Revised Hydrogeological Assessment and Groundwater Monitoring and Sampling Results

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HEMMERA

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July 10, 2015
File: 1721-001.01

Castle Rock Enterprises
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Attn: Ron Bonnycastle, President

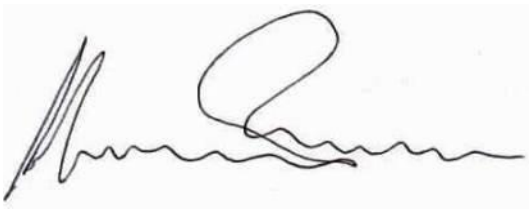
Dear Mr. Bonnycastle,

Re: Revised Hydrogeological Assessment and Groundwater Monitoring and Sampling Results

Hemmera Envirochem Inc. (Hemmera) was retained by Castle Rock Enterprises (Castle Rock) to complete a hydrogeological assessment and groundwater sampling program at their proposed Land Treatment Facility (LTF) located on the west side of Old Ski Hill Road, south of the Alaska Highway (the Site). The proposed LTF is located within an active gravel quarry leased by Castle Rock through the Yukon Government Lands Branch. Yukon Environment issued and replaced LTF Permit #24-023 (the LTF permit) to Castle Rock on March 14, 2007 and April 30, 2014 respectively. Hemmera provided the initial assessment report in October 2014 which was forwarded to Yukon Government for third party review. Based on the reviewer's comments, the assessment report has been revised and we are pleased to provide this final report to Castle Rock.

We have appreciated the opportunity to work with you on this project and trust that this report meets your requirements. Please feel free to contact the undersigned by phone or email regarding any questions or further information that you may require.

Regards,
Hemmera Envirochem Inc.



ORIGINAL SIGNED AND STAMPED

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EXECUTIVE SUMMARY

Hemmera Envirochem Inc. (Hemmera) was retained by Castle Rock Enterprises (Castle Rock) to complete a hydrogeological assessment and groundwater sampling program at their proposed Land Treatment Facility (LTF) located on the west side of Old Ski Hill Road, south of the Alaska Highway (the Site). The proposed LTF is located within an active gravel quarry leased by Castle Rock through the Yukon Government Lands Branch. Yukon Environment issued and replaced LTF Permit #24-023 (the LTF permit) to Castle Rock on March 14, 2007 and April 30, 2014 respectively.

The assessment showed that conceptually, groundwater flows in an unconfined setting within the surficial deposits which blanket bedrock at the Site. The surficial aquifer is interpreted to flow to the east-northeast towards Little Takhini Creek, approximately 250 m down-gradient of the Site. Haeckel Hill acts as a recharge site for shallow unconfined groundwater, and may also recharge a bedrock aquifer. The hydraulic conductivity of the surficial unit is expected to exhibit considerable variability associated with its complex depositional history. However, owing to the sites history as a gravel quarry, high hydraulic conductivity surficial soils are expected at the Site. The bulk hydraulic conductivity of the bedrock is expected to be low and strongly related to the orientation of its bedding planes. The degree of hydraulic connectivity between the surficial and bedrock aquifer remains unclear.

The field program involved a total of 5 boreholes, each completed as a monitoring well (MW14-01-A, MW14-01-B, and MW14-02 to MW14-04), drilled and installed by Midnight Sun Drilling Inc. of Whitehorse, YT, using a truck-mounted, solid stem auger drill rig on July 15 and 16, 2014. On test pit was advanced on August 12, 2014, a temporary monitoring well was installed in the test pit by Hemmera. The locations of the monitoring well locations were selected to represent hydraulically up-gradient and down-gradient conditions relative to the LTF footprint and to assess the water quality conditions and hydraulic conductivity at the site. The monitoring well installed in the test pit location was only used to obtain water level information in the footprint of the LTF.

The groundwater analytical results indicated that aside from MW14-01-A that had a concentration of manganese (213 µg/L) exceeding the CSR DW and IW standards (50 and 200 µg/L respectively), and MW14-03 had a concentration of manganese (57 µg/L) that exceeds the DW standard, no parameters analyzed had concentrations that exceed the applicable CSR standards. The estimated groundwater velocity was determined to be approximately 7 m per day. At this velocity, it would take approximately 36 days for groundwater to migrate from the Site to Little Takhini Creek, the creek located approximately 250 m east-northeast of the Site.

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

1. Castle Rock fill the site between 1.0 and 1.5 m to raise ground surface greater than 3 m above the water table. Three additional monitoring events (see above) will confirm if a 1.5 m increase in land surface is sufficient or if additional filling will be required;
2. Castle Rock grade the site during filling to reduce the slope to less than 6% over the footprint of the holding cells;
3. Confirm site buildings remain greater than 60 m away from the active portion of the Site; and
4. Improve the existing water diversions up-gradient of the Site to divert shallow groundwater around the footprint of the holding cells.

The following groundwater sampling monitoring and sampling program is recommended pursuant to Part 7 of the Permit.

- Three additional groundwater monitoring events for combustible headspace readings (CHR), depth to product, depth to groundwater, etc.
- An additional groundwater sampling event during seasonal high water table (expected during spring runoff)[1]
    - Sample to be submitted for BTEX/VPH, LEPH/HEPH, PAHs, VOCs, dissolved metals, general chemistry[2],and field parameters collected concurrently with sampling.

Completion of the above recommendations is expected to satisfy the requirements of the hydrogeological assessment pursuant to the Permit.

The following recommendations are made for site operations, following completion of the above:

- Extra monitoring well should be installed down-gradient of each of the five holding cells. Depending on final site configuration and grading, this may require the installation of three[3] additional monitoring wells. Seasonal groundwater monitoring data collected during the hydrogeological assessment will determine where to complete well installations such that the screened interval straddles the water table at all times during the year;
- Groundwater sampling should be conducted twice annually. The high hydraulic conductivity of the sand and gravel aquifer, relatively high groundwater velocity, and close proximity to surface water warrant additional groundwater sampling frequency.

Groundwater monitoring should be conducted at least quarterly. High CHR and/or the presence of LNAPL would trigger additional sampling, contacting an environmental protection analyst, and developing an adaptive management plan.

1 Two rounds of sampling (high and low water table) are expected to provide baseline groundwater quality conditions. Low water table is inferred to occur during August/September, for which groundwater samples have already been collected and analyzed.
2 Anions, TDS, TSS, speciated alkalinity/nitrogen, etc.
3 MW14-02 will likely need to be decommissioned and/or re-drilled to facilitate groundwater sample collection.

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1.0 INTRODUCTION

Hemmera Envirochem Inc. (Hemmera) was retained by Castle Rock Enterprises (Castle Rock) to complete a hydrogeological assessment and groundwater sampling program at their proposed Land Treatment Facility (LTF) located on the west side of Old Ski Hill Road, south of the Alaska Highway (the Site). The proposed LTF is located within an active gravel quarry leased by Castle Rock through the Yukon Government Lands Branch. Yukon Environment issued and replaced LTF Permit #24-023 (the LTF permit) to Castle Rock on March 14, 2007 and April 30, 2014 respectively.

1.1 BACKGROUND

The proposed LTF location is on the area of a gravel quarry lease registered to Castle Rock. The LTF footprint is located in an area where gravel has been extracted. The LTF was assessed under YESAA (YESAA file number 2006-0133) and a decision document was issued by Yukon Government on September 5, 2006. An LTF permit (#24-023) was issued by Environment Yukon on March 14, 2007 and subsequently replaced on April 30, 2014. The site location is presented in **Figure 1**.

Access Consulting Group (Access) prepared a report in April 2006 for Castel Rock Enterprises titled *2006 Construction, Operation, and Decommissioning Plan as Required by the Contaminated Sites Regulations of the Yukon Environment Act*. The report includes information about a test pitting program that was completed in 2006 at the proposed LTF area. A copy of the report is attached in **Appendix A**.

Seven test pits were advanced to a depth ranging from 3.2 mbg to 3.7 mbg. Four test pits were advanced in the area of the proposed LTF, the others were advanced southeast of the proposed location. Groundwater was encountered at three of the seven test pit locations. Water was encountered at the following depths: 2.5 mbg (TP01), 2.1 mbg (TP02) and 3.55 mbg (TP05).

1.2 OBJECTIVE

The objective of the hydrogeological assessment and groundwater sampling program was to:

a. Determine the direction and rate of groundwater flow;
b. Identify potential receiving environments;
c. Assess travel times for potential contaminant pathways;
d. Collect data from a minimum of one well hydraulically down-gradient and hydraulically up-gradient of the facility and install additional wells to characterize the groundwater flow regime (if required);
e. Assess baseline groundwater quality;
f. Provide data for the design and construction of the LTF; and
g. Satisfy the LTF #24-023 permit requirements.

Work was carried out in accordance with the scope of services outlined in the Hemmera *Proposal for Hydrogeological Assessment and Groundwater Monitoring* dated June 3, 2014 (the Proposal).

1.3 SCOPE OF SERVICES

Hemmera has completed the following tasks in accordance with the Proposal:

- Conducted a project kick-off meeting to confirm logistics and schedule;
- Reviewed historical site information to assess the presence or absence of underground utilities that may exist at the site;
- Retained Midnight Sun Drilling Inc. of Whitehorse, Yukon to conduct the drilling program;
- Advanced five boreholes, each completed with a groundwater monitoring well (MW14-01-A, MW14-01-B, and MW14-02, MW14-03 and MW14-04) and a protective steel casing to protect the well from damage during LTF construction and/or operations;
- Advanced one test pit in the area of the LTF footprint and installed a temporary shallow groundwater well (MW14-05) to verify groundwater elevations (MW14-05 was not used to collect groundwater quality data or hydrogeological testing data);
- Developed groundwater monitoring wells and sampled groundwater from select groundwater monitoring wells;
- Collected pH, conductivity, dissolved oxygen, redox potential and temperature field parameters during groundwater purging and sampling as applicable;
- Submitted 4 groundwater samples (3 from monitoring wells and 1 duplicate) to ALS Environment (ALS), an accredited laboratory for analysis of the potential contaminants of concern (dissolved metals, benzene, toluene, ethyl benzene, xylenes, styrene (BTEXS), methyl tert-butyl ether (MTBE), volatile petroleum hydrocarbons (VPH), light and heavy extractable hydrocarbons (LEPH & HEPH), and polycyclic aromatic hydrocarbons (PAHs));
- Coordinated the surveying of groundwater monitoring well locations and elevations;
- Monitored combustible headspace readings (relative to petroleum hydrocarbons) at each groundwater monitoring well;
- Determined direction of groundwater flow;
- Stored purge water on site in sealed drums; and
- Prepared this report.

Hemmera will also monitor groundwater levels on a quarterly basis for one year (an additional 3 events after the initial drilling) to establish the timing of high and low water conditions and provide a technical memo documenting any fluctuations in the water table.

2.0 PRELIMINARY HYDROGEOLOGICAL ASSESSMENT

Available information pertaining to the site was reviewed prior to the drilling program. The objective of this desktop review was to develop a preliminary hydrogeological conceptual model to be used to plan the drilling program.

2.1 DATA SOURCES

Sources of information reviewed included:

- topographic maps;
- surficial geologic maps;
- bedrock geologic maps;
- the location and orientation of aquatic life habitat (rivers and streams);
- water well records and borehole logs (if available); and
- historic site assessment reports.

2.2 SURFICIAL GEOLOGY

The surficial geology of the site and vicinity is described in the work of Morison and Klassen (1991). The topography of the site is described as a quarry bench excavated into the side of Haeckel Hill. In the vicinity of the site, the slope of Haeckel Hill dips to the northeast. Topography slopes towards Little Takhini Creek, located approximately 250 m east-northeast (down-gradient) of the Site.

The surficial deposits on-site are comprised of lodgement and ablation till with a sandy to silty matrix 1 m to 30 m thick. This unit blankets the underlying bedrock and its thickness is strongly correlated to the bedrock topography. This unit forms a nearly continuous blanket over benches along the sides of large valleys and gentle mountain slopes.

2.3 BEDROCK GEOLOGY

The bedrock geology of the site and vicinity was compiled by Gordey (2008). Bedrock at the Site is comprised of the Mandanna Member of the Lewes River Group of Upper Triassic age. The Mandanna Member is comprised of red, purple, green and grey, medium bedded to massive arkosic greywacke, mudstone and shale; finely laminated, thick-bedded arkosic sandstone; minor interbedded pebble conglomerate and red, bioturbated sandstone.

No major faults are present in the Mandanna Member in the vicinity of the Site. However, the Mandanna Member exhibits bedding planes dipping towards the northeast in the vicinity of the Site. The hydraulic conductivity of the Mandanna member is expected to exhibit low hydraulic conductivity and flow in bedrock may be dominated by the orientation and connectivity of bedding planes.

The region is generally mineralized with polymetallic veins as evidenced by two drilled prospects south of the Site (Gordey, 2008).

2.4 CONTAMINATED SITES INVENTORY

The Canadian Federal Contaminated Sites Inventory (FCSI) was searched to see if any known federal contaminated sites are present in the vicinity of the Site. The search indicated the closest federal contaminated site was located approximately 7 km southeast of the Site. Based on topography and drainage in the watershed, this property is interpreted to be cross- and down-gradient from the Site. No federal contaminated sites were identified up-gradient of the Site.

2.5 REVIEW OF LTF PERMIT

The following is a review of a sub-set of conditions put forth by Yukon Environment to satisfy permit requirements. Of particular relevance to this Hydrogeological Assessment Report are the following excerpts from the permit:

2.5.1 Part 3: Facility Specifications

1. The permittee shall not construct or operate a facility on any portion of land where:
    a. The slope is greater than 6%;
    b. The seasonal high water table is less than 3 m below the surface;
    c. The facility would be within 100 m of a surface water body;
    d. The land is identified as being within a 25-year floodplain; or
    e. Residential property lines or buildings are less than 60 m away.

14. The permittee shall ensure that a qualified hydrogeologist conducts a hydrogeological assessment of the site which:
    a. Determines the direction and rate of groundwater flow;
    b. Identifies potential receiving environments;
    c. Assesses travel times for potential contaminant pathways; and
    d. Is based on data from a minimum of one well up-gradient of the facility and two wells down-gradient of the facility, at locations chosen by the qualified hydrogeologist, and which are installed in such a way as to allow their use for monitoring of groundwater for contamination as required in Sections 7.4 and 7.5 of the permit.

The permittee shall submit a written report of the hydrogeological assessment for review and approval by an environmental protection analyst before accepting material into the facility.

2.5.2 Part 7: Monitoring

1. The permittee shall develop and implement a sampling and monitoring program for all contaminated material being treated at the facility, in accordance with all guidelines and protocols pursuant to the CSR that pertain to the sampling, analysis and monitoring of contaminated material within a land treatment facility;

2. The permittee shall ensure that all groundwater wells at the facility with detectable water levels are monitored, sampled and analysed as follows:

    a. To determine the timing of high and low water conditions, the groundwater elevation in all wells shall be monitored quarterly for one year following the completion of the hydrogeological assessment. In subsequent years, all wells shall be monitoring twice annually for groundwater elevation at the determined high and low water points;

    b. To establish baseline levels and monitor for groundwater contamination, samples from all wells at the facility shall be analysed for petroleum hydrocarbons, dissolved metals, pH, conductivity, dissolved oxygen, redox potential, temperature, and any other contaminants of concern:

        i. at the time of the hydrogeological assessment; and

        ii. annually thereafter.

3. If groundwater is not encountered during the hydrogeological assessment, the permittee shall ensure that the groundwater wells are checked for water at least once annually during known periods of high water in the area. If groundwater is encountered, the permittee shall conduct the monitoring, sampling, and analysis described in section 7.2 above.

4. If groundwater analysis show detectable concentrations of hydrocarbons at any well during any sampling event, the permittee shall contact an environmental protection analyst within 7 days of receipt of results.

5. If hydrocarbons are detected in any groundwater well under section 7.4, the permittee shall conduct additional monitoring and develop and implement an adaptive management plan to address the contamination as directed in writing by an environmental protection analyst.

2.6 REGULATORY FRAMEWORK – APPLICABLE GROUNDWATER STANDARDS

The Site is located in Yukon Territory and is therefore subject to the Yukon *Environment Act* and the *Contaminated Sites Regulation* (CSR). The applicable standards for groundwater at the Site are dependent upon present and future water use at the Site and on the distance to the closest point of use, as specified in CSR Protocol 6 - Application of Water Quality. As a conservative approach, Hemmera has assumed that the aquatic life water use (AW), drinking water use (DW), irrigation water use (IW), and livestock water use (LW) standards all apply to the Site as follows:

- The Groundwater Information Network Basic Map Viewer (GIN Map) shows an unnamed stream approximately 250 m east-northeast of the Site. The Access report from 2006 identifies this stream as Little Takhini Creek. Little Takhini Creek is a tributary to the Yukon River and it is assumed that it potentially contains aquatic life, therefore the AW standards apply;
- The Site is located within a 1.5 km radius of a water well. GIN Map shows a “Domestic - household needs” Water Use well approximately 1 km northeast of the Site. This well is identified as Well ID #204140085 with information provided by Environment Yukon. Aside from its location and elevation, no other well details including well construction or screen interval is provided. Based on proximity of the water well, DW standards apply; and,

- Hemmera was unable to determine whether irrigation water use presently exists within a 1.5 km radius of the Site, however Hemmera believes that there is the potential for agriculture to occur within 1.5 km radius of the Site in the future and as such has applied the IW and LW standards.

2.7 PRELIMINARY HYDROGEOLOGICAL SITE CONCEPTUAL MODEL

Conceptually, groundwater flows in an unconfined setting within the surficial deposits which blanket bedrock at the Site. The surficial aquifer is interpreted to flow to the east-northeast towards Little Takhini Creek approximately 250 m down-gradient of the Site. Haeckel Hill acts as a recharge site for shallow unconfined groundwater, and may also recharge a bedrock aquifer. The hydraulic conductivity of the surficial unit is expected to exhibit considerable variability associated with its complex depositional history. However, owing to the sites history as a gravel quarry, high hydraulic conductivity surficial soils are expected at the Site. The bulk hydraulic conductivity of the bedrock is expected to be low and strongly related to the orientation of its bedding planes. The degree of hydraulic connectivity between the surficial and bedrock aquifer remains unclear.

A residence with a domestic use well is present approximately 1 km northeast (down-gradient) of the Site, indicating aquifers are present in the vicinity of the Site that will need to be protected.

The proposed LTF will be constructed in a manner which will prevent impacted surface water or groundwater from reaching Little Takhini Creek or the down-gradient domestic water well. As outlined in **Section 2.5.2** above, ongoing monitoring at the Site should be completed.

An unnamed pond is located approximately 125 m east (cross-gradient) from the southeast corner of the Site, and groundwater from the Site is not expected to flow to this pond. Additional groundwater monitoring events will confirm if there is a seasonal component of groundwater flow towards this feature.

3.0 FIELD METHODS

3.1 GROUNDWATER MONITORING WELL DRILLING AND INSTALLATION

A total of 5 boreholes, each completed as a monitoring well (MW14-01-A, MW14-01-B, and MW14-02 to MW14-04) were drilled and installed by Midnight Sun Drilling Inc. of Whitehorse, YT, using a truck-mounted, solid stem auger drill rig on July 15 and 16, 2014.

On test pit was advanced on August 12, 2014, a temporary monitoring well was installed in the test pit by Hemmera. Investigation locations are shown on **Figure 2**.

Monitoring wells were completed with 5.08-cm (2") diameter PVC monitoring well casing. The screen lengths for each monitoring well were 1.5 m and constructed using a Schedule 40 PVC pipe, and a 10-slot PVC screen. The PVC pipe and screens were factory-cleaned and stored in a protective plastic casing until installation. New nitrile gloves were used to handle the well materials during installation.

Once the well screen and pipe were in place, a sand pack was placed around the screen to fill the borehole annulus a height of approximately 0.30 m above the well screen using 10 – 20 washed filter sand. A minimum 0.90-m thick bentonite chip well seal was then placed on top of the sand pack, and in most cases the bentonite seal extended from the top of the sand pack to 0.6 m below ground surface. The monitoring wells were installed to a height of approximately 0.85 m above ground ("stick ups") and finished with red painted metal 'stick up' well protectors.

Newly-installed monitoring wells were developed by removing at least 10 well volumes using dedicated tubing with a low flow pump. This was conducted to remove foreign materials that may have entered the well and to ensure adequate permeability through the sand filter pack surrounding the PVC monitoring well screen length. After development the newly-installed wells were left for a minimum of 24 hours prior to purging and sampling.

The soils at the boreholes and test pit were logged with respect to geologic properties: specifically colour, moisture, density, grain size, and soil type. Soil samples were placed into Ziploc bags, with a minimum of handling and atmospheric exposure, for measurement of combustible soil vapours (CSVs). Each bag was half-filled with soil from each sample location and sealed tightly. The bags were gently agitated to facilitate the break-up of any lumps and then allowed to sit for 20 to 30 minutes. CSVs were measured by inserting the probe of a RKI Eagle (methane elimination mode on, calibrated to hexane) into the headspace of the bag. A copy of each monitoring well log is included in **Appendix B**, attached.

3.2 MONITORING WELL SURVEY

An elevation survey at the monitoring well locations was performed by Castle Rock Enterprises. The survey consisted of measuring the elevation at grade (ground surface) and at the top of the monitoring well pipe (with the j-plug off) of each monitoring well. The horizontal position of each monitoring well tied into Site survey as prepared by Castle Rock Enterprises.

Monitoring well survey measurements are included in **Table 1** and are shown on borehole logs compiled in **Appendix B**.

3.3 GROUNDWATER MONITORING AND SAMPLING EVENT

On August 15, 2014 Hemmera performed the following groundwater monitoring and sampling activities:

a. Immediately upon opening the well casings at MW14-01-A, MW14-01-B, MW14-03, MW14-04 and MW14-05, measured combustible headspace readings (CHRs) using a RKI Eagle set in methane elimination mode and calibrated to hexane;

b. Measurement of light non-aqueous phased liquid (LNAPL) thickness (if any) and static water levels and measurement of total water depth at the aforementioned mentioned monitoring wells was completed using an interface probe;

c. Groundwater was sampled at MW14-01A and MW14-03 using a low-flow sampling technique. Groundwater was purged at a rate not exceeding 150 mL/min using a peristaltic pump. Groundwater temperature, pH, conductivity, redox, and dissolved oxygen were monitored using a YSI multi-probe during purging until measurements stabilized, which indicated collection of representative formation groundwater. Visual and olfactory observations of the groundwater were also noted during sampling (sheen, colour, transparency, silt content, and odour if present);

d. Groundwater was sampled without purging at MW14-04 using a low-flow sampling technique. This monitoring well was developed dry the previous day and exhibited slow recharge. The limited amount of water in the well and slow recharge precluded purging prior to sampling;

e. Groundwater samples were field-filtered and preserved by Hemmera staff prior to dissolved metals analysis; and

f. Groundwater samples were collected in pre-cleaned glass bottles supplied by ALS Environmental (ALS) and specific to the requested analysis.

Groundwater samples were temporarily stored in an insulated shipping cooler to prevent chemical alteration of the samples between the Site and the lab. The coolers were delivered to ALS in Whitehorse, YT on August 15, 2014, the same afternoon that the samples were collected.

Project-specific chain-of-custody forms accompanied the samples shipped for analysis. These forms contained pertinent sampling information and analytical requirements, and followed the samples through the analytical process to final sample disposal. This documentation provided a traceable history of the sample from the time of collection to disposal, and ensured that analytical determinations were performed within recommended holding times. Details of pertinent sampling information for this site were also recorded in a field notebook and on field sample collection sheets.

3.4 HYDRAULIC CONDUCTIVITY TESTING

Single well rising-head (slug) testing was conducted to estimate the hydraulic conductivity of the surficial aquifer at the Site. Slug testing was conducted on September 4, 2014. Three tests were conducted on MW14-03. Data was recorded using an InSitu LevelTroll™ 700 vented pressure transducer. Testing was initiated by removing a "slug" of water from the monitoring well using a dedicated disposable bailer. Slug test data were recorded in true logarithmic time until the water level had recovered to at least 90% of the static water level. Data were downloaded to a PC and interpreted with AQTESOLV Professional (Version 4.0) using the Bouwer-Rice (1976) method for non-oscillating responses in an unconfined aquifer. Slug test results are presented in **Appendix C**.

3.5 QUALITY ASSURANCE / QUALITY CONTROL

Hemmera's field quality assurance/quality control program (QA/QC) included standard soil and groundwater sampling protocols to minimize the potential for cross contamination between samples. The field QA/QC procedure also included the collection and analysis of field duplicates. Where field duplicates were collected, relative percent difference (RPD) calculations were completed between characterization samples and their duplicates. RPDs are calculated as the difference between a sample and its field duplicate, over the average of the two values. RPDs were not calculated where concentrations were less than five times the detection limit, which is considered to be too low to accurately calculate RPD values. RPD calculations were completed for soil and groundwater samples, and are presented with analytical results in **Table 2**. The RPD data quality objectives (DQOs) used in this investigation for soil and groundwater are listed below in **Table A**.

