YUKON ENERGY CORPORATION

PRELIMINARY GEOTHERMAL ASSESSMENT VISTA MOUNTAIN WARM SPRINGS NORTH OF WHITEHORSE, YUKON

REPORT

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1.0 INTRODUCTION

EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA) has been conducting a geothermal exploration program for Yukon Energy Corp. to assess the geothermal potential of multiple sites throughout southern and central Yukon. The objective of the project is to identify potential medium- and high-temperature geothermal resources that can be used to generate electrical power. The exploration activities have now been focused on areas within an economically reasonable distance from the existing power grid.

This report presents the results of a preliminary geothermal assessment and geological mapping in the area of the Vista Mountain Warm Spring (VMWS). The springs are located in southern Yukon about 20 km north of Whitehorse and close to the North Klondike Highway (Figures 1 and 2). The information collected will be used to enhance the understanding of the geological conditions in which the thermal springs occur and to guide further sub-surface exploration of the area.

The VMWS consist of a series of four distinct, small, low-flow springs day-lighting over a distance of about 60 m along an inferred fault.

2.0 PURPOSE AND SCOPE

Based on anecdotal information about the existence of the VMWS, EBA proposed to locate the warm springs and conduct a preliminary assessment including geological mapping in the area of the warm spring to collect structural and lithological data, and water sampling to investigate the geochemistry of the thermal water, further characterize the warm spring and refine a preliminary geothermal model. The results of this reconnaissance level geothermal study will provide an assessment of the geothermal potential of the VMWS to enable YEC to make informed decisions on potential future advanced exploration at this site.

The scope of services for this project phase included:

- Definition of a target search area based on anecdotal information about the existence of the warm springs;
- Review of available geology and other geothermal-related information for the target area;
- Air photo interpretation to identify:
  - Potential locations of the VMWS; and,
  - Potential bedrock outcrops and targets for ground reconnaissance;
- Site visit by EBA representatives Jack Dennett, P.Geo. and Stephan Klump, Ph.D. on July 11, 2012;
- Locating of the warm springs;
- Geological mapping of bedrock outcrops in the area of the VMWS (see Figure 2);
- Structural measurements at bedrock outcrops to identify dominant fracture and fault orientations;

- Sampling of thermal water;
- Hydrochemical and isotope analysis including routine chemistry, dissolved metals, stable isotopes (^{2}H and ^{18}O), and tritium (^{3}H);
- Data interpretation and creation of a preliminary geothermal model; and,
- Recommendations for advanced exploration techniques.

3.0 LOCATION AND ACCESS

Vista Mountain Warm Springs are located about 20 km north of Downtown Whitehorse and about 1 km west of the North Klondike Highway (Figures 1 and 2).

The warm spring is situated within Agricultural Disposition No. 880190 (Agriculture No. GR AGR 363; Parcel Description: “Mile 7 to 10 Mayo Road”). The warm springs are not located on First Nation Settlement Land. Figure 3 shows the land status in the area of the VMWS.

Access to the site is by foot following existing cut lines and trails. The nearest road access is the North Klondike Highway, located about 1 km to the east and Vista Mountain Road about 2.5 km to the south.

4.0 METHODS

4.1 Geological Mapping

4.1.1 Air Photo Interpretation

EBA carried out a stereoscopic air photo interpretation (API) using 1:10,000-scale air photos that were obtained from the Yukon Government, Energy, Mines and Resources Library (Table 1). Google Earth satellite imagery for the area of interest was also reviewed. The images were used to look for indications of the following:

- Topographic features that may indicate the location of the warm springs;
- Bedrock outcrop targets for ground reconnaissance;
- Fault traces and morphological lineaments that might indicate underlying geological structures or lithologic contacts;
- Gross features of bedrock lithology and erosion;
- Vegetation lineaments potentially related to underlying structural bedrock;
- Anomalous or dead vegetation areas potentially indicating warm/hot water seeps or springs (or former springs);
- Details useful for accessing and traversing the target areas;
- Areas of potential hazard from natural features; and,
- Cut lines and trails useful for accessing and traversing the target areas.

Table 1: Air Photograph Coverage of Study Area

FLIGHT LINE	AIR PHOTO Nos.	SCALE	DATE
A28117	140-144	1:10,000	August 2, 1994
A28115	11-15	1:10,000	August 2, 1994
A28472	163-165	1:10,000	August 9, 2001
A28473	003-006	1:10,000	August 9, 2001

4.1.2 Geological Ground Reconnaissance

The warm springs can be efficiently accessed by truck to a staging area on the Klondike Highway. Foot traverses proved to be a good method of access to the springs and to evaluate geology in the area.

Significant features identified during the API were marked on air photos and used in conjunction with enlarged 1:50,000 NTS topographic maps and air photographs for orientation and field navigation.

The scope of the geological reconnaissance included the following:

- Prospect targets identified by air photo interpretation to locate warm springs;
- Reconnaissance of the identified target area by foot to locate the warm springs;
- Identify and map rock staining or mineral precipitation that could be potentially related to past hydrothermal activity. This would include documenting any surface encrustation (e.g., opal or travertine); and,
- Map main rock lithologies, key geological structures and other geological features where exposed to help define the geological setting.

During the geological investigation, rock types at outcrops in the area of the thermal springs were mapped and sampled. Structural measurements such as joint, fault and bedding plane orientations were taken. Each structural measurement and observed rock type was recorded with corresponding GPS locations.

The EBA team held a tailgate-style safety meeting to discuss safety, weather and field logistics issues prior to commencing the site reconnaissance.

4.2 Water Sampling and Field Measurements

Field parameters measured during the site visits included: temperature, pH, electrical conductivity, and dissolved oxygen. The field instruments were calibrated on the day of sampling. Table 2 summarizes the field instruments used along with their resolution and accuracy.

Table 2: Summary of Field Water Chemistry Instruments

Parameter	Instrument	Resolution	Accuracy
UTM Coordinates	Garmin handheld GPS	1 m	~7 m
pH	Hanna Multimeter	0.01 pH units	0.1
EC	Hanna Multimeter	0.01 µS/cm	2% full scale
TDS	Hanna Multimeter	1 ppm	2% full scale
Temperature	Hanna Multimeter	0.1°C	0.5°C

Water samples were analyzed for hardness, alkalinity, cations and anions, dissolved metals, TDS and environmental isotopes of oxygen (oxygen-18) and hydrogen (deuterium and tritium). The major ion chemistry was included in order to classify the waters and determine their general chemical character. The metals analyses were used to support geothermometer calculations, specifically using sodium (Na), potassium (K), calcium (Ca), magnesium (Mg) and silicon (Si). Silicon was used to calculate the equivalent silica (SiO_2) concentration for use in the silica-based geothermometer formulas. The stable isotopes of water were included in order to plot them against a meteoric water line to determine if the sample waters were of meteoric origin, or were fractionated to enriched oxygen-18 values which can be an isotopic characteristic of geothermal waters. The radioactive hydrogen isotope tritium (^3H) was included to obtain information on the subsurface residence time of the water.

Water samples were collected in new, laboratory-supplied sample containers in accordance with laboratory recommended sampling procedures. Dissolved metals samples were field-filtered through a 0.45 µm filter and preserved with nitric acid (HNO_3).

Water samples were shipped on ice by air cargo to the laboratories. Inorganic water chemistry was analyzed by Exova in Surrey, British Columbia. Isotope analyses were conducted by the University of Waterloo, Environmental Isotope Laboratory in Waterloo, Ontario.

4.2.1 Geothermometer

There is a wide range of empirical chemical geothermometer formulas in the literature. One group is based on the equilibrium reached among alkali elements (sodium (Na), potassium (K) and calcium (Ca); Fournier and Truesdell, 1973). Another group is based on the solubility of various mineralogical forms of silica (SiO_2) in hot geothermal waters. Silica solubility is rate-dependent, so waters that gain silica at elevated temperatures only slowly release that silica as the waters cool (i.e., as they move upwards and discharge at the surface). For this reason, the silica content of discharging geothermal waters can be used to calculate the approximate maximum subsurface temperature at which the water acquired the silica content.

Some of the prominent formulas are presented in Table 3.

We have chosen to use the classic alkali formula no. 1 (Fournier and Truesdell, 1973) with the constant term B = 1/3 (assuming subsurface temperatures are over 100°C) and no.3 which is an updated formula using the world database of geothermal fluids.

For a silica geothermometer, we chose to use formula No. 9 (Verma and Santoyo, 1995) since this is an update of Fournier's original formula and is applicable for temperatures ranging from 20 to 210°C. These formulae fit the hydrochemical setting and temperature ranges expected for the samples collected, and provide a reasonable estimate of subsurface temperatures for purposes of this study.

In applying the silica geothermometer, we assumed that for the waters sampled in this program, silicon (Si) is always bound as silica (SiO_2). The measured silicon concentrations were then multiplied by 2.14 which is the ratio of atomic weights of Si and SiO_2. This calculated SiO_2 value was then used in the silica geothermometer formula.

Table 3: Common Geothermometer Formulas

#	Formula	Source	Comment
	Alkali-based formulas		
1	T°C = {1647/ [(log(Na/K) + B(log (sqrt(Ca)/Na) + 2.06)+2.47)]} – 273.15	Fournier and Truesdell, 1973	B = 4/3 below 100°C and 1/3 above 100°C; useable for T > 70°C, best 180–300°C
2	T°C = [1217/ (log(Na/K) + 1.483)] – 273.15	Fournier, 1981	Alkali formula using Na and K only
3	T°C = [876.3/ (log(Na/K) + 0.8775)] – 273.15	Diaz-Gonzalez and Santoyo, 2008	Updated using world database of geothermal fluids
4	T°C = [1289/ (log(Na/K) + 1.635)] – 273.15	Verma and Santoyo, 1995	Updated using an error propagation method, with Fournier's original data
	Silica-based formulas		
5	T°C = [1309/ (5.19 – logSiO_2)] – 273.15	Fournier, 1981	Silica form is quartz with no steam loss; best for T > 180°C
6	T°C = [1522/ (5.75 – logSiO_2)] – 273.15	Fournier, 1981	Silica form is quartz with steam loss from reservoir; best for T > 180°C
7	T°C = [1032/ (4.69 – logSiO_2)] – 273.15	Garcher and Arehart, 2008	Silica form is chalcedony; best for T = 180-140°C
8	T°C = [731/ (4.52 – logSiO_2)] – 273.15	Garcher and Arehart, 2008	Form is amorphous silica; best for T < 140°C
9	T°C = -44.119 +0.24469(SiO_2) – 1.7414 E-4$(SiO_2)^2$ + 79.305log(SiO_2)	Verma and Santoyo, 1995	Updated using an error propagation method, with Fournier's original data; useful for T = 20-210°C

Note: All concentrations in molality (mg/kg). For water with density ~1 kg/L, concentrations of mg/L can be used.

5.0 RESULTS

Four thermal vents were discovered at or near outcrops of limestone at the intersection of prominent geological faults. The most prominent spring was located in a small forest opening where multiple springs flowed from the ground below a shallow soil erosional headscarp created by flow from the springs. There is no pond associated with the springs. Two springs were located south of the main spring, occurring as seeps with low volume flows from the base of a shallow bluff of limestone, the footwall of a fault. There was no effervescence or odour noted at any of the thermal vents.

5.1 Field Observations and Geological Setting

Terrain in the study area is controlled by rolling to ridged bedrock. Typical slopes are gentle (15 % to 26% gradient) to moderate (27% to 49%). There is much evidence of glacial scouring in this area and the exposed rock is smooth and rounded. The rock is fluted, with low relief, elongate northwest-southeast oriented ridges separated by narrow shallow depressions.

