L	0.90			0.02
Copper	Dissolved	µg/L	2			1
Iron	Dissolved	ug/L	13			10
Lead	Dissolved	µg/L	<0.1			0.1
Lithium	Dissolved	µg/L	3			1
Manganese	Dissolved	ug/L	239			5
Mercury	Total Dissolved	ug/L	<0.01			0.01
Molybdenum	Dissolved	µg/L	13.2			0.1
Nickel	Dissolved	µg/L	4			1

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**776095**
Report To:	EBA Engineering Consultants	ID:	W23101317	Control Number:	
	Unit 6, 151 Industrial Road	Name:		Date Received:	Nov 24, 2010
	Whitehorse, YT, Canada	Location:	Mt. Lorne	Date Reported:	Jan 6, 2011
	Y1A 2V3	LSD:		Report Number:	1399567
Attn:	Adam Seeley	P.O.:			
Sampled By:	S. Sternbergh	Acct code:			
Company:	EBA				

Reference Number	776095-4
Sample Date	Nov 22, 2010
Sample Time	NA
Sample Location	
Sample Description	ML-MW02 Duplicate
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved - Continued						
Selenium	Dissolved	µg/L	0.8			0.6
Silver	Dissolved	µg/L	<0.01			0.01
Strontium	Dissolved	µg/L	472			1.0
Tellurium	Dissolved	µg/L	<0.1			0.1
Thallium	Dissolved	µg/L	<0.01			0.01
Thorium	Dissolved	µg/L	<0.4			0.4
Tin	Dissolved	µg/L	0.2			0.1
Titanium	Dissolved	µg/L	0.5			0.4
Uranium	Dissolved	µg/L	5.3			0.4
Vanadium	Dissolved	µg/L	0.2			0.1
Zinc	Dissolved	µg/L	2			1
Zirconium	Dissolved	µg/L	<0.1			0.1

Approved by: Marie England

Marie England
Consulting Scientist

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Aggregate Organic Constituents

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chemical Oxygen Demand	mg/L	0	-5	6	yes
Date Acquired: November 25, 2010					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Chemical Oxygen Demand	mg/L	98.56	95	107	yes
Date Acquired: November 25, 2010					
Chemical Oxygen Demand	mg/L	100.08	70	130	yes
Date Acquired: November 25, 2010					

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
Chemical Oxygen Demand	mg O2/L	40	36	27	45	yes
Date Acquired: November 25, 2010						

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chemical Oxygen Demand	mg O2/L	3400	3400	30	50	yes
Date Acquired: November 25, 2010						

Inorganic Nonmetallic Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Ammonium - N	ug/L	-72.287	-110.00	10.00	yes
Date Acquired: November 25, 2010					
Ammonium - N	mg/L	0	-0.05	0.05	yes
Nitrogen	mg/L	0	-0.06	0.06	yes
Phosphorus	mg/L	-0.002	-0.05	0.05	yes
Orthophosphate-P	mg/L	0.012	-0.05	0.05	yes
Organic Carbon	mg/L	0	-0.5	0.5	yes
Date Acquired: November 28, 2010					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Ammonium - N	ug/L	93.40	85	115	yes
Date Acquired: November 25, 2010					
Ammonium - N	ug/L	82.27	70	130	yes
Date Acquired: November 25, 2010					
Nitrite - N	mg/L	111.33	90	110	yes
Nitrate and Nitrite - N	mg/L	91.95	90	110	yes
Date Acquired: November 25, 2010					

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
Ammonia - N	mg/L	0.6		0.00	0.00	yes
Ammonium - N	mg/L	0.63	0.62	0.52	0.72	yes
Nitrate - N	mg/L	0.67	0.65	0.55	0.75	yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Inorganic Nonmetallic Parameters - Continued

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
Nitrate and Nitrite - N	mg/L	0.67	0.65	0.55	0.75	yes
Date Acquired:	November 25, 2010					
Nitrate - N	mg/L	0.11	0.00	-0.15	0.15	yes
Nitrite - N	mg/L	1.25	1.192	1.040	1.340	yes
Nitrate and Nitrite - N	mg/L	1.36	1.19	0.89	1.49	yes
Date Acquired:	November 25, 2010					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Ammonium - N	mg/L	<0.05	<0.05	10	0.10	yes
Nitrogen	mg/L	2.70	2.85	10	0.06	yes
Phosphorus	mg/L	4.23	4.19	10	0.20	yes
Orthophosphate-P	mg/L	0.84	0.84	10	0.05	yes
Organic Carbon	mg/L	1.0	0.9	10	1.0	yes
Date Acquired:	November 28, 2010					
Ammonia - N	mg/L	<0.01	<0.01	20	0.50	yes
Nitrate - N	mg/L	1.10	1.10	15	0.05	yes
Nitrite - N	mg/L	0.144	0.144	10	0.030	yes
Nitrate and Nitrite - N	mg/L	1.25	1.24	10	0.05	yes
Date Acquired:	November 25, 2010					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrate - N	mg/L	0.04	-0.01	0.02	yes
Nitrite - N	mg/L	0.006	-0.004	0.006	yes
Nitrate and Nitrite - N	mg/L	0.04	0.00	0.01	yes
Date Acquired:	November 25, 2010				
Ammonium - N	mg/L	3.08	2.77	3.19	yes
Nitrogen	mg/L	120	103.98	137.82	yes
Phosphorus	mg/L	8.15	7.64	8.36	yes
Organic Carbon	mg/L	120	102.8	128.8	yes
Date Acquired:	November 28, 2010				
Ammonium - N	mg/L	0.81	0.73	0.85	yes
Nitrogen	mg/L	15.0	12.99	16.41	yes
Phosphorus	mg/L	2.05	1.92	2.16	yes
Orthophosphate-P	mg/L	0.40	0.37	0.42	yes
Organic Carbon	mg/L	15.6	13.3	16.7	yes
Date Acquired:	November 28, 2010				
Nitrogen	mg/L	1.12	0.81	1.23	yes
Orthophosphate-P	mg/L	0.08	0.07	0.09	yes
Organic Carbon	mg/L	2.8	2.5	3.8	yes
Date Acquired:	November 28, 2010				

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Inorganic Nonmetallic Parameters - Continued

Metals Dissolved

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
Aluminum	mg/L	0.055	0.060	0.052	0.068	yes
Antimony	mg/L	0.0157	0.0150	0.0110	0.0190	yes
Arsenic	mg/L	0.0104	0.0109	0.0089	0.0131	yes
Barium	mg/L	0.066	0.070	0.063	0.077	yes
Beryllium	mg/L	0.0119	0.01200	0.01029	0.01371	yes
Boron	mg/L	0.077	0.075	0.050	0.110	yes
Cadmium	mg/L	0.01660	0.01790	0.01533	0.02067	yes
Chromium	mg/L	0.0643	0.0677	0.0563	0.0797	yes
Cobalt	mg/L	0.0768	0.07980	0.07010	0.08990	yes
Copper	mg/L	0.062	0.065	0.060	0.070	yes
Lead	mg/L	0.0514	0.0531	0.0451	0.0610	yes
Molybdenum	mg/L	0.0720	0.07390	0.06161	0.08639	yes
Nickel	mg/L	0.061	0.063	0.057	0.069	yes
Selenium	mg/L	0.0207	0.0190	0.0147	0.0234	yes
Silver	mg/L	0.01180	0.01250	0.01041	0.01359	yes
Strontium	mg/L	0.040	0.043	0.037	0.049	yes
Thallium	mg/L	0.00958	0.00996	-0.01370	0.03370	yes
Vanadium	mg/L	0.0517	0.05390	0.04740	0.06060	yes
Zinc	mg/L	0.066	0.067	0.059	0.075	yes
Date Acquired:	November 25, 2010					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Sulfur	mg/L	22.4	22.8	30	3.0	yes
Date Acquired:	November 25, 2010					

Physical and Aggregate Properties

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Solids	mg/L	58	58	30	25	yes
Date Acquired:	November 26, 2010					

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
Solids	mg/L	566	471	619		yes
Date Acquired:	November 26, 2010					
Solids	mg/L	26	19	34		yes
Date Acquired:	November 26, 2010					
Solids	mg/L	<5	-5	5		yes
Date Acquired:	November 26, 2010					

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	-0.0106	-0.05	0.05	yes
Iron	mg/L	0.0021	-0.031	0.029	yes
Magnesium	mg/L	-0.0105	-0.05	0.07	yes
Manganese	mg/L	-0.0018	-0.008	-0.000	yes
Phosphorus	mg/L	-0.0082	-0.04	0.04	yes
Potassium	mg/L	0.0156	-0.4	0.4	yes
Silicon	mg/L	0.0028	-0.20	0.25	yes
Sodium	mg/L	-0.0058	-0.2	0.2	yes
Date Acquired:	November 25, 2010				
Calcium	mg/L	-0.0053	-0.13	0.16	yes
Iron	mg/L	0	-0.024	0.025	yes
Magnesium	mg/L	0.0111	-0.07	0.08	yes
Manganese	mg/L	-0.0021	-0.009	0.002	yes
Phosphorus	mg/L	-0.0057	-0.14	0.16	yes
Potassium	mg/L	0.0157	-0.8	0.8	yes
Silicon	mg/L	-0.0033	-1.76	2.02	yes
Sodium	mg/L	-0.0079	-0.3	0.4	yes
Date Acquired:	November 25, 2010				
Nitrate - N	mg/L	0.00279863	-0.01	0.01	yes
Nitrite - N	mg/L	0.00202568	-0.005	0.005	yes
Date Acquired:	November 29, 2010				
Chloride	mg/L	0	-0.20	0.20	yes
Sulfate (SO4)	mg/L	1.21557	-0.99	0.99	yes
Date Acquired:	November 25, 2010				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
pH	pH	99.89	98	101	yes
Date Acquired:	November 24, 2010				
Calcium	mg/L	99.20	91	109	yes
Iron	mg/L	89.70	0	0	yes
Magnesium	mg/L	95.05	91	109	yes
Manganese	mg/L	97.60	90	110	yes
Phosphorus	mg/L	97.60	90	110	yes
Potassium	mg/L	95.44	85	115	yes
Silicon	mg/L	93.92	80	120	yes
Sodium	mg/L	98.21	90	110	yes
Date Acquired:	November 25, 2010				
Chloride	mg/L	112.48	85	115	yes
Sulfate (SO4)	mg/L	99.82	85	115	yes
Date Acquired:	November 25, 2010				
Chloride	mg/L	96.99	90	110	yes

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Quality Control

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	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Routine Water - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit		Passed QC
Sulfate (SO4)	mg/L	96.59	90	110		yes
Date Acquired:	November 25, 2010					