Table A BC MOE Recommended DQOs for Groundwater

Parameter Category	DQOs
Organics in Water	
Volatile Organics (including BTEX and VH)	30%
Most other Typical Organic Parameters	30%
General Inorganics in Water	20%

Groundwater sample analyses were completed by ALS in Burnaby, BC. The samples submitted to ALS were subjected to QA/QC procedures specific to the laboratory. Laboratory QA/QC included internal/surrogate standards, replicates and duplicates, method blanks and method spikes.

4.0 RESULTS

The results of the subsurface investigation at the Site are summarized in the following sections.

4.1 SOIL STRATIGRAPHY

Borehole observations by Hemmera are consistent with available surficial geologic information for the Site. Stratigraphy is described as sand and gravel till with less extensive finer grained till units. Groundwater was encountered in a sand and gravel till unit which appears to be continuous across the site. This is consistent with the sites historical use as an aggregate quarry. Bedrock was not encountered in any borehole advanced by Hemmera. Borehole and monitoring well completion details are included in **Appendix B**.

4.2 GROUNDWATER MONITORING

Groundwater monitoring was conducted on August 15, 2014. Monitoring results are presented in **Table 1**. Monitoring results indicated zero combustible headspace readings (CHRs). Measurable headspace readings are a general indication of the presence of hydrocarbons. CHR measurements of 0ppm indicate hydrocarbon impacts are not present in groundwater at the Site.

Groundwater was encountered between 1.8 m and 4.1 m below ground surface (m bgs). Permit requirements stipulate the seasonal high depth to groundwater must be greater than 3 m bgs. Three additional monitoring events are proposed to evaluate seasonal fluctuations in groundwater elevation. This data will assist Castle Rock to determine how much fill is required to raise grade 3 m above the seasonal high water table.

The saturated thickness was observed up to 6.15 m thick. Bedrock was not encountered during the drilling investigation.

Groundwater monitoring data was used in conjunction with survey data to prepare groundwater elevation contours (**Figure 4**). Groundwater appears to flow towards the northeast with an average horizontal hydraulic gradient of 0.12 (12%). The vertical hydraulic gradient was calculated from the MW14-01A/B well pair. The results indicate that the vertical hydraulic gradient is approximately 0.04 m/m (4%) downward.

4.3 GROUNDWATER SAMPLING

Hemmera sampled three monitoring wells (MW14-01-A, MW14-03, and MW14-04) at the Site on August 15, 2014 and submitted these samples for laboratory analysis to ALS. A field duplicate sample (MW14-100) was collected at MW14-03 and was also submitted for laboratory analysis. Samples MW14-01-A, MW14-03, and MW14-04 were analyzed for dissolved metals, BTEXS, VPH, LEPH, HEPH, PAHs, and MTBE. The field duplicate sample MW14-100 was submitted for analysis of LEPH, HEPH, and PAHs only. The certificate of analysis from ALS for is attached in **Appendix D**.

Aside from MW14-01-A that had a concentration of manganese (213 µg/L) exceeding the CSR DW and IW standards (50 and 200 µg/L respectively), and MW14-03 with a concentration of manganese (57 µg/L) exceeding the DW standard, no parameters analyzed had concentrations that exceed the applicable CSR standards. **Table 1** and **Figure 3**, both attached, display a summary of the groundwater analytical results as compared with the CSR standards.

4.4 HYDRAULIC CONDUCTIVITY TESTING

Slug test results indicate that hydraulic conductivity of the sand and gravel unit to be approximately $2x10^{-4}$ m/s. Results are based on three slug tests conducted at MW14-03.

4.5 QUALITY ASSURANCE AND QUALITY CONTROL

4.5.1 Groundwater

Groundwater RPDs for parameters analyzed could not be calculated because all concentrations for the duplicate groundwater sample were reported as non-detect. Hemmera reviewed the laboratory quality assurance/quality control report and there were no items identified that may have impacted the quality of the data. Based on the analytical results and the laboratory report, the data appears to be reliable.

Laboratory QA/QC results from ALS are included with each certified laboratory report (**Appendix D**).

5.0 HYDROGEOLOGIC CONCEPTUAL MODEL

The preliminary hydrogeological conceptual model (**Section 2.8**) assisted in developing the field program presented in **Section 3.0**. Results of the subsurface investigation were used to refine the preliminary hydrogeological conceptual model with site specific data. Results are presented in the following subsections.

5.1 SETTING

The proposed CRE LTF is in the southwest portion of the Yukon, within the Yukon Southern Lakes Ecoregion, and in the territory of the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council. The Site is at an elevation between 763 and 776 m AMSL and lies within the Little Takhini Creek watershed, which is part of the larger Yukon River watershed. The Site encompasses approximately 22,000 m^2 of cleared area within a larger cleared area along the western side of Old Ski Hill Road. Site topography slopes to the northeast, but the surface expression has been altered by aggregate mining at the Site.

5.2 CLIMATE

Climate data for the Site is likely similar to that at the Whitehorse Airport climate station (2101300) located approximately 12 km southeast of the Site at an elevation of 706 m AMSL. Average monthly precipitation reported at the Whitehorse Airport station ranges from an average low of 7 mm in April to an average high of 38 mm in July. The average annual precipitation is approximately 262 mm including 142 cm as snowfall. Temperate ranges from an average low of -19.2 ºC in January to an average high of 20.6 ºC in July (Canadian Climate Normals, 1981-2010).

Average annual precipitation is relatively low (about 260 mm per year). With a significant portion of the precipitation occurring as snow, and the relatively cold climate, little infiltration would be expected during the winter months. The greatest potential for infiltration would occur during spring runoff. This is of particular interest to CRE is spring runoff is when highest groundwater elevations are expected. Seasonal groundwater monitoring will inform the extent of groundwater table fluctuations and the required amount of filling to raise grade to greater than 3m above seasonal high groundwater table.

5.3 GEOLOGY AND HYDROGEOLOGY

The surficial geology of the site and surrounding area is described in the work of Morison and Klassen (1991). They describe the surficial deposits in the vicinity of the site as lodgment and ablation till; silty to sandy matrix; 1 to 30 m thick. These deposits are interpreted to blanket the irregular underlying bedrock surface. Borehole observations by Hemmera are interpreted to represent lodgement and ablation till. Bedrock was not encountered during borehole advancement by Hemmera. Expected bedrock geology is described in **Section 2.3** above.

Groundwater was encountered between 1.8 and 4.1 m bgs during the August 15, 2014 monitoring event. Groundwater was typically encountered within a sand and gravel unit, where groundwater appears to flow in an unconfined setting. During the August 2014 monitoring event, the average horizontal hydraulic conductivity was estimated to be 0.12 m/m (12%). A horizontal gradient of 12% is high for sand and gravel aquifers and is interpreted to be associated the steep slope of the quarry bench. The average vertical hydraulic gradient was calculated using the MW14-01A/B shallow/deep well pair. The results indicate a downward vertical gradient within the sand and gravel unit of 0.04 m/m (4%). In other words, shallow groundwater in the sand and gravel would tend to migrate downward deeper into the sand and gravel. It remains unclear if this observed downward vertical gradient is an indication of the bedrock aquifer being recharged by the surficial (sand and gravel) aquifer. Seasonal monitoring will inform the extent to which horizontal and vertical hydraulic gradients fluctuate over the year.

As stated in **Section 5.2** above, groundwater is expected to be recharged during spring runoff (snow melt), infiltration during the summer months, and ingress from the up-gradient aquifer. Groundwater appears to flow towards Little Takhini Creek, approximately 250 m east-northeast of the Site.

5.4 HYDRAULIC CONDUCTIVITY TESTING

Hydraulic conductivity (slug) testing indicated that the hydraulic conductivity of the sand and gravel aquifer is an estimated $2x10^{-4}$ m/s. This is consistent with literature values for

5.5 ESTIMATED AVERAGE LINER GROUNDWATER VELOCITY

The groundwater velocity can be estimated using the following relationship:

$$v = \frac{K \cdot i}{n_e}$$

where:

- ***v*** is the average linear groundwater velocity,
- ***K*** is the aquifer hydraulic conductivity (2×10^{-4} m/s),
- ***i*** is the interpreted horizontal hydraulic gradient (0.12 m/m)
- n_e is the effective porosity of the aquifer material (n_e = 0.3 estimate for a poorly sorted sand and gravel aquifer).

Using this relationship, the estimated groundwater velocity is approximately 7 m per day. At this velocity, it would take approximately 36 days for groundwater to migrate from the Site to Little Takhini Creek.

5.6 GROUNDWATER CHEMISTRY

Groundwater analytical results and field parameters collected during groundwater sampling are presented in **Table 2**. The results indicate that concentrations of BTEX, EPH, VOC, and PAH were less than YCSR AW, DW, IW, and LW standards and were generally less than the detection limit. The results also indicate that concentrations of dissolved metals less than YCSR AW, DW, IW, and LW standards. The only exception is manganese; analytical results indicated concentration of manganese greater than YCSR DW at MW14-03 (57 µg/L) and greater than YCSR DW and IW at MW14-01A (213 µg/L).

Groundwater analytical results also indicated detectable concentrations of PAH in groundwater as follows:

- naphthalene (0.147 µg/L) @ MW14-01A; YKCSR DW standard is 10 µg/L;
- pyrene (0.11 µg/L) @MW14-03; YKCSR DW standard is 0.2 µg/L; and
- benzo(g,h,i)perylene (0.075 µg/L) @MW14-03; no standard.

It should be noted that a duplicate sample collected at MW14-03 indicated the concentration of pyrene and benzo(g,h,i)perylene was less than the detection limit.

Field parameters collected during groundwater sampling indicate neutral pH and low Electrical Conductivity (ED) typical of freshwater. Dissolved oxygen (DO) measurements generally indicated well oxygenated water with the exception of MW14-01A (0.7 mg/L). This monitoring well is screened approximately 6m below the water table. This low DO concentration is consistent with chemical results indicating a dissolved manganese concentration of 213 µg/L; manganese is not soluble under oxidizing conditions and its presence in groundwater at MW14-01A is consistent with low DO and somewhat reducing conditions.

5.7 POTENTIAL CONTAMINATION OF GROUNDWATER AND TRANSPORT MECHANISMS

Groundwater flows in an unconfined setting in the sand and gravel aquifer. As reported in **Section 5.5** above, the estimated groundwater velocity in this unit is high (7 m/day). Under these conditions, the dominant mechanism for groundwater transport would be advection (groundwater flow) and dispersion (groundwater mixing). Under these aquifer conditions, hydrocarbon contamination and metals contamination are attenuated by different mechanism, as described below:

5.7.1 Dissolved Hydrocarbon Migration

Hydrocarbons migrate in groundwater in the dissolved phase. Dissolved hydrocarbons are attenuated by:

- simple mixing;
- biodegradation; and
- adsorption.

Adsorption is the tendency for hydrocarbons to stick (or adsorb) to organic soil particles, thus partitioning (removing) hydrocarbons from solution and appear to 'slow' the rate of hydrocarbon migration. The degradation of hydrocarbons creates localized reducing conditions which can mobilize certain metal from the aquifer solid phase. An understanding of these transport/attenuation mechanisms will inform the recommended monitoring and sampling plan presented at the end of this report.

5.7.2 Dissolved Metal Migration

Metals migrate in groundwater in the dissolved phase or adsorbed onto colloids. In typical shallow aquifers, such as at the Site, oxidizing conditions prevail. Under oxidizing conditions, many divalent metals strongly adsorb onto iron and manganese oxyhydroxide mineral surfaces, which are nearly ubiquitous in shallow aquifers. Metals are released to solution when the aquifer system changes the pH or redox state, for example, with the release of hydrocarbons which tend to create reducing conditions. Analytical results indicating concentrations of manganese greater than DW standards indicates that the redox state of the aquifer is reducing with respect to manganese.

6.0 CONCLUSIONS

Groundwater is present within a sand and gravel aquifer at the Site. The sand and gravel aquifer is interpreted to be lodgement/ablation till deposited during the last glaciation. This unit overlies an irregular bedrock surface. Bedrock was not encountered during subsurface investigation by Hemmera.

Groundwater appears to flow in an unconfined setting in the sand and gravel unit with an average horizontal hydraulic conductivity of 0.12 m/m. The horizontal hydraulic gradient (the slope of the water table) mirrors the surface of the topography. Groundwater is interpreted to flow to the northeast and discharge to Little Takhini Creek approximately 250 m east-northeast of the Site. This creek discharged to the Yukon River.

With regard to the permit application, the following conclusions are made.

6.1 PART 3

1a The slope of the site is greater than 6%;

1b The water table was encountered less than 3 m below surface;

1c The facility is greater than 100 m from any surface water body;

1d The Site is located approximately 30 m higher than the down-gradient creek, and the Site is interpreted to be above the 15-year flood mark;

1e No residential properties or buildings are within 60 m of the Site;

14a Groundwater appears to flow to the northeast at an average velocity of 7 m/day;

14b Groundwater appears to discharge to Little Takhini Creek, approximately 250 m east-northeast of the Site;

14c The groundwater travel time from the Site to Little Takhini Creek is approximately 36 days;

14d MW14-01A/B is installed up-gradient of the proposed LTF, and MW14-02 to MW14-04 are installed down-gradient of the proposed LTF.

The monitoring and sampling requirements of Part 7 of the permit are addressed in **Section 7.0** below.

7.0 RECOMMENDATIONS

The Yukon Environment permit requires three additional monitoring events to evaluate seasonal groundwater fluctuations and determine the time of year when groundwater levels are highest. In addition to these additional monitoring events, Hemmera recommends:

1. Castle Rock fill the site between 1.0 and 1.5 m to raise ground surface greater than 3 m above the water table. Three additional monitoring events (see above) will confirm if a 1.5 m increase in land surface is sufficient or if additional filling will be required;
2. Castle Rock grade the site during filling to reduce the slope to less than 6% over the footprint of the holding cells;
3. Confirm site buildings remain greater than 60 m away from the active portion of the Site; and,
4. Improve the existing water diversions up-gradient of the Site to divert shallow groundwater around the footprint of the holding cells.

The following groundwater sampling monitoring and sampling program is recommended pursuant to Part 7 of the Permit.

- Three additional groundwater monitoring events for CHR, depth to product, depth to groundwater, etc.
- An additional groundwater sampling event during seasonal high water table (expected during spring runoff)[4]
    - Sample to be submitted for BTEX/VPH, LEPH/HEPH, PAHs, VOCs, dissolved metals, general chemistry[5], and field parameters collected concurrently with sampling.

Completion of the above recommendations is expected to satisfy the requirements of the hydrogeological assessment pursuant to the Permit.

The following recommendations are made for site operations, following completion of the above:

- Extra monitoring well should be installed down-gradient of each of the five holding cells. Depending on final site configuration and grading, this may require the installation of three[6] additional monitoring wells. Seasonal groundwater monitoring data collected during the hydrogeological assessment will determine where to complete well installations such that the screened interval straddles the water table at all times during the year;
- Groundwater sampling should be conducted twice annually. The high hydraulic conductivity of the sand and gravel aquifer, relatively high groundwater velocity, and close proximity to surface water warrant additional groundwater sampling frequency; and
- Groundwater monitoring should be conducted at least quarterly. High CHR and/or the presence of LNAPL would trigger additional sampling, contacting an environmental protection analyst, and developing an adaptive management plan.

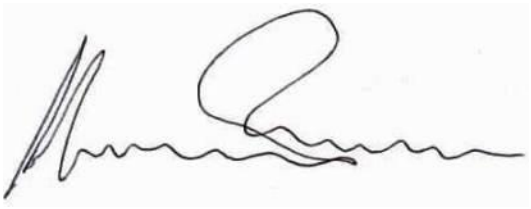
[4] Two rounds of sampling (high and low water table) are expected to provide baseline groundwater quality conditions. Low water table is inferred to occur during August/September, for which groundwater samples have already been collected and analyzed.

[5] Anions, TDS, TSS, speciated alkalinity/nitrogen, etc.

[6] MW14-02 will likely need to be decommissioned and/or re-drilled to facilitate groundwater sample collection.

We sincerely appreciate the opportunity to have assisted you with this project and if there are any questions, please do not hesitate to contact the undersigned by phone at 604.669.0424.

Report prepared by:
Hemmera Envirochem Inc.



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8.0 REFERENCES

Access Consulting Group, 2006: Construction, Operation, and Decommissioning Plan as Required by the Contaminated Sites Regulations of the Yukon Environment Act.

Gordey, S.P. (comp.) 2008: Bedrock Geology, Whitehorse (105D), Yukon; Geological Survey of Canada, Open File 5640, scale 1:250,000

Groundwater Information Network, GIN Basic Map Viewer, accessed online via: http://gin.gw-info.net/service/api_ngwds:gin2/en/wmc/standard.html;jsessionid=E1B5152C85CA6098828EF32A25DE606B

National Climate Data and Information Archive, Canadian Climate Normals and Averages, Environment Canada, accessed online via: http://climate.weatheroffice.gc.ca/climate_normals/index_e.html

Morison, S.R. and Klassen, R.W. 1991: Surficial Geology, Whitehorse, Yukon Territory; Geological

Treasury Board of Canada Secretariat, Federal Contaminated Sites Inventory, accessed online via: http://www.tbs-sct.gc.ca/fcsi-rscf/home-accueil.aspx?Language=EN&sid=wu7912225287Survey of Canada, Map 12-1990, scale 1:250,000

Yukon Geological Survey, MapMaker Online, accessed online via: http://mapservices.gov.yk.ca/YGS/WebMap.aspx

Yukon Government, Yukon Environment. 2011: Protocol for the Contaminated Sites Regulation Under the Environment Act.

Yukon Government, Yukon Water, 2013, Monitoring Yukon Water online map maker, accessed online via: http://yukonwater.ca/monitoring-yukon-water/water-data-catalogue

9.0 STATEMENT OF LIMITATIONS

This report was prepared by Hemmera Envirochem Inc., based on fieldwork conducted by Hemmera, for the sole benefit and exclusive use of Castle Rock Enterprises. The material in it reflects Hemmera's best judgment in light of the information available to it at the time of preparing this Report. Any use that a third party makes of this Report, or any reliance on or decision made based on it, is the responsibility of such third parties. Hemmera accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

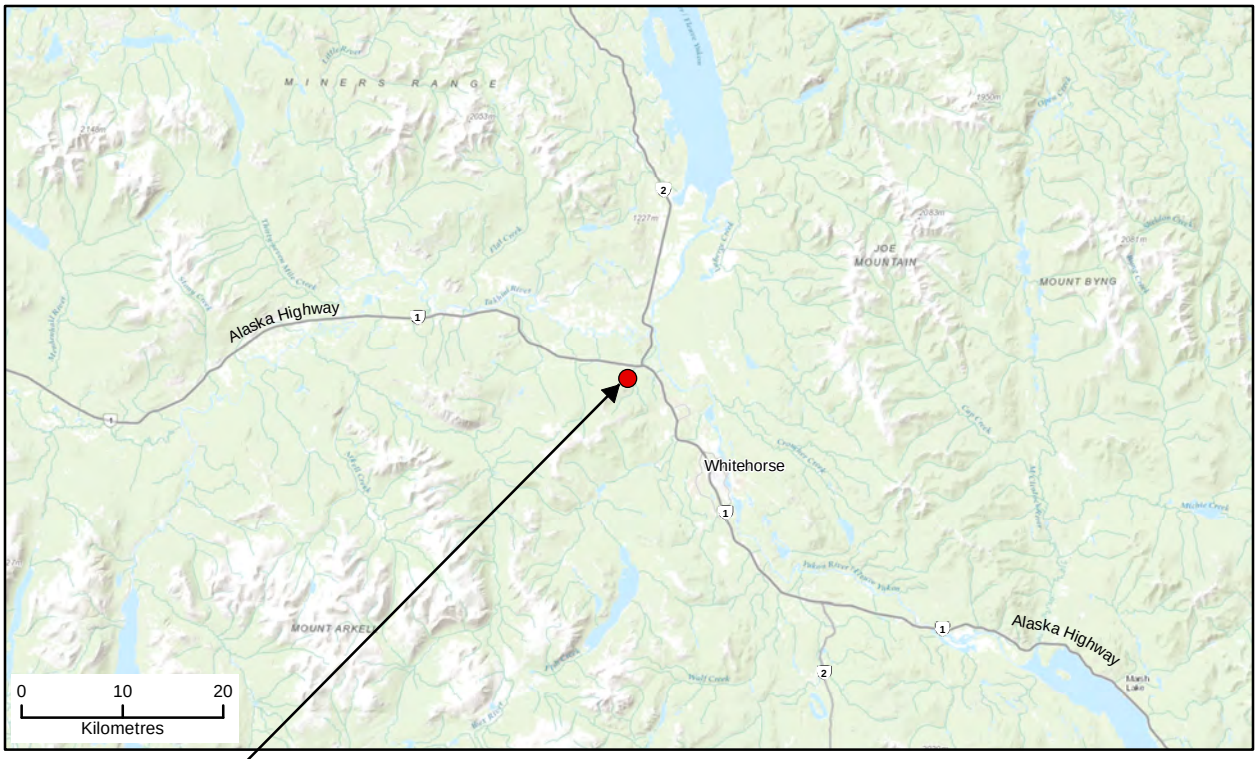
Hemmera has performed the work as described above and made the findings and conclusions set out in this Report in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession practicing under similar conditions at the time the work was performed.

This Report represents a reasonable review of the information available to Hemmera within the established Scope, work schedule and budgetary constraints. It is possible that the levels of contamination or hazardous materials may vary across the Site, and hence currently unrecognised contamination or potentially hazardous materials may exist at the Site. No warranty, expressed or implied, is given concerning the presence or level of contamination on the Site, except as specifically noted in this Report. The conclusions and recommendations contained in this Report are based upon applicable legislation existing at the time the Report was drafted. Any changes in the legislation may alter the conclusions and/or recommendations contained in the Report. Regulatory implications discussed in this Report were based on the applicable legislation existing at the time this Report was written.

In preparing this Report, Hemmera has relied in good faith on information provided by others as noted in this Report, and has assumed that the information provided by those individuals is both factual and accurate. Hemmera accepts no responsibility for any deficiency, misstatement or inaccuracy in this Report resulting from the information provided by those individuals.

The liability of Hemmera to Castle Rock Enterprises shall be limited to injury or loss caused by the negligent acts of Hemmera. The total aggregate liability of Hemmera related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of Hemmera for services rendered on this project.