Drainage corridors in the study area typically align with regional fault direction trends. Open or shallow bedrock dominates the terrain of the VMWS study area. Numerous small lakes with surrounding wetland and organic soil veneers overlie moraine and colluvium fills of linear depressions that follow locally continuous geology structures.

Starting about 500 m east of the warm springs, bedrock is covered by a thick plain of glaciolacustrine silts that were probably deposited during inundation by glacial Lake Champlain, the same source of sediments that mask the source of the Takhini Hot Springs.

The study area is located within the Whitehorse Trough, an elongate, northwest-trending sedimentary basin of mid- to late Triassic to Mid-Jurassic sedimentary deposits. Two dominant regional fault trends are recognized: oriented (1) north-northeast to north; and, (2) northwest. Strong fault lineaments in the VMWS study area that correlate with regional trends were mapped from air photo interpretation and verified on the ground. Most structural data collected at field stations was coincident with the regional structural trends. The warm springs are significantly located at the intersection of two prominent faults.

Two main rock units are recognized in the VMWS study area:

- Lower and Middle Jurassic Age Laberge Group Sediments (sandstone, shale, conglomerate); and,
- Upper Triassic Hancock member of the Aksala Group (including massive to thickly bedded limestone) (Figure 2).

Regional mapping shows a large anticline with a northwest-southeast oriented axis that bisects the mountainous area between VMWS and Takhini Hot Springs (Figure 4), virtually placing these two springs on opposite arms of a shared anticline.

Bedrock outcrop closest to the warm springs is massive, light grey, translucent, siliceous, fine-grained limestone, associated with the Aksala Group. A prominent, 4 m-high outcrop/bluff of fine-grained limestone, aligned with the springs, is steeply dipping to the west and extends about 450 m south of the springs (Photo 5). The outcrop has a linear north-south orientation and is interpreted as the footwall of the prominent north-south oriented fault mapped in the study area. Northeast of the warm springs, dark grey shale and translucent, light grey, fine crystalline quartzite was observed interbedded with the limestone unit.

Structural measurements recorded in the field indicate a dominant jointing direction in a north-south orientation, steeply dipping to the west. Secondary structural trends are oriented northwest-southeast, dipping southwest, and oriented northeast-southwest with sub-vertical dip.

5.2 Hydrogeochemistry

Table 4 summarizes the results of water quality field parameters collected at the VMWS.

Table 4: Field Sampling Stations

Location ID	Location Type	UTM (NAD83, Zone 8)		T†	EC†	pH	Sample	Site Description
		Easting	Northing	(°C)	(µS/cm)	(-)		
SK-1	Shallow Pond	489706	6753335	8.1	-	-	No	Shallow pond between two small lakes; likely not related to any thermal springs.
SK-2	Spring	489742	6753386	10.5	587	9.83	No	Spring on base of limestone outcrop; flow: ~1 L/min; white algea Photo 1
SK-3	Spring	489749	6753401	11.1	658	10.06	Yes	Spring on base of limestone outcrop; similar to SK-2 (~15 m south); gas bubbles; slight H_2S odour. Photo 2
SK-4	Spring	489760	6753434	13.7	595	10.07	Yes	Two distinct springs; flow: ~1-2 L/min. Photos 3 and 4

† T – water temperature, EC – electrical conductivity

5.2.1 Inorganic Chemistry

Table 5 presents a summary of the chemistry and isotope analytical results. The laboratory reports and certificates are included as Appendix B. The ion balances were reported as 100% and 102% for samples SK-3 and SK-4, respectively. The ion balance for both samples indicate that analytical results were generally within acceptable limits, all major cations and anions were included in the analyses and that there can be a general degree of confidence in the accuracy of the results.

A comparison of groundwater chemistry for major ions for each sample is displayed in the Piper Plot presented in Figure 5. The water samples can be classified based on their major ion chemical composition, taking into account all major anions and cations exceeding 10 meq-%. The hydrochemical facies is determined by listing the ions with concentrations greater than 10 meq-% in decreasing order (cations are listed first).

The results for both samples SK-3 and SK-4 are very similar and can be characterized as sodium-sulfate ($Na-SO_4$) type water.

5.2.2 Stable Isotopes

Figure 6 presents the results of the oxygen-18 and deuterium stable isotope analyses along with the Global (GMWL) and Local (LMWL) Meteoric Water Lines. The results are expressed in per mil units (parts per thousand) relative to Standard Mean Ocean Water (SMOW). The sample plots close to the LMWL for Whitehorse.

5.2.3 Radioactive Isotopes

The tritium concentration in sample SK-4 collected from the warm spring showed a tritium concentration below the detection limit of 0.8 TU.

6.0 ANALYSIS AND DISCUSSION

6.1 Conceptual Geological Model

Of the three categories of thermal springs identified in western Canada (Gabrielse 1992), Class I (springs associated with deep flow systems in layered carbonate rock) is the most likely category in which to place the VMWS. There is no evidence to suggest that suggest that the Vista occurrence is directly associated with fractures in granite, metamorphic or young volcanic rocks.

Bedrock exposure in the study area is good and the association of the warm springs with a fault in limestone is quite definitive. The geological environment suggests a strong correlation with the known hot springs model attributed to essentially all Cordilleran hot springs.

In southern BC, Eocene Epoch (56 to 40 m.y. BP) or later brittle fault systems provide a high-permeability flow path that allows for deep circulation of meteoric water. Circulation depth, and thus temperature, is largely influenced by fault plane geometry. Studies in southern BC associate most of the thermal springs to major regional fault systems (Gabrielse 1992). The north-south oriented fault at the VMWS may either directly correlate with a major regional fault, or be a splay fault that joins a regional fault at depth. Additional heat sources, such as magma, are not essential for the development of a geothermal system in the Cordillera, as the normal geothermal gradients are sufficient.

The origin of the VMWS is most likely similar to the Cordilleran hot springs model, which suggests a deep flow system. Extensive Quaternary sediment cover has precluded the mapping of large regional faults associated with the Takhini and Yukon River valleys near the study area. However, it is probable that the source of the Vista Warm Springs is related to a major fault system.

A conceptual model to illustrate the probable structure and hydrogeology of a deep flow system that could characterize the VWS mechanism is included (Figure 7). Surface water percolates downward through a vertical fault zone of rock fractured from crustal deformation processes (faulting and folding). At sufficient depth, cold groundwater originating from higher elevation surface sources is heated when it comes in contact with warm rocks next to a near surface magma. With the appropriate conditions, hot water is piped to the surface through a fault zone where mineral precipitates deposited by thermal fluids have sealed fractures to restrict lateral flow. If the plumbing system is consistently sealed and the system inflow pressure is suitable, heated water will reach the surface.

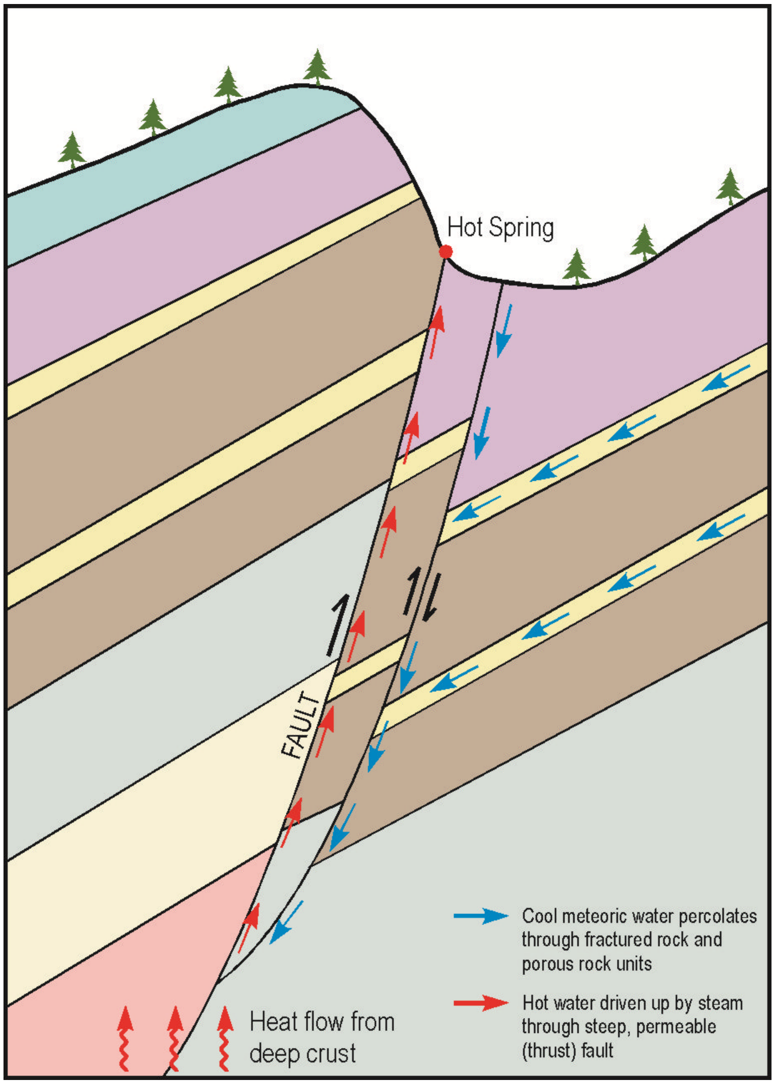

Figure 7: Thermal Springs Conceptual Geology Cross-Section

6.2 Hydrogeochemistry

6.2.1 Inorganic Chemistry

The low mineralization and only moderately high chloride concentration suggest that dilute meteoric water is infiltrating, heating up, and discharging at the warm spring without long residence time to acquire a stronger ionic content (including chloride). This, along with the stable isotopes plotting close to the LMWL, suggests that source waters are local, probably derived from local recharge at adjacent mountain slopes and ridges.

The very high fluoride concentration of about 10 mg/L in both samples from the warm springs is typical of water in contact with granitoid rocks which typically contain minerals that are rich in fluorine (e.g., derived from fluorite, apatite, and micas).

6.2.2 Stable Isotopes

The fact that the stable isotope results of all samples collected plot close to the LMWL indicates that the spring water is of local meteoric origin (Figure 6). Stable isotopic fractionation which can be typical for high-temperature geothermal waters with high residence times was not observed.

6.2.3 Radioactive Isotopes

A tritium concentration below detection limit in the sample collected from the warm spring at SK-4 indicates that the residence time of the water is greater than about 50 years. This is in agreement with the conceptual model of deep circulating groundwater that is being heated at depth and then ascends fast enough to retain the temperature observed at surface. The low tritium concentrations of < 0.8 TU also suggest that there is little if any mixing of the thermal water with shallow, cold groundwater.

6.2.4 Geothermometry

EBA used geothermometer methods to estimate subsurface geothermal reservoir temperatures as described in Section 4.2.1. Table 6 summarizes the temperatures estimated for the different samples collected. The temperature obtained from the Na-K-Ca geothermometer (Fournier and Truesdell, 1973) strongly depends on the chosen parameter B = 1/3 for temperatures > 100°C or B = 4/3 for temperatures < 100°C. As mentioned above, EBA used B = 1/3 assuming that the maximum reservoir temperature is > 100°C which is in agreement with the temperature estimates using the silica geothermometer. The alkali geothermometer is usually less affected by mixing and dilution than the silica-based geothermometer because it uses concentration ratios rather than absolute concentrations. However, this is only true if the majority of the alkali elements originate from the thermal water component. Because tritium concentrations below detection limit suggest little mixing with shallow groundwater, it can be assumed that the geothermometer results are probably not significantly affected by mixing and dilution.