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
T-Alkalinity	mg/L	10	10	8	11	yes
Date Acquired:	November 24, 2010					
Calcium	mg/L	14.9	14.85	11.55	18.25	yes
Magnesium	mg/L	8.8	9.07	6.88	11.26	yes
Manganese	mg/L	0.076	0.078	0.072	0.084	yes
Potassium	mg/L	8.3	8.6	6.4	10.8	yes
Sodium	mg/L	13.1	14.2	11.7	16.7	yes
Date Acquired:	November 25, 2010					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Nitrate - N	mg/L	2.38	2.34	10	0.01	yes
Nitrite - N	mg/L	0.178	0.176	10	0.010	yes
Date Acquired:	November 29, 2010					
Calcium	mg/L	165	166	30	1.00	yes
Iron	mg/L	<0.005	<0.005	30	0.060	yes
Magnesium	mg/L	44.1	44.1	30	1.00	yes
Manganese	mg/L	0.534	0.535	30	0.015	yes
Phosphorus	mg/L	<0.01	<0.01	30	0.10	yes
Potassium	mg/L	3.8	3.8	30	1.0	yes
Silicon	mg/L	8.56	8.61	30	0.15	yes
Sodium	mg/L	10.0	10.1	30	1.0	yes
Date Acquired:	November 25, 2010					
pH		7.87	7.87	2		yes
Electrical Conductivity	dS/m at 25 C	0.597	0.600	10	0.005	yes
Bicarbonate	mg/L	290	290	10	10	yes
Carbonate	mg/L	<6	<6	10	10	yes
Hydroxide	mg/L	<5	<5	10	10	yes
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	238	238	10	5	yes
Chloride	mg/L	0.79	0.88	15	0.25	yes
Sulfate (SO4)	mg/L	102	103	15	0.50	yes
Date Acquired:	November 25, 2010					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Chloride	mg/L	0.79	0.77	6	0.01	yes
Sulfate (SO4)	mg/L	4.27	4.15	6	0.01	yes
Date Acquired:	November 25, 2010					

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Quality Control

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	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH		10.2	9.08	10.92	yes
Electrical Conductivity	µS/cm at 25 C	210	165	243	yes
P-Alkalinity	mg/L	39	9	53	yes
T-Alkalinity	mg/L	97	90	101	yes
Date Acquired:	November 24, 2010				
Electrical Conductivity	µS/cm at 25 C	1420	1330	1510	yes
Date Acquired:	November 24, 2010				
Electrical Conductivity	µS/cm at 25 C	<1	-2	2	yes
Date Acquired:	November 24, 2010				
Nitrate - N	mg/L	10.1	9.51	10.49	yes
Nitrite - N	mg/L	10.1	9.510	10.530	yes
Nitrate and Nitrite - N	mg/L	20.2	18.09	22.11	yes
Date Acquired:	November 29, 2010				
Nitrate - N	mg/L	0.52	0.45	0.55	yes
Nitrite - N	mg/L	0.516	0.452	0.548	yes
Nitrate and Nitrite - N	mg/L	1.03	0.79	1.19	yes
Date Acquired:	November 29, 2010				

Extractable Petroleum Hydrocarbons - Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
EPHw10-19	ug/mL	55.64	-100	100	yes
EPHw19-32	ug/mL	42.96	-100	100	yes
Date Acquired:	November 29, 2010				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
EPHw10-19	ug/mL	106.90	85	115	yes
EPHw19-32	ug/mL	106.90	85	115	yes
Date Acquired:	November 29, 2010				

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
EPHw10-19	ug/L	500	400	60	500	yes
EPHw19-32	ug/L	500	400	60	500	yes
Date Acquired:	November 29, 2010					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
EPHw10-19	ug/L	90	79	128	yes
EPHw19-32	ug/L	90	81	136	yes
Date Acquired:	November 29, 2010				

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Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Polycyclic Aromatic Hydrocarbons - Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Acenaphthene	ng/mL	0	-0.1	0.1	yes
Acenaphthylene	ng/mL	0	-0.1	0.1	yes
Acridine	ng/mL	0	-0.05	0.05	yes
Anthracene	ng/mL	0	-0.1	0.1	yes
Benzo(a)anthracene	ng/mL	0.00043	-0.01	0.01	yes
Benzo(a)pyrene	ng/mL	0.00056	-0.01	0.01	yes
Benzo(b)fluoranthene	ng/mL	0.0005	-0.01	0.01	yes
Benzo(g,h,i)perylene	ng/mL	0.00063	-0.1	0.1	yes
Benzo(k)fluoranthene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0.00065	-0.1	0.1	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.01	0.01	yes
Fluoranthene	ng/mL	0.00171	-0.1	0.1	yes
Fluorene	ng/mL	0.00069	-0.1	0.1	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0.00066	-0.1	0.1	yes
Naphthalene	ng/mL	0.00747	-0.1	0.1	yes
Phenanthrene	ng/mL	0.00751	-0.1	0.1	yes
Pyrene	ng/mL	0.00818	-0.02	0.02	yes
Quinoline	ng/mL	0.00061	-3.4	3.4	yes

Date Acquired: November 29, 2010

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Acenaphthene	ng/mL	98.79	80	120	yes
Acenaphthylene	ng/mL	97.71	80	120	yes
Acridine	ng/mL	98.08	80	120	yes
Anthracene	ng/mL	98.39	80	120	yes
Benzo(a)anthracene	ng/mL	97.68	80	120	yes
Benzo(a)pyrene	ng/mL	97.88	80	120	yes
Benzo(b)fluoranthene	ng/mL	97.62	80	120	yes
Benzo(g,h,i)perylene	ng/mL	97.11	80	120	yes
Benzo(k)fluoranthene	ng/mL	96.10	80	120	yes
Chrysene	ng/mL	98.41	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	96.00	80	120	yes
Fluoranthene	ng/mL	97.74	80	120	yes
Fluorene	ng/mL	97.71	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	96.30	80	120	yes
Naphthalene	ng/mL	95.92	80	120	yes
Phenanthrene	ng/mL	98.21	80	120	yes
Pyrene	ng/mL	97.68	80	120	yes
Quinoline	ng/mL	95.31	80	120	yes

Date Acquired: November 29, 2010

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC

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Quality Control

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Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Polycyclic Aromatic Hydrocarbons - Water - Continued

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Acenaphthene	ug/L	97.6	92.9	60	0.5	yes
Acenaphthylene	ug/L	90.2	86.2	60	0.5	yes
Acridine	ug/L	92.8	88.5	60	0.25	yes
Anthracene	ug/L	86.2	82.9	60	0.5	yes
Benzo(a)anthracene	ug/L	91.5	87.2	60	0.05	yes
Benzo(a)pyrene	ug/L	86.9	82.8	60	0.05	yes
Benzo(b)fluoranthene	ug/L	92.6	86.7	60	0.05	yes
Benzo(g,h,i)perylene	ug/L	87.7	83.2	60	0.5	yes
Benzo(k)fluoranthene	ug/L	81.9	79.2	60	0.05	yes
Chrysene	ug/L	95.5	91.2	60	0.5	yes
Dibenzo(a,h)anthracene	ug/L	77.1	72.3	60	0.05	yes
Fluoranthene	ug/L	93.8	87.3	60	0.5	yes
Fluorene	ug/L	91.5	85.8	60	0.5	yes
Indeno(1,2,3-c,d)pyrene	ug/L	81.2	74.7	60	0.5	yes
Naphthalene	ug/L	97.0	94.2	60	0.5	yes
Phenanthrene	ug/L	96.2	92.6	60	0.5	yes
Pyrene	ug/L	101	98.3	60	0.10	yes
Quinoline	ug/L	91.0	86.0	60	17.0	yes

Date Acquired: November 29, 2010

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Acenaphthene	ug/L	97.6	50.0	130.0	yes
Acenaphthylene	ug/L	90.2	50.0	130.0	yes
Acridine	ug/L	92.8	50.01	129.99	yes
Anthracene	ug/L	86.2	50.0	130.0	yes
Benzo(a)anthracene	ug/L	91.5	50.01	129.99	yes
Benzo(a)pyrene	ug/L	86.9	50.01	129.99	yes
Benzo(b)fluoranthene	ug/L	92.6	50.01	129.99	yes
Benzo(g,h,i)perylene	ug/L	87.7	50.0	130.0	yes
Benzo(k)fluoranthene	ug/L	81.9	50.01	129.99	yes
Chrysene	ug/L	95.5	50.0	130.0	yes
Dibenzo(a,h)anthracene	ug/L	77.1	50.01	129.99	yes
Fluoranthene	ug/L	93.8	50.0	130.0	yes
Fluorene	ug/L	91.5	50.0	130.0	yes
Indeno(1,2,3-c,d)pyrene	ug/L	81.2	50.0	130.0	yes
Naphthalene	ug/L	97.0	50.0	130.0	yes
Phenanthrene	ug/L	96.2	50.0	130.0	yes
Pyrene	ug/L	101	50.01	129.99	yes
Quinoline	ug/L	91.0	50.0	130.0	yes

Date Acquired: November 29, 2010

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Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID: **776095**
Control Number:
Date Received: Nov 24, 2010
Date Reported: Jan 6, 2011
Report Number: 1399567

PAH - Water - Surrogate Recovery

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
2-Fluorobiphenyl	%	99.11	80	120	yes
Nitrobenzene-d5	%	96.46	80	120	yes
p-Terphenyl-d14	%	96.05	80	120	yes
Date Acquired:	November 29, 2010				

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
2-Fluorobiphenyl	%	91	91	60	0	yes
Nitrobenzene-d5	%	78	88	60	0	yes
p-Terphenyl-d14	%	91	90	60	0	yes
Date Acquired:	November 29, 2010					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
2-Fluorobiphenyl	%	91	40	130	yes
Nitrobenzene-d5	%	78	40	130	yes
p-Terphenyl-d14	%	91	40	130	yes
Date Acquired:	November 29, 2010				

VOC Screen - Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-2	2	yes
Bromodichloromethane	ng	0	-2	2	yes
Bromoform	ng	0	-2	2	yes
Bromomethane	ng	0	-15	15	yes
Carbon Tetrachloride	ng	0	-2	2	yes
Chlorobenzene	ng	0	-2	2	yes
Chloroethane	ng	0	-15	15	yes
2-Chloroethyl Vinyl Ether	ng	0	-2	2	yes
Chloroform	ng	0	-2	2	yes
Chloromethane	ng	0	-15	15	yes
Dibromochloromethane	ng	0	-2	2	yes
1,2-Dichlorobenzene	ng	0	-2	2	yes
1,3-Dichlorobenzene	ng	0	-2	2	yes
1,4-Dichlorobenzene	ng	0	-2	2	yes
1,1-Dichloroethane	ng	0	-2	2	yes
1,2-Dichloroethane	ng	0	-2	2	yes
1,1-Dichloroethene	ng	0	-2	2	yes
1,2-Dichloroethene(cis)	ng	0	-2	2	yes
1,2-Dichloroethene(trans)	ng	0	-2	2	yes
1,2-Dichloropropane	ng	0	-2	2	yes
1,3-Dichloropropene(cis)	ng	0	-2	2	yes
1,3-Dichloropropene(trans)	ng	0	-2	2	yes
Ethylbenzene	ng	0	-2	2	yes

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Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID: **776095**
Control Number:
Date Received: Nov 24, 2010
Date Reported: Jan 6, 2011
Report Number: 1399567

VOC Screen - Water - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Methylene Chloride	ng	0	-15	15	yes
Styrene	ng	0	-2	2	yes
1,1,2,2-Tetrachloroethane	ng	0	-2	2	yes
Tetrachloroethene	ng	0	-2	2	yes
Toluene	ng	0	-2	2	yes
1,1,1-Trichloroethane	ng	0	-2	2	yes
1,1,2-Trichloroethane	ng	0	-2	2	yes
Trichloroethene	ng	0	-2	2	yes
Trichlorofluoromethane	ng	0	-2	2	yes
Vinyl Chloride	ng	0	-15	15	yes
Xylene-m&p	ng	0	0	0	yes
Xylene-o	ng	0	0	0	yes
Total Xylenes (m,p,o)	ng	0	-2	2	yes