FIGURES



Site Location

Site Location 1:750,000
(Source: ESRI World Topographic Map)

N

Aerial View 1:10,000
(Source: City of Whitehorse, 2011)

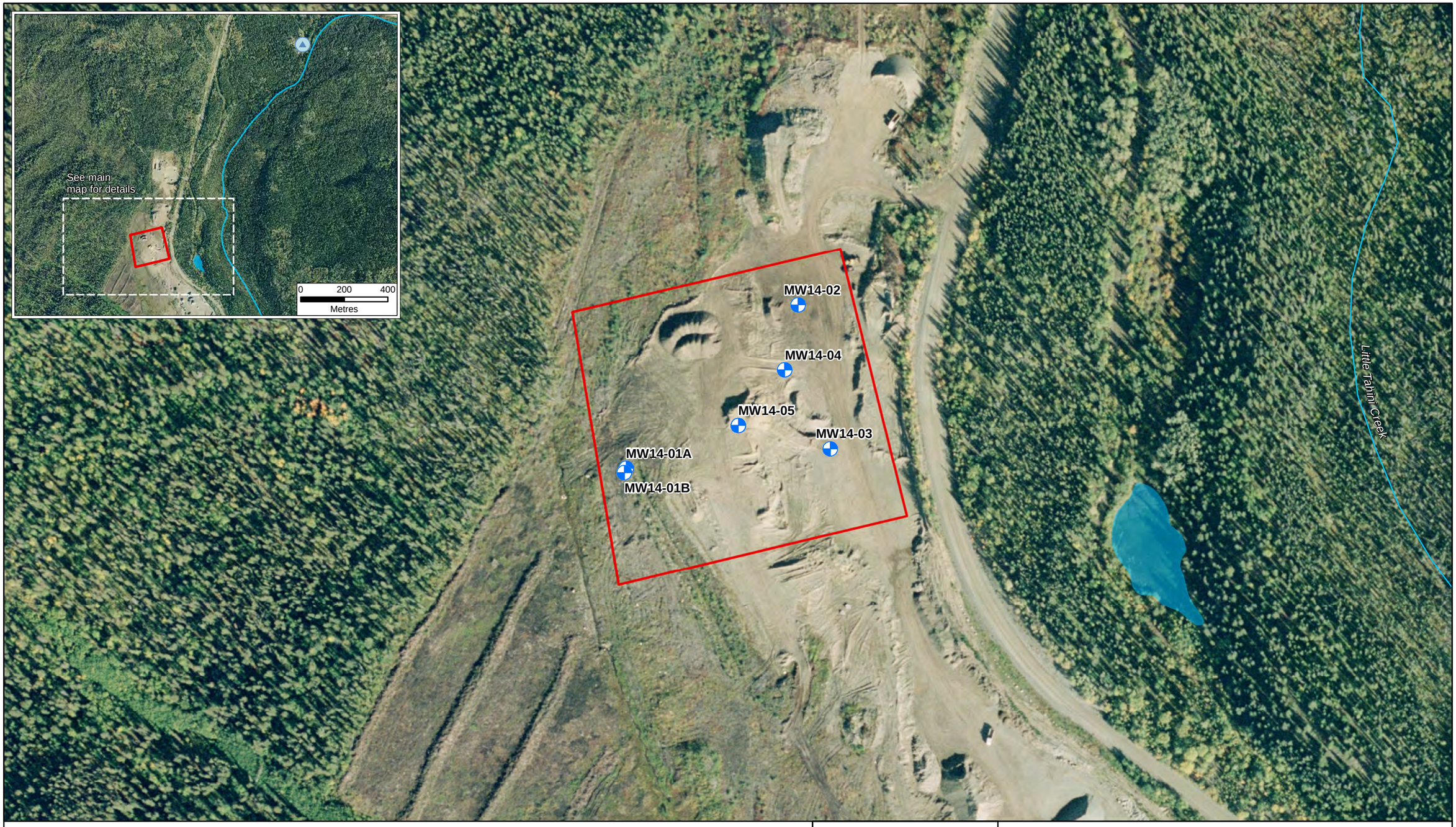
HEMMERA

CLIENT:
Castle Rock Enterprises

CASTLE ROCK LTF
Whitehorse, Yukon Territory, Canada

SITE LOCATION MAP & AERIAL VIEW

PROJECT No.		
1721-001.01	April 2015	FIGURE 1



Legend

- Monitoring Well Location
- GIN Map Domestic Water Use record
- Site Location

N

1:2,000

0 25 50 75

Metres

Aerial Image: City of Whitehorse 2011

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Whitehorse, Yukon Territory, Canada

SITE SURROUNDING AREA & INVESTIGATION LOCATIONS

PROJECT No.		
1721-001.01	April 2015	FIGURE 2

Path: O:\1\1700\17211001\01\mxd\Fig2_1721_001_01_InvLocations.mxd

YUKON CSR STANDARDS (ug/L)				
	AW	IW	LW	DW
Dissolved Manganese	-	200	-	50
R-Dissolved Metals	See Tables	See Tables	See Tables	See Tables
Benzene	1000	-	-	5
Ethylbenzene	2000	-	-	2.4
Styrene	720	-	-	-
Toluene	390	-	-	24
Xylenes	-	-	-	300
EPHw $_{10-19}$	5000	5000	5000	5000
EPHw $_{19-32}$	-	-	-	-
LEPHw	500	-	-	-
HEPHw	-	-	-	-
VHw $_{6-10}$	15000	15000	15000	15000
VPHw	1500	-	-	-
PAHs	See Tables	See Tables	See Tables	See Tables
MTBE	4400	-	11000	20

MW14-01-A	2014/08/15
	MW14-01-A
Dissolved Manganese	213
R-Dissolved Metals	<CSR
Benzene	<0.5
Ethylbenzene	<0.5
Styrene	<0.5
Toluene	<0.5
Xylenes	<0.75
EPHw $_{10-19}$	<250
EPHw $_{19-32}$	<250
LEPHw	<250
HEPHw	<250
VHw $_{6-10}$	<100
VPHw	<100
PAHs	<CSR
MTBE	<0.5

MW14-04	2014/08/15
	MW14-04
Dissolved Manganese	32
R-Dissolved Metals	<CSR
Benzene	<0.5
Ethylbenzene	<0.5
Styrene	<0.5
Toluene	<0.5
Xylenes	<0.75
EPHw $_{10-19}$	<250
EPHw $_{19-32}$	<250
LEPHw	<250
HEPHw	<250
VHw $_{6-10}$	<100
VPHw	<100
PAHs	<DL
MTBE	<0.5

MW14-03	2014/08/15	
	MW14-03	MW14-100 (DUP)
Dissolved Manganese	57	-
R-Dissolved Metals	<CSR	-
Benzene	<0.5	-
Ethylbenzene	<0.5	-
Styrene	<0.5	-
Toluene	<0.5	-
Xylenes	<0.75	-
EPHw $_{10-19}$	<250	<DL
EPHw $_{19-32}$	<250	<DL
LEPHw	<250	<DL
HEPHw	<250	<DL
VHw $_{6-10}$	<100	-
VPHw	<100	-
PAHs	<CSR	<DL
MTBE	<0.5	-

MW14-02

MW14-04

MW14-05

MW14-03

MW14-01A

MW14-01B

Monitoring Well ID	2014/01/01	<< Sample Date (yyyy/mm/dd)
	MW14-01	<< Sample ID
Manganese	57	<< Concentration (µg/L) greater than the CSR DW Standard
Manganese	213	<< Concentration (µg/L) greater than the applicable CSR IW and DW Standards
R-Dissolved Metals	<CSR	<< Parameter(s) analyzed in data series less than the applicable CSR AW, IW, LW and/or DW Standards
Benzene	<DL	<< Parameter(s) analyzed in data series less than the laboratory detection limit and less than the applicable CSR AW, IL, LW and/or DW Standards(s)
VPH	-	<< Parameter(s) not analyzed

Legend

- Monitoring Well Location
- No parameters analyzed have concentrations greater than the applicable Yukon CSR AW, IW, LW and/or DW Standards
- Concentration of one or more parameters analyzed greater than the applicable Yukon CSR IW and DW Standards
- Site Location

N

1:1,000

0 10 20 30

Metres

Aerial Image: City of Whitehorse 2011

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CASTLE ROCK LTF
Whitehorse, Yukon Territory, Canada

GROUNDWATER ANALYTICAL RESULTS

PROJECT No. 1721-001.01

April 2015

FIGURE 3

Path: O:\1\1700\1721\001\01\mxd\Fig3_1721_001_01_GW_Results.mxd

MW14-02
< 761.45

MW14-04
760.81

MW14-05
765.66

MW14-03
761.54

MW14-01A
773.40

MW14-01B
773.65

773 m
772 m
771 m
770 m
769 m
768 m
767 m
766 m
765 m
764 m
763 m
762 m
761 m

Legend

- Monitoring Well Location
- Groundwater Contour [m amsl]
- Inferred Groundwater Flow Direction
- Site Location
- 765.66 Groundwater Elevation [m amsl]

NOTE: m amsl = metres above mean sea level

N

1:1,000

0 10 20 30

Metres

Aerial Image: City of Whitehorse 2011

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GROUNDWATER ELEVATION CONTOUR MAP (AUGUST 15, 2014)

PROJECT No.		
1721-001.01	April 2015	FIGURE 4

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TABLES

Table 1: Groundwater Monitoring Results (August 15, 2014)

Monitoring Well ID	Northing	Easting	CHV	TOC Elevation	Ground Elevation	Depth to Water	Depth to Bottom	Groundwater Elevation	Depth to Water
	[m]	[m]	ppm	[m amsl]	[m amsl]	[mb TOC]	[mb TOC]	[m amsl]	[mbgs]
MW14-1A	6740341.33	487373.56	0	777.32	776.44	3.918	9.918	773.40	3.04
MW14-1B	6740338.98	487373.08	0	777.39	776.49	3.745	4.68	773.65	2.85
MW14-02	6740444.57	487448.54	nm	764.52	763.63	*dry*	3.074	<761.45	>2.18
MW14-03	6740374.75	487479.43	0	765.43	764.58	3.895	4.665	761.54	3.05
MW14-4	6740408.93	487447.84	0	765.73	764.89	4.918	5.16	760.81	4.08
MW14-5	6740375.00	487428.68	0	768.6	767.42	2.945	3.815	765.66	1.77

NOTES: CHV = combustible headspace vapours
ppm = parts per million
nm = not measured

Table 2: Groundwater Analytical Results

				Location ID:	MW14-01-A	MW14-03			MW14-04
				Sample ID:	MW14-01-A	MW14-03	MW14-100	RPD (%)	MW14-04
				Date Sampled:	15/08/2014	15/08/2014	15/08/2014		15/08/2014
Parameter	**YKCSR AW [3,4]**	**YKCSR IW [3,5]**	**YKCSR LW [3,6]**	**YKCSR DW [3,7]**					
Location Info									
Dissolved Metals Filtration Location (text)	-	-	-	-	FIELD	FIELD	-	-	FIELD
Sample Info									
Lab's Sample ID (text)	-	-	-	-	L1503364-1	L1503364-2	L1503364-4	-	L1503364-3
Duplicate Of (text)	-	-	-	-	-	-	MW14-03	-	-
Comment (text)	-	-	-	-	no odour, no sheen, water clear	no odour, no sheen, water clear	no odour, no sheen, water clear	-	no odour, no sheen, water clear. Limited water in well and slow recharge. Direct sample with no purge after well developed dry previous day by NS. Almost complete drawdown during sample - see field sheet
Sample Time, Start (text)	-	-	-	-	3:57:00, 12:5	4:03:00, 14:0	4:03:00, 00:0	-	15:55:00, 14:55
Well Depth, To Bottom (m)	-	-	-	-	9.918	4.665	4.665	-	5.16
Well Depth, To Water (m)	-	-	-	-	3.918	3.895	3.895	-	4.918
Field Tests									
Field Conductance, Specific (uS/cm)	-	-	-	-	609	474	474	*0.0*	-
Field Conductivity (uS/cm)	-	-	-	-	380	335	335	*0.0*	-
Field Dissolved Oxygen (mg/L)	-	-	-	-	0.7	7.29	7.29	*0.0*	-
Field pH	-	-	-	-	7.29	7.21	7.21	*0.0*	-
Field Redox, Uncorrected (mV)	-	-	-	-	42.4	109.8	109.8	*0.0*	-
Field Temperature (ºC)	-	-	-	-	5.81	9.74	9.74	*0.0*	-
Field Vapours (ppm)	-	-	-	-	0	0	0		0
Physical Tests									
Hardness, Total (CaCO3) (mg/L)	-	-	-	-	320	265	-		261

Table 2: Groundwater Analytical Results

	Location ID:				MW14-01-A	MW14-03			MW14-04
	Sample ID:				MW14-01-A	MW14-03	MW14-100	RPD (%)	MW14-04
	Date Sampled:				15/08/2014	15/08/2014	15/08/2014		15/08/2014
Parameter	**YKCSR AW [3,4]**	**YKCSR IW [3,5]**	**YKCSR LW [3,6]**	**YKCSR DW [3,7]**					
Dissolved Metals									
Aluminum	-	5000 [8]	5000 [8]	200 [8]	<10	<10	-	nc	<10
Antimony	200 [8]	-	-	6 [8]	<0.5	<0.5	-	nc	<0.5
Arsenic	50 [9]	100 [8]	25 [8]	25 [8]	2.1	<1	-	nc	<1
Barium	5000 [10]	-	-	1000 [8]	46	44	-	nc	31
Beryllium	53 [9]	100 [8]	100 [8]	-	<5	<5	-	nc	<5
Boron	50000 [8]	500 [8]	5000 [8]	5000 [8]	<100	<100	-	nc	<100
Cadmium	0.1-1 [11]	5 [8]	80 [8]	5 [8]	<0.05	<0.05	-	nc	<0.05
Calcium	-	-	1000000 [8]	-	104000	94000	-	nc	92700
Chromium	10 [9]	5 [8]	50 [8]	50 [8]	<0.5	<0.5	-	nc	<0.5
Cobalt	9 [8]	50 [8]	1000 [8]	-	0.71	<0.5	-	nc	<0.5
Copper	20-20 [12]	200 [8]	300 [8]	1000 [8]	<1	2	-	nc	1.6
Iron	-	5000 [8]	-	300 [8]	<30	<30	-	nc	<30
Lead	20 [10]	200 [8]	100 [8]	10 [8]	<1	<1	-	nc	<1
Lithium	-	2500 [8]	5000 [8]	-	<50	<50	-	nc	<50
Magnesium	-	-	-	100000 [8]	14700	7260	-	nc	7190
Manganese	-	200 [8]	-	50 [8]	**213**	**57**	-	nc	32
Mercury	1 [8]	1 [8]	2 [8]	1 [8]	<0.2	<0.2	-	nc	<0.2
Molybdenum	10000 [8]	10 [8]	50 [8]	250 [8]	2.4	2.7	-	nc	2.8
Nickel	83 [10]	200 [8]	1000 [8]	-	<5	<5	-	nc	<5
Selenium	10 [9]	20 [15]	50 [8]	10 [8]	<1	<1	-	nc	<1
Silver	0.5-15 [13]	-	-	-	<0.05	<0.05	-	nc	<0.05
Sodium	-	-	-	200000 [8]	7000	3000	-	nc	3600
Thallium	3 [8]	-	-	-	<0.2	<0.2	-	nc	<0.2
Titanium	1000 [8]	-	-	-	<50	<50	-	nc	<50
Uranium	1000 [10]	10 [8]	200 [8]	20 [8]	2.32	2.79	-	nc	2.09
Vanadium	-	100 [8]	100 [8]	-	<30	<30	-	nc	<30
Zinc	75-100 [14]	1000 [8]	2000 [8]	5000 [8]	<5	<5	-	nc	<5
BTEX									
Benzene	1000 [10]	-	-	5 [8]	<0.5	<0.5	-	nc	<0.5
Ethylbenzene	2000 [9]	-	-	2.4 [8]	<0.5	<0.5	-	nc	<0.5
meta- & para-Xylene	-	-	-	-	<0.5	<0.5	-	nc	<0.5
ortho-Xylene	-	-	-	-	<0.5	<0.5	-	nc	<0.5
Styrene	720 [8]	-	-	-	<0.5	<0.5	-	nc	<0.5
Toluene	390 [9]	-	-	24 [8]	<0.5	<0.5	-	nc	<0.5
Xylenes	-	-	-	300 [8]	<0.75	<0.75	-	nc	<0.75
EPH									
EPH10-19	5000 [8]	5000 [8]	5000 [8]	5000 [8]	<250	<250	<250	nc	<250
EPH19-32	-	-	-	-	<250	<250	<250	nc	<250
LEPH	500 [8]	-	-	-	<250	<250	<250	nc	<250
HEPH	-	-	-	-	<250	<250	<250	nc	<250
VPH									
VH6-10	15000 [8]	15000 [8]	15000 [8]	15000 [8]	<100	<100	-	nc	<100
VPH	1500 [8]	-	-	-	<100	<100	-	nc	<100

Table 2: Groundwater Analytical Results

	Location ID:	MW14-01-A	MW14-03			MW14-04
	Sample ID:	MW14-01-A	MW14-03	MW14-100	RPD (%)	MW14-04
	Date Sampled:	15/08/2014	15/08/2014	15/08/2014		15/08/2014
Parameter	**YKCSR AW [3,4] / YKCSR IW [3,5] / YKCSR LW [3,6] / YKCSR DW [3,7]**					
PAH						
Acenaphthene	60 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Acenaphthylene	- / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Acridine	0.5 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Anthracene	1 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Benzo(a)anthracene	1 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Benzo(a)pyrene	0.1 [8] / - / - / 0.01 [8]	<0.01	<0.01	<0.01	nc	<0.01
Benzo(b)fluoranthene	- / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Benzo(g,h,i)perylene	- / - / - / -	<0.05	0.075	<0.05	nc	<0.05
Benzo(k)fluoranthene	- / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Chrysene	1 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Dibenz(a,h)anthracene	- / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Fluoranthene	2 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Fluorene	120 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Indeno(1,2,3-c,d)pyrene	- / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Naphthalene	10 [8] / - / - / -	0.147	<0.05	<0.05	nc	<0.05
Phenanthrene	3 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
Pyrene	0.2 [8] / - / - / -	<0.05	0.11	<0.05	nc	<0.05
Quinoline	34 [8] / - / - / -	<0.05	<0.05	<0.05	nc	<0.05
VOC						
Methyl tert-butyl ether (MTBE)	4400 [10] / - / 11000 [8] / 20 [8]	<0.5	<0.5	-	nc	<0.5
Surrogate Recovery						
1,4-Difluorobenzene, surrogate (%)	- / - / - / -	97.4	97.4	-	nc	97.6
3,4-Dichlorotoluene, surrogate (%)	- / - / - / -	77.2	88	-	nc	84.9
4-Bromofluorobenzene, surrogate (%)	- / - / - / -	94	96	-	nc	96.9
Acenaphthene-d10, surrogate (%)	- / - / - / -	93	93.9	92.8	nc	93.4
Acridine-d9, surrogate (%)	- / - / - / -	94.6	96	93.1	nc	89.6
Chrysene-d12, surrogate (%)	- / - / - / -	91.8	93.3	91.2	nc	92.4
Naphthalene-d8, surrogate (%)	- / - / - / -	96.3	91.2	90.8	nc	91.3
Phenanthrene-d10, surrogate (%)	- / - / - / -	96.8	97.6	95.1	nc	95.6
Unknown Parameters						
Dissolved Mercury Filtration Location (text)	- / - / - / -	FIELD	FIELD	-	-	FIELD
Field TDS	- / - / - / -	389000	308000	308000	nc	-

Table 2: Groundwater Analytical Results

(1) All values are reported as µg/L unless otherwise noted
(2) - = No standard or not analyzed
(3) YKCSR = Yukon Environment Act, Contaminated Sites Regulation, Y.O.I.C. 2002/171, effective September 30, 2002
(4) YKCSR AW = Schedule 3, Column II Aquatic Life
(5) YKCSR IW = Schedule 3, Column III Irrigation
(6) YKCSR LW = Schedule 3, Column IV Livestock
(7) YKCSR DW = Schedule 3, Column V Drinking Water
(8) Schedule 3, Generic Numerical Water Standards
(9) Schedule 3, Generic Numerical Water Standards, Standard to protect freshwater aquatic life (Schedule 3, Note 6)
(10) Schedule 3, Generic Numerical Water Standards, Standard to protect marine and/or estuarine aquatic life (Schedule 3, Note 8)
(11) Cadmium varies with Hardness in mg/L as follows for YKCSR AW, Schedule 3, Generic Numerical Water Standards, Standard to protect freshwater aquatic life (Schedule 3, Note 6):
0.1 if H<=30
0.3 if H>30 and H<90
0.5 if H>=90 and H<150
0.6 if H>=150 and H<210
0.8 if H>=210 and H<270
0.9 if H>=270 and H<330
Otherwise, Schedule 3, Generic Numerical Water Standards, Standard to protect marine and/or estuarine aquatic life (Schedule 3, Note 8) applies (1 ug/L).
(12) Copper varies with Hardness in mg/L as follows for YKCSR AW, Schedule 3, Generic Numerical Water Standards, Standard to protect freshwater aquatic life (Schedule 3, Note 6):
20 if H<50
Otherwise, Schedule 3, Generic Numerical Water Standards, Standard to protect marine and/or estuarine aquatic life (Schedule 3, Note 8) applies (20 ug/L).
(13) Silver varies with Hardness in mg/L as follows for YKCSR AW, Schedule 3, Generic Numerical Water Standards, Standard to protect freshwater aquatic life (Schedule 3, Note 6):
0.5 if H<=100
15 if H>100
Otherwise, Schedule 3, Generic Numerical Water Standards, Standard to protect marine and/or estuarine aquatic life (Schedule 3, Note 8) applies (15 ug/L).
(14) Zinc varies with Hardness in mg/L as follows for YKCSR AW, Schedule 3, Generic Numerical Water Standards, Standard to protect freshwater aquatic life (Schedule 3, Note 6):
75 if H<=90
Otherwise, Schedule 3, Generic Numerical Water Standards, Standard to protect marine and/or estuarine aquatic life (Schedule 3, Note 8) applies (100 ug/L).
(15) Schedule 3, Generic Numerical Water Standards, selenium standard for continuous application on crops (Schedule 3, Note 26)
(14) RPD = Relative Percent Difference. The difference between a sample and its field duplicate over the average of two values.
nc = not calculated. RPD is not calculated if either the sample or the field duplicate concentration is less than five times the detection limit.
Bold Indicates QAQC values exceed expected results (i.e. RDP values exceed 20%).

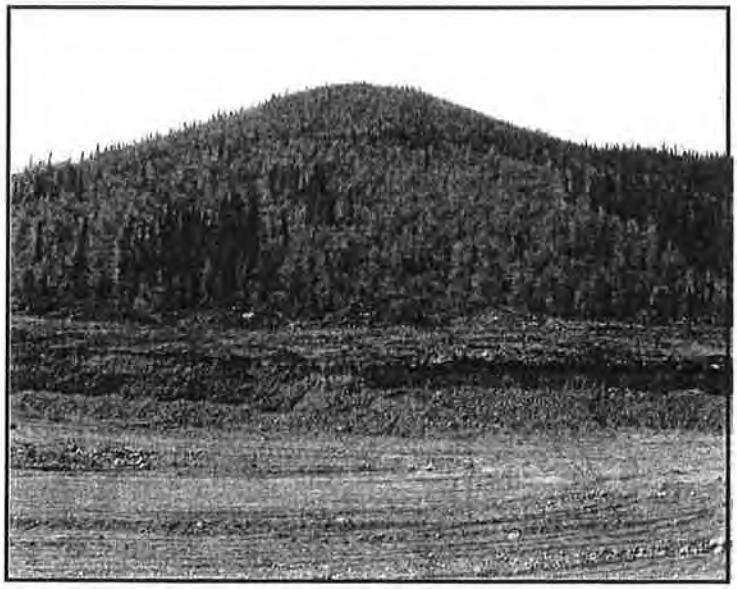
APPENDIX A

Previous Report

Land Treatment Facility Plan

2006 Construction, Operation, and Decommissioning Plan
as required by the
Contaminated Sites Regulations
of the
Yukon Environment Act

Whitehorse, Yukon Territory, Canada



Prepared by:

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April 2006

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** Access Consulting Group is a registered trade name for Access Mining Consultants Ltd.*

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Appendix B: Emergency and Spill Response Plan
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1.0 INTRODUCTION

Castle Rock Enterprises (CRE) and Access Consulting Group (ACG) have created a working plan to undertake the construction, operation, and decommissioning of a Land Treatment Facility (LTF) on the area of a gravel quarry lease registered to CRE. The LTF plan draws upon the expertise of these two organisations for the various requirements of a LTF. CRE will undertake the day-to-day operations of the LTF including the LTF construction and maintenance and treatment of contaminated soil while ACG will be responsible for permitting, environmental monitoring, environmental inspections, and remediation verification assessments. The LTF will only accept and treat hydrocarbon-contaminated soil or water. A Special Waste permit is being applied for to accept liquid and solid hydrocarbon contaminated special waste.

The area for the proposed Land Treatment Facility is within the City of Whitehorse on the north end of the city limits near Haeckel Hill off the Road known as Heackel Hill Ski Road or the Old Ski Hill Road. The land disposition number for the site is 960239. The site is a current gravel quarry lease to CRE (quarry lease #792). The quarry lease was first permitted in to Alpine Backhoe in June 1966 (quarry lease number 792). CRE holds the current lease through the Yukon Government Lands Branch and the quarry is still currently used by CRE for construction projects. As part of the LTF permitting process the quarry lease, which expires in April of 2006, is being applied for renewal with an amendment to allow construction and operation of the LTF.

2.0 PROPOSAL TO CONSTRUCT AND OPERATE A LAND TREATMENT FACILITY

The proposed Land Treatment Facility is an effort to create and operate a commercial LTF in the city of Whitehorse to accept and treat hydrocarbon contaminated soil and liquids. Qualified ACG staff will provide the technical knowledge required for the construction, operation, and decommissioning of the facility in the roles of Environmental Monitor and Environmental Inspector. CRE staff will provide the technical knowledge of heavy equipment operation and use required for the construction, operation, and decommissioning of the facility.

ACG staff will supervise and advise during the construction process to aid in proper construction, particularly the areas of cell construction, liner installation, and berm construction. Should additional cells be required for an increase in treatment capacity ACG staff will plan and supervise the construction of these cells. ACG staff will undertake management and supervision

of remediation activities within this operation and will be responsible for the technical knowledge and supervision required for these operational activities. This technical knowledge of remediation work will be used to determine contaminated soil segregation, the rates of soil turning, fertilization additive requirements, and rates and methods of liquid waste application. ACG staff will also be responsible for routine inspections of the operation and activities that may result from these inspections, such as cell and liner maintenance and repair and supply and equipment upgrade and repair. ACG staff will also be responsible for monitoring of the contaminated soil and determination of remediation levels and rates. Once remediation of a select lot of contaminated soil is suspected to be complete by the Environmental Monitor samples will be taken using standard field techniques as described in Section 3.8.

CRE staff will be provide the technical knowledge of facility operation in the receiving and shipping of contaminated soil as well as expert knowledge of heavy equipment operation during the contaminated soil remediation work including cell loading, contaminated soil stacking and processing, and soil windrow maintenance. CRE staff will be also responsible for facility maintenance and repair activities.

3.0 LAND TREATMENT FACILITY PLAN

The following is the LTF plan as required by the *Contaminated Sites Regulations* of the *Yukon Environment Act*.