The subsurface temperatures estimated using the Na-K-Ca, Na-K, and SiO_2 geothermometer methods are fairly consistent at about 105°C to 110°C.

It is important to note that the geothermometers do not provide any information on the depth and location of these temperature conditions.

Table 6: Geothermometer Results for Vista Mountain Warm Springs

Sample	Na-K-Ca	Na-K	SiO_2
	°C		
SK-3	108	104	110

SK-4	108	105	110
Mean Temperature	**108**	**104**	**110**
Reference:	Fournier & Truesdell, 1973	Fournier, 1981	Verma & Santoyo, 1995

7.0 GEOTHERMAL SPRINGS IN THE WHITEHORSE AREA

Four thermal springs have been investigated in the Whitehorse area (Figure 4):

- Takhini Hot Springs
- Vista Mountain Warm Springs
- Versluce Warm Spring
- Stinky Lake Warm Spring

Versluce and Stinky Lake springs are located 1.4 km apart and appear to share the same geological structure. Takhini and Vista Mountain springs are located about 10 km apart and 18 km from Versluce and Stinky Lake springs. All four springs occur in the same mapped geological unit (Upper Triassic Aksala Group sediments) and are located on a geological fault in limestone (Figure 4).

As a result of the investigations at these four sites we can conclude that the lithology and structure of the Upper Triassic Aksala Group sediments provides a suitable environment for the development of a deep groundwater flow system that delivers geothermal water to the earth's surface (Figure 4). Further geological and geophysical sub-surface data is required to expand on these conclusions.

Even though the thermal springs in the Whitehorse area occur in similar geological settings, the chemical composition of the thermal water is significantly different as indicated by the Piper Plot (Figure 5).

The samples collected from Stinky Lake and Versluce Warm Springs showed a similar chemical composition that is quite typical for shallow groundwater (calcium-magnesium-bicarbonate type water; EBA, 2009) and distinctively different from the other thermal springs in the Whitehorse area. In contrast to the Takhini Hot Springs and Vista Mountain Warm Springs, Stinky Lake and Versluce spring samples did not contain elevated fluoride concentrations typical for groundwater originating from granitic rocks.

The anion composition of the Takhini Hot Springs and VMWS samples were similar with sulfate being the dominating anion. However, calcium was found to be the dominant cation in Takhini Hot Springs water whereas the VMWS are sodium dominated. Another significant difference is the mineralization of the water which is very high for the Takhini Hot Springs (TDS >2,000 mg/L) but relatively low in the VMWS (TDS ~380 mg/L). Fluoride concentrations are elevated in both Takhini Hot Springs (~3 mg/L) and VMWS (~10 mg/L) suggesting a granitic origin of the fluids.

Table 7 summarizes the geothermometer results for the thermal springs in the Whitehorse area.

Table 7: Summary of Geothermometer Results for Thermal Springs in the Whitehorse Area.

Thermal Spring	Surface Water Temperature (°C)	Average Geothermometer Temperature (°C)
Vista Mountain Warm Springs	14	110
Takhini Hot Springs	47	96
Stinky Lake Warm Springs	19	85
Versluce Warm Springs	13	54

8.0 SUMMARY AND CONCLUSIONS

The geological and geochemical characterization of Vista Warm Springs is the first known study of these springs and is a valuable addition to the general understanding of geothermal potential in the Whitehorse area. The following conclusions result from this study:

- The VMWS consist of four main thermal vents with a maximum water temperature at surface of about 14°C.
- The springs appear to be located at a prominent fault in limestone, which is associated with the Hancock member of the Upper Triassic Aksala Formation (Figure 2).
- Vista Warm Springs are located on the northeast arm of a regional-scale fold that bisects the mountainous area separating VWS from the Takhini Hot Springs, which are located in similar geological units on the southwest influences of this regional fold.
- Jointing orientations and the trend of outcrops near the springs are consistent with the two dominant regional faulting directions: steeply dipping, north-south trends and moderately to steeply dipping with a northwest-southeast orientation.
- The water chemistry of the VMWS is also typical for waters associated with granitic rocks, especially the very high fluoride concentrations suggests an origin of the water in rocks such as granitoids that are rich in F-containing minerals (e.g., fluorite, apatite and micas). The mineralization is low and does not indicate a long subsurface residence time of the water.
- Stable isotopes indicate local meteoric origin of the thermal water and lack of detectable tritium indicates a residence time of more than 50 years and little to no mixing with shallow, cold groundwater.
- Geothermometer methods consistently indicate maximum subsurface temperatures in the range of about 105-110°C.
- Both mid-Cretaceous and early Tertiary granitoid intrusions are mapped in relative proximity to the springs and suggest that a granitic pluton is a possible heat source for the thermal water. The mid-Cretaceous to early Tertiary age of the intrusions likely rules out that remnant heat is still available; however, heat produced by radioactive decay of uranium, thorium, and potassium radioisotopes, which are often present at elevated concentrations in granitic rocks, could result in a local geothermal

anomaly and the occurrence of thermal springs such as the Takhini Hot Springs and the Vista Mountain, Stinky Lake, and Versluce Warm Springs.

- The low temperature of the thermal water at surface could be the result of sub-surface dilution by local groundwater;
- Based on the results of this preliminary geothermal assessment of the VMWS, the area is a favourable target for continued geothermal exploration in the Yukon.

9.0 RECOMMENDATIONS

Based on this preliminary geothermal assessment of the Vista Mountain Warm Springs area, EBA makes the following recommendations for further geothermal exploration of the site:

- Further evaluation of the geothermal potential at Vista Warm Springs is warranted. Both surface and downhole geophysical surveys are recommended in association with drilling to determine geothermal gradient and subsurface geology;
- A surface geophysical survey should be conducted to verify and characterize potential geological structures controlling the occurrence of the VMWS;
- The initial geological and geophysical information would be used to guide a geotechnical program to drill at least two boreholes to a depth of several hundred metres to determine the local geothermal gradient;
- Subsurface temperature surveys should also be conducted in deep drinking water wells in the area of the VMWS. Given the relatively large number of residences in the area along the North Klondike Highway between the intersection with the Alaska Highway and the southern end of Lake Laberge it is likely that deep water wells exist in the area that could be accessed to measure subsurface temperatures and infer the local geothermal gradient; and,
- Prior to further investment in exploration, and in the absence of other regulatory mechanisms to reserve areas for geothermal resource exploration, staking of mineral claims to cover the structural anomaly associated with the warm spring is recommended if permitted based on the current land status of the area.

10.0 CLOSURE

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

Sincerely,
EBA Engineering Consultants Ltd.

Prepared by:

ISSUED FOR REVIEW

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Hydrogeologist, Team Lead
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TABLES

Table 1	Air Photograph Coverage of Study Area (page 3 of report)
Table 2	Summary of Field Water Chemistry Instruments (page 4 of report)
Table 3	Common Geothermometer Formulas (page 5 of report)
Table 4	Field Sampling Stations (page 7 of report)
Table 5	Results of Chemical and Isotope Analyses
Table 6	Geothermometer Results for Vista Mountain Warm Springs (page 11 of report)
Table 7	Summary of Geothermometer Results for Thermal Springs in the Whitehorse Area (page 12 of report)

TABLE 5: RESULTS OF CHEMICAL AND ISOTOPE ANALYSES

Analyte		Units	Sample Name	SK-3	SK-4
			Lab ID	881748-1	881748-2
			Sample Date	11-Jul-12	11-Jul-12
			Sample Location	Vista Mtn	Vista Mtn
			Easting (UTM, Nad83)	489749 E	489760 E
			Northing (UTM, Nad83)	6753401 N	6753434 N
			Matrix	Water	Water
			Detection Limit	Results	
Ion Balance		%	-	100	102
Water type		-	-	Na-SO4	Na-SO4
Field Parameters					
Temperature	T	oC	-	11.1	13.7
pH		pH units	-	10.06	10.07
Electrical Conductivity	EC	µS/cm at 25°C	-	658	595
Physical Parameters					
pH		pH units	-	9.26	9.32
Electrical Conductivity	EC	µS/cm at 25°C	1	619	624
Total Dissolved Solids		mg/L	1	387	381
Hardness (as $CaCO_3$)		mg/L	-	14	14
Dissolved Major Ions					
Calcium	Ca		0.2	5.7	5.8
Magnesium	Mg		0.2	<0.2	<0.2
Sodium	Na		0.4	128	126
Potassium	K		0.4	2.3	2.3
Chloride	Cl		0.4	35.8	34.8
Fluoride	F		0.05	10.0	9.85
Nitrate - N	NO_3		0.01	<0.01	<0.01
Nitrite - N	NO2	mg/L	0.005	<0.005	<0.005
Nitrate and Nitrite - N			0.01	<0.01	<0.01
Sulfate (SO4)	SO_4		0.9	185	185
Hydroxide	OH		5	<5	<5
Carbonate	CO_3		6	21	20
Bicarbonate	HCO_3		5	18	12
P-Alkalinity	$CaCO_3$		5	17	17
T-Alkalinity	$CaCO_3$		5	50	44
Metals - Dissolved					
Aluminum	Al		0.002	0.002	0.002
Antimony	Sb		0.0004	0.0004	0.0002
Arsenic	As		0.0002	<0.0002	0.0002
Barium	Ba		0.001	0.005	0.004
Beryllium	Be		0.0001	<0.0001	<0.0001
Bismuth	Bi		0.0005	0.0005	0.0005
Boron	B		0.002	0.567	0.599
Cadmium	Cd		0.00001	0.00001	<0.00001
Chromium	Cr		0.0005	<0.0005	<0.0005
Cobalt	Co		0.0001	<0.0001	<0.0001
Copper	Cu		0.001	<0.001	<0.001
Iron	Fe		0.01	<0.01	<0.01
Lead	Pb		0.0001	<0.0001	<0.0001
Lithium	Li		0.001	0.124	0.131
Manganese	Mn	mg/L	0.005	<0.005	<0.005
Mercury	Hg		0.0001	<0.0001	<0.0001
Molybdenum	Mo		0.001	0.037	0.039
Nickel	Ni		0.0005	<0.0005	<0.0005
Selenium	Se		0.0002	<0.0002	<0.0002
Silicon	Si		0.05	27.3	27.3
Silver	Ag		0.00001	<0.00001	<0.00001
Strontium	Sr		0.001	0.525	0.530
Sulfur	S		0.3	61.7	61.6
Thallium	Tl		0.00005	<0.00005	<0.00005
Tin	Sn		0.001	<0.001	<0.001
Titanium	Ti		0.0005	0.0023	0.0024
Uranium	U		0.0005	<0.0005	<0.0005
Vanadium	V		0.0001	0.0001	0.0001
Zinc	Zn		0.001	0.002	0.002
Environmental Isotopes					
Oxygen-18[1]	$d^{18}O$	‰	-	-	-22.42
Deuterium[1]	$d^{2}H$	‰	-	-	-177.25
Tritium	3H	TU[2]	0.8	-	<0.8±0.3

Notes:

"<" indicates less than the laboratory detection limit

[1] Stable isotope ratios are measured relative to the VSMOW (Vienna Standard Mean Ocean Water):

d18O = ((18O/16O)_sample/(18O/16O)_reference))*1000‰VSMOW; d2H = ((2H/1H)_sample/(2H/1H)_reference))*1000‰VSMOW

[2] TU - Tritium Units (1TU = 0.11919 Becquerels/L per IAEA, 2000 Report; 1TU equals 1 ^{3}H atom in 10^{18} ^{1}H atoms)

FIGURES

Figure 1 Site Location Map
Figure 2 Site Geology and Goggle Earth Imagery
Figure 3 Land Status
Figure 4 Regional Geology
Figure 5 Piper Plot
Figure 6 Stable Isotopes Plot
Figure 7 Conceptual Thermal Springs Geology Cross-Section (page 9 of report)

Q:\Vancouver\GIS\ENVIRONMENTAL\W231\W23101579_YukonGeothermal\Maps\004\W23101579_004_Map008_SiteLocation.mxd modified 7/18/2012 by stephanie.leusink

LEGEND

- ★ Site Location
- ● Populated Place
- Road
- Waterbody
- Political Boundary

PRELIMINARY GEOTHERMAL ASSESSMENT VISTA MOUNTAIN WARM SPRING WHITEHORSE, YUKON

Site Location

PROJECTION	DATUM	CLIENT
Albers	NAD83	Yukon Energy Corp.