Date Acquired: November 26, 2010

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	96.18	78	122	yes
Bromodichloromethane	ng	107.58	78	122	yes
Bromoform	ng	102.30	78	122	yes
Bromomethane	ng	103.24	78	122	yes
Carbon Tetrachloride	ng		78	122	yes
Chlorobenzene	ng	106.58	78	122	yes
Chloroethane	ng		78	122	yes
2-Chloroethyl Vinyl Ether	ng		78	122	yes
Chloroform	ng	96.76	78	122	yes
Chloromethane	ng		78	122	yes
Dibromochloromethane	ng	111.68	78	122	yes
1,2-Dichlorobenzene	ng	104.22	78	122	yes
1,3-Dichlorobenzene	ng	107.12	78	122	yes
1,4-Dichlorobenzene	ng	110.08	78	122	yes
1,1-Dichloroethane	ng	99.84	78	122	yes
1,2-Dichloroethane	ng		78	122	yes
1,1-Dichloroethene	ng	94.22	78	122	yes
1,2-Dichloroethene(cis)	ng		78	122	yes
1,2-Dichloroethene(trans)	ng		78	122	yes
1,2-Dichloropropane	ng		78	122	yes
1,3-Dichloropropene(cis)	ng		78	122	yes
1,3-Dichloropropene(trans)	ng	155.38	78	122	yes
Ethylbenzene	ng	105.30	78	122	yes
Methylene Chloride	ng		78	122	yes
Styrene	ng	106.32	78	122	yes
1,1,2,2-Tetrachloroethane	ng	113.80	78	122	yes
Tetrachloroethene	ng	90.46	78	122	yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID: **776095**
Control Number:
Date Received: Nov 24, 2010
Date Reported: Jan 6, 2011
Report Number: 1399567

VOC Screen - Water - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Toluene	ng	99.40	78	122	yes
1,1,1-Trichloroethane	ng	104.16	78	122	yes
1,1,2-Trichloroethane	ng	101.40	78	122	yes
Trichloroethene	ng	107.46	78	122	yes
Trichlorofluoromethane	ng	110.24	78	122	yes
Vinyl Chloride	ng	98.44	78	122	yes
Xylene-m&p	ng	102.87	78	122	yes
Xylene-o	ng	103.14	78	122	yes
Total Xylenes (m,p,o)	ng	102.96	78	122	yes

Date Acquired: November 26, 2010

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	ug/L	<1	<1	15	2	yes
Bromodichloromethane	ug/L	<1	<1	15	2	yes
Bromoform	ug/L	<1	<1	15	2	yes
Carbon Tetrachloride	ug/L	<1	<1	15	2	yes
Chloroform	ug/L	26	26	15	2	yes
Dibromochloromethane	ug/L	<1	<1	15	2	yes
1,2-Dichloroethane	ug/L	<1	<1	15	2	yes
1,1-Dichloroethene	ug/L	<1	<1	15	2	yes
1,2-Dichloropropane	ug/L	<1	<1	15	2	yes
Ethylbenzene	ug/L	<1	<1	15	2	yes
Styrene	ug/L	<1	<1	15	2	yes
Tetrachloroethene	ug/L	<1	<1	15	2	yes
Toluene	ug/L	<1	<1	15	2	yes
1,1,1-Trichloroethane	ug/L	<1	<1	15	2	yes
1,1,2-Trichloroethane	ug/L	<1	<1	15	2	yes
Trichloroethene	ug/L	<1	<1	15	2	yes
Vinyl Chloride	ug/L	<2	<2	15	20	yes
Xylene-m&p	ug/L	<1	<1	15	2	yes
Xylene-o	ug/L	<1	<1	15	2	yes
Total Xylenes (m,p,o)	ug/L	<1	<1	15	2	yes

Date Acquired: November 26, 2010

VOC - Water - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Dibromofluoromethane	%	107.46	85	115	yes
Toluene-d8	%	97.26	85	115	yes
Bromofluorobenzene	%	109.75	85	115	yes

Date Acquired: November 26, 2010

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Trace Metals Dissolved

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aluminum	µg/L	-4.244	-10	10	yes
Antimony	µg/L	0	-0.4	0.2	yes
Arsenic	µg/L	0.029	-0.5	0.5	yes
Barium	µg/L	-0.018	-0	0	yes
Beryllium	µg/L	0.003	-0.10	0.10	yes
Bismuth	µg/L	0.004	-1.0	1.0	yes
Boron	µg/L	-2.558	-6	5	yes
Cadmium	µg/L	-0.001	-0.03	0.03	yes
Chromium	µg/L	-0.026	-0.1	0.2	yes
Cobalt	µg/L	-0.001	-0.07	0.07	yes
Copper	µg/L	-0.074	-1	1	yes
Lead	µg/L	-0.015	-0.1	0.1	yes
Lithium	µg/L	-0.006	-1	1	yes
Molybdenum	µg/L	-0.023	-0.31	0.29	yes
Nickel	µg/L	0.007	-1	1	yes
Selenium	µg/L	0.485	-1.7	1.3	yes
Silver	µg/L	-0.001	-0.05	0.05	yes
Strontium	µg/L	-0.024	-0	0	yes
Tellurium	µg/L	0.016	-0.7	0.7	yes
Thallium	µg/L	-0.002	-0.03	0.03	yes
Thorium	µg/L	0.006	-1.5	1.5	yes
Tin	µg/L	-0.006	-3.0	3.0	yes
Titanium	µg/L	-0.248	-0.2	0.2	yes
Uranium	µg/L	0.001	-0.03	0.03	yes
Vanadium	µg/L	-0.006	-0.35	0.35	yes
Zinc	µg/L	-0.018	-2	4	yes
Zirconium	µg/L	0.01	-0.0	0.0	yes
Date Acquired:	November 25, 2010				
Aluminum	µg/L	-3.953	-6	6	yes
Antimony	µg/L	-0.005	-0.4	0.3	yes
Arsenic	µg/L	0.007	-0.4	0.3	yes
Barium	µg/L	0.085	-0	1	yes
Beryllium	µg/L	0.003	-0.10	0.10	yes
Bismuth	µg/L	-0.029	0.0	0.0	yes
Boron	µg/L	-2.431	-18	19	yes
Cadmium	µg/L	-0.001	-0.03	0.03	yes
Chromium	µg/L	0.002	-0.1	0.2	yes
Cobalt	µg/L	0	-0.30	0.30	yes
Copper	µg/L	-0.089	-1	1	yes
Lead	µg/L	-0.011	-0.3	0.4	yes
Lithium	µg/L	-0.002	-0	0	yes
Molybdenum	µg/L	0.005	-0.95	0.85	yes

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Quality Control

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Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Trace Metals Dissolved - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nickel	µg/L	0.016	-1	1	yes
Selenium	µg/L	0.386	-1.7	1.7	yes
Silver	µg/L	-0.003	-0.67	0.47	yes
Strontium	µg/L	0.66	-2	4	yes
Tellurium	µg/L	-0.042	-0.7	0.7	yes
Thallium	µg/L	0.001	-0.06	0.06	yes
Thorium	µg/L	-0.107	-0.7	0.5	yes
Tin	µg/L	-0.025	-3.8	4.0	yes
Titanium	µg/L	0.213	-0.3	0.2	yes
Uranium	µg/L	0.013	-0.04	0.02	yes
Vanadium	µg/L	-0.003	-0.30	0.30	yes
Zinc	µg/L	0.058	-11	19	yes
Zirconium	µg/L	-0.016	-0.0	0.0	yes
Date Acquired:	November 25, 2010				
Mercury	ug/L	<0.01	-9.99	9.99	yes
Date Acquired:	November 26, 2010				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Mercury	ng/L	108.40	85	115	yes
Date Acquired:	November 26, 2010				
Aluminum	µg/L	99.64	70	130	yes
Antimony	µg/L	96.12	85	115	yes
Arsenic	µg/L	100.20	90	110	yes
Barium	µg/L	94.52	90	110	yes
Beryllium	µg/L	100.20	90	110	yes
Bismuth	µg/L	100.40	90	110	yes
Boron	µg/L	103.92	70	130	yes
Cadmium	µg/L	99.88	90	110	yes
Chromium	µg/L	91.54	90	110	yes
Cobalt	µg/L	92.94	90	110	yes
Copper	µg/L	93.30	90	110	yes
Lead	µg/L	100.76	90	110	yes
Lithium	µg/L	94.32	90	110	yes
Molybdenum	µg/L	91.52	90	110	yes
Nickel	µg/L	93.20	90	110	yes
Selenium	µg/L	107.52	90	110	yes
Silver	µg/L	0.12	0	0	yes
Strontium	µg/L	94.52	90	110	yes
Thallium	µg/L	99.00	90	110	yes
Tin	µg/L	95.80	90	110	yes
Titanium	µg/L	92.88	90	110	yes
Uranium	µg/L	104.80	85	115	yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID: **776095**
Control Number:
Date Received: Nov 24, 2010
Date Reported: Jan 6, 2011
Report Number: 1399567

Trace Metals Dissolved - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Vanadium	µg/L	90.80	90	110	yes
Zinc	µg/L	100.74	90	110	yes
Zirconium	µg/L	101.12	90	110	yes
Date Acquired:	November 25, 2010				

Certified Reference Material	Units	Measured	Target	Lower Limit	Upper Limit	Passed QC
Mercury	ug/L	0.09	0.09	0.08	0.10	yes
Date Acquired:	November 26, 2010					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Aluminum	µg/L	<5	<5	20	20	yes
Antimony	µg/L	<0.2	0.2	20	1.0	yes
Arsenic	µg/L	0.4	0.4	20	1.0	yes
Barium	µg/L	105	105	20	5	yes
Beryllium	µg/L	<0.04	<0.04	20	1.00	yes
Boron	µg/L	35	36	20	5	yes
Cadmium	µg/L	0.14	0.13	20	0.50	yes
Chromium	µg/L	0.6	0.6	20	5.0	yes
Cobalt	µg/L	0.35	0.35	20	0.50	yes
Copper	µg/L	3	3	20	5	yes
Lead	µg/L	<0.1	<0.1	20	0.5	yes
Lithium	µg/L	12	12	20	5	yes
Molybdenum	µg/L	2.0	2.0	20	0.50	yes
Nickel	µg/L	8	8	20	5	yes
Selenium	µg/L	<0.6	<0.6	20	0.5	yes
Silver	µg/L	<0.01	<0.01	20	0.50	yes
Strontium	µg/L	1154	1176	20	0	yes
Tellurium	µg/L	<0.1	<0.1	20	0.5	yes
Thallium	µg/L	0.03	0.03	20	0.10	yes
Thorium	µg/L	<0.4	<0.4	10	0.1	yes
Tin	µg/L	0.1	0.2	20	0.5	yes
Titanium	µg/L	0.7	0.6	20	0.5	yes
Uranium	µg/L	2.9	3.0	20	0.10	yes
Vanadium	µg/L	0.8	0.8	20	0.50	yes
Zinc	µg/L	2	3	20	5	yes
Zirconium	µg/L	0.2	0.2	20	0.5	yes
Date Acquired:	November 25, 2010					