1.1 AREA ENVIRONMENTAL ATTRIBUTES

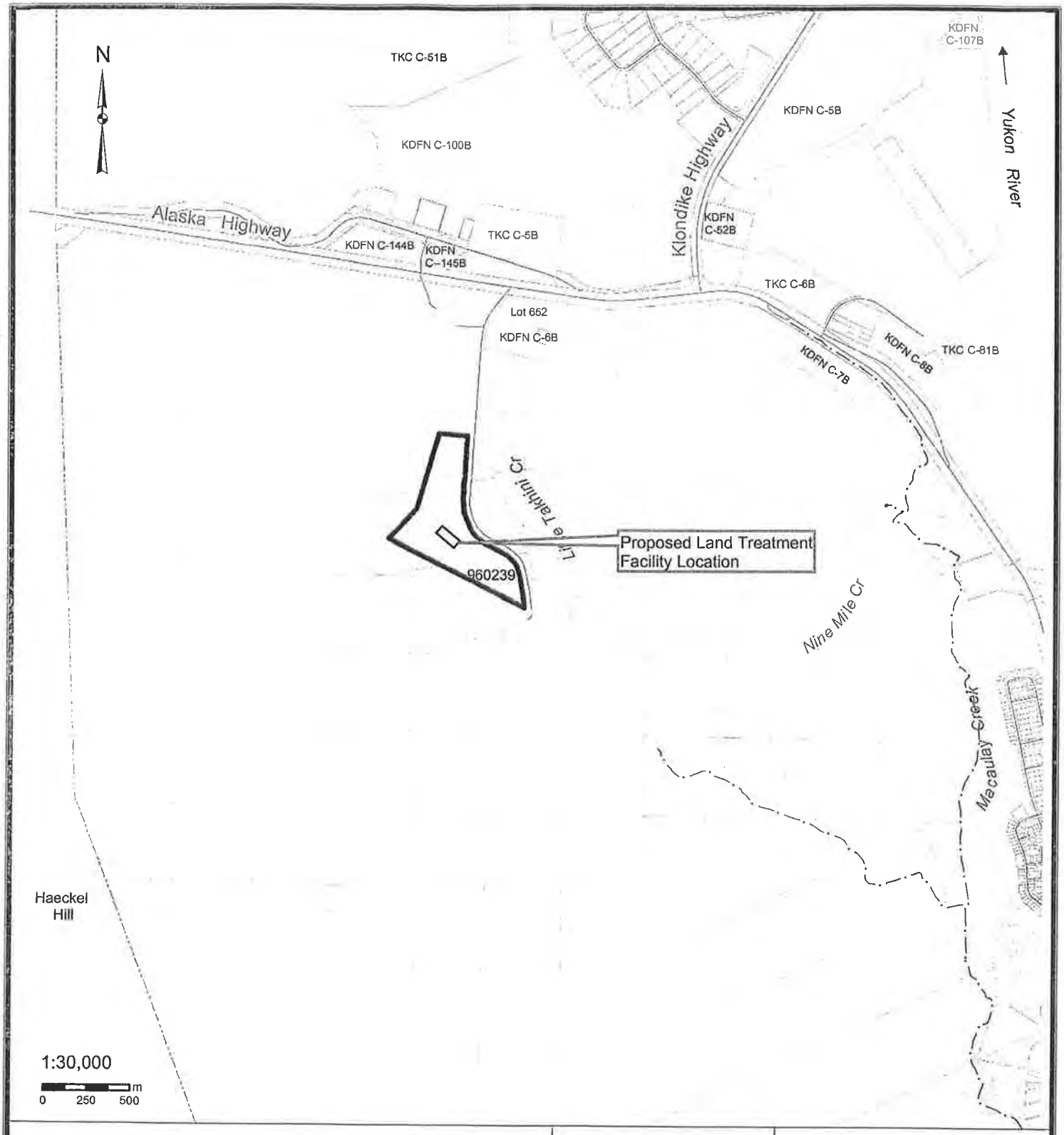
The site of the proposed LTF had been cleared in preparation for use as a gravel quarry by Alpine Backhoe in the 1980's and expanded as the deposit became exhausted. This site is situated on gravely substrate with significant portions of silt, sand, and clay. The site has been used as a gravel quarry by CRE and excavated to a depth of up 4.5m in some areas with no sign of groundwater at any point throughout the year. Test pitting was undertaken to determine the soil profile and groundwater level at various locations, the results are included in Appendix C. The surrounding area is forested, primarily black and white spruce with willows and shrubs and exposed rock faces. The nearest surface water is Little Takhini Creek that flows north past the property approximately 200m to the south and the east. The nearest residence and First Nation settlement land (KDFN-C-6B) are both greater than 1000m from the proposed facility. The area is not known as a frequent wildlife passageway or residence area. While some wildlife is expected to use the area, considering the proximity to other city structures and infrastructure, this

is not thought to be extensive. The only Key Wildlife Area identified in the area is Haeckel Hill as an alpine raptor area approximately 0.6km distant. The LTF would have little to no impact on raptor nesting as the level of activity is not expected to significantly increase with the LTF. The area of Little Takhini Creek near the site is described in the City of Whitehorse Significant Wildlife Areas report as an area of High Wildlife Values and Moderate Sensitivity, but the LTF is not expected to have any impact on this area. The site is situated outside a floodplain. At more than 150m above both the Yukon and Takhini Rivers, the proposed LTF site is not in danger of being flooded, particularly as the Yukon River has flood control just upstream at the Whitehorse Rapids generating facility at Schwatka Lake.

Topographic Map Sheet:	*NTS 105 D/11*
Geographic Location Name:	*City of Whitehorse*
Latitude:	*60°47'52.0" N*
Longitude:	*135°13'54.4" W*
Drainage Region:	*Little Takhini Creek, Yukon River*
Watershed:	*Yukon River*
Community:	*Within City of Whitehorse*
Traditional Territory:	*Kwanlin Dun First Nation,*
Surrounding Land Status:	*Commissioner's Lands*

1.2 Site Layout and Treatment Cell Description

No infrastructure, such as telephone and power lines will be put in place and no buildings will be constructed on the site except for a small Environmental Field Shed (EFS). This lockable shed will contain spill response kits and equipments such as shovels, protective suits, sampling equipment, and MSDS sheets. A sign will be erected at the entrance to the site to identify the site as a LTF. The facility will consist of a single staging cell approximately 15 x 15m, a special waste treatment cell 15 x 15m, and a treatment cell of approximately 29 x 29m. Figure 1 shows the site location and Figure 2 shows the site layout and proposed locations for the treatment, staging and special waste treatment cells. Each cell will have a containment system consisting of lined with a LLDPE (linear low density polyethylene) impermeable geomembrane liner between a 10-30cm layer of bedding sand below and above surrounded by a berm approximately 60-70cm high with the impermeable liner toed into the berm at approximately the 40-50cm height. The geomembrane liner thickness will be 30mil for the contaminated soil treatment cells and the staging cell and 60mil for the special waste treatment cell. The cells will be a single sheet of liner, not requiring any hot-welding of liner seams. The specifications for the geomembrane liner are in Appendix A. The cells will be constructed on levelled (less than 6% slope) ground. At no point



Legend

- Road/Street
- Lot
- City Boundary
- Snowmobile Trail
- Water Course
- Wetland
- Water Body
- Project Area Lease
- First Nation Settlement Land
- First Nation Settlement Land (Unrecorded)
- Agricultural Application
- Land Disposition
- Quartz Claim

UTM Zone 8 NAD83
NTS Sheet 105D/14

Castle Rock Enterprises

ACCESS CONSULTING GROUP

Haeckel Hill Road Land Treatment Facility

Figure 1 Location Map

Drawn By: HD	Checked By: PI
Date: September 2006	

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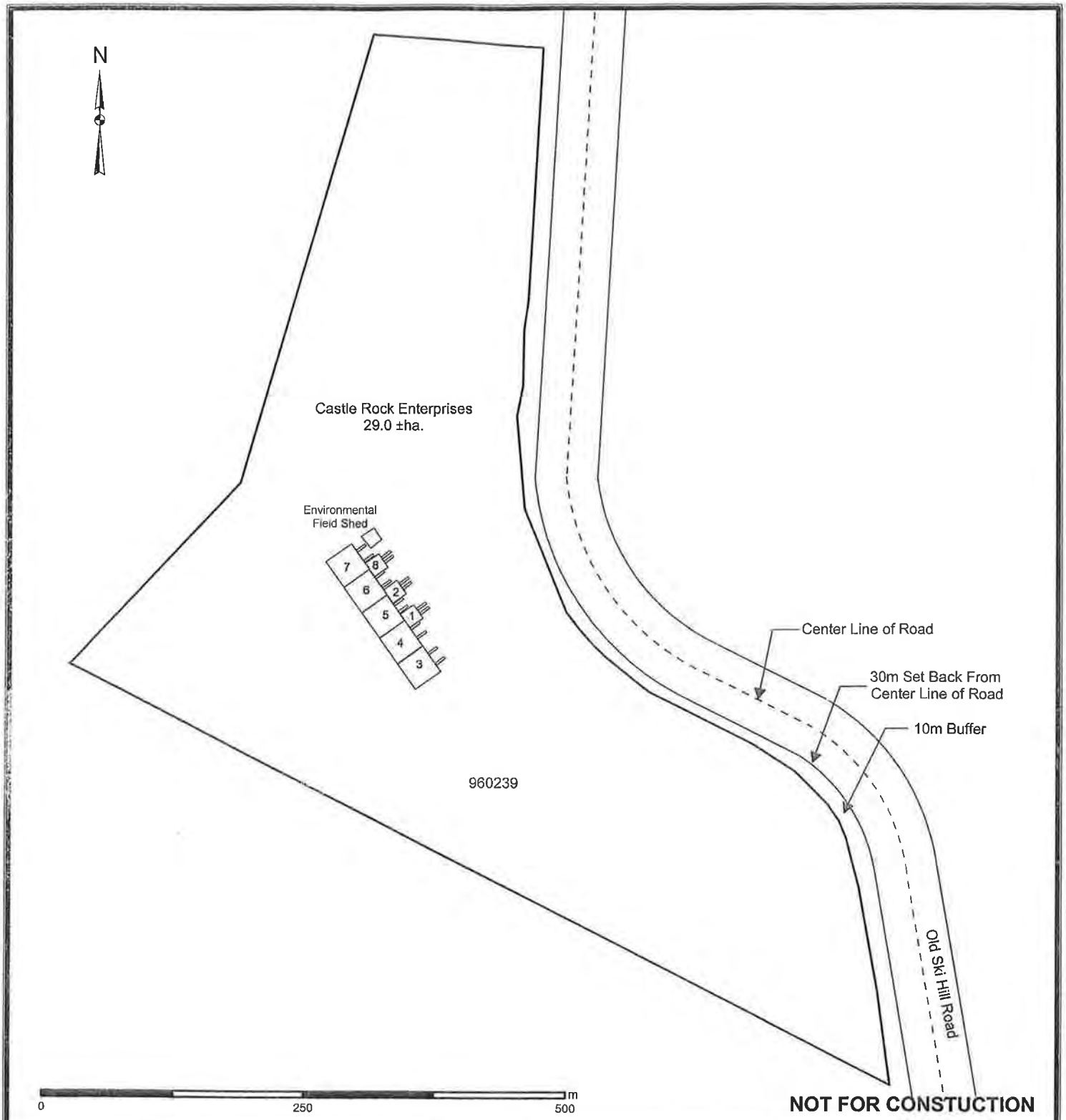

Legend

- Castle Rock Enterprises
- 1 Staging Area (1 ramp) 15m x 15m
- 2 Special Waste Treatment Cell (1 ramp) 15m x 15m
- 3 Treatment Cell (2 ramps) 30m x 30m
- 4 Future Treatment Cells (2 ramps) 30m x 30m
- 5 Future Treatment Cells (2 ramps) 30m x 30m
- 6 Future Treatment Cells (2 ramps) 30m x 30m
- 7 Future Treatment Cells (2 ramps) 30m x 30m
- 8 Future Special Treatment Cell (1 ramp) 15m x 15m

Original Site Sketch obtained from Yukon Community Services Land Planning
Original Drawing No. 25-1-140m
Date: '96 04 29
UTM Zone 8 NAD83
NTS Sheet 105D/14

Castle Rock Enterprises

ACCESS CONSULTING GROUP

Haeckel Hill Road Land Treatment Facility

Figure 2
Site Sketch

Drawn By: HD	Checked By: PI
Date: September 2006	

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will the impermeable liner be exposed to the sun. An outer ditch will surround the cell to divert any surface flow from precipitation away from the cell and down slope. A slight slope in the cell will allow any excess liquid from precipitation to collect and be reapplied to the piles for continued remediation. A corner of the staging cell will be isolated for storage of liquid waste brought to the site. This area will contain well-maintained drums to hold liquids until laboratory testing determines the level and type of contamination.

1.3 Soil Volumes

The initial capacity of the proposed LTF for contaminated soil to be remediated at the site is estimated to be approximately 3400m^3 in the treatment cell, 900m^3 in the staging cell, and 900m^3 in the special waste treatment cell. Based on the schedule proposed in Section 2.6, the capacity is expected to increase by 3400m^3 (one treatment cell) annually over 5 years. Contaminated water will also be accepted at the site and will be held in drums within a lined and bermed holding area. When the levels of hydrocarbon contamination exceeds special waste criteria this water will be separated when possible and any water within contaminated water levels will be hand pumped from the containment facility and spread over remediation piles within the treatment cells. Remaining product that can be utilized in a waste oil burner will be loaded into sealed containers and shipped to a site with a waste oil burner. Other product that contains high levels of metals or otherwise cannot be used in a waste oil burner will be shipped to an approved facility.

1.4 Spill Protection

Steps will be taken throughout the construction and operation of the facility to minimize potential spills and to contain and clean any actual spills. Construction of the containment system and installation of geomembrane liner will be supervised by qualified personnel. During construction the subgrade preparation will ensure no protrusions beneath the under-layer of bedding sand and installation of the liner will not occur in freezing conditions. Proper heavy equipment utilization will protect the liner from inadvertent damage during both the construction and operation stages. A low impact dozer will be used to push material, maintaining an easily cleaned hard-pack surface around the cells. When moving contaminated material between cells equipment will fill buckets to less than capacity to minimize potential overspills. A Spill Response Plan has been created to prepare all staff in case of a spill; this plan is in Appendix B and will be available on-site. As mentioned in Section 2.1 the EFS will contain all necessary spill response equipment. Contaminated material will only be handled within cells except during transfer from the staging cell to the treatment cells. All tanks and liquid transfer equipment will be regularly inspected and maintained to prevent liquid spills or leaks.

1.5 PERSONNEL TRAINING

All personnel operating heavy equipment on-site will be experienced, safety certified heavy equipment operators. All personnel will be WHMIS (Workplace Hazardous Materials Information System) certified and have access to, and understanding of, the Spill Response Plan in Appendix B. CRE personnel required to transport contaminated soil will have current TDG certification. CRE has certification through the COR Certificate of Recognition Program through Yukon Construction Safety Association (YCSA) and the Yukon Workers' Compensation Health and Safety Board (YWCHSB). and All personnel will be aware of the conditions of the required permits and have access to copies of these while working on the site.

1.6 EMERGENCY PLANS

Emergency response will follow standard WHMIS training response and guidelines outlined in the Spill Response Plan in Appendix B. The only hazardous materials on site will be contaminated soil and water, special waste soil and water, and standard vehicle fuel (diesel) and lubricants required for vehicle operation. None of these materials will be stored on site. In an emergency the employee on site will be required to follow the spill response plan.

1.7 SCHEDULES AND OPERATING PLANS

1.7.1 CONSTRUCTION

Construction of the facility will begin in 2006 as soon as all permitting requirements have been fulfilled. The facility will initially have a contaminated soil capacity of 5200m^3 (staging, treatment and special waste treatment cells), with an expected annual increase of one treatment cell (3400m^3) per year. This capacity increase schedule may change as demand for treatment capacity changes.

1.7.2 RECEIVING CONTAMINATED MATERIALS

The operation of the LTF will be between the months April and November annually or as long as the ground is not frozen. A Relocation Permit will be obtained for any contaminated soil brought to the site. Soil will be received when available and brought to the staging cell should soil characterization be required. Samples will be analysed and the results interpreted to determine the remediation requirements. Should characterization sampling be complete prior to delivery and space available the contaminated soil will be delivered directly to the treatment cells, except during periods of rainfall or when the contaminated soil is saturated with water, ice, or snow, or frozen. All loads of contaminated soil from different sources will be segregated within the

treatment, special waste, and staging cells and no mixing of contaminated soil with non-contaminated soil will occur. Should soil be found to exceed criteria for contaminants that cannot be remediated it would be removed from the site and transported to a facility permitted to deal with these contaminants.

1.7.3 OPERATION

Qualified ACG staff will provide the technical knowledge required for the construction, operation, and decommissioning of the facility in the roles of Environmental Monitor and Environmental Inspector. CRE staff will provide the technical knowledge of heavy equipment operation and use required for the construction, operation, and decommissioning of the facility.

ACG staff will undertake management and supervision of remediation activities within this operation and will be responsible for the technical knowledge and supervision required for these operational activities to determine the rates of soil turning, contaminated soil segregation, fertilization additive requirements, and rates and methods of liquid waste application.

Contaminated soil at the site will be naturally remediated with a minimum monthly soil turning process using a small John Deere 350 dozer with wide pads (1.5 pounds per square inch ground pressure) and a hydraulic excavator with a rake and clean-up bucket. Heavily contaminated soil may be turned more frequently or require fertilizer additives to speed the remediation process. Soil turning will be restricted on very windy days to minimized the amount of dust produced from the treatment cells. When required, contaminated soil will be transported to the site, and remediated soil from the site, using CRE's dump trucks. Remediated soil will only be used for the land uses corresponding to the level to which the soil has been remediated or land uses with less stringent criteria. A Relocation Permit will be obtained for any soil removed from the site that exceeds the most restrictive criteria. At any reasonable time an environmental inspector will be allowed to enter and inspect the site.

Contaminated liquids will be stored in drums within the staging cell until characterization analysis determines the type and level of contamination. Characterized liquids will be sprayed onto soil within the appropriate treatment cell (special waste or contaminated soil) for bioremediation. Any liquids that are found to contained contaminants that cannot be removed through bioremediation will be permitted and transported to a facility permitted to receive these.

1.7.4 Monitoring and Record Keeping

A qualified employee of ACG will supervise an inspection of the Land treatment facility every two weeks during the treatment season. Immediate remedial action will be undertaken should any irregularities in the facility be noticed and the Environmental Program Branch will be notified. Monitoring of the remedial work on the contaminated soil will also occur until such time as the ACG staff determine the remediation has progressed enough to warrant laboratory remediation verification testing.

Records of all relevant activities on site will be kept, including the following:

- The origin of all contaminated soil (including producer and location);
- The current location of soil within land treatment facility;
- The volume of soil being remediated;
- All soil analysis results;
- Transportation details of any special waste;
- Nutrient information (type, dates, quantity) for any fertilizers added to the soil; and
- Details of all soil turning activities.
- Remediated soil removal details

Using this information an annual report will be created and submitted to the Environmental Programs Branch by 31 March each year. Records will be kept for the longer of 3 years or as long as a particular load of contaminated soil is kept on site.

1.8 Remediation Verification

Qualified personnel from ACG will undertake soil remediation verification testing in a two-stage processin accordance with protocols made pursuant to the *Contaminate Sites Regulations* of the Yukon Environment Act. Field screening will be undertaken to determine sufficiently low levels of hydrocarbon contamination to justify laboratory analysis. Samples will then be obtained using standard sampling methods as outlined in ASTM standards D4687-95[1] and D5633-04[2]. Samples will be taken throughout the pile to obtain representative samples. Samples will be shipped to Norwest Labs, or another CAEAL[3] certified laboratory and tested as required by the Environmental Programs Branch. Upon laboratory verification of soil levels within the acceptable levels as outlined in the *Contaminate Sites Regulations* of the Yukon Environment Act, the soil will be removed from the treatment cell and sent to an appropriate site to be used as fill.

[1] *ASTM International Designation: D4687-95 – Standard Guide for General Planning of Waste Sampling*

[2] *ASTM International Designation: D5633-04 - Standard Practice for Sampling with a Scoop*

[3] *Canadian Association for Environmental and Analytical Laboratories (CAEAL)*

1.9 Access

Access to the site will be through the current gate from the old ski hill road at the base of Haeckel Hill, from km 1483.1 of the Alaska Highway. Access will be restricted by use of a locking gate to authorized CRE and ACG personnel unless accompanied by authorized personnel.

1.10 Decommissioning and Abandonment Plans

The proposed LTF has no planned date of decommissioning but the eventual closure of the site will see the area remediated and recontoured. Prior to closure a more detailed closure plan will be submitted to the Environmental Programs Branch upon closure of the site. Upon closure the cell liners will be removed and disposed of at the Whitehorse landfill. The soil throughout the site will be sampled by trained ACG staff and tested for hydrocarbon contamination, with particular emphasis on the areas of the cells and the loading and unloading areas. Should contamination be encountered the contaminated soil will be delineated, excavated, and removed to a permitted LTF. The excavated areas will be filled if required, the berms will be levelled and the area will be recontoured and allowed to naturally reseed.

4.0 CONCLUSION

The gravel quarry currently leased by Caste Rock Enterprises, located on the old Haeckel Hill skill hill road is an ideal location for a Land Treatment Facility. The site is in a stable area, far from residences and watercourses and is currently disturbed. The facility has secured access and spill response plans in place. The Land Treatment Facility plan involves using the a standard treatment cell design for any area that will contain contaminated soil or special waste and will use liners of a thickness recommended by Yukon Environment.

5.0 CERTIFICATION

This report was prepared as part of the requirements for a Land Treatment Facility application with Yukon Environment. Access Consulting Group has followed standard professional procedures in conducting the field surveys and in preparing the contents of this report. The material in this report reflects Access Consulting Group's best judgment in light of the information available at the time of the preparation of this report. Any use that a third party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of the third parties. Access Consulting Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Access Consulting Group believes that the contents of this report are substantively correct.

The information and data contained in this report, including without limitation, the results of any sampling and analyses conducted by Access Consulting Group, are based solely on the conditions observed at the time of the field assessment and have been developed or obtained through the exercise of Access Consulting Group's professional judgment and are set to the best of Access Consulting Group's knowledge, information, and belief. Although every effort has been made to confirm that all such information and data is factual, complete and accurate, Access Consulting Group offers no guarantees or warranties, either expressed or implied, with respect to such information or data.

Should you have any questions regarding this report, or require further information, please contact the undersigned at Access Consulting Group in Whitehorse, Yukon Territory.

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Reviewed by:

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Appendix A

Geomembrane Liner Specifications

SMOOTH LLDPE GEOMEMBRANE
ENGLISH UNITS

100x100

Attn: Paul
2 pg's
667-6680

Property	Test Method	Minimum Average Values 30 Mil	40 Mil	60 Mil	80 Mil
Thickness, mils	ASTM D 5199				
minimum average		30	40	60	80
lowest individual reading		27	36	54	72
Sheet Density, g/cc (max.)	ASTM D 1505/D 792	0.939	0.939	0.939	0.939
Tensile Properties[1]	ASTM D 6693				
1. Break Strength, lb/in		114	152	228	304
2. Break Elongation, %		800	800	800	800
2% Modulus, lb/in² (max.)	ASTM D 5323	60,000	60,000	60,000	60,000
Tear Resistance, lb	ASTM D 1004	16	22	33	44
Puncture Resistance, lb	ASTM D 4833	42	56	84	112
Axi-Symetric Break Strain, %	ASTM D 5617	30	30	30	30
Carbon Black Content[3], %	ASTM D 1603	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596		–Note 3–		
Oxidative Induction Time (OIT)					
Standard OIT, minutes	ASTM D 3895	100	100	100	100
Oven Aging at 85°C	ASTM D 5721				
Standard OIT - % retained after 90 days	ASTM D 3895	35	35	35	35
UV Resistance[4]	GRI GM11				
High Pressure OIT[2] - % retained after 1600 hrs	ASTM D 5885	35	35	35	35
Seam Properties	ASTM D 6392 (@ 2 in/min)				
1. Shear Strength, lb/in		45	60	90	120
2. Peel Strength, lb/in - Hot Wedge		38	50	75	100
- Extrusion Fillet		34	44	66	88
Roll Dimensions					
1. Width (feet):		23	23	23	23
2. Length (feet):		1,000	750	500	375
3. Area (square feet):		23,000	17,250	11,500	8,625
4. Gross weight (pounds, approx.):		3,435	3,435	3,435	3,435

1 Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 2.0 inches.
2 Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.
3 Carbon black dispersion for 10 different views: Nine in Categories 1 and 2 with one allowed in Category 3.
4 The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
5 UV resistance is based on percent retained value regardless of the original HP-OIT value.