Scale: 1:6,000,000

100 50 0 100

Kilometres

FILE NO.
W23101579_004_Map008_SiteLocation.mxd

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PROJECT NO.	DWN	CKD	APVD	REV
W23101579.004	SL	MEZ	SK	0

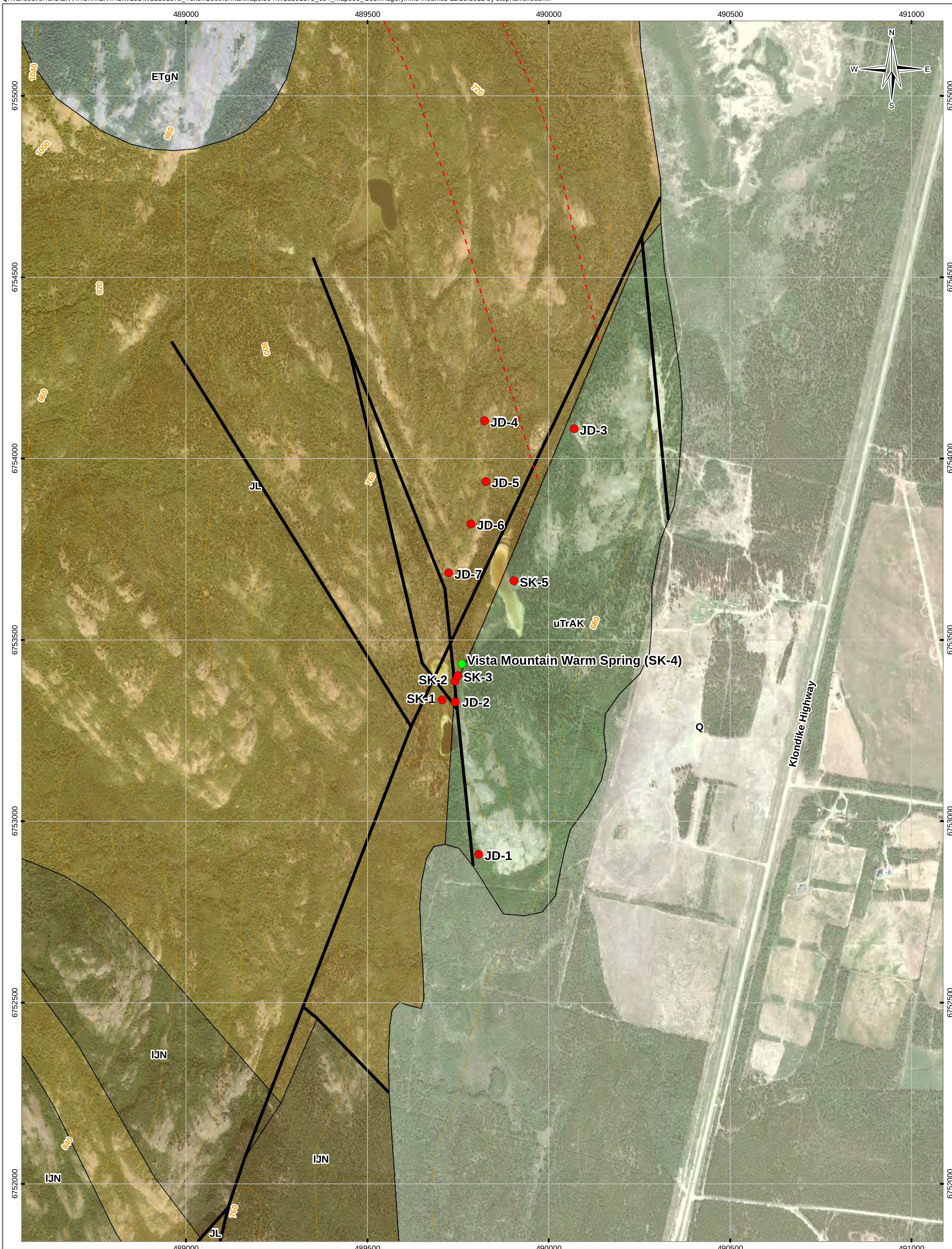
OFFICE	DATE
EBA-VANC	July 18, 2012

Figure 1

NOTES
Base data source: ESRI Data and Maps; Government of Yukon

STATUS
ISSUED FOR REVIEW

Q:\Vancouver\GIS\ENVIRONMENTAL\W231\W23101579_YukonGeothermal\Maps\004\W23101579_004_Map005_GeolImagery.mxd modified 12/20/2012 by stephanie.leusink



LEGEND

- Vista Mountain Warm Spring
- Field Station
- Fold
- Fault
- Contour (40 m)

Site Geology

Quaternary

Q (silt/sand/gravel

Early Tertiary

ETgN (granodiorite/quartz monzonite/ quartz diorite/diorite/porphyry)

Jurassic

JL (shale/sandstone/conglomerate)

IJN (sandstone/conglomerate/dacite/tuff)

Upper Triassic

uTrAK (limestone/dolostone/shale/ sandstone/conglomerate)

NOTES

Base data source: CanVec 1:50,000 (Sheet 105D14); Yukon Geomatics; Google Earth Pro (July 2010). Geology and fault lines modified by EBA.

STATUS

ISSUED FOR REVIEW

PRELIMINARY GEOTHERMAL ASSESSMENT VISTA MOUNTAIN WARM SPRING WHITEHORSE, YUKON

Site Geology and Google Earth Imagery

PROJECTION	DATUM	CLIENT
UTM Zone 8	NAD83	Yukon Energy Corp.

Scale: 1:10,000

200 100 0 200

Metres

FILE NO.				
W23101579_004_Map005_GeolImagery.mxd				
PROJECT NO.	**DWN**	**CKD**	**APVD**	**REV**
W23101579.004	SL	MEZ	SK	0
OFFICE	**DATE**			
EBA-VANC	December 20, 2012			

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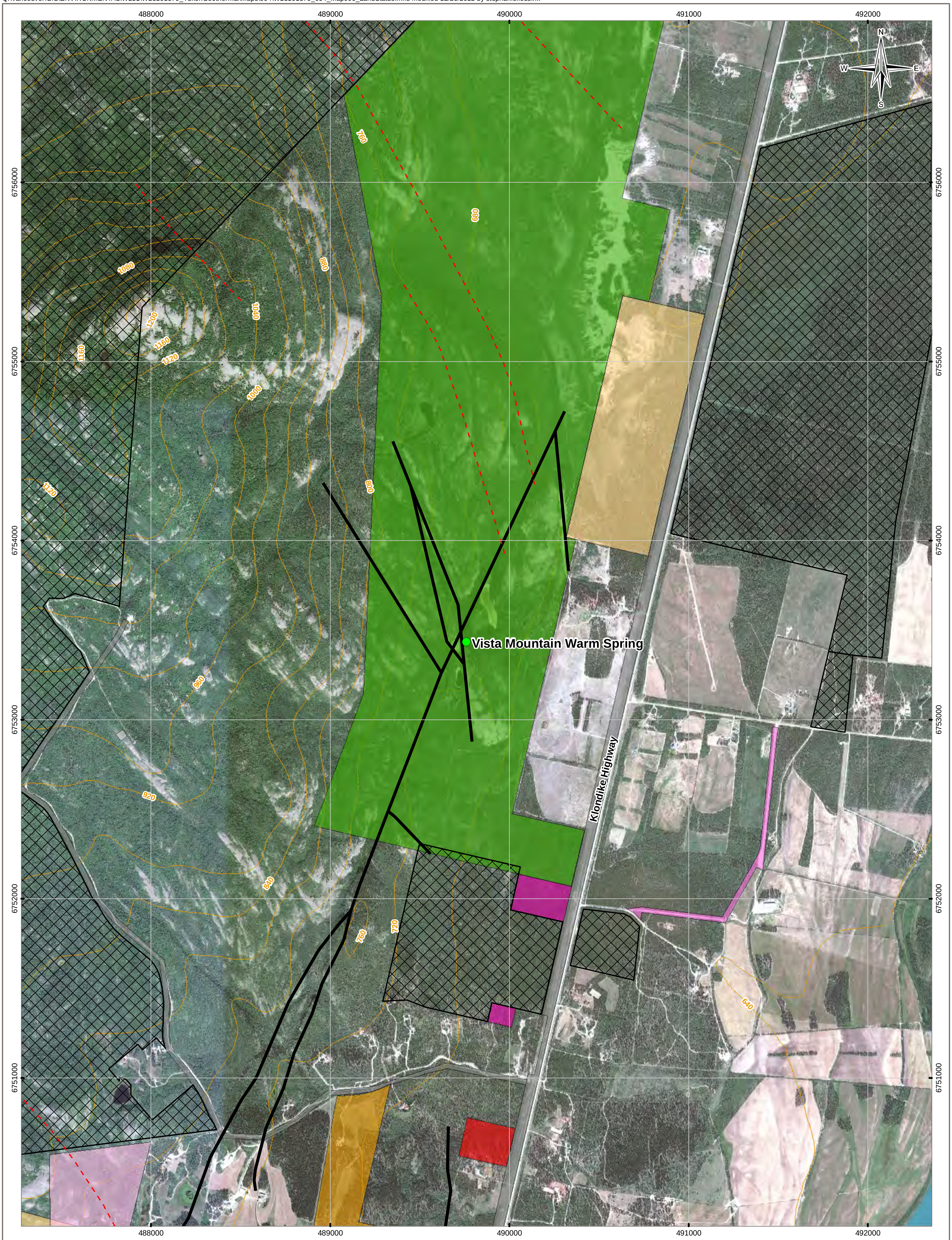
Figure 3



LEGEND

- Vista Mountain Warm Spring
- Fold
- Fault
- Contour (40 m)

Land Disposition

- Residential
- Utility Easement
- Utility Lease
- Reservation - Land Claims
- Reservation - Roadway
- Reservation - Rural Residential
- First Nations Settlement Lands
- Agricultural Application
- Agricultural Disposition
- Grazing Disposition

NOTES
Base data source: CanVec 1:50,000 (Sheet 105D14); Yukon Geomatics; Google Earth Pro (July 2010).
Fault lines modified by EBA.

STATUS
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PRELIMINARY GEOTHERMAL ASSESSMENT
VISTA MOUNTAIN WARM SPRING
WHITEHORSE, YUKON

Land Status

PROJECTION	DATUM	CLIENT
UTM Zone 8	NAD83	Yukon Energy Corp.