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Methodology and Notes

Bill To:	EBA Engineering Consultants	Project:	
Report To:	EBA Engineering Consultants	ID:	W23101317
	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water	APHA	*	Alkalinity - Titration Method, 2320 B	24-Nov-10	Exova Surrey
Alk, pH, EC, Turb in water	APHA	*	pH - Electrometric Method, 4500-H+ B	24-Nov-10	Exova Surrey
Ammonia-N in Water	APHA	*	Titrametric, 4500-NH3 C	25-Nov-10	Exova Surrey
Ammonium-N in Water	APHA	*	Automated Phenate Method, 4500-NH3 G	29-Nov-10	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	29-Nov-10	Exova Edmonton
Anions by IEC in water (Surrey)	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	25-Nov-10	Exova Surrey
BTEX-VPH - Water	BCELM	*	Volatile Hydrocarbons in Water by GC/FID, VH Water	26-Nov-10	Exova Surrey
Carbon Organic (Dissolved) in water (DOC)	APHA		High-Temperature Combustion Method, 5310 B	28-Nov-10	Exova Edmonton
Chemical Oxygen Demand (water-Surrey)	APHA	*	Closed Reflux, Colorimetric Method, 5220 D	25-Nov-10	Exova Surrey
EPH - Water	BCELM	*	Extractable Petroleum Hydrocarbons (EPH) in Water by GC/FID, EPH Water	29-Nov-10	Exova Surrey
Mercury Low Level (Total) in water	EPA	*	Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	26-Nov-10	Exova Surrey
Metals SemiTrace (Dissolved) in water	US EPA	*	Metals & Trace Elements by ICP-AES, 6010C	25-Nov-10	Exova Surrey
Nitrogen - nitrite+nitrate-N	APHA	*	Automated Cadmium Reduction Method, 4500-NO3- F	25-Nov-10	Exova Surrey
Orthophosphate-P in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	26-Nov-10	Exova Edmonton
PAH - Water (Surrey)	BCELM	*	Polycyclic Aromatic Hydrocarbons in Water by GC/MS - PBM, PAH Water	29-Nov-10	Exova Surrey
Phosphorus - Total in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	29-Nov-10	Exova Edmonton
Solids Dissolved (Total, Fixed and Volatile)2	APHA	*	Total Dissolved Solids Dried at 180 C, 2540 C	26-Nov-10	Exova Surrey
Total and Kjeldahl Nitrogen (Total) in Water	ISO	*	Water Quality - Determination of nitrogen, ISO/TR 11905-2	28-Nov-10	Exova Edmonton
VOC - Water	US EPA	*	US EPA method, 8260B/5030B	26-Nov-10	Exova Calgary

** Reference Method Modified*

References

US EPA	US Environmental Protection Agency Test Methods
B.C.M.O.E	B.C. Ministry of Environment
APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
BCELM	B.C. Environmental Laboratory Manual

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Methodology and Notes

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	Unit 6, 151 Industrial Road	Name:	
	Whitehorse, YT, Canada	Location:	Mt. Lorne
	Y1A 2V3	LSD:	
Attn:	Adam Seeley	P.O.:	
Sampled By:	S. Sternbergh	Acct code:	
Company:	EBA		

Lot ID:	**776095**
Control Number:	
Date Received:	Nov 24, 2010
Date Reported:	Jan 6, 2011
Report Number:	1399567

ISO	International Organization for Standardization

Comments:

- Report was issued to include QA/QC data and to report nitrate and nitrite analysis separately as requested by Adam Seeley on Jan. 5/11. Report 1399567 is an addendum to report 1391265.
- pH analysis was performed past the recommended holding time of 15 minutes from sample collection.

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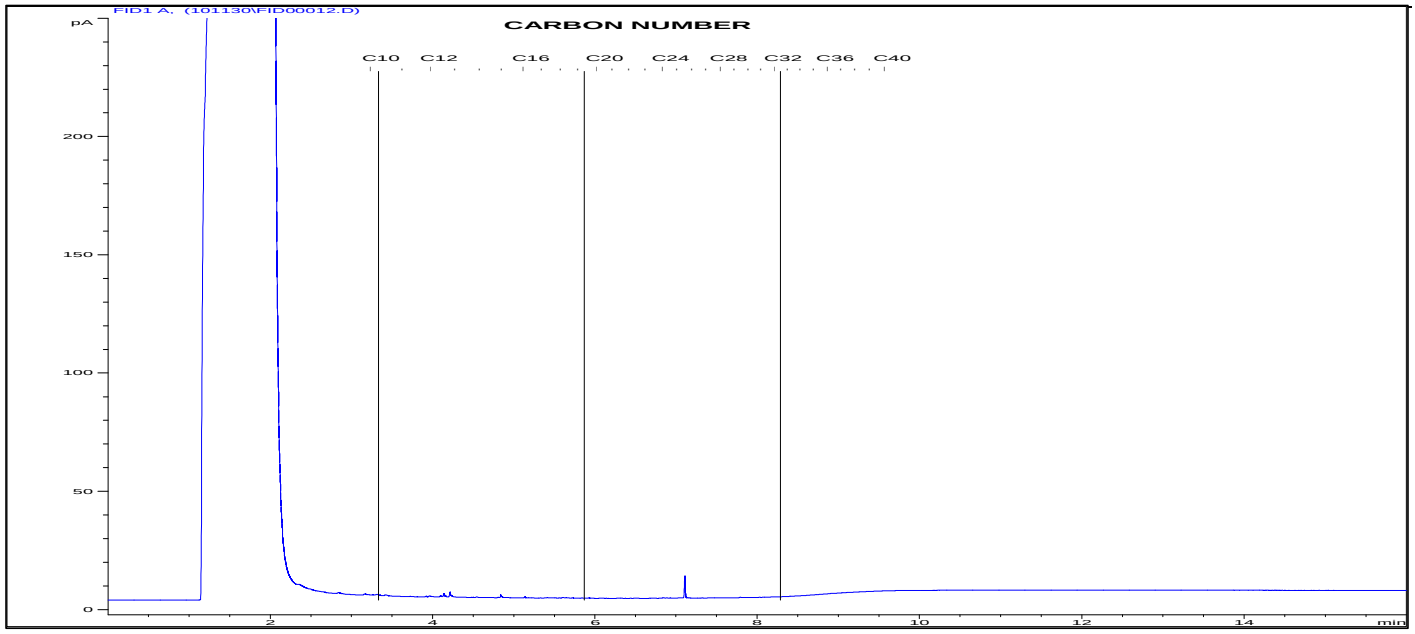
Hydrocarbon Chromatogram

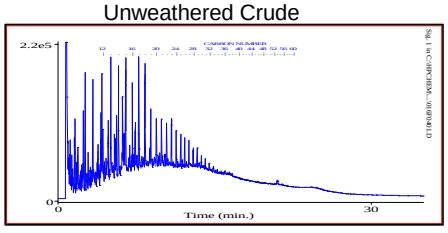
Bill To:	EBA Engineering Consultants Lt	Project ID:	W23101317	Lot ID:	**776095**
Report To:	EBA Engineering Consultants Lt	Name:		Control Number:	
		Location:	Mt. Lorne	Date Received:	Nov 24, 2010
	Unit 6, 151 Industrial Road	LSD:		Date Reported:	Dec 2, 2010
	Whitehorse, YT, Canada	P.O.:		Report Number:	1391265
	Y1A 2V3				
Attn:	Adam Seeley				
Sampled by:	S. Sternbergh				
Company:	EBA				

Exova Number: 776095-1 Sample Description: ML-MW01
Sample Date: Nov 22, 2010

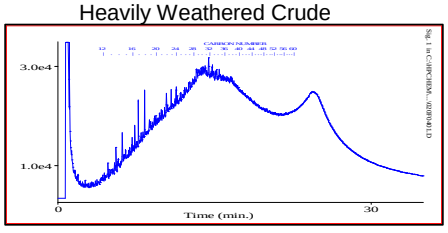


TYPICAL PRODUCT CHROMATOGRAMS

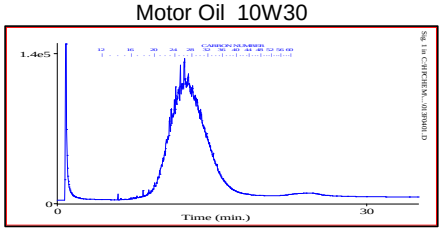
Unweathered Crude



Heavily Weathered Crude



Motor Oil 10W30



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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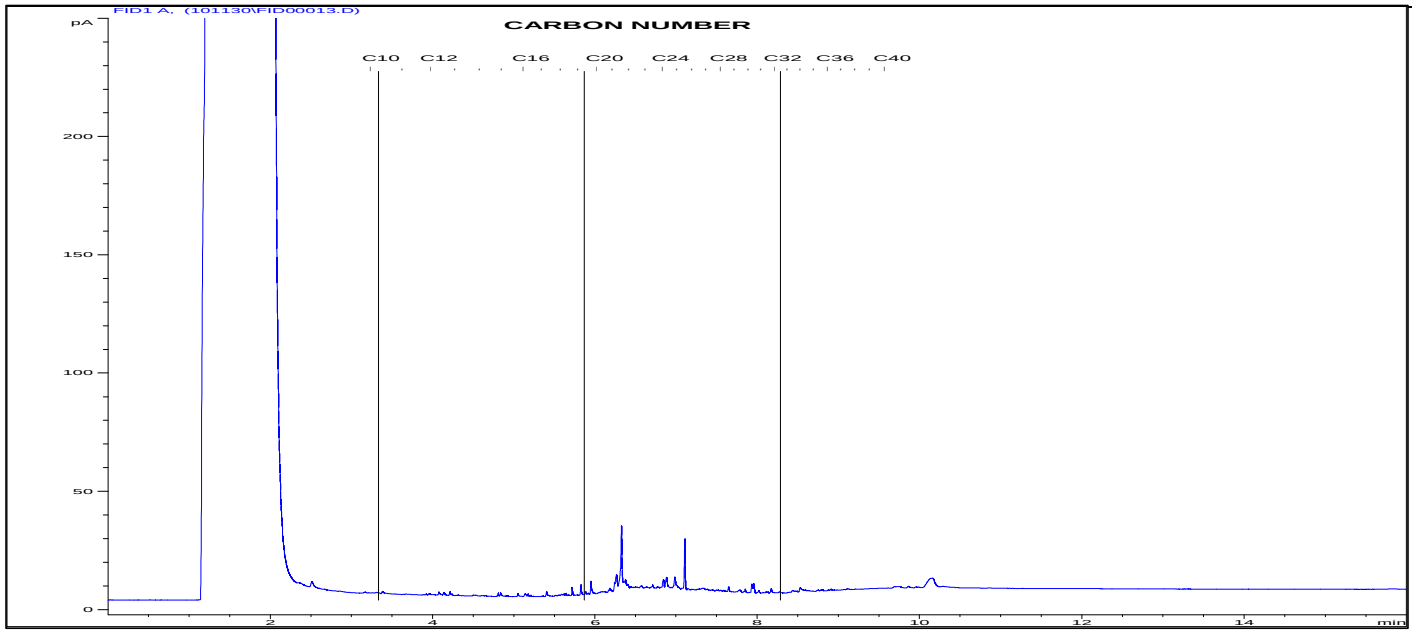
Hydrocarbon Chromatogram

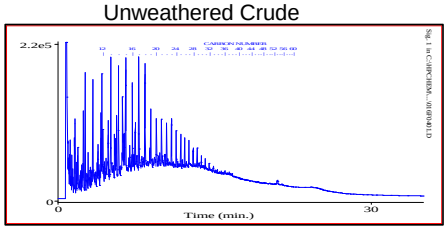
Bill To:	EBA Engineering Consultants Lt	Project ID:	W23101317	Lot ID:	**776095**
Report To:	EBA Engineering Consultants Lt	Name:		Control Number:	
		Location:	Mt. Lorne	Date Received:	Nov 24, 2010
	Unit 6, 151 Industrial Road	LSD:		Date Reported:	Dec 2, 2010
	Whitehorse, YT, Canada	P.O.:		Report Number:	1391265
	Y1A 2V3				
Attn:	Adam Seeley				
Sampled by:	S. Sternbergh				
Company:	EBA				