SMOOTH LLDPE GEOMEMBRANE
METRIC UNITS

Property	Test Method	Minimum Average Values 0.75 mm	1.00 mm	1.50 mm	2.00 mm
Thickness, microns	ASTM D 5199				
minimum average		750	1,000	1,500	2,000
lowest individual reading		675	900	1,350	1,800
Sheet Density, g/cc (max.)	ASTM D 1505/D 792	0.939	0.939	0.939	0.939
Tensile Properties[1]	ASTM D 6693				
1. Break Strength, kN/m		20	27	40	53
2. Break Elongation, %		800	800	800	800
2% Modulus, MPa (max.)	ASTM D 5323	414	414	414	414
Tear Resistance, N	ASTM D 1004	70	100	150	200
Puncture Resistance, N	ASTM D 4833	190	250	370	500
Axi-Symetric Break Strain, %	ASTM D 5617	30	30	30	30
Carbon Black Content[2], %	ASTM D 1603	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596		—Note 3—		
Oxidative Induction Time (OIT)					
Standard OIT, minutes	ASTM D 3895	100	100	100	100
Oven Aging at 85°C	ASTM D 5721				
Standard OIT - % retained after 90 days	ASTM D 3895	35	35	35	35
UV Resistance[4]	GRI GM11				
High Pressure OIT[5] - % retained after 1600 hrs	ASTM D 5885	35	35	35	35
Seam Properties	ASTM D 6392 (@ 5 cm/min)				
1. Shear Strength, kN/m		7.9	10.5	15.8	21.0
2. Peel Strength, kN/m - Hot Wedge		6.6	8.7	13.1	17.5
- Extrusion Fillet		5.9	7.7	11.5	15.4
Roll Dimensions					
1. Width (meters):		7	7	7	7
2. Length (meters):		304.9	228.7	152.4	114.3
3. Area (square meters):		2,137	1,603	1,068	801
4. Gross weight (kilograms, approx.):		1,558	1,558	1,558	1,558

1 Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 50 mm.
2 Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.
3 Carbon black dispersion for 10 different views: Nine in Categories 1 and 2 with one allowed in Category 3.
4 The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
5 UV resistance is based on percent retained value regardless of the original HP-OIT value.

Appendix B

EMERGENCY AND SPILL RESPONSE PLAN FOR THE CASTLE ROCK ENTERPRISES LAND TREATMENT FACILITY

EMERGENCY AND SPILL RESPONSE PLAN FOR THE CASTLE ROCK ENTERPRISES LAND TREATMENT FACILITY

March 07

Prepared By:

ACCESS CONSULTING GROUP

A Registered Tradename for Access Mining Consultants Ltd.
accessconsulting.ca

1.0 Introduction

An emergency response plan is important to be in place prior to the construction or operation of a Land Treatment Facility. This Emergency and Spill Response Plan is a guide for the operators as to the planned course of action in the event of an emergency situation, a spill, or leakage of petroleum products during the course of the operation. Safety procedures for personnel and for proper equipment usage during such operations are discussed within this plan.

Fuel use/handling activities will be undertaken during the construction and operation of the Land Treatment Facility (LTF). These activities involve the use of equipment that consume petroleum products and including refuelling of other hydrocarbons. The purpose of a LTF is to remediate contaminated soil and water and there is potential for spills of these materials. Contaminated water must be treated as a petroleum spill but contaminated soil should be treated differently.

A table of contact phone numbers is provided below in Table 1.

1. Table 1 Spill Related Resources and Contact Numbers

Resource	Contact Number
Yukon Spill Line	(867) 667-7244
City of Whitehorse – Engineering and Environmental Services	(867) 668-8306
Police (Whitehorse)	911 or (867) 667-5555
Hospital – Whitehorse	911 or (867) 667-8700
Fire Department – Whitehorse	911 or (867) 668-8699
YG Environmental Programs Branch Standards and Approvals Section (permitting)	(867)-667-5610
YG Environmental Programs Branch Monitoring and Inspections Section	(867) 667-3436
Castle Rock Enterprises	(867) 668-6188
Access Consulting Group	(867) 668-6463

2.0 Spill Severity Ratings

2.1 Special Waste

Under the Yukon Special Waste Regulations (section 3):

No person shall release or cause to be released into the environment any special waste which

(a) causes or may cause an adverse effect, or

(b) is equal to or greater than

(i) within a 24 hour period,

(A) 500 grams in the case of a solid waste,

(B) 500 millilitres in the case of a liquid waste, or

(C) 500 grams or 500 millilitres whichever is less, in the case of a mixture of solid waste and a liquid waste, or

(ii) within a 30 day period,

(A) 5 kilograms in the case of a solid waste,

(B) 5 litres in the case of a liquid waste, or

(C) 5 kilograms or 5 litres, whichever is less, in the case of a mixture of a solid waste and a liquid waste, except where the release is authorized by the Act or these regulations or a special waste permit issued under the Act or these regulations.

Any accidental release of Special Waste that falls within the above listed criteria must be reported to the Yukon Spill Line.

2.2 Petroleum Products

A spill of a petroleum product is defined as:

"Petroleum product or lubricant which is poured, spilled, or pumped onto the ground or into water, by faulty conveyance or transfer, overturned vehicles or equipment, or through human error or negligence."

Severity rating:	Non-Reportable – Less than 100 litres*
	Minor – More than 100 litres and Less than 400 litres
	Major – More than 400 and Less than 1,000 litres
	Emergency - More than 1,000 litres

*If a spill is less than 100 litres and has not entered a watercourse, the Owner and/or operator are not required to report the spill but are encouraged to do so.

or

"Hydrocarbon contaminated water or soil or a liquid or solid special waste which is poured, spilled, or pumped onto the ground or into water, by faulty conveyance or transfer, overturned vehicles or equipment, or through human error or negligence.."

A **"leak"** is defined as:

"Passing of a petroleum product through a breach, tear or puncture in a container, or receptacle at a rate of less than 10 litres per minute."

Please find a table of reportable spills for various substances in Attachment A.

3.0 EMERGENCY RESPONSE

3.1 In the case of an accident that has resulted in an injury:

- Call for medical help, attend to injured person, and administer first aid if safe to do so.
- If unsafe to administer first aid, remove the injured person from the area if it is safe to do so
- If unsafe to remove the person from the site, contact emergency personnel and prepare for their arrival
- Warn / remove bystanders
- Contact the Castle Rock Enterprises and Access Consulting Group offices

3.2 In the case of fire:

- Clear the Area – Evacuate everyone that could be affected by the event.
- Assess the Situation – Determine action, equipment and Personal Protective Equipment (PPE) required to control the situation. For flammable liquids, eliminate ignition sources, avoid splashing onto clothing and wear rubber boots and gloves.
- Contact the Whitehorse Fire Department
- Contact the Castle Rock Enterprises office and Access Consulting Group office

4.0 Reporting Procedures

The following two levels of reporting is required by any individual who locates a spill or leak:

Report to a Supervisor: Refers to the direct supervisor in charge of the individual who located the spill or leak.

and,

Report to the Owner: The Owner shall immediately be given details of any leak or spill. It is the Owner's responsibility to ensure protection of human health and safety, provide directions to

stop or contain spills, and report the spill (if necessary, see severity rating and notes above) to affected agencies prior to investigating the spill themselves.

Affected Agencies: Affected Agencies shall all be contacted through the 24-hour emergency spill response line at ***(867) 667-7244***.

The following information shall be conveyed to the affected agencies through the 24-hour Emergency Spill Response Line. This information should be documented on the "Spill Reporting Form" provided in Attachment B.

- Location of the Spill or Leak
  - Nearest community, town, highway, major water body, kilometre location on highway if known etc.
  - Quarry Lease 792, off the Haeckel Hill Ski Road (Old Ski Hill Road), km 1438.1 Alaska Highway if on site at the LTF.
- Time of Spill
- Severity of Spill or Leak
  - Minor – more than 100 litres and less than 400 litres
  - Major – more than 400 litres and less than 1,000 litres
  - Emergency - more than 1,000 litres
- Type of Spill
  - Total loss/leakage
  - Overturned vehicle or tanker (plus name of transport company)
  - Ruptured tank
  - Lost drum
- Product Spilled
  - Special Waste
  - Diesel Fuel (Identify Grade)
  - Gasoline
  - Lubricant (Identify Grade)
  - Contaminated Water/Liquid Special Waste (include laboratory characterization results)
  - Contaminated Soil/Solid Special Waste (include laboratory characterization results)
  - Other (Identify)
- Nearest Watercourse
  - Identify by name and description the nearest watercourse, pond or lake, with an approximate distance to the spill – The nearest watercourse to the LTF site is Little Takhini Creek.
  - Describe the soils conditions and direction of probable flow for the spilled product.

- Potential to enter surface water
- Fire Hazard
- Hazard to life and limb, injuries
- Environmental effect expected, if any
- Equipment and clean-up consumables on hand

Response by Affected Agencies depends upon the location of the possible spill and will vary. However, they will be co-ordinated by phoning the Emergency Response Spill Line ***(867) 667-7244***. For the purpose of this Plan, it is recommended that only one call be made to government or other agencies using the 24 hr spill line.

Other affected parties may include organizations associated with fuel supply and transport companies or local First Nations. Most major suppliers in the Yukon are members of the Transportation Emergency Assistance Plan (TEAP). One of the responsibilities of this organisation is the sharing of resources, consumables, equipment and personnel in the event of a spill. The transporter is responsible for contacting TEAP in the event of a spill.

The Canadian Transport Emergency Centre (CANUTEC), a branch of Transport Canada, can also be contacted for 24 hr technical advise on Dangerous Goods, as needed. The CANUTEC – help line for dangerous goods is **0 (613) 996-6666 (collect)**.

5.0 Spill Response Procedure

5.1 Contaminated Water/Liquid Special Waste/Petroleum Product Emergency Spill Response Procedure

The first person on the scene is to do the following:

Ensure personal and worker safety, if you cannot identify the spilled substance consider it dangerous.

If Personnel Are Injured
- Call for medical help, attend to injured person, and administer first aid if safe to do so.
- Warn / remove bystanders

If Safe (do not enter confined spaces or expose self to fire hazard)
- Stop all sources of ignition and stop or reduce the source flow of the spill
- Shut off all valves
- Shut off all electrical power
- Initiate containment: put down sorbent pads and berm spill area, if possible
- Recover product and contaminated soil / other materials
- Remain at the site and assist with response as needed when help arrives.

If Unsafe
- Initiate evacuation (upgrade or upwind), move to safe area
- Notify Owner

- Report the following: location, initial spill site, possible cause, description of present condition, affecting or about to enter water.

- Isolate area and deny entry until qualified response personnel arrive
- Deny access to all unauthorized personnel
- Update Owner on spill status

5.2 Response for Gasoline Spills

5.2.1 If in water and if safe to do so:

1. Stop or reduce discharge, if safe to do so, by plugging, uprighting, adjusting valves, or other suitable method.
2. If possible, contain discharge by booming using commercial boom material, logs, or other material at hand.
3. If in rapidly flowing water, direct to quieter backwater using booms to deflect material.

4. Ensure that you have reported the spill.
5. Remove from water by skimming, using absorbents, and collect in suitable container (tanks, drums, plastic lined depression in ground or snow). **See Attachment C for a listing of typical spill response tools/equipment.**

NOTE: IN THE EVENT MATERIAL IS SPILLED DURING VERY WARM WEATHER AND THERE IS DANGER OF FIRE DUE TO FUMES, DO NOT ATTEMPT TO CONTAIN PRODUCT ON WATER. ALLOW PRODUCT TO DISPERSE AND EVAPORATE.

6. Dispose absorbents by recycling or incineration if conditions are suitable and after consultation with environmental authorities and/or forestry officials contacted through the Emergency Spill Response Line.

5.2.2 Response for Gasoline Spills (Cont'd)

If on land and it is safe to do so:

1. Stop, or reduce discharge if safe to do so by plugging, uprighting, adjusting valves or other suitable method.
2. Contain spill by diking with earth, snow and ice or other barrier, possible trenching or creating a lined sump down gradient from the spill source.
3. Ensure that you have reported the spill.
4. Remove fuel from containment area with pumps, vacuum equipment and place in appropriate containers. Ensure equipment intrinsically safe (does not have a source of ignition/spark).
5. Absorb residual liquid on natural or synthetic absorbents (e.g. 3M products).
6. Remove contaminated soils in the spill site to an appropriate disposal site if spill located near water supply or stream/river course or for aesthetic reasons.
7. Dispose of contaminated fuel by recycling or incineration. In situ, incineration may be possible if permission granted from environmental and forestry officials contacted through the Emergency Spill Response Line.

5.2.3 Response for Diesel Spills and Contaminated Water/Liquid Special Waste

If in water and if safe to do so:

1. Stop, or reduce discharge if safe to do so by plugging, uprighting, adjusting valves, or other suitable method.
2. If possible, contain discharge by booming using commercial boom material, logs or other material at hand.
3. If in rapidly flowing water, direct to quieter backwater using booms to deflect material.

4. Ensure that you have reported the spill.
5. Remove from water by skimming, using absorbents, and collect in suitable container (tanks, drums, plastic lined depression in ground or snow).
6. Dispose by recycling or incineration, if conditions are suitable and regulatory authorities grant permission.

5.2.4 Response for Diesel Spills and Contaminated Water/Liquid Special Waste

If on land and it is safe to do so:

1. Stop or reduce discharge if safe to do so by plugging, uprighting, adjusting valves or other suitable method.
2. Contain spill by diking with earth, snow or ice or other barrier, possible trenching or creating a lined sump down gradient from the spill source.
3. Ensure that you have reported the spill.
4. Remove fuel from containment area with pumps, vacuum equipment and place in appropriate containers.
5. Absorb residual liquid on natural or synthetic absorbents (e.g. 3M products).
6. Remove contaminated soils in the spill to an appropriate disposal site if spill site is located near water supply or stream/river course or for aesthetic reasons.
7. Dispose of contaminated fuel by recycling or incineration. In site, incineration may be possible if permission granted from environmental and forestry officials.

5.2.5 Contaminated Soil/ Solid Special Waste Spill Response Procedure

The first person on the scene is to do the following:

1. Call for medical help, attend to injured person, and administer first aid if safe to do so.
2. Stop operations that resulted in the spill or may impede spill clean-up
3. Notify the office of Castle Rock Enterprises and Access Consulting Group
4. Report the following: location, initial spill site, possible cause, description of present condition, affecting or about to enter water. - Initiate containment: prevent the spill material from migrating off site through berms if required
5. Recover spilled material and contaminated soil and move to the an isolated area of the staging cell
6. Remain at the site and assist with response as needed when help arrives.

Hazardous Materials Information

Gasoline

Characteristics
- Flammable
- Solubility in water 1 to 100 ppm
- Floats
- Flash point - 38 to -43 C

Human Health
- Moderately toxic by inhalation. Avoid prolonged exposure to fumes

Environment
- Harmful to aquatic life. Fish toxicity: 5 - 40 ppm rainbow trout

Protective Clothing
- No specific recommendations. Protective clothing is required.

Diesel

Characteristics
- Combustible/Flammable liquid
- Insoluble in water (30 ppm)
- Floats
- Flash point 52 to 96 C

Human Health
- Low toxicity by all routes

Environment
- Fish toxicity: 10 ppm rainbow trout; 2 ppm for grass shrimp

Protective Clothing
- Gloves and boots made from neoprene or butyl rubber

SPILL RESPONSE PLAN
FOR THE CASTLE ROCK ENTERPRISES
LAND TREATMENT FACILITY

ATTACHMENT A

REPORTABLE SPILLS

A spill in excess of the following thresholds is considered a spill under the Yukon *Spill Regulations* (O.I.C. 1996/193), pursuant to the Environment Act. In this table, the listed regulations "Federal Regulations" means the *Transportation of Dangerous Goods Regulations* (Canada) Sor/85/77 of January 18, 1985.

Substance Spilled	TDG Code	Reportable Quantity
Explosives of Class 1 as defined in section 3.9 of the Federal Regulations.	1	Any amount
Flammable gases, of Division 1 of Class 2 as defined in section 3.11 (a) of the Federal Regulations.	2.1	Any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction.
Non-flammable gases of Division 2 of Class 2 as defined in section 3.11 (d) of the Federal Regulations.	2.2	Any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction.
Poisonous gases of Division 3 of Class 2 as defined in section 3.11(b) of the Federal Regulations.	2.3	Any amount
Corrosive gases of Division 4 of Class 2 as defined in section 3.11 (c) of the Federal Regulations.	2.4	Any amount
Flammable liquids of Class 3 as defined in section 3.12 of the Federal Regulations.	3	200L (Any amount if spilled into a watercourse)
Flammable solids of Class 4 as defined in section 3.15 of the Federal Regulations.	4	25 kg
Products or substances that are oxidizing substances of Division 1 of Class 5 as defined in sections 3.17(a) and 3.18(a) of the Federal Regulations.	5.1	50 kg or 50 L
Products or substances that are organic compounds that contain the bivalent "-0-0-" structure of Division 2 of Class 5 as defined in sections 3.17 (b) and 3.18 (b) of the Federal Regulations.	5.2	1 kg or 1L
Products or substances that are poisons of Division 1 of Class 6 as defined in sections 3.19 (a) to (e) and 3.20 (a) of the Federal Regulations.	6.1	5 kg or 5 L
Organisms that are infectious or that are reasonable believed to be infectious and the toxins of these organisms as defined in sections 3.19(f) and 3.20(b) of the Federal Regulations.	6.2	Any amount
Radioactive materials of Class 7 as defined by section 3.24 of the Federal Regulations.	7	Any discharge or a radiation level exceeding 10 mSv/h at the package surface and 200 mSv/h at 1 m from the package surface.
Products or substances of Class 8 as defined by section 3.24 of the Federal Regulations.	8	5 kg or 5 L
Miscellaneous products or substances of Division 1 of Class 9 as defined by sections 3.27 (1) and 2 (a) of the Federal Regulations.	9	50 kg or 50 L

SPILL RESPONSE PLAN
FOR THE CASTLE ROCK ENTERPRISES
LAND TREATMENT FACILITY

ATTACHMENT B

SPILL REPORTING FORM

Spill Reporting Form

1) Type: (check) Oil ____Gasoline ____Diesel ____Sewage ____

   Other (name) _____

2) Source (Company): _____

3) Severity: (check) Minor 100 – 400 litres _____ Major 400 - 1,000 litres _____
   Emergency more than 1,000 litres _____

4) Date of Incident: _____ Time: _____

5) General Roadway Kilometre Mine Site Location: _____

6) Specifics of Location (nearest community, watercourse etc.): _____

   _____

7) Cause of Incident (e.g.: building failure): _____

8) Reason: (e.g.: earthquake): _____

9) Weather Conditions: Temperature _____ Wind Direction/Speed _____ Precipitation _____

10) Hazards to human life or health: _____

11) Expected Environmental Effects: _____

12) Nearest Surface Water with Approximate Distance to Spill: _____

    _____

13) Potential to Enter Surface Water: _____

14) Fish Kill: Yes ___ No ___ Bird Kill: Yes ___ No ___

15) Fire Hazard: _____

16) Threat to drinking water: _____

17) Who to contact at the scene: _____

    Company: _____ Phone: _____

18) General Comments: _____

19) How to prevent recurrence: _____

20) Action taken to date: Containment: _____

    Clean up: _____

Reported by:
Name: _____ Dept.: _____ Phone: _____

Reported to:
Name: _____ Dept.: _____ Phone: _____

ACCESS CONSULTING GROUP

SPILL RESPONSE PLAN
FOR THE CASTLE ROCK ENTERPRISES
LAND TREATMENT FACILITY

ATTACHMENT C

LIST OF TYPICAL SPILL RESPONSE EQUIPMENT

List of Typical Spill Response Equipment

- **Absorbents** (For Petroleum Hydrocarbon {Fuels, Lubricants, and Solvents} and Wastewater)
  - Booms
  - Sheets
  - Towels
  - Absorbent granules
- **Contaminated Soils Recovery Tools**
  - Shovels
  - Picks
  - Excavators
  - Loaders
  - Trucks
- **Liquid Recovery Tools**
  - Pumps
  - Containers
  - Vacuum / Eductor Truck
- **Fire Suppression Equipment**
  - Various, for different material types
- **Personal Safety Equipment**
  - Protective Clothing
  - Eye Protection
  - Breathing Apparatus

Castlerock Enterprises will have the following at the LTF at all times:

- Eye protection
- Protective gloves
- Hand shovels and brooms
- A spill response bucket, containing:
  - Booms
  - Sheets
  - Towels
  - Absorbent granules

Fire suppression equipment, liquid recovery tools, loaders, excavators, trucks and additional protective equipment are available from the Castlerock Enterprises Ltd main shop as required.

Note:

This is by no means an exhaustive list of materials and tools that can be assembled and used for spill response.

More information on spill response equipment and equipment suppliers can be found on the Internet. Yukon Explosives in Whitehorse is an example of a local supplier.

Appendix C

YESAA Review Related Communication and Plan Amendments for the Castle Rock Enterprises Land Treatment facility

YESAB
Yukon Environmental and Socio-economic
Assessment Board

Whitehorse Designated Office Evaluation
7209 B 7th Ave, Whithorse, Yukon Y1A 1R8 Tel: 867-456-3200 Fax: 867-456-3209

REQUEST FOR ADDITIONAL INFORMATION:

DATE: May 12, 2006

ASSESSOR: Keith Maguire
phone: (867) 456-3202 toll free: 1-866-322-4040
email: keith.maguire@yesab.ca

PROJECT #: Old Ski Hill Road Land Treatment Facility # 2006-0133

RE: Request for additional information (2)

Thank you for your submission of this project proposal to the Whitehorse Designated Office of the Yukon Environmental and Socio-economic Assessment Board (YESAB).

In order for your project proposal to be deemed complete and for the assessment to begin, it has been determined that additional information is required to supplement your project proposal and additional information. A list of this required information is included below. Once your proposal has been deemed complete, the evaluation will begin as soon as possible.

The Project Assessment Officer for your proposed project is Keith Maguire who can be contacted via email at keith.maguire@yesab.ca, by phone at 867-456-3202, by fax at 867-456-3209 or in person during most regular business hours at the Whitehorse Designated Office.

In order to avoid having this project proposal being deemed withdrawn, you are required to submit the requested supplementary information, or advise the Project Assessment Officer in writing when you will be submitting the information, before November 12, 2006.

Additional Information Request

Land Treatment Facility

1. The Land Treatment Facility Plan indicates on page 3 that the treatment cell will be a dimension of 29 X 29 m and will not require any hot welding of liner seams. In Appendix A the roll dimensions are 23 m in width. Are role dimensions over 29 m in width available by the manufacturer to ensure that no seams will be required for the proposed 29 X 29 m cell?

2. The Land Treatment Facility Plan indicates on pages 3 and continuing on page 6 that excess liquid will collect in a corner of the cell and reapplied to the piles. What is the maximum capacity of liquid that can collect in the corner cell? What steps will be taken if the maximum capacity of liquid is exceeded?

3. The Land Treatment Facility Plan indicates on page 6 that holding drums will hold liquids until laboratory testing determines levels and type of contamination. How will you reuse/dispose of holding drums once empty?

4. Section 1.4 of the Land Treatment Facility Plan deals with Spill Protection. How will you monitor the integrity of the geomembrane liner? What is your response plan if a leak in the liner is discovered? What is the effective life of the geomembrane liner?

5. The Land Treatment Facility Plan indicates on page 7 and continued on page 8 that loads of contaminated soil from different sources will be segregated within the treatment, special waste and staging cells. How will soils be segregated?

6. Will remedied soils be stockpiled on site prior to being used for appropriate land uses? If so, how will the remediated soils be stockpiled?

7. Attachment C of the Spill Response Plan provides a list of typical spill response equipment. What spill response equipment will be stored on site?

Quarry Operation

8. What is the estimated quantity of rock available for quarrying?

9. What is the quantity of rock quarried in an average year from the site?
10. What is the purpose of the small clearing on the south end of the lease?

General

11. Please provide a site map indicating LTF proposed location and associated infrastructure and the quarry extraction area, overburden stockpile area, aggregate sorting area, and stockpiling area.

12. What is the expected operation life of the quarry? What is the expected operational life of the land treatment facility?

Please contact me at your earliest convenience if you have a need to clarify anything, or have any other questions.

■ Access Mining Consultants Ltd.
■ Access Oil & Gas Services

 # 3 Calcite Business Centre, 151 Industrial Road, Whitehorse, Yukon Y1A 2V3
***PHONE** (867) 668-6463 **FAX** (867) 667-6680*
www.accessconsulting.ca

May 26, 2006

Yukon Environmental and Socio-economic Assessment Board
Whitehorse Designated Office
7209B 7th Avenue
Whitehorse, YT
Y1A 1R8

Attention: Mr. Keith Maguire, Whitehorse DO Project Assessment Officer

Response to Additional Information Request – 2 (May 12, 2006)

Land Treatment Facility

1. While the geomembrane specifications described in Appendix A indicate a the dimensions to be 23 x 1000ft the type to be used in this treatment facility is a smooth LLDPE Geomembrane with the same specifications but of 100 x 100ft (30.48 x 30.48m) dimensions. With an approximate 1.5m of the liner required for a stabilization toe-in to the berm the remaining dimensions are 29 x29m.
2. The maximum capacity of excess liquid will be calculated based on the quantity of contaminated soil within the cell and the height of the liner in the berm. The planned berm height is approximately 60-70cm and the liner height in the berm is 40-50cm. With an estimated lined area of 840m^2 this allows for a liquid holding capacity of 336m^3 when empty and approximately 20%, or 67m^3 when containing contaminated soil. The water volumes will only be from precipitation and as the Whitehorse area is considered to be a precipitation deficit area it is only during uncommon periods of heavy precipitation and spring melts that liquid collection within a cell could be a concern. During these periods increased monitoring of the site for excess liquid build-up will occur. Should there be significant liquid collection that threatens to breach the lined berm the water will be drained and applied to any non-saturated bioremediation piles or stored in holding drums until such time as application to the bioremediation piles will not saturate the soil. Should the maximum capacity be exceeded and contaminated liquid breach the lined cell all soil contaminated by the spill will be excavated and moved to an available treatment cell for bioremediation. Soil adjacent to the spill will be sampled and tested to confirm that all contamination has been excavated.
3. Holding drums described on page 6 of the LTF Plan will be reused whenever empty. Should they need to be cleaned prior to reuse due to the incompatibility of contents with the bioremediation procedures at the proposed LTF the drum will be steam cleaned and the wash water collected, tested if required, and shipped for treatment at a permitted treatment facility for that specific type of waste. Regular inspection of the holding drums will occur and should irreparable damage be observed the drums will be steam cleaned and disposed of as scrap metal with all wash water treated as described above.
4. Spill Protection
    a. The geomembrane liner will be inspected through visual monitoring of any portion of the liner that is exposed and staining of the ground in the area of the cell to indicate potential leaks. Reporting and immediate inspection of any inadvertent exposure of the liner during LTF operations will also aid in

identification of potential liner failure. Proper installation of the liner is the most effective method of minimizing potential liner failures. Study of past installation failures and instruction by the members of the Contaminated Sites, Standards and Approvals Section of the Yukon Government Environment Department will ensure safe installation. Safe operation will also minimize the potential for rips or tears in the liner. This involves having experienced operators on site to use the equipment; a well-built and maintained ramp to ensure no exposure of the liner to vehicle tires during loading, unloading, and turning stages; and careful, methodical turning and loading of the soil.

b. In the event of a leak in the liner the cell will be emptied and the contaminated soil transferred to another cell, the area of the leak will be sampled and tested to determine if the leak contaminated any soil. Should it be required the contaminated soil will be excavated and moved to an available cell. The liner will then be repaired if possible or removed from the site and disposed of at an appropriate waste treatment facility

c. The effective life of the geomembrane liner is 50 years.

5. Soils will be segregated in the cells by using separate cells when possible, otherwise by separating piles far enough from each other to allow for piling and turning without mixing.

6. Remediated soil may be stockpiled on-site if required. Remediated soil below the industrial/commercial criteria as described in the *Environment Act, Contaminated Sites Regulations* will be transported off-site and used as fill in an industrial area. These industrial/commercial level soils will be stored in a lined cell until an available receiving site is found. As soil containing this level of hydrocarbon contamination is considered contaminated soil a relocation permit will be obtained prior to transportation. Soil below residential/park/agricultural standards will not require a permit to transport.

7. Spill response equipment that will be stored on site include:

    a. Absorbents (For Petroleum Hydrocarbons)
        i. Booms
        ii. Towels
        iii. Absorbent granules
    b. Contaminated Soils Recovery Tools
        i. Shovels
        ii. Picks
    c. Fire Suppression Equipment
        i. Hand-held fire extinguisher
    d. Personal Safety Equipment
        i. Protective Clothing
        ii. Eye Protection
        iii. Breathing Apparatus
    e. Liquid Recovery Tools (also to be used for liquid recovery in the event of a excess liquid in the treatment cells)
        i. Pumps
        ii. Containers

    Spill response equipment available from Castle Rock Enterprises shop if needed:

    a. Contaminated Soils Recovery Tools
        i. Excavators
        ii. Loaders
        iii. Trucks

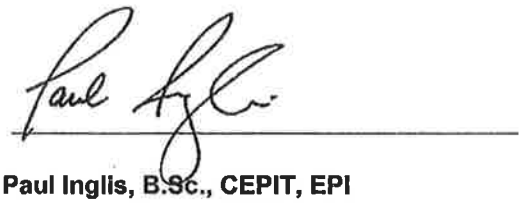
Quarry Operation

8. The estimated quantity of aggregate available for quarrying is approximately 1.5 million m^3.

9. Approximately 5000m^3 of rock in the form of pit-run rock, gravel and sand is quarried in an average year from this site.
10. The small clearing to the south end of the site is for the Land Treatment Facility.

General

11. see attached map
12. The expected life of the quarry is approximately 50 years. The expected operational life of the Land treatment facility is approximately 50 years.



Paul Inglis, B.Sc., CEPIT, EPI
Environmental Scientist

Attachment: One (1) page

Yukon
Environment
Box 2703, Whitehorse, Yukon Y1A 2C6

July 6, 2006

Paul Inglis
Access Consulting Group
#3 – 151 Industrial Road
Whitehorse, YT
Y1A 2V3

Dear Mr. Inglis,

Re: Old Ski Hill Land Treatment (LTF) Facility, Project # 2006-0133

The Environmental Programs Branch (EPB) received your response to our questions regarding the project noted above.

Before the EPB can determine whether or not the proposed site is a suitable location for a land treatment facility, some additional information is required: the proponent must drill or dig for groundwater to a depth of at least 3.5 – 4m. The bore hole log or test pit log must be submitted to the EPB and must demonstrate that groundwater at the proposed LTF site is deeper than 3.0m below grade.

If you have any questions, please call me at 667-5610.

Sincerely,

Jennifer Peterson
A/Contaminated Sites Analyst
Environmental Programs Branch

■ Access Mining Consultants Ltd.
■ Access Oil & Gas Services

 # 3 Calcite Business Centre, 151 Industrial Road, Whitehorse, Yukon Y1A 2V3
***PHONE** (867) 668-6463 **FAX** (867) 667-6680*
www.accessconsulting.ca

July 20, 2006

Environmental Programs Branch
Environment Department
Yukon Government
Box 2703, Whitehorse
Y1A 2C6

Attention: Jennifer Peterson

Re: Old Ski Hill Road Land Treatment Facility, YESAB Project #2006-0133

In response to your letter of July 6, 2006 please see the following letter report and attachment from test pitting undertaken at the Castle Rock Enterprises quarry lease (Disposition # 960239).

On Tuesday July 18th two test pits were dug in the area of the proposed LTF, both of which revealed groundwater above the 3 metre minimum required depth for a LTF (all test pit logs are attached). In TP01 water was encountered at 2.5m, in TP02 water was encountered at 2.1m. Five more test pits were dug in an alternate area within the lease on Wednesday July 19th, the updated proposed LTF area and these pit locations are shown in Figure 1. Four of these test pits are directly under the proposed location, and the fifth is between these pits and the access road. Of the 4 pits under the proposed LTF area, three (TP04, TP06, and TP07) encountered no groundwater up to depths of 3.3m or greater and the fourth test pit (TP05) revealed groundwater at a depth of 3.55m below ground level. Figure 2 shows the layout of the treatment cells within the proposed LTF area and a cross-sectional diagram of a single treatment cell.

The new location for the proposed LTF meets all of the siting criteria for LTFs as described in the site selection criteria posed by the Department of Environment. This includes:

- The site is currently cleared although some limited clearing will be required around the edges.
- There is little known wildlife use of the site
- The site is greater than 100m from the nearest surface water body, the nearest (Little Takhini Creek) is 340m distant
- The land is not identified as being within a floodplain
- The seasonal high water table was observed at 3.55m in one test pit, unobserved in all others
- The natural slope of the site is approximately 3% and the slope after site preparation will be less than 2%
- The site is greater than 60m from the nearest residential property, the nearest is over 1km distant

Test pitting timeline:

2003 - A test pitting program was conducted in June 2003 with the objective of determining the suitability of soils for use as an unlined LTF (ie: soils with a tested conductivity of 10^{-5} cm/s and greater than 1 metre in thickness). Upon determination of unsuitable soil characteristics the project was terminated

2006 - In 2006 the project was revitalized, test pitting was done in accordance with discussions with YG Environment with the objective of determining a suitable groundwater regime

Year	Test Pit	Location (UTM)		Depth to Groundwater (m)	Pit Depth (m)	Soil Profile Prepared
		Easting	Northing			
2003	CRE-03-01*	487700	6739989	None encountered	2.2	yes
2003	CRE-03-02*	487647	6740012	None encountered	1.5	no
2003	CRE-03-03*	487647	6740065	None encountered	2.0	yes
2003	CRE-03-04*	487696	6740054	None encountered	1.5	yes
2003	CRE-03-05*	487612	6740039	None encountered	2.1	yes
2006	CRE Test Pit01	487719	6740020	2.5	3.8	no
2006	CRE Test Pit02	487763	6739971	2.1	3.2	no
2006	CRE Test Pit03	487458	6740434	None encountered	3.7	yes
2006	CRE Test Pit04	487436	6740374	None encountered	3.4	yes
2006	CRE Test Pit05	487466	6740316	3.55	3.7	yes
2006	CRE Test Pit06	487474	6740332	None encountered	3.3	yes
2006	CRE Test Pit07	487393	6740429	None encountered	3.4	yes

* locations approximate

The proposed new location is within the same land parcel described in the initial application (YESAB Project # 2006-0133) and all information supplied in the LTF Plan and Permit applications remain the same, excepting the information provided above.

We trust that this meets with your approval. If you have any questions, please contact our office at (867) 668-6463.

Prepared by:

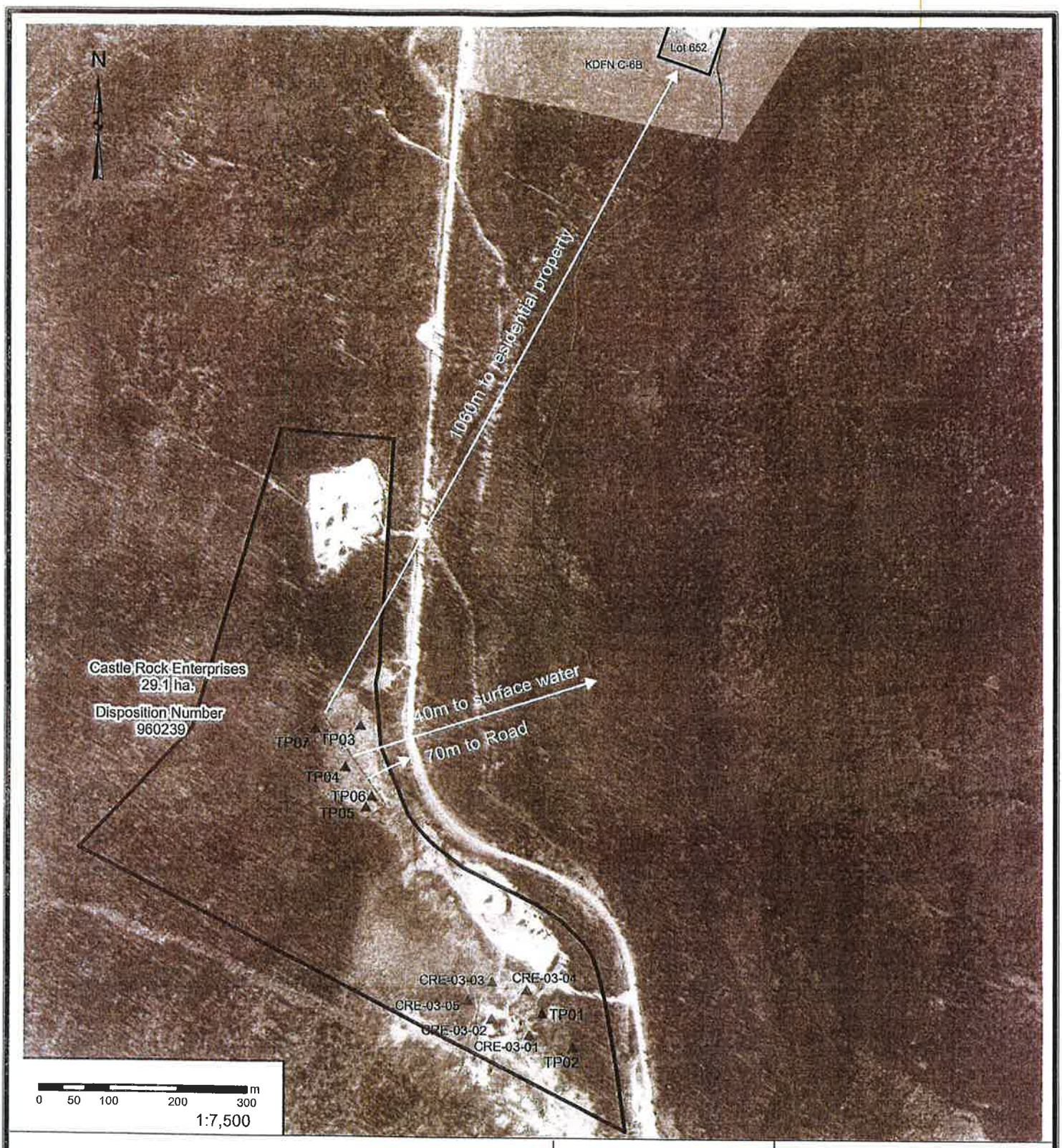
Paul Inglis, BSc., CEPIT, EPI
Environmental Scientist

Reviewed by:

REGISTERED ENGINEERING TECHNOLOGIST
ROBERT L. McINTYRE
1372
ALBERTA

Robert L. McIntyre, R.E.T., CCEP,
President

Enclosure



Legend

- Castle Rock Enterprises Quarry Lease (disp. # 960239)
- 2006 Test Pit
- 2003 Test Pit
- Proposed LTF Area
- Residential Property
- Little Takhini Creek

Original Site Sketch obtained from Yukon Community Services Land Planning
Original Drawing No. 25-1-140m
Date: '96 04 29
UTM Zone 8 NAD83
NTS Sheet 105D/14

Castle Rock Enterprises

ACCESS CONSULTING GROUP

Castle Rock Enterprises Old Ski Road Quarry

Figure 1 Test Pit Locations

Drawn By: HD/PI	Checked By: PI
Date: July 2006	

Our file: D:\Projects\All Projects\ACG-05-99 CRE\gis\mxd\Permit\Fig3_QuarrySitePlan.mxd

Plate 1: Soil profiling in CRE-03-03

Plate 2: Groundwater seep at 2.5m – CRE Test Pit01

Plate 3: Soil profiling in CRE Test Pit05

Plate 4: Excavator at work in CRE Test Pit07

TEST PIT LOG

ACCESS CONSULTING GROUP

Pit No:	TP-CR-03-01
Date:	JUNE 12/03
Project:	CASTLE ROCK LTF INVESTIGATION
Total Depth:	2.0 m
Location:	KM. 1490 AK HWY
Pit Dimensions:	3m x 1.5m
Logged by:	R. McINTYRE P.ET!
Initials:	
Sampling Method:	N/A
Contractor:	CASTLE ROCK ENTERPRISES
Equipment Type:	"CASE 688"
Comments:	TEST PITS TO DETERMINE SOIL TYPES

Depth Log (ft/m)	Material Description	Ground Water	Sample No.	Remarks
	ORGANIC MAT, ORGANIC SOILS	N/D		
0.7m	MD. BRN. SANDY SOIL, SAND, SILTY SAND (VARIEGATED SPATIALLY)			0.7m
1.2m	LT. BRN. SILTY CLAY / CLAYEY SILT			1.2m > 1m SILTY MATL.; MAKES GOOD FOR LTF FOUNDATION
2.0m	E.O.H.			

* N/D Not Detected

TEST PIT LOG

ACCESS CONSULTING GROUP

Project:	CASTLE ROCK QUARRY PIT		Pit No: CR-03-02
Location:	N. WHSE. AK. HWY		Date:
Logged by:	RCM	Initals:	Total Depth:
Contractor:	CASTLE ROCK ENT		Pit Dimensions:
Comments:			Sampling Method:
			Equipment Type:

Depth Log (m)	Material Description	Ground Water	Sample No.	Remarks
0	– M.D. BRN. – DK. BRN. SANDY/GRAVELLY SOIL, 8% SILT, 2% CLAY 50% SAND 40% GRAVEL – COBBLES TO 10 cm. – APPEARS TO BE HIGHLY REMOVABLE – OCCASIONAL MINOR SAND LENSES (≥1 m THICK)			
1				
2	* N/D. 105-D-06 PIT BRUCE RUCKER – BH			
3	JUNE 11 LAST DAY			
4				
5				
6				

* N/D Not Detected

TEST PIT LOG

ACCESS CONSULTING GROUP

Pit No:	CR-03-03
Date:	June 12/03
Project:	CASTLE ROCK LTF. INVESTIGATION
Total Depth:	2.0 m
Location:	CASTLE ROCK PIT Km 1990 RE. Hwy
Pit Dimensions:	4m x 1.5m
Logged by:	R. McINNIS R.E.T. Initials: RM
Sampling Method:	N/A
Contractor:	R. BOWN/CASTLE
Equipment Type:	CASE 688
Comments:	TEST PITTING TO DETERMINE SOIL TYPES

Depth Log (ft/m)	Material Description	Ground Water	Sample No.	Remarks
0				
	0.2 BLK. ORGANIC MAT			
	BLK. ORGANIC SOILS			
	0.6			
	DK. BLN. SILTY SOIL, SOME SAND			
	0.95			
	SANDY SILTS			
	1.6			
2	SILTY SANDY GRAVELS, SOME COBBLES	N/D		
	— EOH 2.0M —			
3				
4				
5				

* N/D Not Detected

TEST PIT LOG

ACCESS CONSULTING GROUP

Pit No: CR-03-04
Date: June 12/03
Project: CASTLE ROCK LOT. INVESTIGATION
Total Depth: 1.5 m
Location: CASTLE ROCK PIT - KM. 1490 AL. Hwy 1
Pit Dimensions: 4m x 1.5m
Logged by: R. McINTYRE, P.E.T. Initials: RM
Sampling Method: N/A
Contractor: R. BONNY CASTLE
Equipment Type: CASE 688
Comments: TEST PITTING TO DETERMINE SOIL TYPES

Depth Log (ft/m)	Material Description	Ground Water	Sample No.	Remarks
	BLK. ORGANIC SOILS			
	DK. BN. SILTY SOIL			POOR CANDIDATE
	SILTY SAND & GRAVELS			
	— E.O.H. 1.5m —	N/D		

* N/D Not Detected

TEST PIT LOG

ACCESS CONSULTING GROUP

Pit No:	CR-03-05
Date:	June 10/03
Project:	CASTLE ROCK CTF INVESTIGATION
Total Depth:	2.0 m
Location:	KM 1490 Alc. Hwy - CASTLE ROCK Pit DEVELOPMENT
Pit Dimensions:	4m x 1.5m
Logged by:	R. McINTYRE, E.E.T.
Initials:	RCM
Sampling Method:	N/A
Contractor:	CASTLE ROCK ENTERPRISES
Equipment Type:	CASE 688
Comments:	TEST PITTING TO DETERMINE SOIL TYPES

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
	BLK. ORGANIC MAT / SOILS, some SILTY MATL.			
	LT. BRN. SANDY SILTS, OCCASIONAL SANDY SEAMS (0.1m THICK)	N/D		
	+/- VAR. TO CLAYEY SILTS			
2	SILTY CLAY — E.O.H. 2.1 m	N/D		

* N/D Not Detected

TEST PIT LOG

ACCESS CONSULTING GROUP

Project: CRE-LTP	Pit No: 1
Location: Castlerock Quarry - Proposed LTF site	Date: 18 July, 2006
Logged by: Paul Inglis	Total Depth: 3.8m
Contractor: Operator - Jamie	Pit Dimensions:
Comments: pic 37-80	Sampling Method: N/A
	Equipment Type: Case CX210 excavator.

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
0.5	topsoil/organics		N/A	
2	Mixed Gravel/silts/sands some cobbles			
1				
4				
	silty			
6				
2				
8		-2.5		slow seep
3		-2.9		slow seep
10				
12				
3.8 4	Bottom of pit.			

ACCESS CONSULTING GROUP

TEST PIT LOG

Project: CRE-LTF	Pit No: CRE 2
Location: Castlerock Quarry - proposed LTF location	Date: 18 July 06
Logged by: Paul Inglis	Total Depth: 3.2
Contractor: Castlerock - Operator: Jamie	Pit Dimensions: N/A
Comments: AC38	Sampling Method: N/A
	Equipment Type: Case CX210 excavator

Depth Log (ft/m)		Material Description	Ground Water	Sample No.	Remarks
0	0.2	Topsoil		N/A	
2	0.9	Mixed gravel/silts/sands			
4	1.2	Silts some gravels and cobbles			
6	2				
7.1			2.1m		
8	3				
10	3.2	- Bottom of Pit			
12	4				

TEST PIT LOG

ACCESS CONSULTING GROUP

Project: CRE-LTF	Pit No: 3
Location: CRE Quarry - Proposed LTF site.	Date: 19th July 06
Logged by: Paul Foglis	Total Depth: 3.7m
Contractor: Castlerock - Operator - Jamie	Pit Dimensions:
Comments:	Sampling Method:
	Equipment Type: Case CX210 excavator.

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
0 / 0	organics			
	Black topsoil (dark brown)			
2 / 0.7				
1	Sandy silt			Yellowish brown/orange
4				
6 / 1.7				
2				
8 / 2.4	Gravelly silt			
3				
10	Sandy silt			
12 / 3.7	Pit bottom	None observed		
4				

TEST PIT LOG

ACCESS CONSULTING GROUP

Project: CRE - LTF	Pit No: CRE-4
Location: Castlerock Quarry - Proposed LTF	Date: 19 July 06
Logged by: Paul Inglis	Total Depth: 3.4
Contractor: Castlerock - Operator Jamie	Pit Dimensions:
Comments: pics 39-44	Sampling Method: N/A
	Equipment Type: Case CX210 excavator

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
0.5	Organics			
	Cobbles.			
	Coarse gravel irregular mat banding			
2	occassional cobbles.			
	Olive grey			
1				
1.2				
4				moist prob. collected surface water.
1.5	dense silt.			
1.7	W Lite River Ash.			occassional rusted plastic
	Sandy Cobbly Gravel			
6	Silt gravel - prob mass wasting.			
2				
8				
2.6				
	Sandy gravel			occassional rusted plastic
3	basal till			
10	possibly alluvial			
3.4				
12				
4				

ACCESS CONSULTING GROUP

TEST PIT LOG

Pit No: 5

Date: 19 July 2006

Project: ~~Castle~~ CRE-LTF

Total Depth: 3.7

Location: Castlerock Quarry - Proposed LTF site

Pit Dimensions: — —

Logged by: Paul Inglis

Sampling Method: N/A

Contractor: Castlerock - Operator Jamie

Equipment Type: Case CX210 excavator

Comments: pictures 46 & 49, 50

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
0 / 0	Organic topsoil		N/A	
0.5 / 0.2	silt - grayish brown - obvious banding: dark brown / red brown			
2 / 0.8	silt & gravel			
1				
4	Sandy gravel & cobbles			
6 / 2				
8				
3				
10				
3.5	coarse gravel	3.55		Water encountered @ 3.5m
3.7 / 12	Bottom of pit			
4				

TEST PIT LOG

ACCESS CONSULTING GROUP

Project: CRE - LTF	Pit No: CRE 6
Location: Castle rock Quarry - Proposed LTF location	Date: 19 July 00
Logged by: Paul Inglis	Total Depth: 3.3m
Contractor: Castle rock - Operator: Jamie.	Pit Dimensions: N/A
Comments: pictures 47&48	Sampling Method: N/A
	Equipment Type: Case CX210 excavator

Depth Log (ft / m)	Material Description	Ground Water	Sample No.	Remarks
0 / 0		none	N/A	
0.7	Organics / topsoil			
2	silt - banded: dark brown grey/brown dark grey			
0.9 / 1				
4	silt / coarse gravel ± cobbles			
6 / 2				
2.1	coarse sand & coarse / fine sand & gravel ± cobbles			
8 / 3				
10 / 3.3	bottom of pit.			
12 / 4				

TEST PIT LOG

ACCESS CONSULTING GROUP

Project: CRE-LTF	Pit No: 7
Location: Castlerock Quarry - Proposed LTF site	Date: 19 July 2006
Logged by: Paul Inglis	Total Depth: 3.4m
Contractor: Castlerock - Operator: Jamie	Pit Dimensions: N/A
Comments: pics 51-55	Sampling Method: N/A
	Equipment Type: Case CX210 excavator

Depth Log (ft/m)	Material Description	Ground Water	Sample No.	Remarks
0.1	Dark Brown topsoil	none		
1	Brown/Grey silt			
1.1	Cobbles/gravel sand.			
3.1	Bottom of pit			

Yukon
Environment
Box 2703, Whitehorse, Yukon Y1A 2C6

July 26, 2006

Keith Maguire
Whitehorse Designated Office
Yukon Environment and Socio-Economic Assessment Board
7209B 7th Avenue
Whitehorse, YT
Y1A 1R8

Attention: Keith Maguire

Re: Old Ski Hill Land Treatment Facility (LTF) Project # 2006-0133

On July 25, 2006, Access Consulting Group submitted a letter report and groundwater test pit data to YESAB for the proposed location of the LTF on the Castle Rock Enterprises land lease on the Old Ski Hill Road ("Old Ski Hill Road Land Treatment Facility, YESAB Project # 2006-0133", dated July 20, 2006). Consequent to the test pit findings, Access has applied on behalf of Castle Rock to construct the LTF at an alternate location on the same property.

After reviewing the site characterization information specific to the alternate location as supplied in and with the letter report noted above, the EPB is satisfied that the site can be safely used for a Land Treatment Facility subject to standard construction and operating practices. By way of an LTF permit, the EPB will ensure that the construction and operation of the LTF are conducted appropriately and that protection to environmental and human health are achieved through the permit conditions and regular inspections.

Please contact me at 667-5610 if you have any questions regarding these comments.

Sincerely,

Jennifer Peterson
A/Contaminated Sites Analyst
Environmental Programs Branch

APPENDIX B
Logs

Log of Monitoring Well: MW14-01-A/B

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

Date Drilled: July 16, 2014

Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Modified Split Point

Logged by: Thomas Kolb

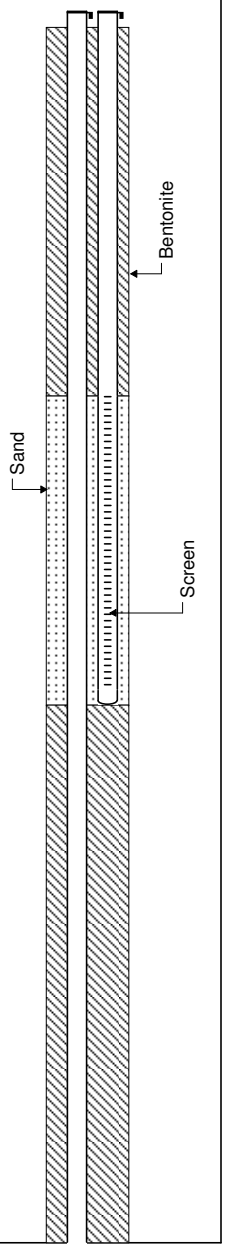
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
			Ground Surface	0.00
0	0		**Organic Topsoil** Spongy, black, rootlets present	0.00
3	1		**SILT AND SAND AND GRAVEL** Fine to coarse grained silt, fine to coarse grained sand and gravel (subangular to subrounded, poorly sorted), brown, low density, dry to moist, coated in topsoil from the auger	-1.07 1.07
9	2			-2.90 2.90
10	3		**CLAYEY SILT** Some trace fine to coarse grained gravel (subangular to subrounded, poorly sorted), light grey/brown, some blue shading, soft, medium density, wet	
13	4		Increasing density with depth starting at 4.200 m	
18	5			-5.49 5.49
19	6		**CLAYEY SILT** Trace fine to coarse grained gravel (subangular to subrounded), blue grey, firm, high density, moist to wet, homogeneous	

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW14-01-1			0	
MW14-01-2			0	
MW14-01-3			0	
MW14-01-4			0	

Backfill details



Well location: Upgradient of LTF

Depth to water level (TOC):

Date of water level:

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

Well screen interval (bgs): 1.950 - 3.450 m / 6.600 - 8.700 m

Depth of well (TOC): 3.450 m / 8.700 m

Well Elevation (TOC): Not Surveyed

Ground Elevation: Not Surveyed

Log of Monitoring Well: MW14-01-A/B

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

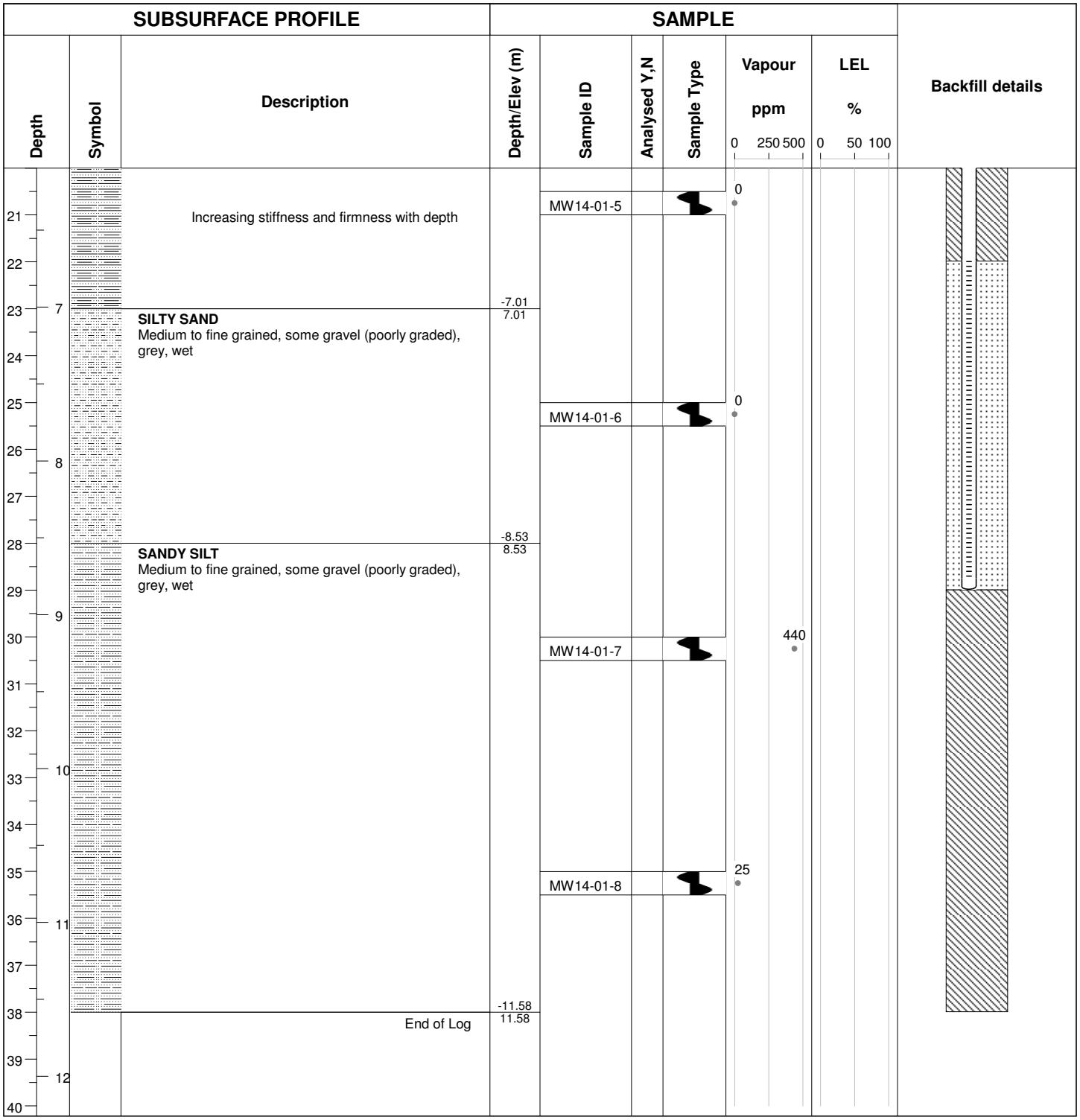
Date Drilled: July 16, 2014

Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Modified Split Point

Logged by: Thomas Kolb



Well location: Upgradient of LTF

Depth to water level (TOC):

Date of water level:

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

Well screen interval (bgs): 1.950 - 3.450 m / 6.600 - 8.700 m

Depth of well (TOC): 3.450 m / 8.700 m

Well Elevation (TOC): Not Surveyed

Ground Elevation: Not Surveyed

Log of Monitoring Well: MW14-02

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

Date Drilled: July 15, 2014

Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Auger

Logged by: Thomas Kolb

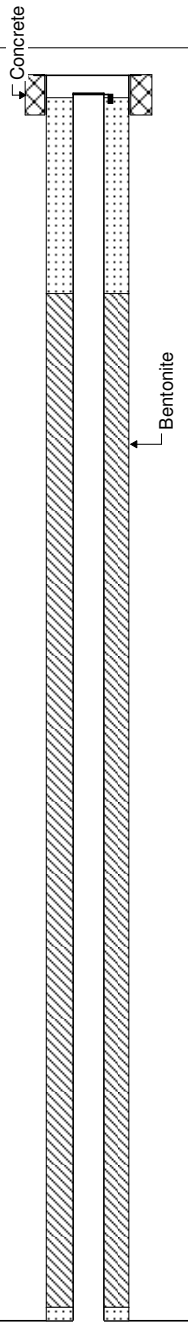
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
			Ground Surface	763.63
0	0		**SANDY SILT** Fine grained, some fine to coarse grained gravel and cobbles (subangular to subrounded), dark brown, loose to very slightly dense, slightly moist, fairly homogeneous	0.00
7	2		Cobbles end at 2.100 m, trace clay, density increases with depth (medium density), moist	761.50 2.13
8			**SAND AND GRAVEL** Fine to coarse grained sand, fine to coarse grained gravel (subrounded, poorly sorted), light brown to grey, dry to moist	761.19 2.44
11	3		**SAND AND SILT** Fine grained sand, trace fine grained gravel, stiff, moist, homogeneous	760.28 3.35
13	4		**SAND AND SILT AND GRAVEL** Fine grained sand, fine to coarse grained gravel (subangular to subrounded, poorly sorted), brown, crumbly, moist	759.67 3.96
15			Poor recovery from 4.350 - 4.800 m	759.21 4.42

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW14-02-1			10	
MW14-02-2			0	
MW14-02-3			0	
MW14-02-4			30	

Backfill details



Well location: Southeast corner of proposed LTF

Depth to water level (TOC): dry

Date of water level: 14 Aug 2014

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

Well screen interval (bgs): double check

Depth of well (TOC): double check

Well Elevation (TOC): 764.52

Ground Elevation: 763.63

Log of Monitoring Well: MW14-02

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

Date Drilled: July 15, 2014

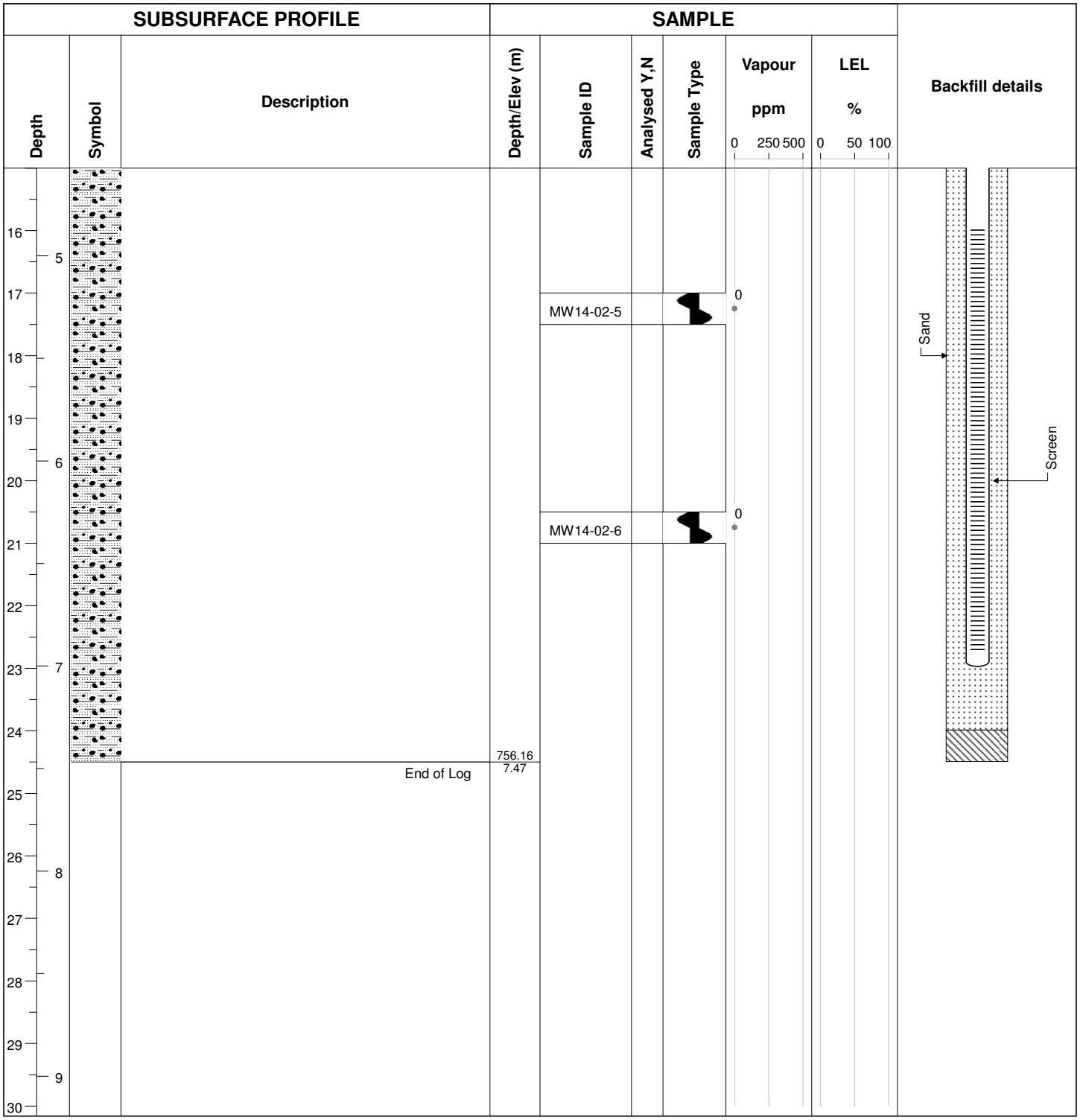
Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Auger

Logged by: Thomas Kolb

Sheet: 2 of 2



Well location: Southeast corner of proposed LTF

Depth to water level (TOC): dry

Date of water level: 14 Aug 2014

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

Well screen interval (bgs): double check

Depth of well (TOC): double check

Well Elevation (TOC): 764.52

Ground Elevation: 763.63

Log of Monitoring Well: MW14-03

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

Date Drilled: July 15, 2014

Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Modified Split Point

Logged by: Thomas Kolb

Sheet: 1 of 1

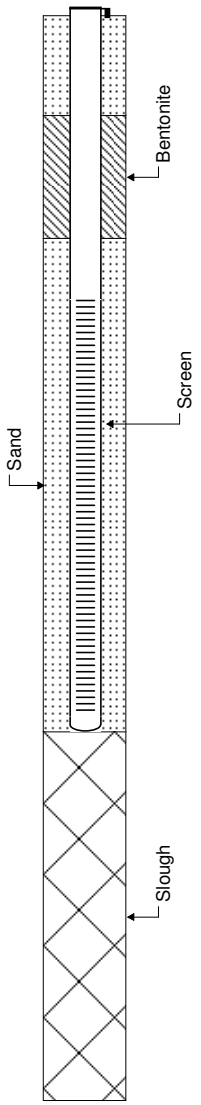
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev (m)
		Ground Surface	764.58
0	0	**SAND AND SILT AND GRAVEL** Fine grained sand, fine to coarse grained gravel (subangular to subrounded, poorly sorted), loose, moist	0.00
4	1	**SAND AND SOME GRAVEL** Fine to coarse grained sand, fine to coarse grained gravel (subangular to subrounded), trace silty sand, brown, loose to medium density, moist to wet	763.36 1.22
6	2	Some silt beginning at 1.800 - 2.250 m	762.75 1.83
13	4	**SAND AND GRAVEL** Fine to medium grained sand, trace coarse grained silty sand, fine to coarse grained gravel (subangular to subrounded, poorly sorted), some soft to stiff clay, medium plasticity, wet with some moist sections	760.62 3.96
18	5	End of Log	759.09 5.49
20	6		

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW14-03-1			0	
MW14-03-2			0	
MW14-03-3			0	
MW14-03-4			0	
MW14-03-5			0	

Backfill details



Well location: Southwest corner of proposed LTF

Depth to water level (TOC): 3.895 m

Date of water level: 15 Aug 2014

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

Well screen interval (bgs): double check

Depth of well (TOC): double check

Well Elevation (TOC): 765.43

Ground Elevation: 764.58

Log of Monitoring Well: MW14-04

HEMMERA

Project Name/No: 1721-001.01

Client: Castle Rock Enterprises

Date Drilled: July 16, 2014

Site Location: Alaska Highway

Drilling Company: Mightnight Sun Drilling Inc.

Drilling Method: Solid Stem Modified Split Point

Logged by: Thomas Kolb

Sheet: 1 of 1

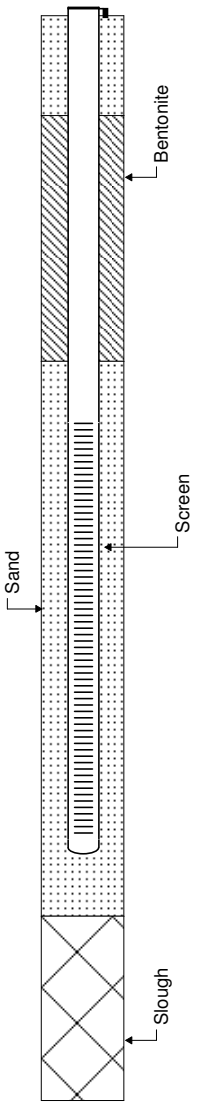
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev (m)
0	0	Ground Surface	764.89
		SAND Fine to medium grained, trace medium to coarse grained gravel (subrounded), loose, dry, homogeneous	0.00
			763.98
	1	**NO RECOVERY**	0.91
			763.52
		SAND Fine to medium grained, trace medium to coarse grained, reddish brown, loose, dry, homogeneous	1.37
	2	Moist from 2.400 - 2.700 m	762.45
			2.44
		Up-rippling silt contours increase in presence with depth	762.15
			2.74
	3	Wet from 2.700 - 3.900 m	
		SILT AND SAND Fine to medium grain silt contours dominate with some coarse grained sand, some fine to coarse grained gravel and some small cobbles (subangular to subrounded)	760.93
	4		3.96
	5		
		End of Log	759.40
	6		5.49

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW14-04-1			0	
MW14-04-2			0	
MW14-04-3			0	
MW14-04-4			0	

Backfill details



Well location: Upgradient of LTF

Depth to water level (TOC): 4.918 m

Date of water level: 15 Aug 2014

Borehole diameter: 0.1524 m

Well casing diameter: 0.050 m

Well casing material: PVC

Well screen slot size: 10 Slot Schedule 40

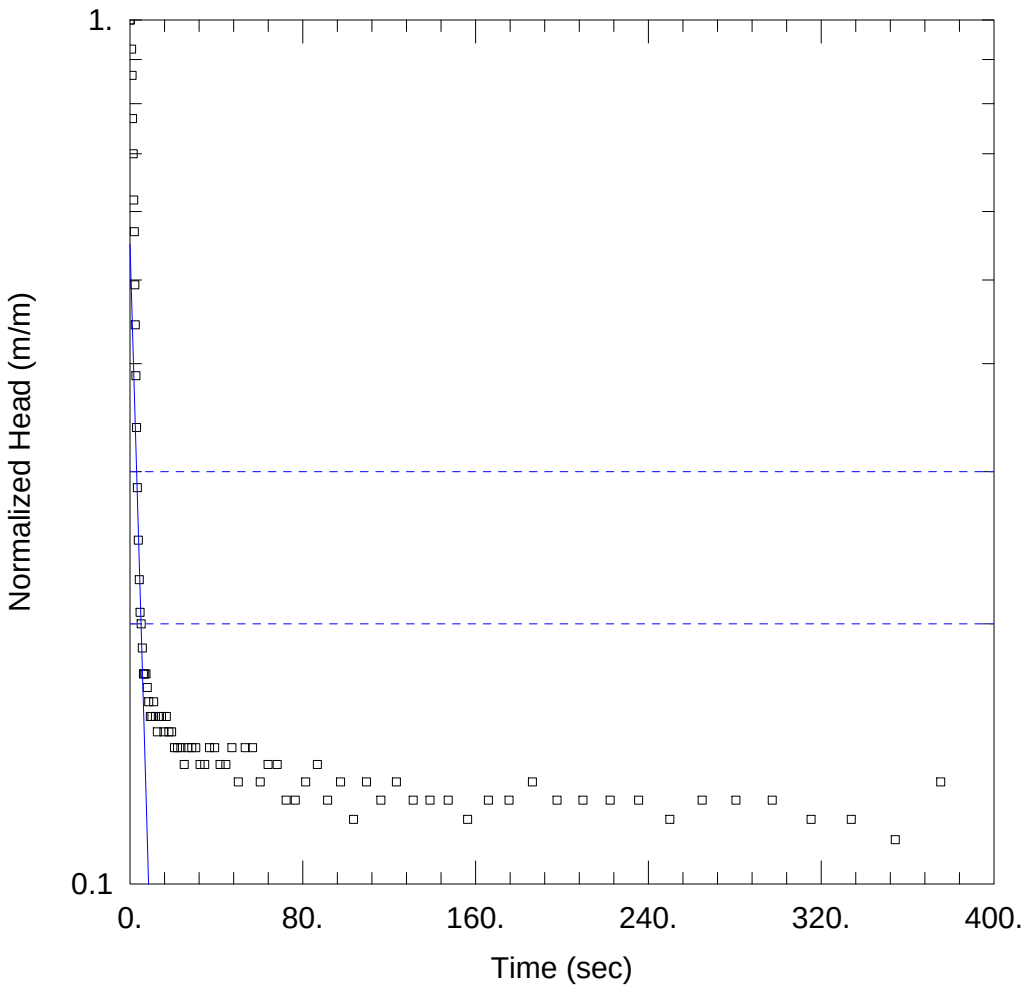
Well screen interval (bgs): double check

Depth of well (TOC): double check

Well Elevation (TOC): 765.73 m

Ground Elevation: 764.89 m

APPENDIX C
Slug Test Results



MW14-03 TEST 1

Data Set: Q:\...\MW14-03 Test 1.aqt
Date: 09/09/14 Time: 09:04:36

PROJECT INFORMATION

Company: Hemmera
Client: Castle Rock Enterprises
Project: 1721-001.01
Location: Whitehorse, YT
Test Well: MW14-03
Test Date: September 4, 2014

AQUIFER DATA

Saturated Thickness: 2.442 m Anisotropy Ratio (Kz/Kr): 1.

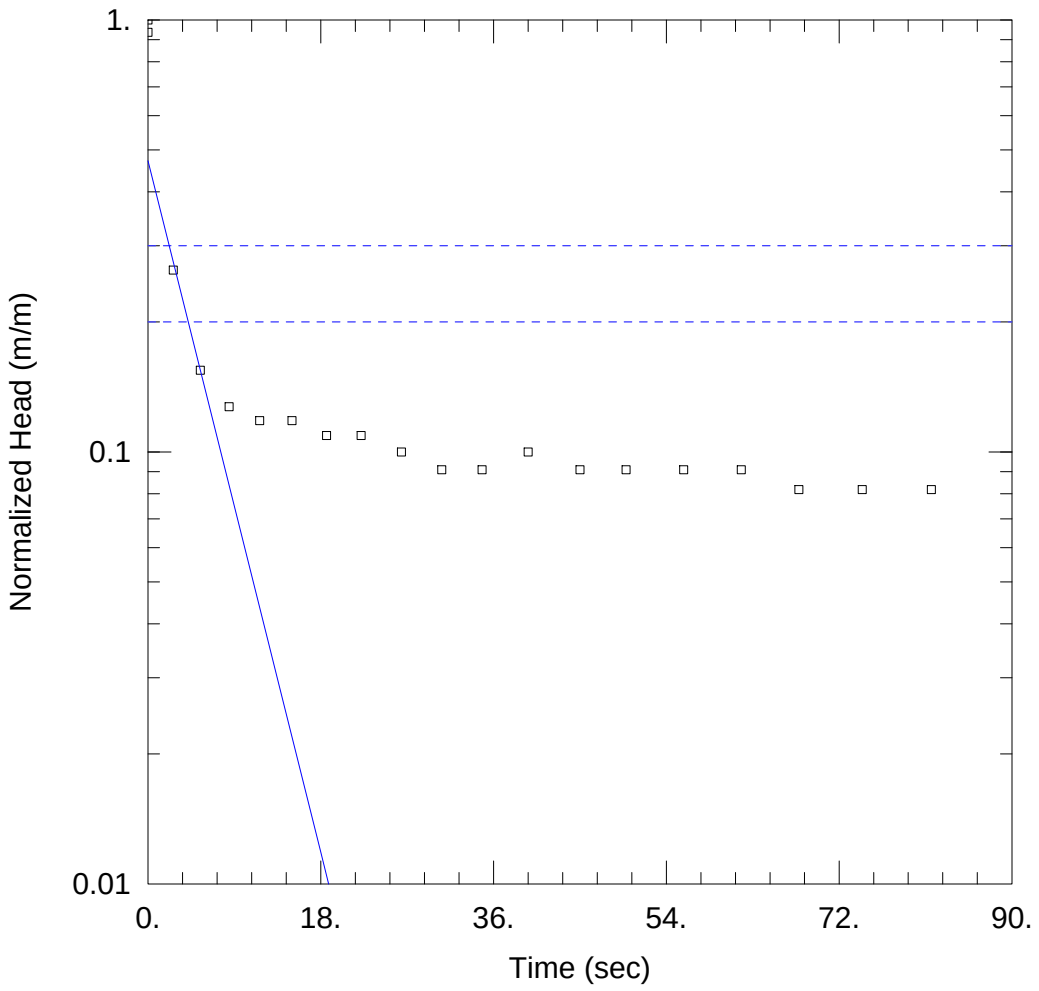
WELL DATA (MW14-03 Test 1)

Initial Displacement: 0.16 m
Total Well Penetration Depth: 0.613 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.613 m
Screen Length: 0.613 m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001215 m/sec
y0 = 0.08804 m



MW14-03 TEST 2

Data Set: Q:\...\MW14-03 Test 2.aqt
Date: 09/09/14 Time: 09:08:12

PROJECT INFORMATION

Company: Hemmera
Client: Castle Rock Enterprises
Project: 1721-001.01
Location: Whitehorse, YT
Test Well: MW14-03
Test Date: September 4, 2014

AQUIFER DATA

Saturated Thickness: 2.436 m Anisotropy Ratio (Kz/Kr): 1.

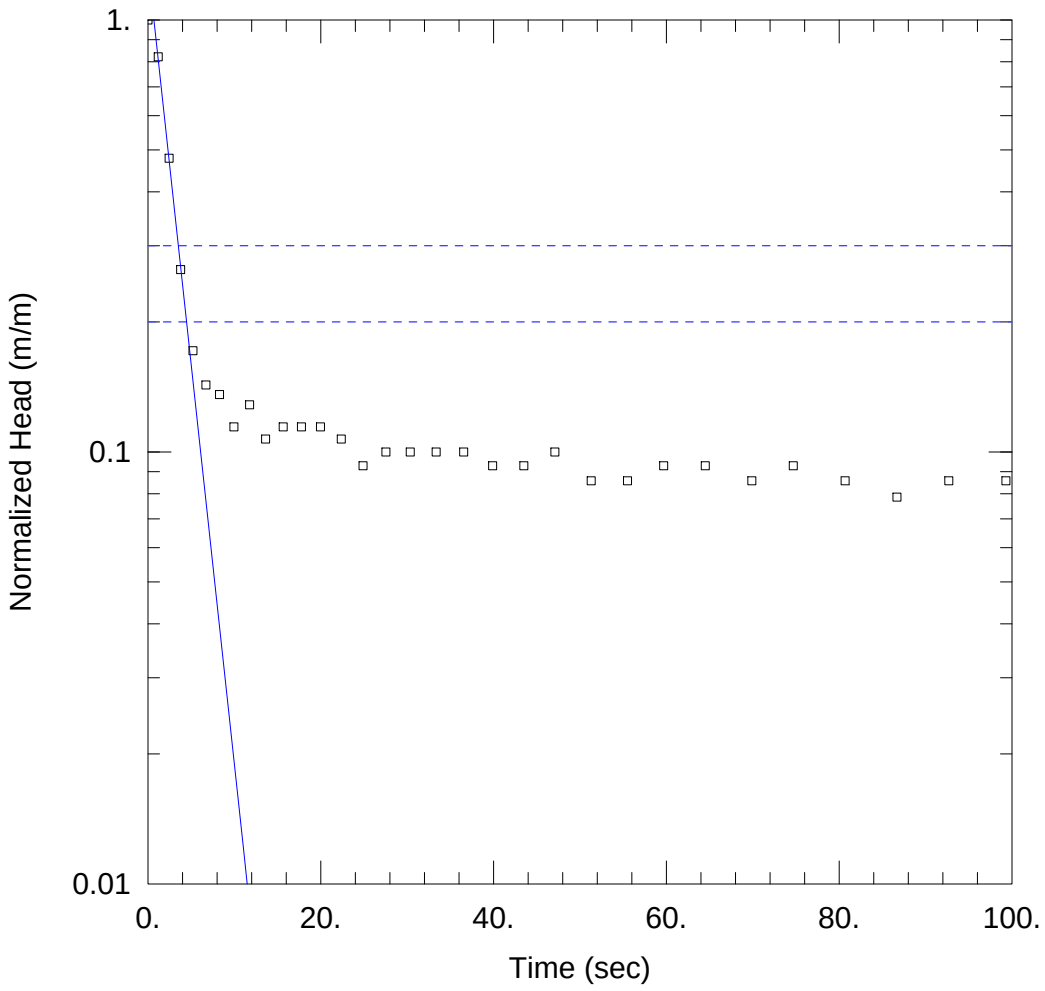
WELL DATA (MW14-03 Test 2)

Initial Displacement: 0.11 m
Total Well Penetration Depth: 0.607 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.607 m
Screen Length: 0.607 m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001263 m/sec
y0 = 0.05192 m



MW14-03 TEST 3

Data Set: Q:\...\MW14-03 Test 3.aqt
Date: 09/09/14 Time: 09:10:38

PROJECT INFORMATION

Company: Hemmera
Client: Castle Rock Enterprises
Project: 1721-001.01
Location: Whitehorse, YT
Test Well: MW14-03
Test Date: September 4, 2014

AQUIFER DATA

Saturated Thickness: 2.425 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW14-03 Test 3)

Initial Displacement: 0.14 m
Total Well Penetration Depth: 0.596 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.596 m
Screen Length: 0.596 m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0002646 m/sec
y0 = 0.1876 m

APPENDIX D
Certified Analytical Reports

HEMMERA ENVIROCHEM INC.
ATTN: Natasha Sandys
230 - 2237 2nd Avenue
Whitehorse YK Y1A 0K7

Date Received: 15-AUG-14
Report Date: 26-AUG-14 11:48 (MT)
Version: FINAL

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1503364

Project P.O. #: NOT SUBMITTED
Job Reference: 1721-001.01
C of C Numbers: 10-152811
Legal Site Desc:

Comments:

Brent Mack
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1503364-1	L1503364-2	L1503364-3	L1503364-4	
	Description	Groundwater	Groundwater	Groundwater	Groundwater	
	Sampled Date	15-AUG-14	15-AUG-14	15-AUG-14	15-AUG-14	
	Sampled Time	12:57	14:03	14:55		
	Client ID	MW14-01-A	MW14-03	MW14-04	MW14-100	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	320	265	261		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Arsenic (As)-Dissolved (mg/L)	0.0021	<0.0010	<0.0010		
	Barium (Ba)-Dissolved (mg/L)	0.046	0.044	0.031		
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Calcium (Ca)-Dissolved (mg/L)	104	94.0	92.7		
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Cobalt (Co)-Dissolved (mg/L)	0.00071	<0.00050	<0.00050		
	Copper (Cu)-Dissolved (mg/L)	<0.0010	0.0020	0.0016		
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	<0.030		
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Magnesium (Mg)-Dissolved (mg/L)	14.7	7.26	7.19		
	Manganese (Mn)-Dissolved (mg/L)	0.213	0.057	0.032		
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Molybdenum (Mo)-Dissolved (mg/L)	0.0024	0.0027	0.0028		
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Sodium (Na)-Dissolved (mg/L)	7.0	3.0	3.6		
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Uranium (U)-Dissolved (mg/L)	0.00232	0.00279	0.00209		
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030		
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050		
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050		
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050		
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050		
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050		
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050		
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1503364-1	L1503364-2	L1503364-3	L1503364-4	
	Description	Groundwater	Groundwater	Groundwater	Groundwater	
	Sampled Date	15-AUG-14	15-AUG-14	15-AUG-14	15-AUG-14	
	Sampled Time	12:57	14:03	14:55		
	Client ID	MW14-01-A	MW14-03	MW14-04	MW14-100	
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	94.0	96.0	96.9		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	97.4	97.4	97.6		
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	
	LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	
	HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10		
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	77.2	88.0	84.9		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Benzo(g,h,i)perylene (mg/L)	<0.000050	0.000075	<0.000050	<0.000050	
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Naphthalene (mg/L)	0.000147	<0.000050	<0.000050	<0.000050	
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Pyrene (mg/L)	<0.000050	0.000110	<0.000050	<0.000050	
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Surrogate: Acenaphthene d10 (%)	93.0	93.9	93.4	92.8	
	Surrogate: Acridine d9 (%)	94.6	96.0	89.6	93.1	
	Surrogate: Chrysene d12 (%)	91.8	93.3	92.4	91.2	
	Surrogate: Naphthalene d8 (%)	96.3	91.2	91.3	90.8	
	Surrogate: Phenanthrene d10 (%)	96.8	97.6	95.6	95.1	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1503364-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1503364-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1503364-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
EPH-SF-FID-VA	Water	EPH in Water by GCFID	BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Water by GC/FID", v2.1, July 1999. Whole water samples are extracted with DCM prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

PAH-SF-MS-VA	Water	PAH in Water by GCMS	EPA 3510, 8270

The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PAH-SURR-MS-VA	Water	PAH Surrogates for Waters	EPA 3510, 8270

Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	B.C. MIN. OF ENV. LAB. MAN. (2009)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA	Water	VH Surrogates for Waters	B.C. MIN. OF ENV. LAB. MAN. (2009)
VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Water	VOC7 and/or VOC Surrogates for Waters	EPA8260B, 5021
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE LABORATORY MANUAL (2005)

Reference Information

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-152811

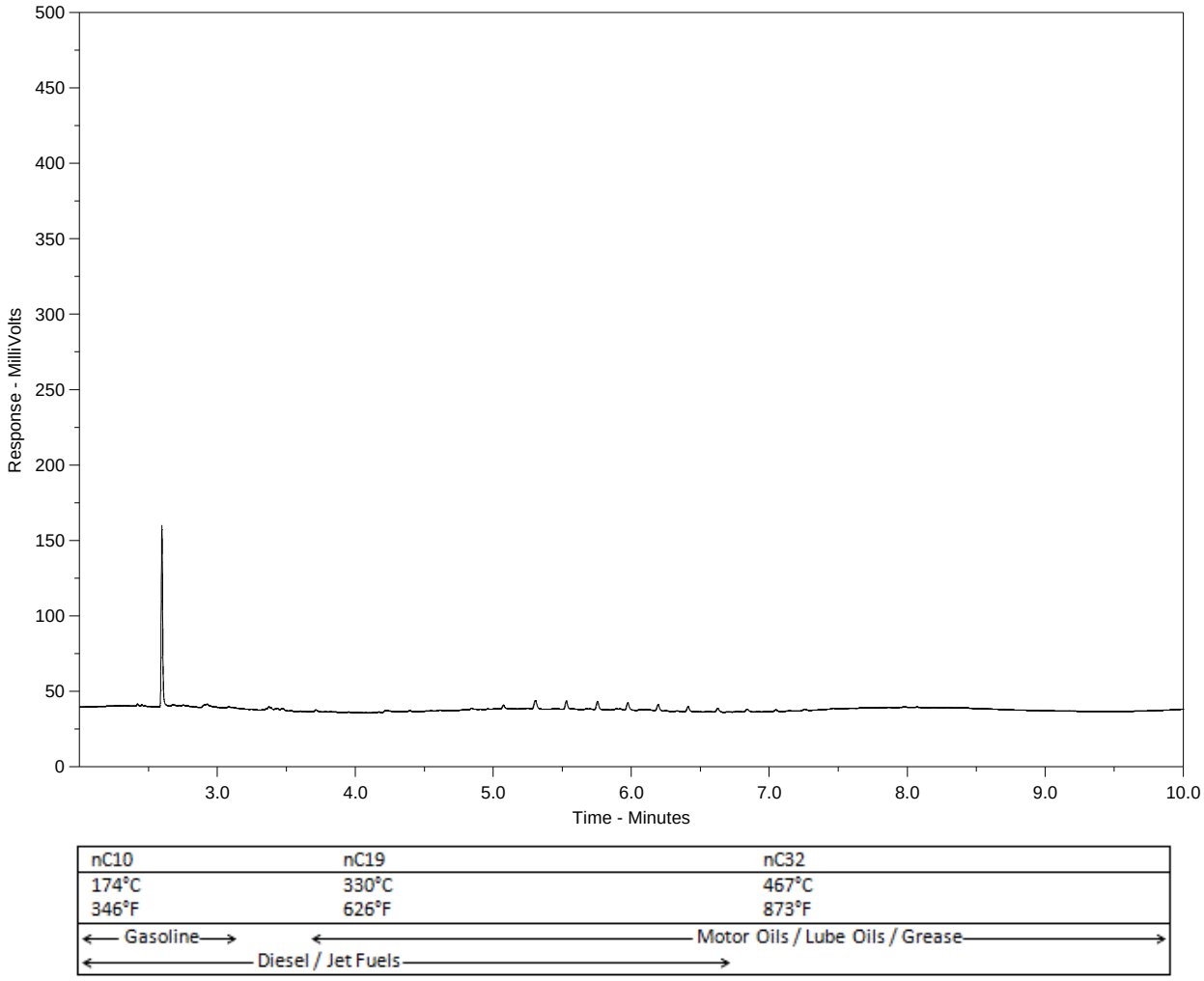
GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report

ALS Sample ID: L1503364-1
Client Sample ID: MW14-01-A



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

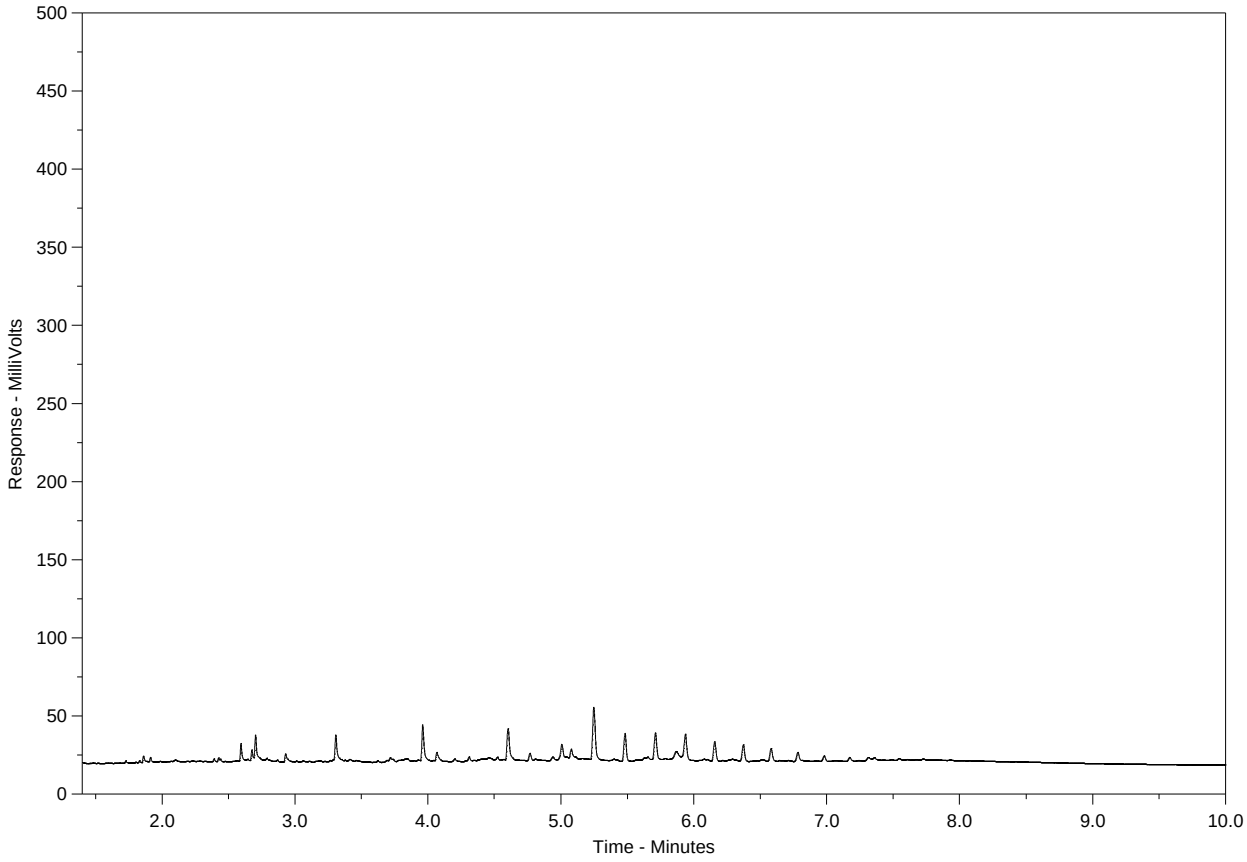
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1503364-2
Client Sample ID: MW14-03



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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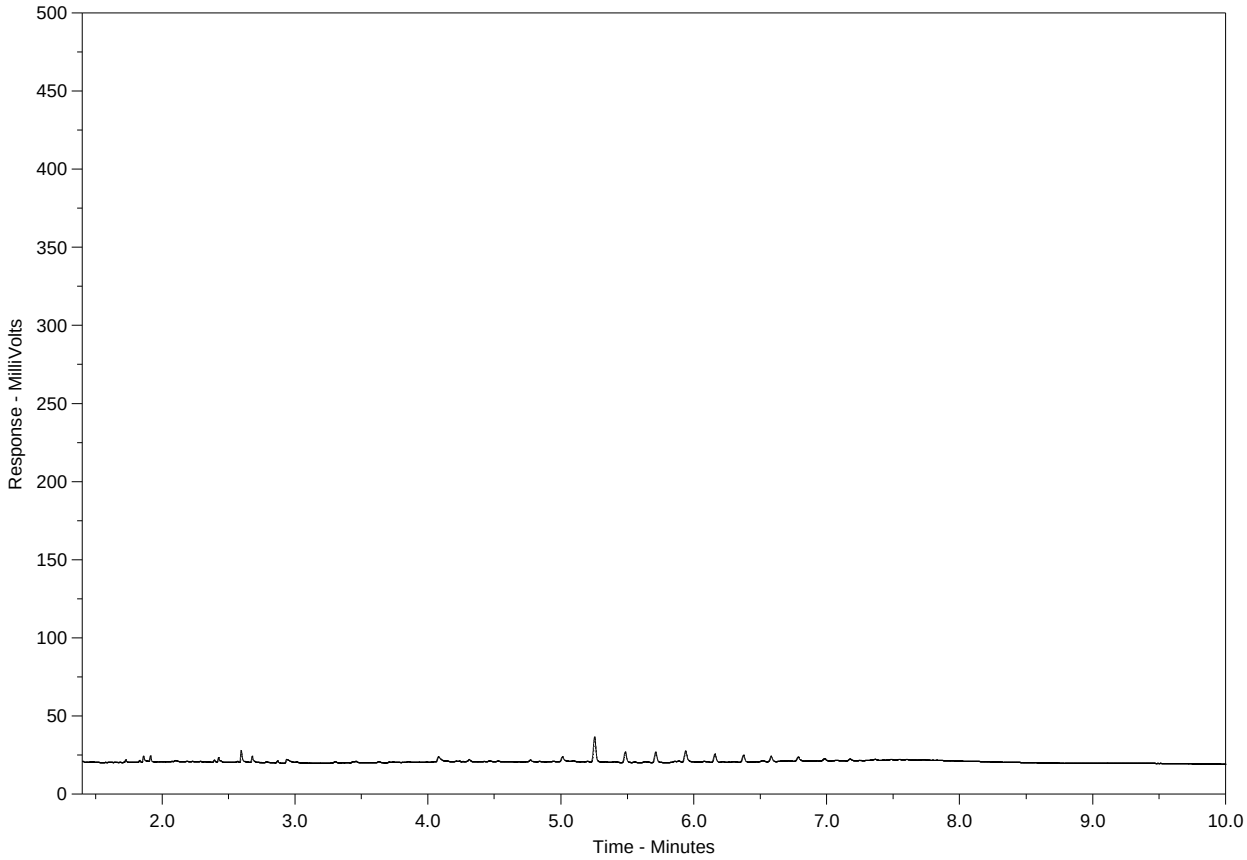
A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1503364-3
Client Sample ID: MW14-04



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

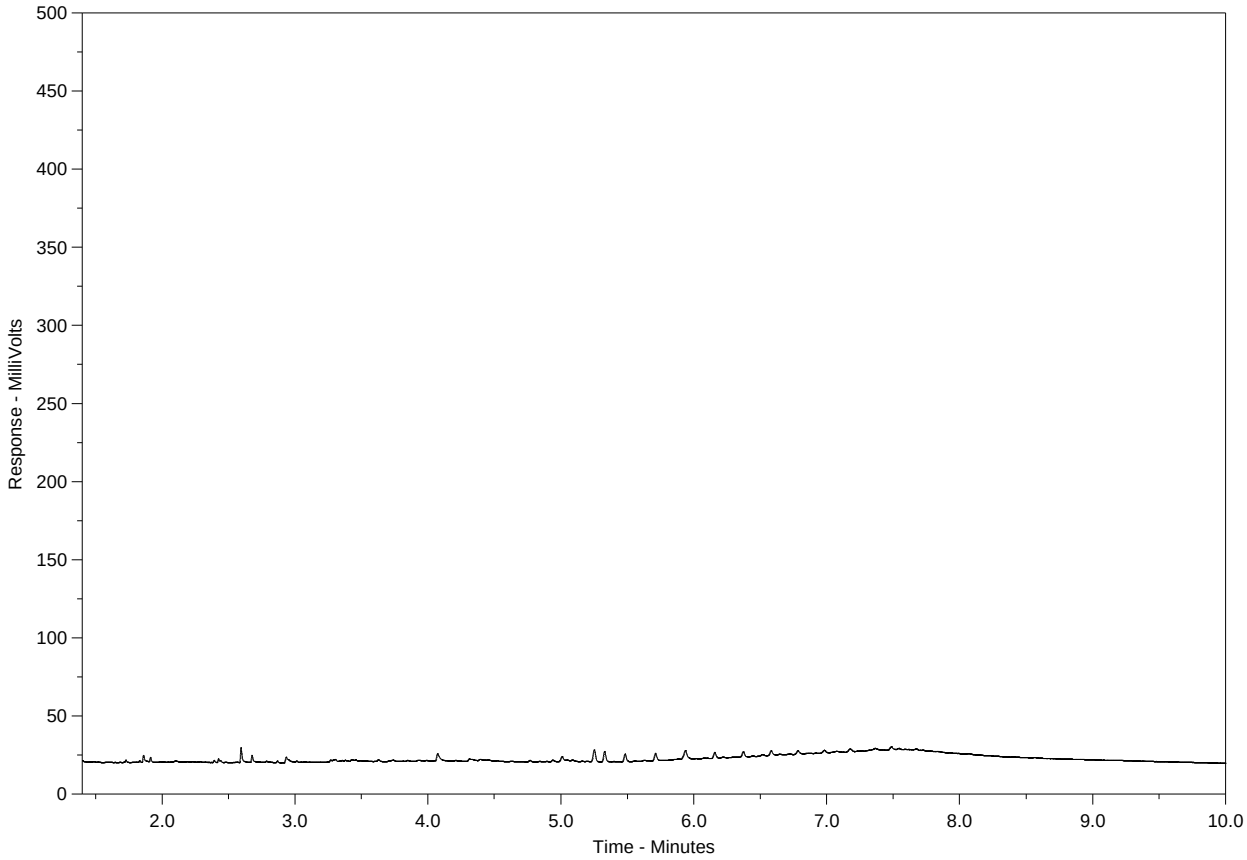
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1503364-4
Client Sample ID: MW14-100



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F

Gasoline
Diesel / Jet Fuels
Motor Oils / Lube Oils / Grease

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

10-152811

ALS Environmental

Chain of Custody / Analytical Request
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

L1503364-COFC

Page 1 of 1

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: Hemmera Envirochem	Standard: ✓ Other (specify): Hemmera Std.	✓ Regular (Standard Turnaround Times - Business Days)
Contact: Natasha Sandys	Select: PDF Excel Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: #230 - 2237 2nd Ave Whitehorse YT	Email 1: nSandys@hemmera.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone: 867 456 4865 Fax:	Email 2: abrown@hemmera.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 1721-001.01	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** B Mack **Sampler:** A Brown	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX/MTBE/VPH	LEPH/HEPH/PAH	Metals	LEPH/HEPH								Number of Containers
	MW14-01-A	15-0@8-14	12:57	GW	X	X	X									6
	MW14-03	↓	14:03	↓	X	X	X									6
	MW14-04		14:55		X	X	X									6
	MW14-100							X								2

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Yukon CSR, disregard extra bottles for MW14-100

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Natasha Sandys	Date: Aug 15/14	Time: 4:00pm	Received by:	Date: 15-AUG-14	Time: 4:00	Temperature: 9.2 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

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