Scale: 1:20,000
400 200 0 400
Metres

FILE NO.
W23101579_004_Map006_LandStatus.mxd

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PROJECT NO.	DWN	CKD	APVD	REV
W23101579.004	SL	MEZ	SK	0

OFFICE	DATE
EBA-VANC	December 20, 2012

Figure 7


Vista Mountain Warm Spring
Takhini Hot Springs
Versluce Warm Spring
Stinky Lake Warm Spring
PORTER CREEK
Klondike Highway
Alaska Highway
Yukon River
Takhini River
LEGEND
Vista Mountain Warm Spring
Other Hot/Warm Spring
Fold
Fault
Road
Contour (40 m)
Watercourse
Waterbody
Wetland
Bedrock Geology
Quaternary
Q (silt/sand/gravel)
Lower Eocene
lES1 (rhyolite/andesite/flows/breccia/tuffs/conglomerate/domes/plugs/laccoliths)
Early Tertiary
ETgN (granodiorite/quartz monzonite/quartz diorite/diorite/porphyry)
ETqN (granite/alaskite/quartz monzonite/granodiorite)
Mid-Cretaceous
mKW (quartz monzonite/granite/monzonite/syenite/granodiorite/quartz diorite)
mKdW (quartz diorite/diorite)
mKgW (granodiorite/quartz diorite)
mKqW (quartz monzonite/granite/monzonite/syenite)
Jurassic
EJgA (granodiorite/diorite/monzodiorite)
JL (shale/sandstone/conglo)
lJN (sandstone/conglo/dacite/tuff)
Upper Triassic
uTrP (argillite/sandstone/basalt/flows/breccia/tuff/schist/amphibolite/gneiss)
uTrAK1 (shale/conglo/limestone)
uTrAK2 (conglo/limestone/dolostone)
uTrAK3 (shale/sandstone/conglo)
Mesozoic
Mg (diorite/quartz monzonite/monzonite)
NOTES
Base data source: Yukon Geomatics; CanVec 1:50,000 (Sheets 105D10, 105D11, 105D14 and 105D15).
STATUS
ISSUED FOR REVIEW
PRELIMINARY GEOTHERMAL ASSESSMENT
VISTA MOUNTAIN WARM SPRING
WHITEHORSE, YUKON
Overview Bedrock Geology
PROJECTION
UTM Zone 8
DATUM
NAD83
CLIENT
Yukon Energy Corp.
Scale: 1:40,000
Kilometres
FILE NO.
W23101579_004_Map007_GeolVersluce.mxd
PROJECT NO.
W23101579.004
DWN SL
CKD MEZ
APVD SK
REV 0
OFFICE
EBA-VANC
DATE
July 18, 2012
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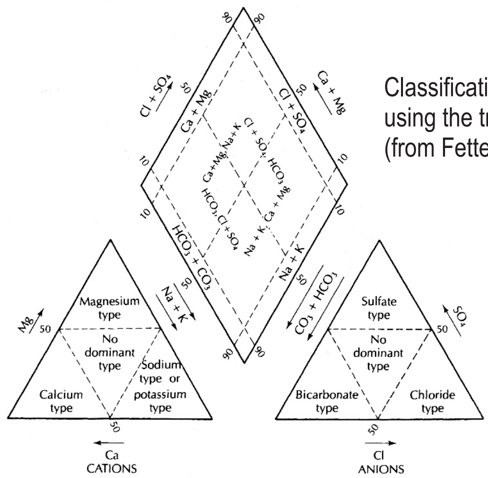
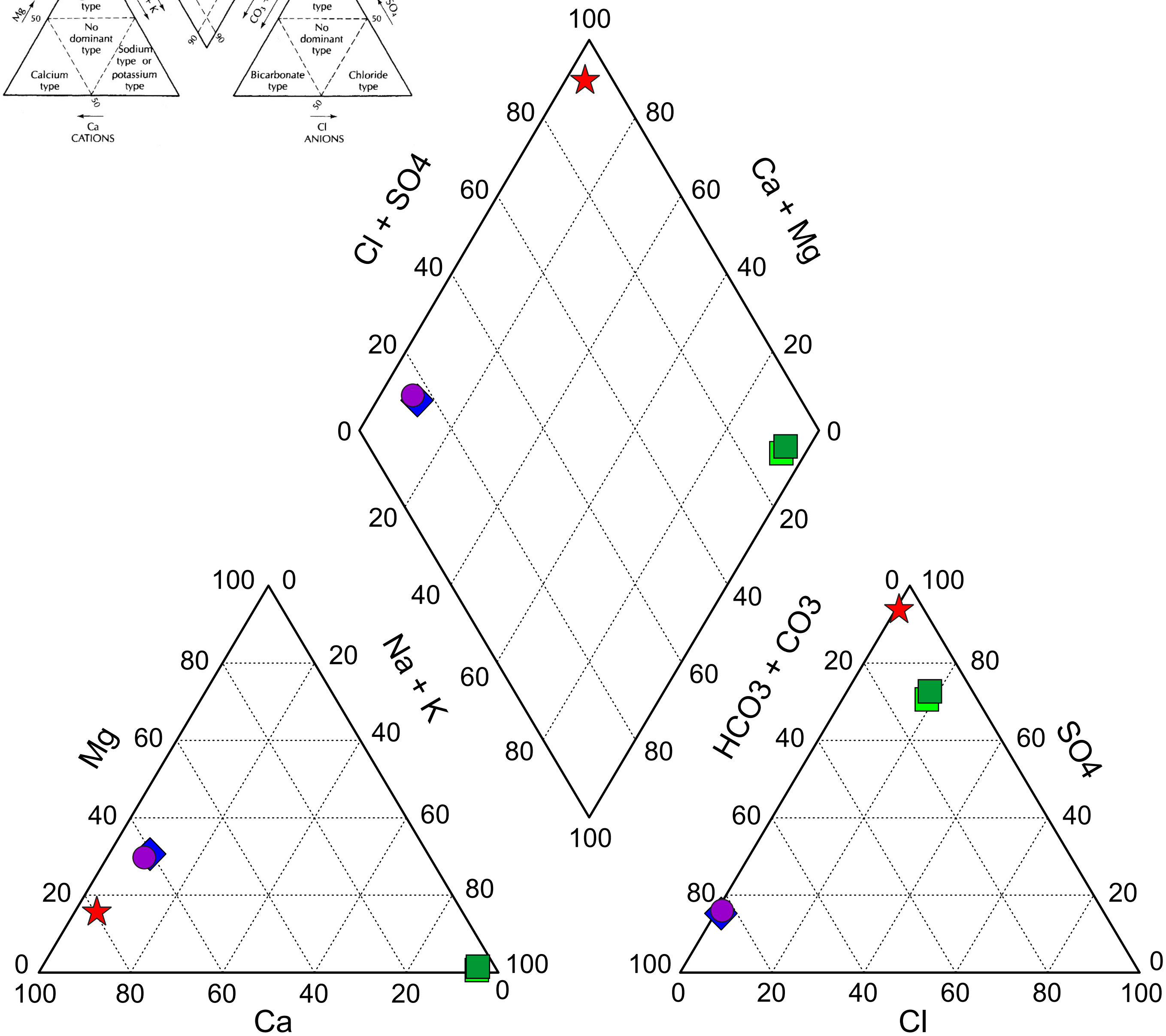
Figure 7



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



LEGEND

- Vista Mountain Warm Springs (SK-3)
- Vista Mountain Warm Springs (SK-4)
- Takhini Hot Spring
- Stinky Lake Warm Spring
- Versluce Warm Spring

STATUS
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CLIENT
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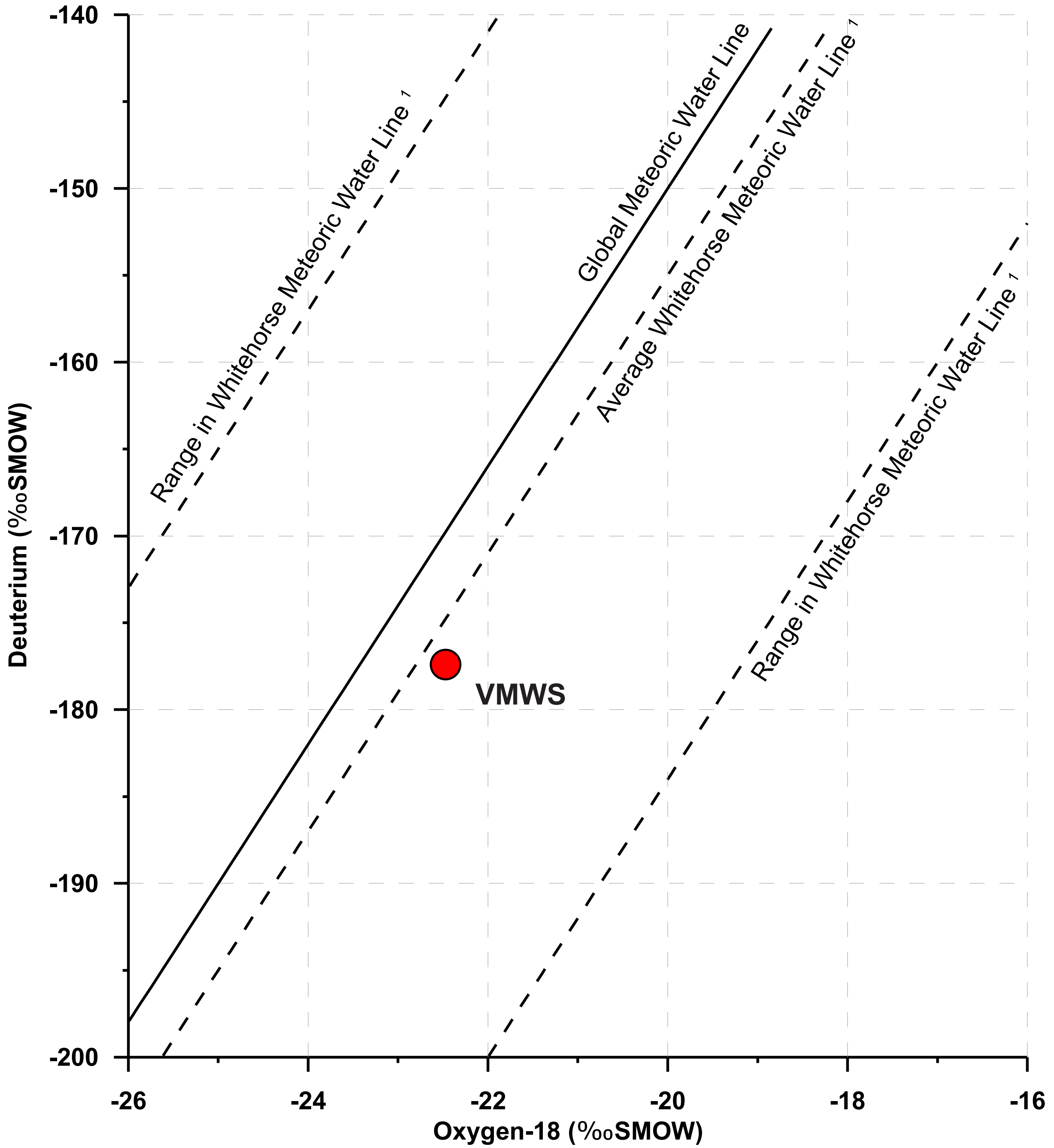
PRELIMINARY GEOTHERMAL ASSESSMENT VISTA MOUNTAIN WARM SPRINGS

Piper Plot

PROJECT NO.	DWN	CKD	APVD	REV
W23101579.004	SK			0

OFFICE	DATE
EBA-WHSE	December 15, 2012

Figure 6



LEGEND

1) LMWL - Local (Mayo) Meteoric Water Line from Birks, Edwards, Gibson, Michel, Drimmie, and MacTavish, Canadian Network for Isotopes in Precipitation, Univeristy of Waterloo/ Meteorological Service of Canada 2003.
2) GMWL - Global Meteoric Water Line from Fetter (1994) citing Craig (1961).
3) SMOW = Standard Mean Ocean Water

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PRELIMINARY GEOTHERMAL ASSESSMENT
VISTA MOUNTAIN WARM SPRINGS, YUKON

Plot of Stable Isotope Data with Meteoric Water Line

PROJECT NO.	DWN	CKD	APVD	REV
W23101579.004	SK			0

OFFICE	DATE
EBA-WHSE	December 15, 2012

Figure 6

PHOTOGRAPHS

Photo 1	Warm Springs at Field Station SK-2.
Photo 2	Warm Springs at Field Station SK-3.
Photo 3	Warm Springs at Field Station SK-4b.
Photo 4	Warm Springs at Field Station SK-4a and b. Two streams from separate springs meet.
Photo 5	Limestone fault scarp located about 300 m south of Vista Warm Springs.