Exova Number: 776095-2 Sample Description: ML-MW02
Sample Date: Nov 22, 2010

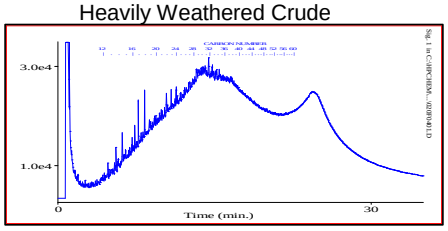


TYPICAL PRODUCT CHROMATOGRAMS

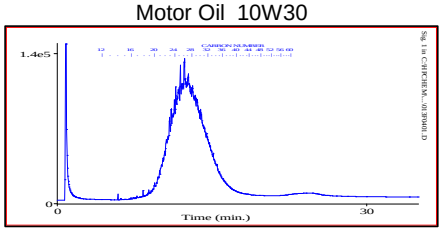
Unweathered Crude



Heavily Weathered Crude



Motor Oil 10W30



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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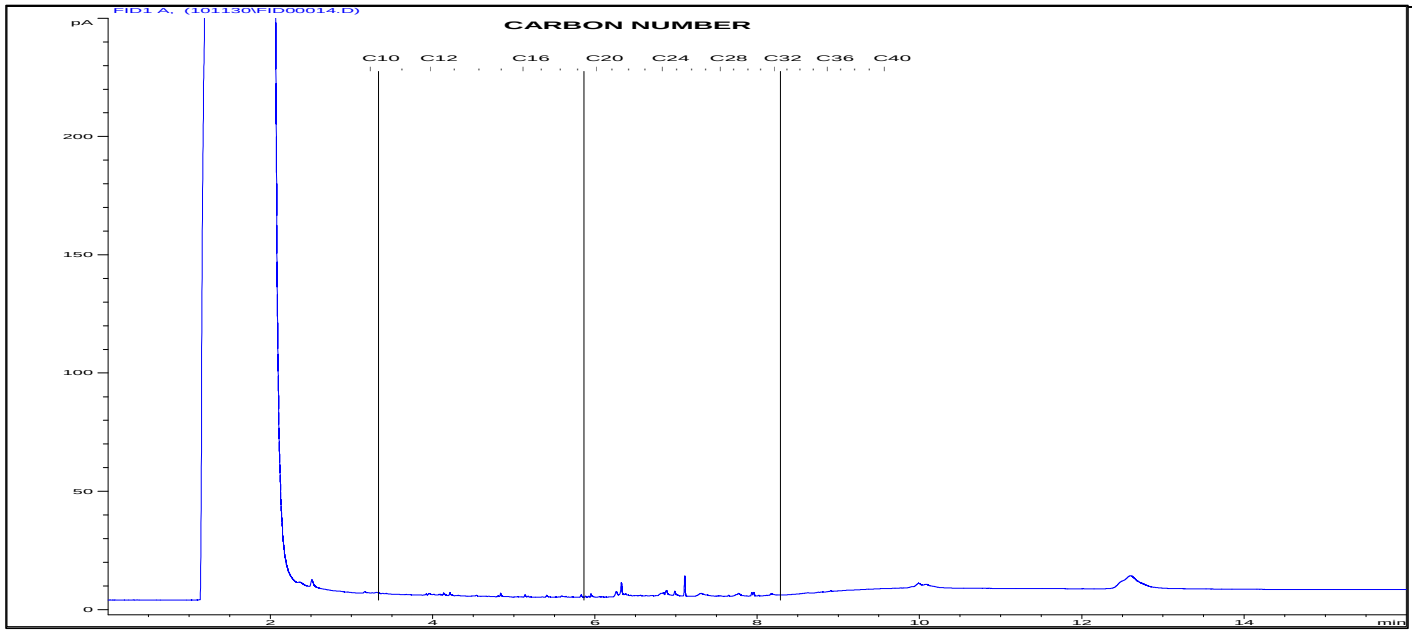
Hydrocarbon Chromatogram

Bill To:	EBA Engineering Consultants Lt	Project ID:	W23101317	Lot ID:	**776095**
Report To:	EBA Engineering Consultants Lt	Name:		Control Number:	
		Location:	Mt. Lorne	Date Received:	Nov 24, 2010
	Unit 6, 151 Industrial Road	LSD:		Date Reported:	Dec 2, 2010
	Whitehorse, YT, Canada	P.O.:		Report Number:	1391265
	Y1A 2V3				
Attn:	Adam Seeley				
Sampled by:	S. Sternbergh				
Company:	EBA				

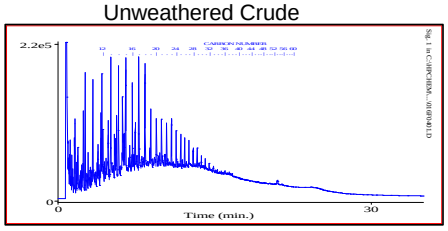
Exova Number: 776095-3
Sample Date: Nov 22, 2010

Sample Description: ML-MW03

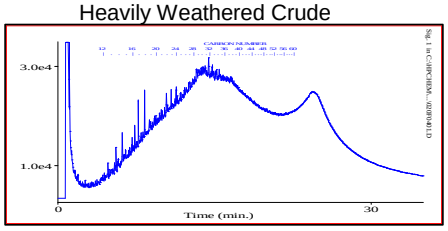


TYPICAL PRODUCT CHROMATOGRAMS

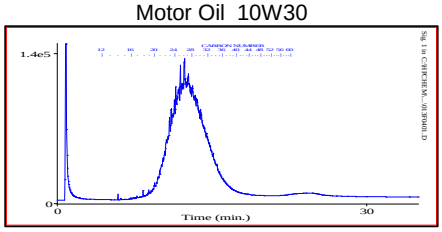
Unweathered Crude



Heavily Weathered Crude



Motor Oil 10W30



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

776095

Bodycote TESTING GROUP

LOT: _____ Control Number _____

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

See reverse for your nearest Bodycote location and proper sampling protocol

Billing Address:			**Copy of Report To:**		Copy of invoice:
Company:	EBA Engineering Consulting Ltd.		Company:	EBA Engineering Consulting Ltd.	Mail invoice to this address for approval ☐
Address:	Unit 6, 151 Industrial Rd Whitehorse, YT Y1A 2V3	QA/QC Report [x]	Address:	Unit 6, 151 Industrial Rd Whitehorse, YT Y1A 2V3	
		Report Result:			Report Result:
Attention:	Adam Seeley	Fax [ ]	Attention:	Adam Seeley	Fax [ ]
Phone:	867-668-3068	Mail [x]	Phone:	867-668-3068	Mail [x]
Fax:	867-668-4349	Courier [ ]	Fax:	867-668-4349	Courier [ ]
Cell:		e-mail [x]	Cell:		e-mail [x]
e-mail:	aseeley@eba.ca	e-Service [ ]	e-mail:	aseeley@eba.ca	e-Service [ ]

Information to be included on Report and Invoice

Project ID: W23101317
Project Name:
Project Location: Mt. Lorne
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

RUSH **Please contact the laboratory to confirm rush dates and times before submitting samples.**

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐

Date Required: Regular TAT

Signature: _____

Bodycote Authorization: _____

Sample Custody (Please Print)

Sampled by: S. Sternbergh

Company EBA Signature

I authorize Bodycote to proceed with the work work indicated on this form:

Date: 23-Nov Initial:

Received by: Sample Temp

Waybill #: NOV 2 2010 Date

Company Time

Special Instructions / Comments

Quote provided by Tracy Buehler to S. Klump.

FOR LAB USE ONLY

Condiftion of containers/coolers upon arrival at lab

☐ Check here if Bodycote is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for **HUMAN CONSUMPTION**

Please indicate which regulations you are required to meet: CCME Aquatic Life

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	W38BC	NUTR	ICSO	ALK	ICCL	TDS	DOC	COD	CTEH6	VOW2BC	CVPH3
							↓	Enter tests above (✓ relevant samples below)										
1	ML-MW01	ML-MW01		22-Nov-10	Water		10	X	X	X	X	X	X	X	X	X	X	X
2	ML-MW02	ML-MW02		22-Nov-10	Water		10	X	X	X	X	X	X	X	X	X	X	X
3	ML-MW03	ML-MW03		22-Nov-10	Water		10	X	X	X	X	X	X	X	X	X	X	X
4																		
5																		
6																		
7																		
8																		
10																		
11																		
12																		
13																		
14																		
15																		

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

Heather Dyck

From: Seeley, Adam [aseeley@eba.ca]
Sent: November 24, 2010 3:00 PM
To: Heather Dyck
Subject: W23101317.007 - Duplicate Analysis List, Mt Lorne

Hi Heather,

As discussed, could you please analyse the duplicate sample not listed on the COC for Mt Lorne for the following:

- W38BC
- CUPH3
- N3
- NH3

Thanks,

Adam

Adam Seeley, B.Sc., M.Hyd. | Intermediate Hydrogeologist
p. 867.668.2071 x243 | **f.** 867.668.4349
aseeley@eba.ca

EBA, A Tetra Tech Company | Environment Practice
Calcite Business Centre, Unit 6, 151 Industrial Road | Whitehorse, YT Y1A 2V3 | **www.eba.ca**