Photograph 1: Warm Springs at Field Station SK-2.

Photograph 2: Warm Springs at Field Station SK-3.

Photograph 3: Warm Springs at Field Station SK-4b.

Photograph 4: Warm Springs at Field Station SK-4a and b. Two streams from separate springs meet.

Photograph 5: Limestone fault scarp located about 300 m south of Vista Warm Springs.

APPENDIX A

EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT

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

1.0 USE OF REPORT AND OWNERSHIP

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

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

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

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

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

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

3.0 NOTIFICATION OF AUTHORITIES

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

4.0 INFORMATION PROVIDED TO EBA BY OTHERS

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

APPENDIX B
LABORATORY REPORTS

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

Report Transmission Cover Page

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Contact & Affiliation	Address	Delivery Commitments
Stephan Klump EBA Engineering Consultants Ltd -	Unit 6, 151 Industrial Road, Calcite Business Centre Whitehorse, Yukon Territory Y1A 2V3 Phone: (867) 668-2071 Fax: (867) 668-4349 Email: sklump@eba.ca	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report) by Email - Single Report On [Report Approval] send (Test Report) by Email - Single Report On [Lot Creation] send (COR) by Email - Single Report
Ingrid Fuller EBA Engineering Consultants Ltd -	Unit 6, 151 Industrial Road, Calcite Business Centre Whitehorse, Yukon Territory Y1A 2V3 Phone: (867) 668-2071 Fax: (867) 668-4349 Email: ifuller@eba.ca	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Single Report

Notes To Clients:

- Some ICP-MS total metal results were less than dissolved metal results for samples 881748-1 to 2. The results were verified and are within expected measurement uncertainty.
- Some trace total metal results were less than dissolved metal results for samples 881748 - 1 and 2. The results were verified and are within expected measurement uncertainty.

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

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W: www.exova.com

Sample Custody

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Sample Disposal Date: October 18, 2012

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

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

The following charges apply to extended sample storage:

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

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

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

Name ____________________
Company ____________________
Address ____________________
____
Phone ____________________
Fax ____________________

Signature ____________________

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

		Reference Number	881748-1	881748-2		
		Sample Date	Jul 11, 2012	Jul 11, 2012		
		Sample Time	NA	NA		
		Sample Location	Vista Mtn	Vista Mtn		
		Sample Description	SK-3	SK-4		
		Matrix	Water	Water		
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Phosphorus	Dissolved	mg/L	<0.05	<0.05		0.05
Metals Dissolved						
Silicon	Dissolved	mg/L	27.3	27.3		0.05
Sulfur	Dissolved	mg/L	61.7	61.6		0.3
Mercury	Dissolved	mg/L	<0.0001	<0.0001		0.0001
Aluminum	Dissolved	mg/L	0.002	0.002		0.002
Antimony	Dissolved	mg/L	0.0004	0.0004		0.0002
Arsenic	Dissolved	mg/L	<0.0002	0.0002		0.0002
Barium	Dissolved	mg/L	0.005	0.004		0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001		0.0001
Bismuth	Dissolved	mg/L	0.0005	0.0005		0.0005
Boron	Dissolved	mg/L	0.567	0.599		0.002
Cadmium	Dissolved	mg/L	0.00001	<0.00001		0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005		0.0005
Cobalt	Dissolved	mg/L	<0.0001	<0.0001		0.0001
Copper	Dissolved	mg/L	<0.001	<0.001		0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001		0.0001
Lithium	Dissolved	mg/L	0.124	0.131		0.001
Molybdenum	Dissolved	mg/L	0.037	0.039		0.001
Nickel	Dissolved	mg/L	<0.0005	<0.0005		0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002		0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001		0.00001
Strontium	Dissolved	mg/L	0.525	0.530		0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005		0.00005
Tin	Dissolved	mg/L	<0.001	<0.001		0.001
Titanium	Dissolved	mg/L	0.0023	0.0024		0.0005
Uranium	Dissolved	mg/L	<0.0005	<0.0005		0.0005
Vanadium	Dissolved	mg/L	0.0001	0.0001		0.0001
Zinc	Dissolved	mg/L	0.002	0.002		0.001
Metals Total						
Aluminum	Total	mg/L	0.32	1.9		0.02
Calcium	Total	mg/L	7.4	6.8		0.2
Iron	Total	mg/L	0.40	1.2		0.05
Magnesium	Total	mg/L	0.3	0.3		0.1
Manganese	Total	mg/L	<0.01	0.02		0.005
Potassium	Total	mg/L	2.1	2.6		0.4

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

		Reference Number	881748-1	881748-2		
		Sample Date	Jul 11, 2012	Jul 11, 2012		
		Sample Time	NA	NA		
		Sample Location	Vista Mtn	Vista Mtn		
		Sample Description	SK-3	SK-4		
		Matrix	Water	Water		
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Metals Total - Continued						
Silicon	Total	mg/L	26.4	29.1		0.05
Sodium	Total	mg/L	118	124		0.4
Sulfur	Total	mg/L	57.0	59.3		0.3
Antimony	Total	mg/L	0.0005	0.001		0.0002
Arsenic	Total	mg/L	<0.0004	0.001		0.0002
Barium	Total	mg/L	0.01	0.023		0.001
Beryllium	Total	mg/L	<0.0002	<0.0002		0.0001
Bismuth	Total	mg/L	<0.001	<0.001		0.0005
Boron	Total	mg/L	0.652	0.654		0.002
Cadmium	Total	mg/L	0.00004	0.00002		0.00001
Chromium	Total	mg/L	0.001	0.0026		0.0005
Cobalt	Total	mg/L	0.0002	0.0005		0.0001
Copper	Total	mg/L	<0.002	<0.002		0.001
Lead	Total	mg/L	0.0002	0.0004		0.0001
Lithium	Total	mg/L	0.15	0.15		0.001
Molybdenum	Total	mg/L	0.043	0.044		0.001
Nickel	Total	mg/L	<0.001	<0.001		0.0005
Selenium	Total	mg/L	<0.0004	<0.0004		0.0002
Silver	Total	mg/L	<0.00002	<0.00002		0.00001
Strontium	Total	mg/L	0.540	0.529		0.001
Thallium	Total	mg/L	<0.0001	<0.0001		0.00005
Tin	Total	mg/L	<0.002	<0.002		0.001
Titanium	Total	mg/L	0.0348	0.0716		0.0005
Uranium	Total	mg/L	<0.001	<0.001		0.0005
Vanadium	Total	mg/L	0.0020	0.0032		0.0001
Zinc	Total	mg/L	0.004	0.005		0.001
Zirconium	Total	mg/L	<0.002	<0.002		0.001
Routine Water						
pH			9.26	9.32		
Temperature of observed pH		°C	23.0	23.3		
Electrical Conductivity		µS/cm at 25 C	619	624		1
Calcium	Dissolved	mg/L	5.7	5.8		0.2
Magnesium	Dissolved	mg/L	<0.2	<0.2		0.2
Sodium	Dissolved	mg/L	128	126		0.4
Potassium	Dissolved	mg/L	2.3	2.3		0.4
Iron	Dissolved	mg/L	<0.01	<0.01		0.01

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Analytical Report

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

		Reference Number	881748-1	881748-2		
		Sample Date	Jul 11, 2012	Jul 11, 2012		
		Sample Time	NA	NA		
		Sample Location	Vista Mtn	Vista Mtn		
		Sample Description	SK-3	SK-4		
		Matrix	Water	Water		
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Routine Water - Continued						
Manganese	Dissolved	mg/L	<0.005	<0.005		0.005
Chloride	Dissolved	mg/L	35.8	34.8		0.4
Fluoride		mg/L	10.0	9.85		0.05
Nitrate - N		mg/L	<0.01	<0.01		0.01
Nitrite - N		mg/L	<0.005	<0.005		0.005
Nitrate and Nitrite - N		mg/L	<0.01	<0.01		0.01
Sulfate (SO4)	Dissolved	mg/L	185	185		0.9
Hydroxide		mg/L	<5	<5		5
Carbonate		mg/L	21	20		6
Bicarbonate		mg/L	18	12		5
P-Alkalinity	as CaCO3	mg/L	17	17		5
T-Alkalinity	as CaCO3	mg/L	50	44		5
Total Dissolved Solids	Calculated	mg/L	387	381		1
Hardness	Dissolved as CaCO3	mg/L	14	14		
Ionic Balance	Dissolved	%	100	102		

Approved by: Mathieu Simoneau

Mathieu Simoneau
Operations Manager

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Inorganic Nonmetallic Parameters

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Phosphorus	mg/L	0.024	-0.05	0.05	yes
Date Acquired: July 18, 2012					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Phosphorus	mg/L	<0.05	<0.05	10	0.20	yes
Date Acquired: July 18, 2012						

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Phosphorus	mg/L	8.26	7.60	8.38	yes
Date Acquired: July 18, 2012					
Phosphorus	mg/L	4.15	3.61	4.39	yes
Date Acquired: July 18, 2012					

Metals Dissolved

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Silicon	mg/L	0.0034	-0.04	0.05	yes
Sulfur	mg/L	0.0177	-0.3	0.2	yes
Mercury	ug/L	0.02	-0.0380	0.0640	yes
Aluminum	ug/L	0.702	-2	2	yes
Antimony	ug/L	-0.041	-0.2	0.2	yes
Arsenic	ug/L	0.05	-0.2	0.2	yes
Barium	ug/L	0.039	-1	1	yes
Beryllium	ug/L	0.004	-0.0	0.1	yes
Bismuth	ug/L	0.488	-1.5	1.5	yes
Boron	ug/L	0.059	-2	2	yes
Cadmium	ug/L	-0.002	-0.01	0.01	yes
Chromium	ug/L	-0.009	-0.3	0.3	yes
Cobalt	ug/L	0.003	-0.1	0.1	yes
Copper	ug/L	0.034	-1	1	yes
Lead	ug/L	-0.004	-0.1	0.1	yes
Lithium	ug/L	-0.002	-1	1	yes
Molybdenum	ug/L	-0.01	-1	1	yes
Nickel	ug/L	0.003	-0.5	0.5	yes
Selenium	ug/L	-0.123	-0.2	0.2	yes
Silver	ug/L	-0.001	-0.10	0.10	yes
Strontium	ug/L	0.033	-1	1	yes
Thallium	ug/L	0.001	-0.05	0.05	yes
Tin	ug/L	-0.017	-1	1	yes
Titanium	ug/L	-0.055	-0.5	0.5	yes
Uranium	ug/L	0.002	-0.5	0.5	yes
Vanadium	ug/L	0	-0.1	0.1	yes
Zinc	ug/L	0.185	-0	2	yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Dissolved - Continued