APPENDIX F

APPENDIX F HYDRAULIC RESPONSE TEST DATA AND ANALYSIS

2010 Monitoring Well Program

Serial Number 1023050
Project ID W23101317

Location Mount Lorne ML-MW02

Channel 1 Identification
Static (level) 1.23

Time	LEVEL	Seconds	Drawdown	Time	LEVEL	Seconds	Drawdown	Time	LEVEL	Seconds	Drawdown
13:33:46	0.87857	0	0.35143	13:34:41	1.1714	55	0.0586	13:35:36	1.21171	110	0.01829
13:33:47	0.90382	1	0.32618	13:34:42	1.17371	56	0.05629	13:35:37	1.21228	111	0.01772
13:33:48	0.92479	2	0.30521	13:34:43	1.17465	57	0.05535	13:35:38	1.21186	112	0.01814
13:33:49	0.93361	3	0.29639	13:34:44	1.1763	58	0.0537	13:35:39	1.21282	113	0.01718
13:33:50	0.94545	4	0.28455	13:34:45	1.17709	59	0.05291	13:35:40	1.21239	114	0.01761
13:33:51	0.95584	5	0.27416	13:34:46	1.17925	60	0.05075	13:35:41	1.21329	115	0.01671
13:33:52	0.966	6	0.264	13:34:47	1.18011	61	0.04989	13:35:42	1.21329	116	0.01671
13:33:53	0.97647	7	0.25353	13:34:48	1.18112	62	0.04888	13:35:43	1.21342	117	0.01658
13:33:54	0.98443	8	0.24557	13:34:49	1.18323	63	0.04677	13:35:44	1.21361	118	0.01639
13:33:55	0.99359	9	0.23641	13:34:50	1.18498	64	0.04502	13:35:45	1.21366	119	0.01634
13:33:56	1.00161	10	0.22839	13:34:51	1.1854	65	0.0446	13:35:46	1.21403	120	0.01597
13:33:57	1.00936	11	0.22064	13:34:52	1.1871	66	0.0429	13:35:47	1.21352	121	0.01648
13:33:58	1.01631	12	0.21369	13:34:53	1.18762	67	0.04238	13:35:48	1.21466	122	0.01534
13:33:59	1.02344	13	0.20656	13:34:54	1.18876	68	0.04124	13:35:49	1.21447	123	0.01553
13:34:00	1.03081	14	0.19919	13:34:55	1.18905	69	0.04095	13:35:50	1.21456	124	0.01544
13:34:01	1.03729	15	0.19271	13:34:56	1.19051	70	0.03949	13:35:51	1.21505	125	0.01495
13:34:02	1.04354	16	0.18646	13:34:57	1.19154	71	0.03846	13:35:52	1.21491	126	0.01509
13:34:03	1.05011	17	0.17989	13:34:58	1.19235	72	0.03765	13:35:53	1.21536	127	0.01464
13:34:04	1.05612	18	0.17388	13:34:59	1.19348	73	0.03652	13:35:54	1.2156	128	0.0144
13:34:05	1.06225	19	0.16775	13:35:00	1.19389	74	0.03611	13:35:55	1.21579	129	0.01421
13:34:06	1.06736	20	0.16264	13:35:01	1.19437	75	0.03563	13:35:56	1.21572	130	0.01428
13:34:07	1.07289	21	0.15711	13:35:02	1.19537	76	0.03463	13:35:57	1.21572	131	0.01428
13:34:08	1.07732	22	0.15268	13:35:03	1.19605	77	0.03395	13:35:58	1.21586	132	0.01414
13:34:09	1.08222	23	0.14778	13:35:04	1.19692	78	0.03308	13:35:59	1.21641	133	0.01359
13:34:10	1.08717	24	0.14283	13:35:05	1.19739	79	0.03261	13:36:00	1.21592	134	0.01408
13:34:11	1.09071	25	0.13929	13:35:06	1.19763	80	0.03237	13:36:01	1.21625	135	0.01375
13:34:12	1.09507	26	0.13493	13:35:07	1.19899	81	0.03101	13:36:02	1.21651	136	0.01349
13:34:13	1.09885	27	0.13115	13:35:08	1.1997	82	0.0303	13:36:03	1.21703	137	0.01297
13:34:14	1.10325	28	0.12675	13:35:09	1.19957	83	0.03043	13:36:04	1.21698	138	0.01302
13:34:15	1.10822	29	0.12178	13:35:10	1.20109	84	0.02891	13:36:05	1.21714	139	0.01286
13:34:16	1.11007	30	0.11993	13:35:11	1.2021	85	0.0279	13:36:06	1.21709	140	0.01291
13:34:17	1.11413	31	0.11587	13:35:12	1.20252	86	0.02748	13:36:07	1.21715	141	0.01285
13:34:18	1.11776	32	0.11224	13:35:13	1.20297	87	0.02703	13:36:08	1.21686	142	0.01314
13:34:19	1.12127	33	0.10873	13:35:14	1.20334	88	0.02666	13:36:09	1.21695	143	0.01305
13:34:20	1.12499	34	0.10501	13:35:15	1.20366	89	0.02634	13:36:10	1.21741	144	0.01259
13:34:21	1.12689	35	0.10311	13:35:16	1.20445	90	0.02555	13:36:11	1.2176	145	0.0124
13:34:22	1.13061	36	0.09939	13:35:17	1.20482	91	0.02518	13:36:12	1.21734	146	0.01266
13:34:23	1.13325	37	0.09675	13:35:18	1.20514	92	0.02486	13:36:13	1.21763	147	0.01237
13:34:24	1.13563	38	0.09437	13:35:19	1.20602	93	0.02398	13:36:14	1.21777	148	0.01223
13:34:25	1.14613	39	0.08387	13:35:20	1.20605	94	0.02395	13:36:15	1.21782	149	0.01218
13:34:26	1.14133	40	0.08867	13:35:21	1.20623	95	0.02377	13:36:16	1.21806	150	0.01194
13:34:27	1.14309	41	0.08691	13:35:22	1.20688	96	0.02312	13:36:17	1.21809	151	0.01191
13:34:28	1.14642	42	0.08358	13:35:23	1.20725	97	0.02275	13:36:18	1.21842	152	0.01158
13:34:29	1.15063	43	0.07937	13:35:24	1.20825	98	0.02175	13:36:19	1.21848	153	0.01152
13:34:30	1.15044	44	0.07956	13:35:25	1.20783	99	0.02217	13:36:20	1.21844	154	0.01156
13:34:31	1.15342	45	0.07658	13:35:26	1.20896	100	0.02104	13:36:21	1.219	155	0.011
13:34:32	1.15487	46	0.07513	13:35:27	1.20873	101	0.02127	13:36:22	1.21852	156	0.01148
13:34:33	1.15727	47	0.07273	13:35:28	1.20913	102	0.02087	13:36:23	1.21893	157	0.01107
13:34:34	1.1591	48	0.0709	13:35:29	1.20899	103	0.02101	13:36:24	1.21851	158	0.01149
13:34:35	1.16117	49	0.06883	13:35:30	1.21006	104	0.01994	13:36:25	1.22048	159	0.00952
13:34:36	1.16316	50	0.06684	13:35:31	1.20967	105	0.02033	13:36:26	1.21838	160	0.01162
13:34:37	1.1656	51	0.0644	13:35:32	1.21051	106	0.01949	13:36:27	1.21883	161	0.01117
13:34:38	1.16645	52	0.06355	13:35:33	1.21091	107	0.01909	13:36:28	1.21839	162	0.01161
13:34:39	1.16834	53	0.06166	13:35:34	1.21109	108	0.01891	13:36:29	1.21905	163	0.01095
13:34:40	1.17034	54	0.05966	13:35:35	1.2113	109	0.0187	13:36:30	1.21912	164	0.01088

13:36:31	1.21893	165	0.01107	13:37:34	1.22165	228	0.00835	13:38:37	1.2225	291	0.0075
13:36:32	1.21922	166	0.01078	13:37:35	1.22213	229	0.00787	13:38:38	1.22207	292	0.00793
13:36:33	1.21938	167	0.01062	13:37:36	1.22184	230	0.00816	13:38:39	1.22278	293	0.00722
13:36:34	1.21912	168	0.01088	13:37:37	1.22205	231	0.00795	13:38:40	1.22213	294	0.00787
13:36:35	1.21889	169	0.01111	13:37:38	1.22158	232	0.00842	13:38:41	1.22255	295	0.00745
13:36:36	1.21922	170	0.01078	13:37:39	1.22181	233	0.00819	13:38:42	1.22266	296	0.00734
13:36:37	1.21976	171	0.01024	13:37:40	1.22181	234	0.00819	13:38:43	1.22279	297	0.00721
13:36:38	1.21993	172	0.01007	13:37:41	1.22161	235	0.00839	13:38:44	1.22266	298	0.00734
13:36:39	1.22001	173	0.00999	13:37:42	1.2223	236	0.0077	13:38:45	1.22261	299	0.00739
13:36:40	1.21958	174	0.01042	13:37:43	1.22175	237	0.00825	13:38:46	1.22274	300	0.00726
13:36:41	1.21938	175	0.01062	13:37:44	1.22226	238	0.00774	13:38:47	1.22255	301	0.00745
13:36:42	1.2197	176	0.0103	13:37:45	1.22178	239	0.00822	13:38:48	1.22304	302	0.00696
13:36:43	1.22004	177	0.00996	13:37:46	1.22213	240	0.00787	13:38:49	1.22256	303	0.00744
13:36:44	1.21991	178	0.01009	13:37:47	1.22207	241	0.00793	13:38:50	1.22287	304	0.00713
13:36:45	1.21974	179	0.01026	13:37:48	1.22133	242	0.00867	13:38:51	1.22226	305	0.00774
13:36:46	1.21989	180	0.01011	13:37:49	1.22167	243	0.00833	13:38:52	1.22245	306	0.00755
13:36:47	1.22038	181	0.00962	13:37:50	1.22173	244	0.00827	13:38:53	1.2225	307	0.0075
13:36:48	1.2208	182	0.0092	13:37:51	1.22178	245	0.00822	13:38:54	1.22239	308	0.00761
13:36:49	1.22505	183	0.00495	13:37:52	1.22207	246	0.00793	13:38:55	1.22268	309	0.00732
13:36:50	1.2191	184	0.0109	13:37:53	1.22274	247	0.00726	13:38:56	1.22224	310	0.00776
13:36:51	1.21963	185	0.01037	13:37:54	1.22234	248	0.00766	13:38:57	1.22261	311	0.00739
13:36:52	1.21916	186	0.01084	13:37:55	1.22217	249	0.00783	13:38:58	1.222	312	0.008
13:36:53	1.21941	187	0.01059	13:37:56	1.22256	250	0.00744	13:38:59	1.2222	313	0.0078
13:36:54	1.2265	188	0.0035	13:37:57	1.22214	251	0.00786	13:39:00	1.22279	314	0.00721
13:36:55	1.22016	189	0.00984	13:37:58	1.22201	252	0.00799	13:39:01	1.22294	315	0.00706
13:36:56	1.22039	190	0.00961	13:37:59	1.22195	253	0.00805	13:39:02	1.23137	316	-0.00137
13:36:57	1.22061	191	0.00939	13:38:00	1.2223	254	0.0077	13:39:03	1.21457	317	0.01543
13:36:58	1.2209	192	0.0091	13:38:01	1.22237	255	0.00763	13:39:04	1.22122	318	0.00878
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13:37:00	1.22084	194	0.00916	13:38:03	1.22246	257	0.00754	13:39:06	1.22036	320	0.00964
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13:37:03	1.22035	197	0.00965	13:38:06	1.22259	260	0.00741	13:39:09	1.22109	323	0.00891
13:37:04	1.22075	198	0.00925	13:38:07	1.22236	261	0.00764	13:39:10	1.22176	324	0.00824
13:37:05	1.22055	199	0.00945	13:38:08	1.22192	262	0.00808	13:39:11	1.22138	325	0.00862
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13:37:07	1.22051	201	0.00949	13:38:10	1.22229	264	0.00771	13:39:13	1.22141	327	0.00859
13:37:08	1.2211	202	0.0089	13:38:11	1.22197	265	0.00803	13:39:14	1.22175	328	0.00825
13:37:09	1.22109	203	0.00891	13:38:12	1.22256	266	0.00744	13:39:15	1.22191	329	0.00809
13:37:10	1.22133	204	0.00867	13:38:13	1.22239	267	0.00761	13:39:16	1.22154	330	0.00846
13:37:11	1.22107	205	0.00893	13:38:14	1.22303	268	0.00697	13:39:17	1.2217	331	0.0083
13:37:12	1.22051	206	0.00949	13:38:15	1.22256	269	0.00744	13:39:18	1.22191	332	0.00809
13:37:13	1.22096	207	0.00904	13:38:16	1.22304	270	0.00696	13:39:19	1.22175	333	0.00825
13:37:14	1.22077	208	0.00923	13:38:17	1.2225	271	0.0075	13:39:20	1.22119	334	0.00881
13:37:15	1.22104	209	0.00896	13:38:18	1.22249	272	0.00751	13:39:21	1.22179	335	0.00821
13:37:16	1.22141	210	0.00859	13:38:19	1.22304	273	0.00696	13:39:22	1.22138	336	0.00862
13:37:17	1.22144	211	0.00856	13:38:20	1.22274	274	0.00726	13:39:23	1.22226	337	0.00774
13:37:18	1.22126	212	0.00874	13:38:21	1.22223	275	0.00777	13:39:24	1.2217	338	0.0083
13:37:19	1.22117	213	0.00883	13:38:22	1.22258	276	0.00742	13:39:25	1.22132	339	0.00868
13:37:20	1.22119	214	0.00881	13:38:23	1.2217	277	0.0083	13:39:26	1.22194	340	0.00806
13:37:21	1.22142	215	0.00858	13:38:24	1.22185	278	0.00815	13:39:27	1.22217	341	0.00783
13:37:22	1.22161	216	0.00839	13:38:25	1.22255	279	0.00745	13:39:28	1.22192	342	0.00808
13:37:23	1.22148	217	0.00852	13:38:26	1.22226	280	0.00774	13:39:29	1.22249	343	0.00751
13:37:24	1.22151	218	0.00849	13:38:27	1.22316	281	0.00684	13:39:30	1.22195	344	0.00805
13:37:25	1.2212	219	0.0088	13:38:28	1.22256	282	0.00744	13:39:31	1.22208	345	0.00792
13:37:26	1.22128	220	0.00872	13:38:29	1.22278	283	0.00722	13:39:32	1.22185	346	0.00815
13:37:27	1.22133	221	0.00867	13:38:30	1.22236	284	0.00764	13:39:33	1.22249	347	0.00751
13:37:28	1.22179	222	0.00821	13:38:31	1.22268	285	0.00732	13:39:34	1.2224	348	0.0076
13:37:29	1.22123	223	0.00877	13:38:32	1.22237	286	0.00763	13:39:35	1.22211	349	0.00789
13:37:30	1.22097	224	0.00903	13:38:33	1.22272	287	0.00728	13:39:36	1.2217	350	0.0083
13:37:31	1.22197	225	0.00803	13:38:34	1.22234	288	0.00766	13:39:37	1.22195	351	0.00805
13:37:32	1.22149	226	0.00851	13:38:35	1.2229	289	0.0071	13:39:38	1.22181	352	0.00819
13:37:33	1.22184	227	0.00816	13:38:36	1.223	290	0.007	13:39:39	1.22236	353	0.00764