Blanks	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Date Acquired:	July 18, 2012					
Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Mercury	mg/L	<0.0001	<0.0001	10	0.0003	yes
Date Acquired:	July 18, 2012					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Mercury	mg/L	0.0008	0.0007	0.0009		yes
Date Acquired:	July 18, 2012					
Mercury	mg/L	0.0030	0.0026	0.0032		yes
Aluminum	ug/L	992	887	1063		yes
Antimony	ug/L	39.8	37.4	43.4		yes
Arsenic	ug/L	39.3	36.7	43.3		yes
Barium	ug/L	197	182	212		yes
Beryllium	ug/L	18.9	17.3	22.1		yes
Bismuth	ug/L	104	93.8	111.8		yes
Boron	ug/L	396	344	434		yes
Cadmium	ug/L	2.04	1.86	2.26		yes
Chromium	ug/L	99.3	89.7	107.7		yes
Cobalt	ug/L	21.2	18.5	22.3		yes
Copper	ug/L	198	184	208		yes
Lead	ug/L	20.7	18.4	22.0		yes
Lithium	ug/L	197	175	223		yes
Molybdenum	ug/L	194	180	210		yes
Nickel	ug/L	97.5	90.6	108.6		yes
Selenium	ug/L	39.7	35.8	43.0		yes
Silver	ug/L	20.4	18.62	22.58		yes
Strontium	ug/L	197	174	210		yes
Thallium	ug/L	10.4	9.40	11.20		yes
Tin	ug/L	192	178	208		yes
Titanium	ug/L	102	88.9	108.7		yes
Uranium	ug/L	98.8	86.8	106.6		yes
Vanadium	ug/L	18.2	17.0	20.0		yes
Zinc	ug/L	202	183	219		yes
Date Acquired:	July 18, 2012					
Mercury	mg/L	0.0008	0.0007	0.0009		yes
Date Acquired:	July 18, 2012					
Aluminum	ug/L	54	45	55		yes
Antimony	ug/L	1.9	1.8	2.2		yes
Arsenic	ug/L	2.0	1.8	2.2		yes
Barium	ug/L	10	9	11		yes
Beryllium	ug/L	1	0.9	1.1		yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Dissolved - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Bismuth	ug/L	5.2	4.5	5.5	yes
Boron	ug/L	19	18	22	yes
Cadmium	ug/L	0.10	0.09	0.11	yes
Chromium	ug/L	5.1	4.5	5.5	yes
Cobalt	ug/L	1.1	0.9	1.1	yes
Copper	ug/L	10	9	11	yes
Lead	ug/L	1.0	0.9	1.1	yes
Lithium	ug/L	10	9	11	yes
Molybdenum	ug/L	10	9	11	yes
Nickel	ug/L	5.1	4.5	5.5	yes
Selenium	ug/L	1.9	1.8	2.2	yes
Silver	ug/L	1.01	0.90	1.10	yes
Strontium	ug/L	10	9	11	yes
Thallium	ug/L	0.54	0.45	0.55	yes
Tin	ug/L	10	9	11	yes
Titanium	ug/L	4.9	4.5	5.5	yes
Uranium	ug/L	5.4	4.5	5.5	yes
Vanadium	ug/L	1	0.9	1.1	yes
Zinc	ug/L	10	9	11	yes
Date Acquired:	July 18, 2012				
Silicon	mg/L	10.1	8.70	10.50	yes
Sulfur	mg/L	144	140.5	158.5	yes
Date Acquired:	July 18, 2012				
Silicon	mg/L	2.07	1.80	2.20	yes
Sulfur	mg/L	10.1	9.0	11.0	yes
Date Acquired:	July 18, 2012				
Silicon	mg/L	0.21	0.18	0.22	yes
Sulfur	mg/L	3.0	2.8	3.3	yes
Date Acquired:	July 18, 2012				

Metals Total

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aluminum	mg/L	-0.0019	-0.01	0.02	yes
Calcium	mg/L	-0.0701	-0.1	0.1	yes
Iron	mg/L	-0.0078	-0.01	0.02	yes
Magnesium	mg/L	-0.0156	-0.0	0.0	yes
Manganese	mg/L	-0.0001	-0.003	0.003	yes
Potassium	mg/L	-0.0527	-0.1	0.2	yes
Silicon	mg/L	-0.019	-0.03	0.04	yes
Sodium	mg/L	-0.103	-0.1	0.2	yes
Sulfur	mg/L	-0.0093	-0.1	0.2	yes

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Total - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	ug/L	0.083	-0.2	0.2	yes
Arsenic	ug/L	-0.062	-0.2	0.2	yes
Barium	ug/L	0.067	-1	1	yes
Beryllium	ug/L	0.005	-0.1	0.1	yes
Bismuth	ug/L	-0.088	-0.5	0.5	yes
Boron	ug/L	1.739	-1	3	yes
Cadmium	ug/L	-0.003	-0.01	0.01	yes
Chromium	ug/L	0.173	-0.7	0.3	yes
Cobalt	ug/L	0.009	-0.1	0.1	yes
Copper	ug/L	0.177	-1	1	yes
Lead	ug/L	-0.013	-0.1	0.1	yes
Lithium	ug/L	0.1071	-1	1	yes
Molybdenum	ug/L	0.013	-1	1	yes
Nickel	ug/L	0.097	-0.5	0.5	yes
Selenium	ug/L	0.077	-0.2	0.2	yes
Silver	ug/L	0.006	-0.02	0.10	yes
Strontium	ug/L	0.025	-1	1	yes
Thallium	ug/L	0.001	-0.05	0.05	yes
Tin	ug/L	0.03	-1	1	yes
Titanium	ug/L	-0.045	-0.5	0.5	yes
Uranium	ug/L	0.007	-0.5	0.5	yes
Vanadium	ug/L	0.053	-0.1	0.1	yes
Zinc	ug/L	0.327	-0	1	yes
Zirconium	ug/L	0.152	-1	1	yes

Date Acquired: July 18, 2012

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aluminum	mg/L	3.94	3.46	4.30	yes
Calcium	mg/L	49.8	46.1	54.5	yes
Iron	mg/L	2.00	1.83	2.19	yes
Magnesium	mg/L	19.8	18.1	22.1	yes
Manganese	mg/L	0.513	0.442	0.538	yes
Potassium	mg/L	50.5	45.8	55.8	yes
Silicon	mg/L	1.96	1.81	2.21	yes
Sodium	mg/L	50.9	45.9	56.0	yes
Sulfur	mg/L	9.9	8.9	10.9	yes
Antimony	ug/L	11.6	9.7	12.7	yes
Arsenic	ug/L	11.0	9.6	12.6	yes
Barium	ug/L	62	54	68	yes
Beryllium	ug/L	5.8	4.7	6.6	yes
Bismuth	ug/L	31.2	24.8	34.4	yes
Boron	ug/L	133	102	139	yes
Cadmium	ug/L	0.65	0.47	0.78	yes

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	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chromium	ug/L	33.6	27.3	35.1	yes
Cobalt	ug/L	6.5	5.7	7.3	yes
Copper	ug/L	62	53	67	yes
Lead	ug/L	6.4	5.2	7.1	yes
Lithium	ug/L	62	53	77	yes
Molybdenum	ug/L	60	53	66	yes
Nickel	ug/L	32.3	26.2	35.2	yes
Selenium	ug/L	10.9	8.5	12.1	yes
Silver	ug/L	6.01	5.39	7.13	yes
Strontium	ug/L	58	54	69	yes
Thallium	ug/L	3.24	2.67	3.69	yes
Tin	ug/L	59	52	64	yes
Titanium	ug/L	32.9	26.6	35.7	yes
Uranium	ug/L	31.8	25.7	36.3	yes
Vanadium	ug/L	6.0	5.1	7.2	yes
Zinc	ug/L	58	49	67	yes
Zirconium	ug/L	62	56	68	yes
Date Acquired:	July 18, 2012				
Antimony	ug/L	40.2	36.8	42.6	yes
Arsenic	ug/L	40.4	37.7	44.7	yes
Barium	ug/L	201	184	209	yes
Beryllium	ug/L	19.3	17.4	22.2	yes
Bismuth	ug/L	96.1	85.6	104.8	yes
Boron	ug/L	406	343	436	yes
Cadmium	ug/L	2.06	1.92	2.20	yes
Chromium	ug/L	103	90.0	110.0	yes
Cobalt	ug/L	21.2	19.2	22.6	yes
Copper	ug/L	197	185	208	yes
Lead	ug/L	20.2	18.6	21.8	yes
Lithium	ug/L	208	173	222	yes
Molybdenum	ug/L	192	180	220	yes
Nickel	ug/L	101	90.0	110.0	yes
Selenium	ug/L	37.8	36.1	42.9	yes
Silver	ug/L	20.8	19.69	22.11	yes
Strontium	ug/L	195	182	212	yes
Thallium	ug/L	10.4	9.57	11.23	yes
Tin	ug/L	195	176	206	yes
Titanium	ug/L	102	91.5	106.3	yes
Uranium	ug/L	95.8	86.3	105.3	yes
Vanadium	ug/L	17.5	16.8	20.6	yes
Zinc	ug/L	198	186	219	yes
Date Acquired:	July 18, 2012				

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	ug/L	12.1	10.8	13.2	yes
Arsenic	ug/L	11.9	10.8	13.2	yes
Barium	ug/L	61	54	66	yes
Beryllium	ug/L	5.8	5.2	6.5	yes
Bismuth	ug/L	29.3	27.0	33.0	yes
Boron	ug/L	116	108	132	yes
Cadmium	ug/L	0.64	0.50	0.70	yes
Chromium	ug/L	31.2	27.0	33.0	yes
Cobalt	ug/L	6.4	5.4	6.6	yes
Copper	ug/L	61	54	66	yes
Lead	ug/L	5.9	5.4	6.6	yes
Lithium	ug/L	65	53	66	yes
Molybdenum	ug/L	60	54	66	yes
Nickel	ug/L	30.5	27.0	33.0	yes
Selenium	ug/L	11.3	10.8	13.2	yes
Silver	ug/L	6.20	5.40	6.60	yes
Strontium	ug/L	60	54	66	yes
Thallium	ug/L	3.07	0.00	6.00	yes
Tin	ug/L	60	54	66	yes
Titanium	ug/L	31.4	27.0	33.0	yes
Uranium	ug/L	28.8	27.0	33.0	yes
Vanadium	ug/L	5.6	5.1	6.3	yes
Zinc	ug/L	60	54	66	yes
Zirconium	ug/L	63	54	66	yes
Date Acquired:	July 18, 2012				
Antimony	ug/L	2.0	1.8	2.2	yes
Arsenic	ug/L	2.0	1.8	2.3	yes
Barium	ug/L	10	9	11	yes
Beryllium	ug/L	0.9	0.8	1.1	yes
Bismuth	ug/L	5.0	4.6	5.7	yes
Boron	ug/L	20	17	23	yes
Cadmium	ug/L	0.11	0.08	0.11	yes
Chromium	ug/L	5.2	4.6	5.4	yes
Cobalt	ug/L	1.1	0.9	1.1	yes
Copper	ug/L	10	9	11	yes
Lead	ug/L	1.0	0.9	1.1	yes
Lithium	ug/L	10	9	11	yes
Molybdenum	ug/L	10	9	11	yes
Nickel	ug/L	5.0	4.5	5.5	yes
Selenium	ug/L	1.9	1.6	2.2	yes
Silver	ug/L	1.05	0.97	1.13	yes
Strontium	ug/L	10	10	11	yes

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	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Thallium	ug/L	0.54	0.48	0.57	yes
Tin	ug/L	10	9	11	yes
Titanium	ug/L	5.0	4.5	5.4	yes
Uranium	ug/L	5.0	4.7	5.7	yes
Vanadium	ug/L	1.0	0.8	1.1	yes
Zinc	ug/L	10	9	11	yes
Zirconium	ug/L	10	10	11	yes
Date Acquired:	July 18, 2012				
Aluminum	mg/L	20.0	18.20	20.60	yes
Calcium	mg/L	249	230.0	257.6	yes
Iron	mg/L	9.97	9.07	10.15	yes
Magnesium	mg/L	102	92.8	104.7	yes
Manganese	mg/L	2.56	2.260	2.560	yes
Potassium	mg/L	255	232.2	259.9	yes
Silicon	mg/L	10.3	9.35	10.43	yes
Sodium	mg/L	255	226.8	267.4	yes
Sulfur	mg/L	149	136.5	166.3	yes
Date Acquired:	July 18, 2012				
Aluminum	mg/L	3.91	3.46	4.44	yes
Calcium	mg/L	49.9	45.0	55.0	yes
Iron	mg/L	2.01	1.80	2.20	yes
Magnesium	mg/L	19.9	18.0	22.0	yes
Manganese	mg/L	0.516	0.449	0.551	yes
Potassium	mg/L	50.7	45.0	55.0	yes
Silicon	mg/L	2.04	1.80	2.20	yes
Sodium	mg/L	51.1	45.0	55.0	yes
Sulfur	mg/L	9.9	9.0	11.0	yes
Date Acquired:	July 18, 2012				
Aluminum	mg/L	0.40	0.36	0.44	yes
Calcium	mg/L	5.2	4.6	5.6	yes
Iron	mg/L	0.20	0.18	0.22	yes
Magnesium	mg/L	2.0	1.8	2.2	yes
Manganese	mg/L	0.054	0.046	0.056	yes
Potassium	mg/L	5.2	4.5	5.5	yes
Silicon	mg/L	0.19	0.18	0.22	yes
Sodium	mg/L	5.2	4.7	5.5	yes
Sulfur	mg/L	3.0	2.8	3.2	yes
Date Acquired:	July 18, 2012				

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Quality Control

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Routine Water - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	-0.0058	-0.2	0.2	yes
Magnesium	mg/L	0.0061	-0.1	0.1	yes
Sodium	mg/L	0.0632	-0.4	0.4	yes
Potassium	mg/L	0.0866	-0.4	0.4	yes
Iron	mg/L	0.0004	-0.01	0.01	yes
Manganese	mg/L	0.0001	-0.004	0.004	yes
Chloride	mg/L	-0.04	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes

Date Acquired: July 18, 2012

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		7.68	7.48	0		yes
Electrical Conductivity	dS/m at 25 C	0.111	0.111	10	0.002	yes
Calcium	mg/L	186	287	10	0.6	yes
Magnesium	mg/L	20	27	10	0.7	yes
Sodium	mg/L	3220	3630	10	1.2	yes
Potassium	mg/L	29	34	10	1.2	yes
Iron	mg/L	12.8	11.2	10	0.05	yes
Chloride	mg/L	3.1	2.8	10	0.5	yes
Nitrate - N	mg/L	0.35	0.35	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes

Date Acquired: July 18, 2012

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2040	1913.9	2188.1	yes

Date Acquired: July 18, 2012

pH		9.11	9.05	9.25	yes
Electrical Conductivity	dS/m at 25 C	2.71	2.616	2.904	yes
Calcium	mg/L	247	228.0	258.0	yes
Magnesium	mg/L	100	92.7	101.1	yes
Sodium	mg/L	251	233.3	257.3	yes
Potassium	mg/L	258	235.2	259.2	yes
Iron	mg/L	9.61	9.01	10.99	yes
Manganese	mg/L	2.42	2.240	2.540	yes
Fluoride	mg/L	10.0	9.41	10.43	yes
Nitrate - N	mg/L	10.2	9.62	10.52	yes
Nitrite - N	mg/L	10.2	9.590	10.550	yes
Nitrate and Nitrite - N	mg/L	20.4	19.23	21.03	yes
P-Alkalinity	mg/L	455	402	552	yes
T-Alkalinity	mg/L	1010	956	1056	yes

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Quality Control

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Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Date Acquired: July 17, 2012					
pH		6.87	6.78	6.96	yes
Electrical Conductivity	dS/m at 25 C	0.077	0.070	0.083	yes
Calcium	mg/L	51.9	47.3	54.5	yes
Magnesium	mg/L	20.6	18.0	22.0	yes
Sodium	mg/L	51.0	47.7	55.5	yes
Potassium	mg/L	50.1	45.0	55.0	yes
Iron	mg/L	2.04	1.91	2.21	yes
Manganese	mg/L	0.511	0.450	0.550	yes
Chloride	mg/L	81.8	74.9	86.9	yes
Fluoride	mg/L	4.89	4.61	5.27	yes
Nitrate - N	mg/L	4.91	4.41	5.13	yes
Nitrite - N	mg/L	5.04	4.530	5.250	yes
Nitrate and Nitrite - N	mg/L	9.95	9.01	10.33	yes
P-Alkalinity	mg/L	36	22	67	yes
T-Alkalinity	mg/L	128	113	137	yes
Date Acquired: July 17, 2012					
Calcium	mg/L	5.3	4.6	5.7	yes
Magnesium	mg/L	2.1	1.8	2.2	yes
Sodium	mg/L	5.2	4.7	5.7	yes
Potassium	mg/L	5.0	4.5	5.5	yes
Iron	mg/L	0.21	0.18	0.22	yes
Manganese	mg/L	0.054	0.045	0.055	yes
Chloride	mg/L	15.8	13.3	16.5	yes
Fluoride	mg/L	0.51	0.45	0.55	yes
Nitrate - N	mg/L	0.48	0.46	0.56	yes
Nitrite - N	mg/L	0.512	0.433	0.547	yes
Nitrate and Nitrite - N	mg/L	0.99	0.93	1.07	yes
Date Acquired: July 18, 2012					

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Methodology and Notes

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
	Unit 6, 151 Industrial Road	Location:	Whitehorse	Date Reported:	Jul 20, 2012
	Whitehorse, YT, Canada	LSD:		Report Number:	1751517
	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	*	Alkalinity - Titration Method, 2320 B	17-Jul-12	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	*	Conductivity, 2510 B	17-Jul-12	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	*	pH - Electrometric Method, 4500-H+ B	17-Jul-12	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	18-Jul-12	Exova Edmonton
Approval-Edmonton	APHA		Checking Correctness of Analyses, 1030 E	17-Jul-12	Exova Edmonton
Chloride in Water	APHA	*	Automated Ferricyanide Method, 4500-Cl- E	18-Jul-12	Exova Edmonton
Mercury (Dissolved) in water	APHA	*	Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	18-Jul-12	Exova Edmonton
Metals ICP-MS (Dissolved) in water	APHA/USEPA	*	Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.8	18-Jul-12	Exova Edmonton
Metals ICP-MS (Total) in water	APHA/USEPA	*	Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.8	18-Jul-12	Exova Edmonton
Metals Trace (Dissolved) in water	APHA		Hardness by Calculation, 2340 B	18-Jul-12	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	18-Jul-12	Exova Edmonton
Metals Trace (Total) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	18-Jul-12	Exova Edmonton
Phosphorus - Dissolved in Water	APHA	*	Automated Ascorbic Acid Reduction Method, 4500-P F	18-Jul-12	Exova Edmonton

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Some ICP-MS total metal results were less than dissolved metal results for samples 881748-1 to 2. The results were verified and are within expected measurement uncertainty.
- Some trace total metal results were less than dissolved metal results for samples 881748 - 1 and 2. The results were verified and are within expected measurement uncertainty.

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Methodology and Notes

Bill To:	EBA Engineering Consultants	Project:		Lot ID:	**881748**
Report To:	EBA Engineering Consultants	ID:	W23101579.004	Control Number:	
	Calcite Business Centre	Name:	Vista Mountain WS	Date Received:	Jul 13, 2012
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	Y1A 2V3	P.O.:			
Attn:	Stephan Klump	Acct code:			
Sampled By:	SK				
Company:	EBA				

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

LOT: 881748 COC

Exova

Testing
Advisin
Assuring

Control Number

ple Information Sheet

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

Billing Address:

Company: EBA Engineering Consulting Ltd.
Address: Unit 6, 151 Industrial Road
Whitehorse, YT
Y1A 2V3

QA/QC Report [x]

Report Result:
Fax [ ]
Mail [ ]
Courier [ ]
e-mail [x]
Results Online [ ]

Attention: Stephan Klump
Phone: 867-668-2071 ext. 250
Fax: 867-668-4349
Cell:
e-mail: sklump@eba.ca

Copy of Report To:

Copy of invoice: [ ]

Company:
Address:

Mail invoice to this address for approval [ ]

Report Result:
Fax [ ]
Mail [ ]
Courier [ ]
e-mail [ ]
Results Online [ ]

Attention:
Phone:
Fax:
Cell:
e-mail:

Information to be included on Report and Invoice

Project ID: W23101579.004
Project Name: Vista Mountain WS
Project Location: Whitehorse
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID: **87038**

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

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

RUSH required on: All Analysis [ ] or As indicated [ ]
Date Required:
Signature:
Exova Authorization:

Sample Custody (Please Print)
Sampled by: SK
Company EBA Signature
I authorize Exova to proceed with the work indicated on this form:
Date: 12-Jul-12 Initial:
Received by: JUL 13 2012
Sample Temp. 6.7
Waybill #:
Date
Company
Time

Special Instructions / Comments
Total and dissolved metals samples are preserved with HNO3

FOR LAB USE ONLY
Condiftion of containers/coolers upon arrival at lab

[ ] Check here if Exova is required to report results directly to a regulatory body (Please include contact information)

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

Please indicate which regulations you are required to meet:

	Sample Identification	Location	Depth (IN / CM / M)	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	TW33	TW22	F	TDP
1	SK-3	Vista Mtn	n/a	11-Jul-12	Water	Grab	3	X	X	X	X
2	SK-4	Vista Mtn	n/a	11-Jul-12	Water	Grab	3	X	X	X	X

Enter tests above (✓ relevant samples below)

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

Client: Klump
EBA, A Tetra Tech Company
PO#:
Project Ref: W23101579.004

ISO# 2012381
Location: T-1
1 for 18O, 2H, E3H

Environmental Isotope Lab
12/20/2012

#	Sample	Lab#	$\delta^{18}O$	Result	Repeat	$\delta^{2}H$	Result	Repeat	E3H	Result	± 1σ	Repeat	± 1σ
			H_2O	VSMOW		H_2O	VSMOW						
1	SK-4 July 11, 2012	289544	X	-22.42	-22.40	X	-177.25	-177.81	X	<0.8	0.3		

pH	Conductivity
	uS/cm
10.07	595

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

Rick Heemskerk
uwEILAB Manager
rkhmskrk@uwaterloo.ca
519 888 4567 ext 35838

To Contact uwEILAB:
519 888 4732