13:39:40	1.22188	354	0.00812
13:39:41	1.22246	355	0.00754
13:39:42	1.22201	356	0.00799
13:39:43	1.22234	357	0.00766
13:39:44	1.22258	358	0.00742
13:39:45	1.22207	359	0.00793
13:39:46	1.22226	360	0.00774
13:39:47	1.22232	361	0.00768
13:39:48	1.22214	362	0.00786
13:39:49	1.22227	363	0.00773
13:39:50	1.22249	364	0.00751
13:39:51	1.22236	365	0.00764
13:39:52	1.22179	366	0.00821
13:39:53	1.22223	367	0.00777
13:39:54	1.22261	368	0.00739
13:39:55	1.22239	369	0.00761
13:39:56	1.22191	370	0.00809
13:39:57	1.22272	371	0.00728
13:39:58	1.22252	372	0.00748

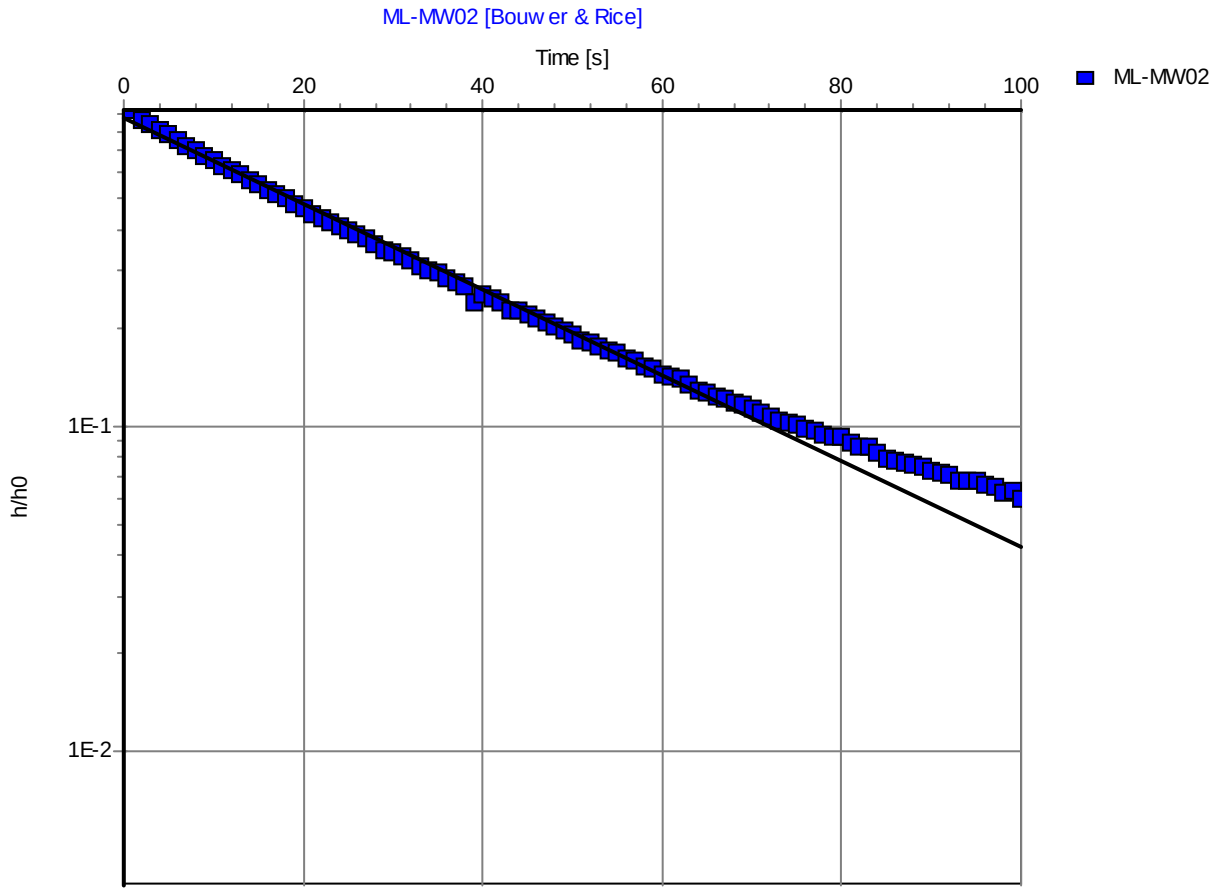
Serial Number 1023050
Project ID W23101317

Location Mount Lorne ML-MW03

Channel 1 Identification
Static (level) 1.78

Time	LEVEL	Seconds	Drawdown	Time	LEVEL	Seconds	Drawdown
11:04:43	1.25485	0	0.52515	11:05:26	1.75798	43	0.02202
11:04:44	1.31071	1	0.46929	11:05:27	1.75913	44	0.02087
11:04:45	1.34652	2	0.43348	11:05:28	1.7597	45	0.0203
11:04:46	1.38065	3	0.39935	11:05:29	1.76013	46	0.01987
11:04:47	1.40741	4	0.37259	11:05:30	1.761	47	0.019
11:04:48	1.43585	5	0.34415	11:05:31	1.76197	48	0.01803
11:04:49	1.45903	6	0.32097	11:05:32	1.76255	49	0.01745
11:04:50	1.48704	7	0.29296	11:05:33	1.7631	50	0.0169
11:04:51	1.50811	8	0.27189	11:05:34	1.76326	51	0.01674
11:04:52	1.52828	9	0.25172	11:05:35	1.76371	52	0.01629
11:04:53	1.5546	10	0.2254	11:05:36	1.76428	53	0.01572
11:04:54	1.56556	11	0.21444	11:05:37	1.76492	54	0.01508
11:04:55	1.58194	12	0.19806	11:05:38	1.76494	55	0.01506
11:04:56	1.59726	13	0.18274	11:05:39	1.76559	56	0.01441
11:04:57	1.61221	14	0.16779	11:05:40	1.76602	57	0.01398
11:04:58	1.62493	15	0.15507	11:05:41	1.76664	58	0.01336
11:04:59	1.63054	16	0.14946	11:05:42	1.76724	59	0.01276
11:05:00	1.64527	17	0.13473	11:05:43	1.76771	60	0.01229
11:05:01	1.65986	18	0.12014	11:05:44	1.76806	61	0.01194
11:05:02	1.6692	19	0.1108	11:05:45	1.76806	62	0.01194
11:05:03	1.67828	20	0.10172	11:05:46	1.76886	63	0.01114
11:05:04	1.68658	21	0.09342	11:05:47	1.76905	64	0.01095
11:05:05	1.69374	22	0.08626	11:05:48	1.76975	65	0.01025
11:05:06	1.70085	23	0.07915	11:05:49	1.76994	66	0.01006
11:05:07	1.70732	24	0.07268	11:05:50	1.76994	67	0.01006
11:05:08	1.71347	25	0.06653	11:05:51	1.77009	68	0.00991
11:05:09	1.71788	26	0.06212	11:05:52	1.77022	69	0.00978
11:05:10	1.72372	27	0.05628	11:05:53	1.77113	70	0.00887
11:05:11	1.72769	28	0.05231	11:05:54	1.7711	71	0.0089
11:05:12	1.73164	29	0.04836	11:05:55	1.77087	72	0.00913
11:05:13	1.73497	30	0.04503	11:05:56	1.77077	73	0.00923
11:05:14	1.73782	31	0.04218	11:05:57	1.77123	74	0.00877
11:05:15	1.74089	32	0.03911	11:05:58	1.77198	75	0.00802
11:05:16	1.74271	33	0.03729	11:05:59	1.77189	76	0.00811
11:05:17	1.74491	34	0.03509	11:06:00	1.7723	77	0.0077
11:05:18	1.74656	35	0.03344	11:06:01	1.77214	78	0.00786
11:05:19	1.74873	36	0.03127	11:06:02	1.77292	79	0.00708
11:05:20	1.75041	37	0.02959	11:06:03	1.78162	80	-0.00162
11:05:21	1.7519	38	0.0281	11:06:04	1.76962	81	0.01038
11:05:22	1.75345	39	0.02655	11:06:05	1.77065	82	0.00935
11:05:23	1.75491	40	0.02509	11:06:06	1.77165	83	0.00835
11:05:24	1.75557	41	0.02443	11:06:07	1.77054	84	0.00946
11:05:25	1.75706	42	0.02294				

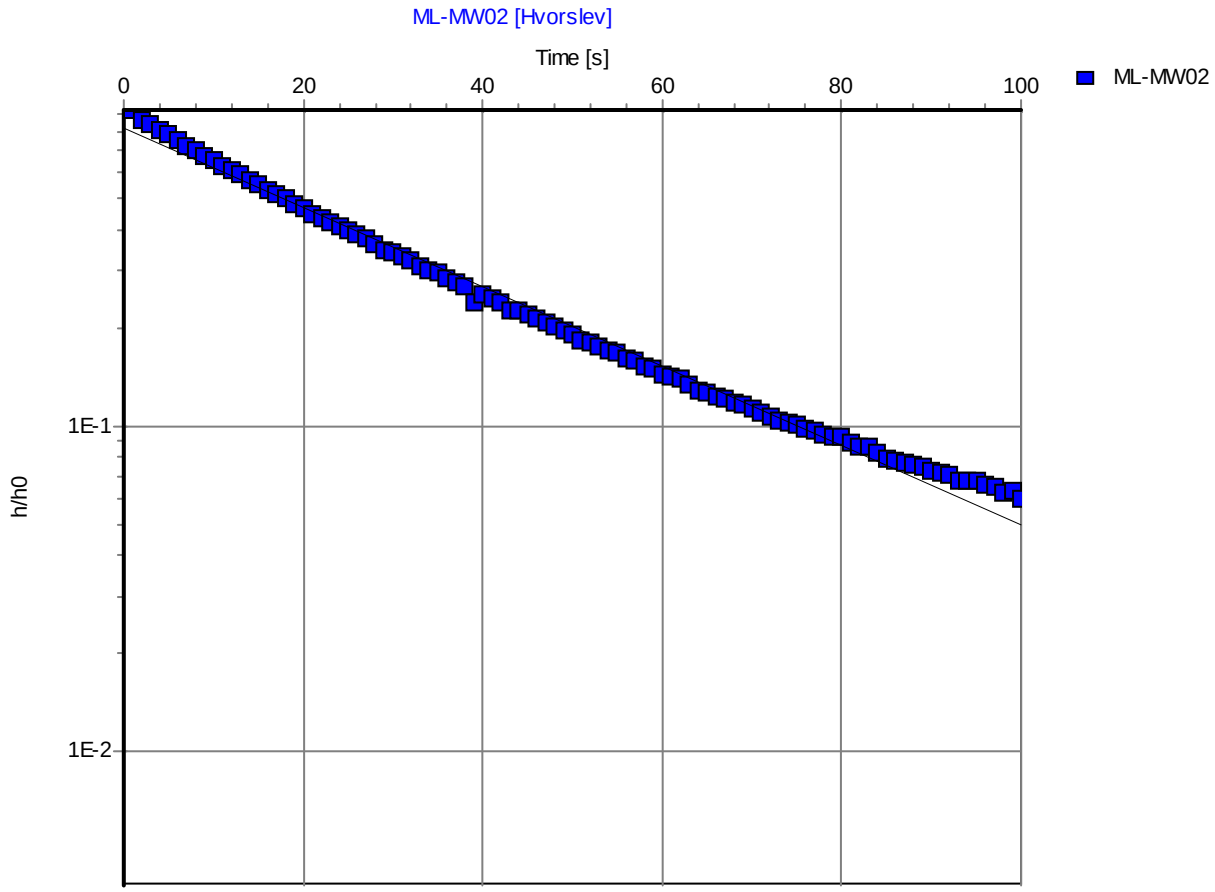
EBA Engineering Consultants Calcite Buisness Centre Unit 6, 151 Industrail Road Whitehorse, Yukon Y1A 2V3	**Slug Test Analysis Report** Number: W23101317 Project: 2010 Monitoring Program- Mount Lorne Client: Yukon Government
Location: Mount Lorne	
Test performed by: Test date: 12/17/2010	Evaluated by: BCW Reviewed by: SK
Analysis Method: Bouwer & Rice	



Conductivity: 1.32E-5 [m/s]

Comments:

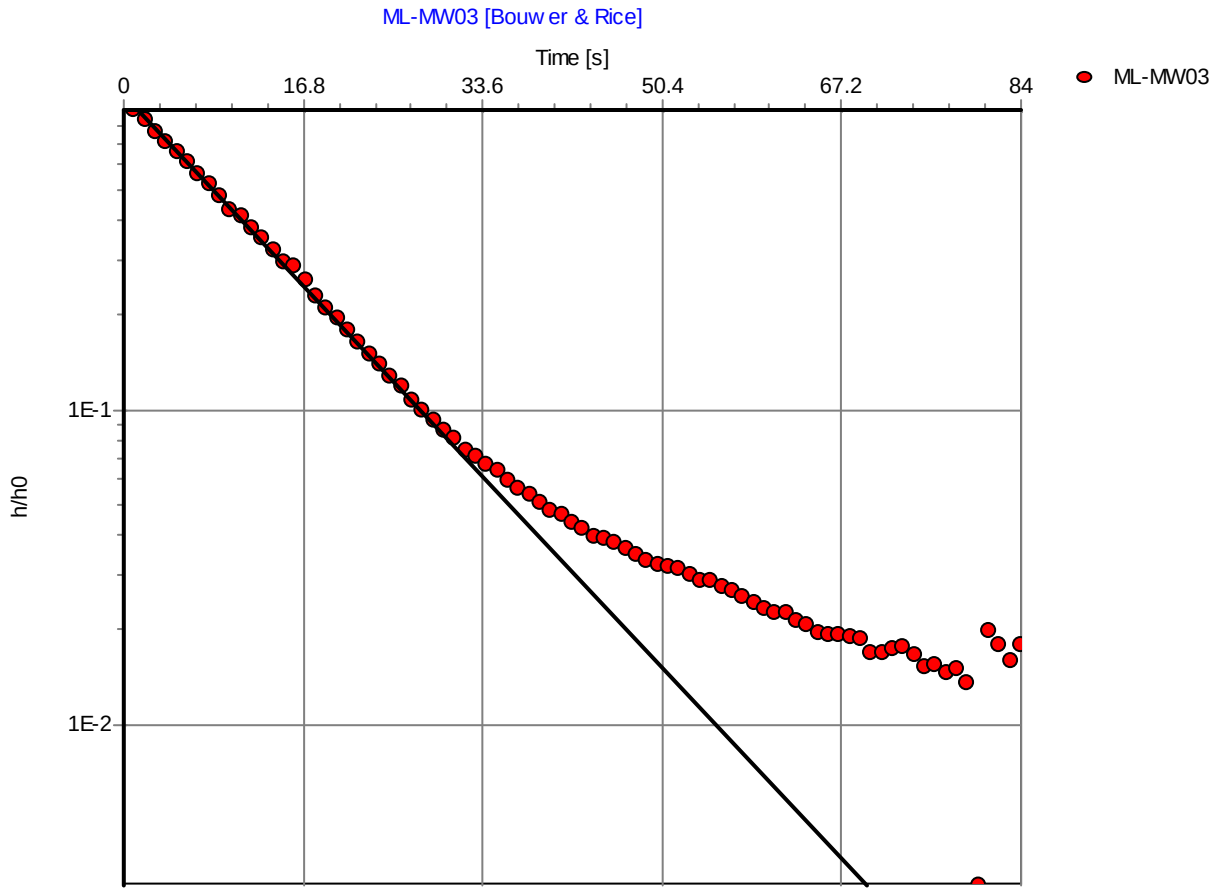
EBA Engineering Consultants Calcite Buisness Centre Unit 6, 151 Industrail Road Whitehorse, Yukon Y1A 2V3	**Slug Test Analysis Report** Number: W23101317 Project: 2010 Monitoring Program- Mount Lorne Client: Yukon Government
Location: Mount Lorne	
Test performed by: Test date: 12/17/2010	Evaluated by: BCW Reviewed by: SK
Analysis Method: Hvorslev	



Conductivity: 1.63E-5 [m/s]

Comments:

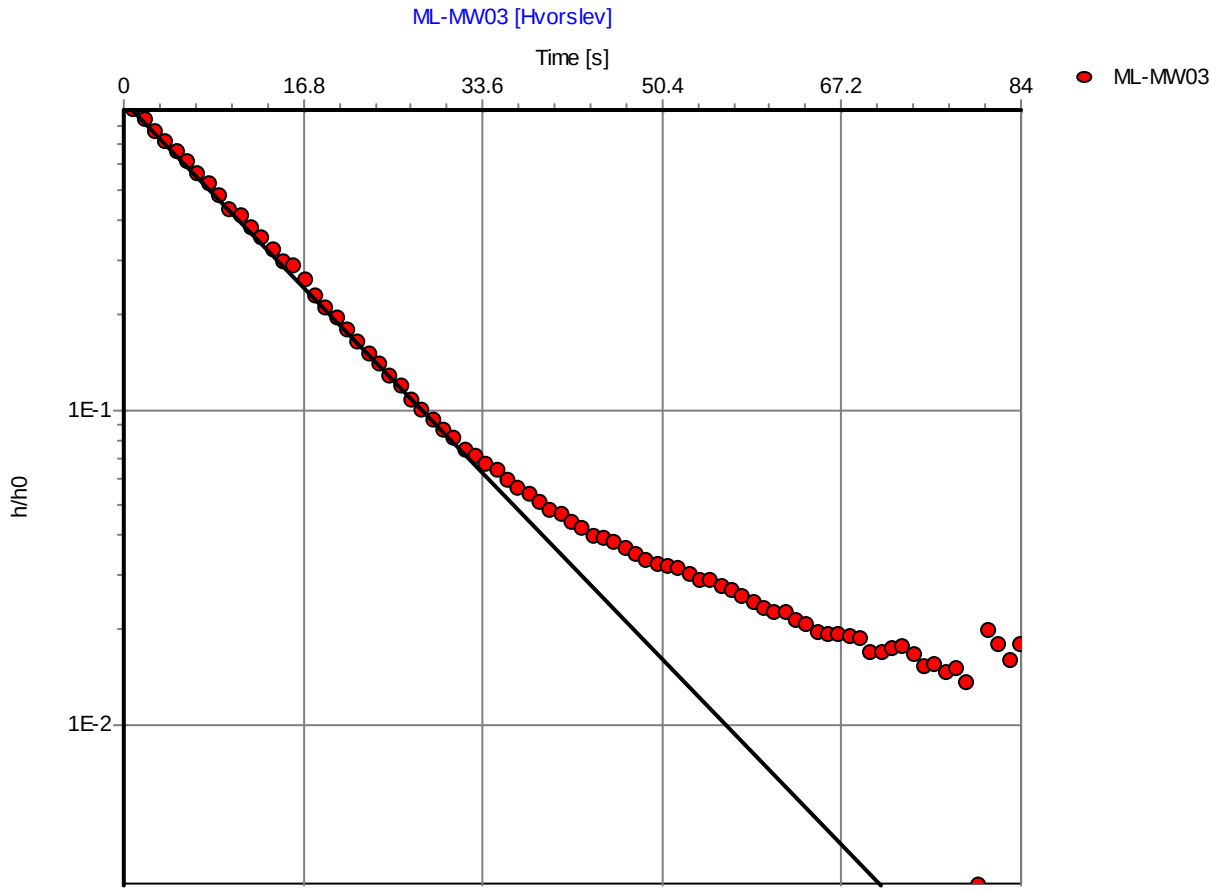
EBA Engineering Consultants Calcite Buisness Centre Unit 6, 151 Industrail Road Whitehorse, Yukon Y1A 2V3	**Slug Test Analysis Report** Number: W23101317 Project: 2010 Monitoring Program- Mount Lorne Client: Yukon Government
Location: Mount Lorne	
Test performed by: Test date: 12/17/2010	Evaluated by: BCW Reviewed by: SK
Analysis Method: Bouwer & Rice	



Conductivity: 3.11E-5 [m/s]

Comments:

EBA Engineering Consultants Calcite Buisness Centre Unit 6, 151 Industrail Road Whitehorse, Yukon Y1A 2V3	**Slug Test Analysis Report** Number: W23101317 Project: 2010 Monitoring Program- Mount Lorne Client: Yukon Government
Location: Mount Lorne	
Test performed by: Test date: 12/17/2010	Evaluated by: BCW Reviewed by: SK
Analysis Method: Hvorslev	



Conductivity: 3.99E-5 [m/s]

Comments: