

March 31, 2010

EBA File: W23101159.022

Yukon Energy Corporation
PO Box 5920
Whitehorse, Yukon Y1A 6S7

Attention: David Morrison, President and CEO

Subject: Noble Gas Data from Multiple Warm and Hot Springs in Southern and Central Yukon

1.0 INTRODUCTION

As part of Yukon Energy Corporation's (YEC's) 2009 Geothermal Exploration Program, EBA Engineering Consultants Ltd. (EBA) collected water samples for dissolved noble gas analysis from multiple warm and hot springs in southern and central Yukon. Dissolved noble gases, especially the helium isotopes helium-3 (^3He) and helium-4 (^4He), can provide significant information on the origin and residence time of thermal waters.

The samples were taken during reconnaissance site visits to assess the geothermal potential of the different areas. Samples for dissolved noble gas analysis were collected from (Figure 1):

- Jarvis River Warm Springs, northwest of Haines Junction, southwest Yukon;
- Stinky Lake Warm Spring, Porter Creek, Whitehorse, southern Yukon;
- Nash Creek Hot Springs, Wernecke Mountains, central Yukon;
- Thorpe Creek Warm Springs, southeast Yukon;
- Coal River Warm Springs, southeast Yukon;
- Larsen Creek Hot Springs, southeast Yukon; and,
- Pool Creek Hot Springs, southeast Yukon.

This project phase has been conducted in collaboration with the Environmental Isotopes Group at the Swiss Federal Institute of Aquatic Science and Technology (Eawag), Duebendorf, Switzerland who provided the analytical facilities to analyze dissolved noble gases in water samples.

2.0 METHODS

2.1 NOBLE GASES AS ENVIRONMENTAL TRACERS

The noble gases helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe) and their isotopes make excellent environmental tracers to study physical processes in groundwater because of their chemical inertness, i.e., dissolved noble gas concentrations in natural water systems are only altered by physical processes (gas exchange, mixing, etc.) and do not undergo any significant biogeochemical transformations. Except for He (and to a lesser extent Ar), the atmosphere is the only source for dissolved noble gases in groundwater.

He also originates from the solid earth by radioactive α -decay of naturally occurring uranium (U) and thorium (Th) and the β -decay of the water-bound, radioactive hydrogen isotope tritium (^3H). Tritogenic ^3He , i.e., ^3He produced by the decay of tritium, can be used together with the tritium concentration in a water sample to determine the residence time of young groundwater (< 50 years). Radiogenic ^4He ($^4\text{He}_{\text{rad}}$) produced by the decay of U and Th accumulates in groundwater as a function of residence time of the water in the subsurface, typically on time scales of 10^2 years or greater. Because the local $^4\text{He}_{\text{rad}}$ accumulation rate is usually unknown, $^4\text{He}_{\text{rad}}$ can only be used as a qualitative tracer for groundwater residence time.

Degassing of primordial He from the earth's mantle can be a further source of He, especially in tectonically active regions. The source of helium can often be distinguished by the helium isotope ratio $^3\text{He}/^4\text{He}$ which is characteristic for the different sources of helium:

- Atmosphere: $^3\text{He}/^4\text{He} = 1.36 \times 10^{-6}$
- Earth's Crust: $^3\text{He}/^4\text{He} \sim 2 \times 10^{-8}$
- Earth's Mantle: $^3\text{He}/^4\text{He} \sim 10^{-6}$ to 10^{-5}

In a recent study, Kennedy and van Soest (2007) have found elevated $^3\text{He}/^4\text{He}$ ratios in areas with increased geothermal resource potential in the Basin and Range Province, western United States. The authors suggest that high $^3\text{He}/^4\text{He}$ anomalies, i.e., areas with admixture of mantle-derived helium in groundwater, indicate enhanced crustal permeability coupled with local zones of deep fluid production and/or hidden magmatic activity.

The argon-40 isotope (^{40}Ar) is also a product of the radioactive decay of potassium-40 (^{40}K), but accumulates on very large time scales and is seldom found to exceed the atmospheric fraction in groundwater.

2.2 SAMPLING AND ANALYTICAL

The water samples for dissolved noble gas analysis were taken from the spring outlet or pool using a small electric submersible pump to minimize contact of the sampled water with the atmosphere and avoid degassing of the sample. The samples were filled in copper tubes that can be pinched off to make a gas-tight seal. If the use of a submersible pump was not

feasible the water was directly filled into the copper tube using a short hose and gravitational flow. Care was taken to insure that no entrained air bubbles remained in the sample. Table 1 summarizes the sampling conditions for each of the sites.

The sample volume required for dissolved noble gas analysis is about 20 mL. The samples were shipped to the Noble Gas Laboratory, Institute of Geochemistry and Mineral Resources, Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. The samples do not need to be cooled or otherwise specifically handled and stored. The noble gas abundances of He, Ne, Ar, Kr, Xe and the isotope ratios $^3\text{He}/^4\text{He}$, $^{20}\text{Ne}/^{22}\text{Ne}$, and $^{36}\text{Ar}/^{40}\text{Ar}$ were measured by noble gas mass spectrometry and standard experimental protocols (Beyerle et al., 2000).

TABLE 1: SAMPLING LOCATIONS AND CONDITIONS		
Sample ID	Sampling Location	Sampling Conditions
H09S-1	Jarvis River Warm Springs	The sample was collected from one of the pools forming the Jarvis River Warm Springs at a depth of about 0.3 m using a submersible pump. Gas bubbles were rising in the pool and residence time of the water in the pool is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.
H09S-11	Jarvis River area, cold spring	The sample was collected at the outlet of a small cold spring about 2 km to the west of the warm springs. Flow was in the order of a few litres per minute. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube by gravitational flow using a short piece of hose.
H09S-19	Jarvis River Warm Springs	The sample was collected from one of the pools forming the Jarvis River Warm Springs at a depth of about 0.3 m using a submersible pump. Gas bubbles were rising in the pool and residence time of the water in the pool is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.
H09S-4	Jarvis River Warm Springs	The sample was collected from one of the pools forming the Jarvis River Warm Springs at a depth of about 0.5 m using a submersible pump. Gas bubbles were rising in the pool and residence time of the water in the pool is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.
JR-09-01	Jarvis River; thermal, artesian aquifer	The sample was taken from the flowing artesian well close to the well head. The sample was filled into the copper tube by gravitational flow using a short piece of hose.
L09S-05	Thorpe Creek Warm Spring	The sample was collected at the outlet of the warm spring. Total flow was in the order of several litres per second. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube by gravitational flow using a short piece of hose.
L09S-4	Coal River Warm Spring	The sample was collected from the main pool to the east of the travertine cascades at a depth of about 0.5 m using a submersible pump. Gas bubbles were rising in the pool and residence time of the water in the pool

TABLE 1: SAMPLING LOCATIONS AND CONDITIONS		
Sample ID	Sampling Location	Sampling Conditions
		is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.
L09S-44	Larsen Creek Hot Springs, south	The sample was collected from the main pool formed by the hot spring at a depth of about 0.5 m using a submersible pump. The pump was placed as close as possible to the actual spring outlet. Gas bubbles were rising in the pool and residence time of the water in the pool is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.
L09S-51	Larsen Creek Hot Springs, north	The sample was collected at the main outlet of the hot springs at the creek bank. Water flow was in the order of several litres per second. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube by gravitational flow using a short piece of hose.
L09S-57	Pool Creek Hot Springs	The sample was collected at the main outlet of the hot springs at the base of a slope. Water flow was in the order of several litres per second. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube by gravitational flow using a short piece of hose.
L09S-71	Pool Creek Hot Springs	The sample was collected at one of the spring outlets feeding the small creek. Water flow was in the order of several litres per minute. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube using a submersible pump.
N09L-27	Nash Creek Hot Springs	The sample was collected from the hottest spring outlet at the base of the limestone outcrop. Water flow was in the order of several litres per minute. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube using a submersible pump.
N09S-21	Nash Creek area, cold spring	The sample was collected at the main cold spring outlet feeding the small creek. Water flow was in the order of several litres per minute. The sample was taken as close to the actual spring outlet as possible to avoid air contact and filled into the copper tube using a submersible pump.
N09S-8	Nash Creek Hot Springs	The sample was collected from the wooden cistern that was built to retain the thermal water for bathing. A submersible pump was used to take the sample. Gas bubbles were rising in the cistern and residence time of the water in the pool is likely to be significant. Therefore, partial degassing of the water and partial re-equilibration with atmospheric noble gases can be expected.

collected from the same group of springs plot closely together and show characteristic helium isotope and Ne/He ratios.

All samples plot significantly above the mixing line between air saturated water (ASW) and crustal helium assuming a typical value of 2×10^{-8} for the $^3\text{He}/^4\text{He}$ ratio of radiogenic helium derived from the earth's crust. The shift of the samples towards higher $^3\text{He}/^4\text{He}$ ratios can be explained by addition of tritiogenic ^3He and/or addition of mantle-derived helium with a higher $^3\text{He}/^4\text{He}$ ratio.

To estimate the maximum possible contribution of tritiogenic ^3He it was assumed that the sample water infiltrated during the ^3H bomb peak in 1963/64 when the highest ^3H concentrations were present in the atmosphere. The assumed residence time of about 45 years corresponds to 3.65 times the half life of ^3H of 4500 days. Based on this and the measured ^3H concentrations, a maximum initial concentration of ^3H and a corresponding maximum concentration of tritiogenic ^3He can be estimated (Table 3). The gray arrows in Figure 3 show the maximum shift of the $^3\text{He}/^4\text{He}$ ratio in the samples due to the addition of tritiogenic ^3He . Except for the two samples N09S-21 and H09S-11, the maximum contribution of tritiogenic ^3He is much too small to cause the significant shift of the $^3\text{He}/^4\text{He}$ ratios towards higher values. EBA therefore concludes that all samples, possibly with the exception of N09S-21 and H09S-11, contain a considerable amount of mantle-derived helium with higher $^3\text{He}/^4\text{He}$ isotope ratios compared to typical crustal values.

TABLE 3: MEASURED AND MAXIMUM INITIAL TRITIUM CONCENTRATIONS				
Sample ID	Sample Location	^3H	error ^3H	max ^3H †
H09S-1	Jarvis River Warm Springs	0.4	0.4	4.2
H09S-11	Jarvis River area, cold springs	3.9	0.5	40.6
H09S-19	Jarvis River Warm Springs	0.4	0.4	4.2
H09S-4	Jarvis River Warm Springs	no tritium data		
JR-09-01	Artesian aquifer, Jarvis River Warm Springs	no tritium data		
L09S-04	Coal River Warm Springs	4.7	0.8	48.9
L09S-05	Thorpe Creek Warm Springs	1.2	0.7	12.5
L09S-44	Larsen Creek Hot Springs, south	0.4	0.6	4.2
L09S-51	Larsen Creek Hot Springs, north	0.4	0.6	4.2
L09S-57	Pool Creek Hot Springs	0.4	0.5	4.2
L09S-71	Pool Creek Hot Springs	no tritium data		
N09L-27	Nash Creek Hot Springs	3.7	0.5	38.5
N09S-08	Nash Creek Hot Springs	2.9	0.4	30.2
N09S-21	Nash Creek area, cold spring	9.7	0.9	100.9
SL-2	Stinky Lake Warm Spring	5.9	0.8	61.4

†The maximum initial ^3H concentrations were calculated assuming recharge of the water sample during the ^3H bomb peak in 1963/64 when atmospheric ^3H concentrations were highest.

3.1 JARVIS RIVER AREA SAMPLES

The samples taken from the pools of the Jarvis River Warm Springs and the artesian aquifer about 100 m northeast of the warm springs cluster closely and show consistent $^3\text{He}/^4\text{He}$ ratios of 6×10^{-7} to 7×10^{-7} and Ne/He ratios of < 0.3 . The $^3\text{He}/^4\text{He}$ ratios are among the highest measured, except for the sample from the Stinky Lake Warm Spring, and indicate a considerable amount of mantle-derived helium with a high $^3\text{He}/^4\text{He}$ isotope ratio. Because the ^3H concentrations in all samples from the Jarvis River Warm Springs were below detection limit (< 0.4 TU) the high helium isotope ratios cannot be explained by accumulation of tritiogenic ^3He .

The sample collected from a cold spring about 2 km to the west of the Jarvis River Warm Springs contained much less radiogenic helium indicating a smaller residence time compared to the samples taken from the warm springs. The slight shift towards a higher $^3\text{He}/^4\text{He}$ ratio is likely caused by accumulation of tritiogenic ^3He .

3.2 WHITEHORSE AREA SAMPLES

Only one sample for noble gas analysis was collected in the Whitehorse area (Stinky Lake Warm Spring). Most of the samples analyzed as part of this project contained $^3\text{He}/^4\text{He}$ ratio of 10^{-7} to 10^{-6} . Sample SL-2 collected from Stinky Lake Spring in Porter Creek shows a significantly higher $^3\text{He}/^4\text{He}$ ratio which cannot be explained by accumulation of tritiogenic ^3He and might be the result of the location of the spring close to a deep reaching fault zone that provides a pathway for mantle fluids. The sample also contained a considerable concentration of radiogenic ^4He which suggests a large residence time of the water and is in agreement with a deep circulation pathway of the thermal water. The ^3H concentration of about 6 TU indicates the admixture of a young, i.e., less than about 50 years old groundwater component.

3.3 NASH CREEK AREA SAMPLES

The samples from Nash Creek Hot Springs show the lowest $^3\text{He}/^4\text{He}$ ratios of all samples collected. However, the $^3\text{He}/^4\text{He}$ ratios are still about one order of magnitude higher than those typical for purely crustal helium. The helium concentrations in the samples from Nash Creek Hot Springs are the highest of all samples and may indicate a large residence time of the water. The ^3H concentration of about 3 to 4 TU suggests the admixture of a young shallow groundwater component to the thermal water.

Sample N09S-21 which was collected from a cold spring very close to the hot springs contained less dissolved helium and showed a slightly higher $^3\text{He}/^4\text{He}$ ratio which can be explained by accumulation of tritiogenic ^3He . The sample from the cold spring also contains considerable amounts of radiogenic helium which likely indicates the admixture of some thermal water.

3.4 LARSEN CREEK / BEAVER RIVER AREA SAMPLES

Samples from four different warm and hot springs were collected in the Larsen Creek and Beaver River area: Coal River Warm Springs, Thorpe Creek Warm Springs, Larsen Creek Hot Springs, and Pool Creek Hot Springs (located at the Beaver River and Pool Creek confluence).

The Coal River Warm Springs sample showed a high $^3\text{He}/^4\text{He}$ ratio of about 7×10^{-7} and a moderately high concentration of radiogenic helium. The ^3H concentration of 4.7 TU likely indicates the admixture of a shallow, young groundwater component. However, the ^3H concentration is too small to explain the high $^3\text{He}/^4\text{He}$ isotope ratio due to the accumulation of tritiogenic ^3He .

The sample from the Thorpe Creek Warm Springs has a lower $^3\text{He}/^4\text{He}$ ratio of 2.3×10^{-7} but a fairly high concentration of radiogenic helium which suggests a large residence time.

Two samples were collected from the southern and northern Larsen Creek Hot Springs. Both samples show very similar Ne/He and $^3\text{He}/^4\text{He}$ ratios and plot closely together (Figure 3). Both the $^3\text{He}/^4\text{He}$ ratio and radiogenic helium concentration are moderately high compared to the samples collected from other warm and hot springs.

The samples taken from the Pool Creek Hot Springs contained higher $^3\text{He}/^4\text{He}$ ratios and higher concentrations of radiogenic helium than the Larsen Creek Hot Springs samples. The $^3\text{He}/^4\text{He}$ ratios were among the highest measured, except for the Stinky Lake Warm Spring sample.

All samples from the Larsen Creek/Beaver River area, with the exception of the Coal River Warm Springs sample, contained very little ^3H . Therefore, the significantly increased $^3\text{He}/^4\text{He}$ ratios observed cannot be explained by accumulation of tritiogenic ^3He but rather indicate the admixture of a mantle-derived helium component with a high $^3\text{He}/^4\text{He}$ ratio relative to crustal helium.

4.0 CONCLUSIONS AND RECOMMENDATIONS

EBA collected a total of thirteen noble gas samples from five warm and hot springs and two samples from cold springs located in the vicinity of hot or warm springs in southern and central Yukon. The noble gas results indicate that some of the samples taken from warm and hot springs were partially degassed. However, atmospheric isotope ratios of Ne and Ar and a comparison of the partially degassed samples with samples that do not show any obvious gas loss suggests that both elemental Ne/He ratios and helium isotope ratios had not been altered significantly.

All samples show considerably elevated ^3He concentrations indicated by plotting above the mixing line between air-saturated water and crustal helium as shown in Figure 3. The elevated $^3\text{He}/^4\text{He}$ isotope ratios can be explained by accumulation of tritiogenic ^3He only for the samples taken from the cold springs in the Jarvis River and Nash Creek areas. All

other samples analyzed contain too little tritium to relate the observed elevated $^3\text{He}/^4\text{He}$ ratios to accumulation of tritiogenic ^3He . Therefore, we conclude that these samples contain a significant component of mantle-derived helium which is characterized by a much higher $^3\text{He}/^4\text{He}$ ratio compared to crustal helium.

The presence of a mantle-derived helium component typically suggests the existence of a deep fluid pathway, usually a steeply inclined fault or fault zone. This is in agreement with the conceptual models for the warm and hot springs which include a deep circulation system for meteoric water to reach a sub-surface heat source and a suitable, fast conduit back to surface.

The samples collected from cold springs in the vicinity of the Jarvis River Warm Springs and Nash Creek Hot Springs indicate that radiogenic helium concentrations and $^3\text{He}/^4\text{He}$ ratios are considerably different from the thermal water in the same area. This is especially true for the cold springs sample from the Jarvis River area. The cold spring sample from the Nash Creek area was collected in very close proximity of the hot springs (< 100 m from nearest hot spring outlet). The observed temperature of 8.1°C which is significantly higher than background shallow groundwater temperature (typically in the range of 2°C to 5°C) suggests the admixture of a small thermal water component in the cold spring at Nash Creek. This likely explains why the difference between the cold and thermal water samples at Nash Creek is less pronounced than for the samples taken in the Jarvis River area (cf. Figure 2).

All samples collected from the warm and hot springs suggest the presence of a mantle-derived helium component and thus a deep water circulation system. However, it remains open whether the noble gas signatures from the warm and hot springs represent local anomalies being characteristic for thermal waters. If this is the case, noble gas data, especially helium isotope ratios, could be used as an exploration tool for geothermal resource assessments once background values have been established. More noble gas data from both thermal waters and cold groundwater in the wider areas of known warm and hot springs would be required to answer this question.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Yukon Energy Corporation (YEC) and their agents. 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, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. EBA's General Conditions are provided in Appendix A of this report.

6.0 CLOSURE

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

Respectfully submitted,
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7.0 REFERENCE

- Beyerle, U., Aeschbach-Hertig, W., Imboden, D.M., Baur, H., Graf, T., and Kipfer, R. (2000) A mass spectrometric system for the analysis of noble gases and tritium from water samples. *Environ. Sci. Technol.*, 34(10), 2042-2050.
- Kennedy, B.M. and van Soest, M.S. (2007) Flow of mantle fluids through the ductile lower crust: helium isotope trends. *Science*, 318, 1433-1436.



TABLES

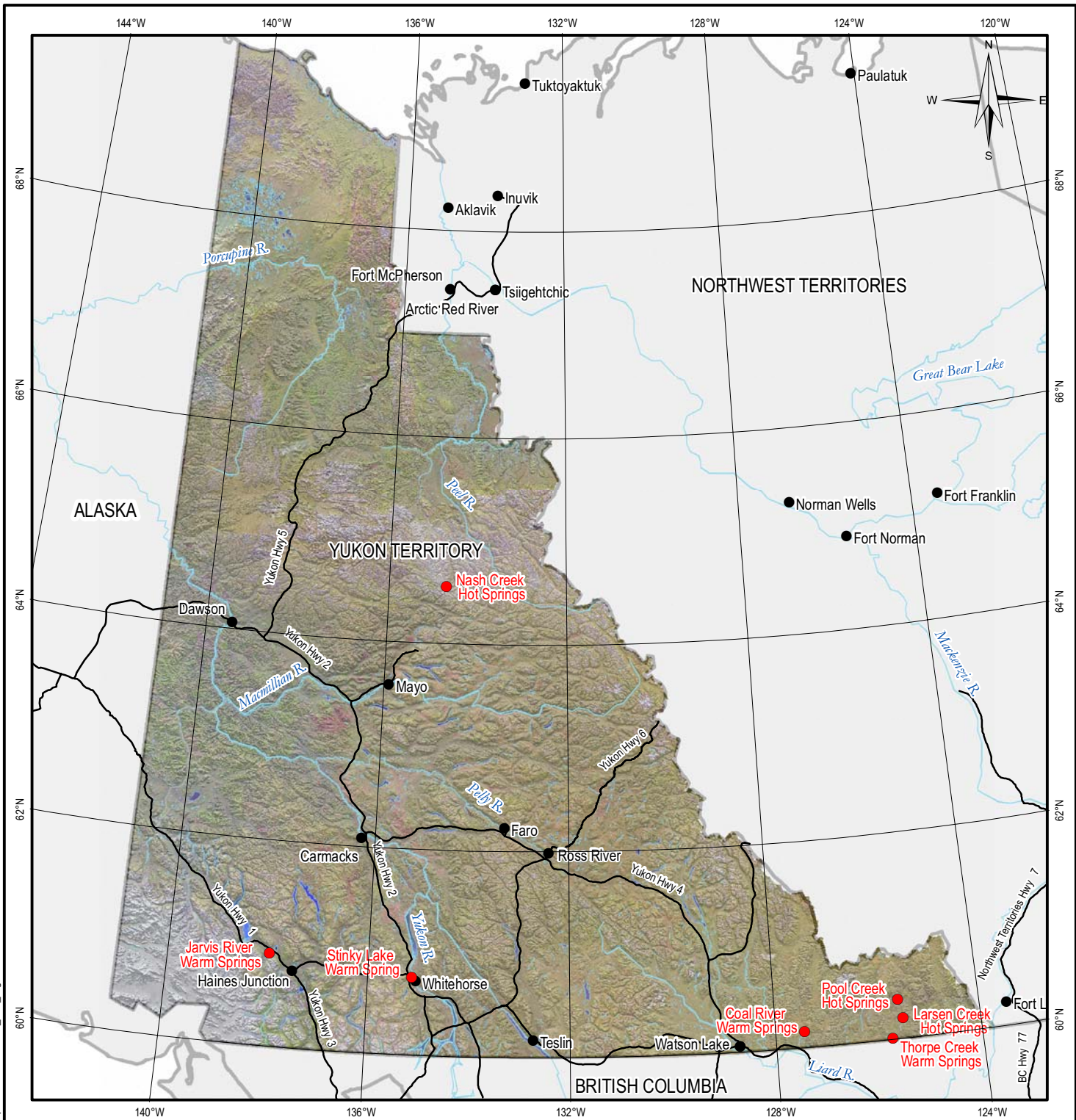
TABLE 2: NOBLE GAS DATA FROM MULTIPLE WARM AND HOT SPRINGS IN SOUTHERN AND CENTRAL YUKON										
Sample ID	Sample Location	He	Ne	Ar	Kr	Xe	3He	3He/4He	22Ne/20Ne	40Ar/36Ar
H09S-1	Jarvis River Warm Springs	1.59E-06	1.34E-07	3.90E-04	9.35E-08	1.44E-08	1.06E-12	6.64E-07	0.10255	296.5
H09S-11	Jarvis River area, cold springs	5.60E-08	1.98E-07	4.30E-04	1.05E-07	1.64E-08	7.21E-14	1.29E-06	0.10228	295.9
H09S-19	Jarvis River Warm Springs	6.13E-07	1.45E-07	3.36E-04	8.00E-08	1.23E-08	4.30E-13	7.01E-07	0.10209	295.2
H09S-4	Jarvis River Warm Springs	1.37E-06	1.38E-07	3.91E-04	9.27E-08	1.42E-08	8.98E-13	6.58E-07	0.10229	296.5
JR-09-01	Artesian aquifer, Jarvis River Warm Springs	1.77E-05	6.50E-07	8.67E-04	1.58E-07	2.08E-08	1.15E-11	6.47E-07	0.10220	296.2
L09S-04	Coal River Warm Springs	7.05E-07	2.85E-07	5.03E-04	1.15E-07	1.72E-08	4.92E-13	6.97E-07	0.10226	295.7
L09S-05	Thorpe Creek Warm Springs	4.58E-06	2.77E-07	4.77E-04	1.09E-07	1.70E-08	1.04E-12	2.26E-07	0.10227	296.0
L09S-44	Larsen Creek Hot Springs, south	8.38E-07	1.66E-07	3.30E-04	7.97E-08	1.25E-08	3.41E-13	4.07E-07	0.10205	295.9
L09S-51	Larsen Creek Hot Springs, north	1.94E-06	2.77E-07	4.59E-04	1.05E-07	1.59E-08	7.34E-13	3.79E-07	0.10236	296.5
L09S-57	Pool Creek Hot Springs	1.87E-06	1.09E-07	2.83E-04	7.48E-08	1.19E-08	1.12E-12	5.99E-07	0.10263	296.9
L09S-71	Pool Creek Hot Springs	1.80E-06	1.35E-07	3.41E-04	8.57E-08	1.30E-08	1.42E-12	7.85E-07	0.10226	296.5
N09L-27	Nash Creek Hot Springs	7.95E-06	1.50E-07	3.45E-04	8.77E-08	1.40E-08	1.11E-12	1.40E-07	0.10238	298.1
N09S-08	Nash Creek Hot Springs	7.67E-06	1.41E-07	3.41E-04	8.72E-08	1.40E-08	1.04E-12	1.35E-07	0.10235	297.9
N09S-21	Nash Creek area, cold spring	5.69E-07	1.97E-07	3.84E-04	9.03E-08	1.37E-08	1.36E-13	2.39E-07	0.10235	296.1
SL-2	Stinky Lake Warm Spring	8.28E-07	2.28E-07	4.47E-04	1.04E-07	1.61E-08	2.90E-12	3.50E-06	0.10217	295.7

NOTES:

All noble gas concentrations are given in $\text{cm}^3_{\text{STP}}/\text{g}$.



FIGURES



LEGEND

- Noble Gas Sampling Location
- Community
- Waterbody
- Road

NOTES

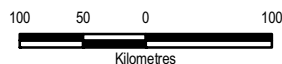
Base data source: ESRI, Geomatics Yukon

**2009 GEOTHERMAL EXPLORATION PROGRAM
MULTIPLE AREAS, YUKON**

Noble Gas Sampling Locations

PROJECTION: Yukon Albers
DATUM: NAD83

Scale: 1:6,000,000



FILE NO.: W23101159_022_Figure01.mxd

PROJECT NO.	DWN	CKD	REV
W23101159.022	MEZ	SK	0

OFFICE	DATE
EBA-VANC	March 12, 2010

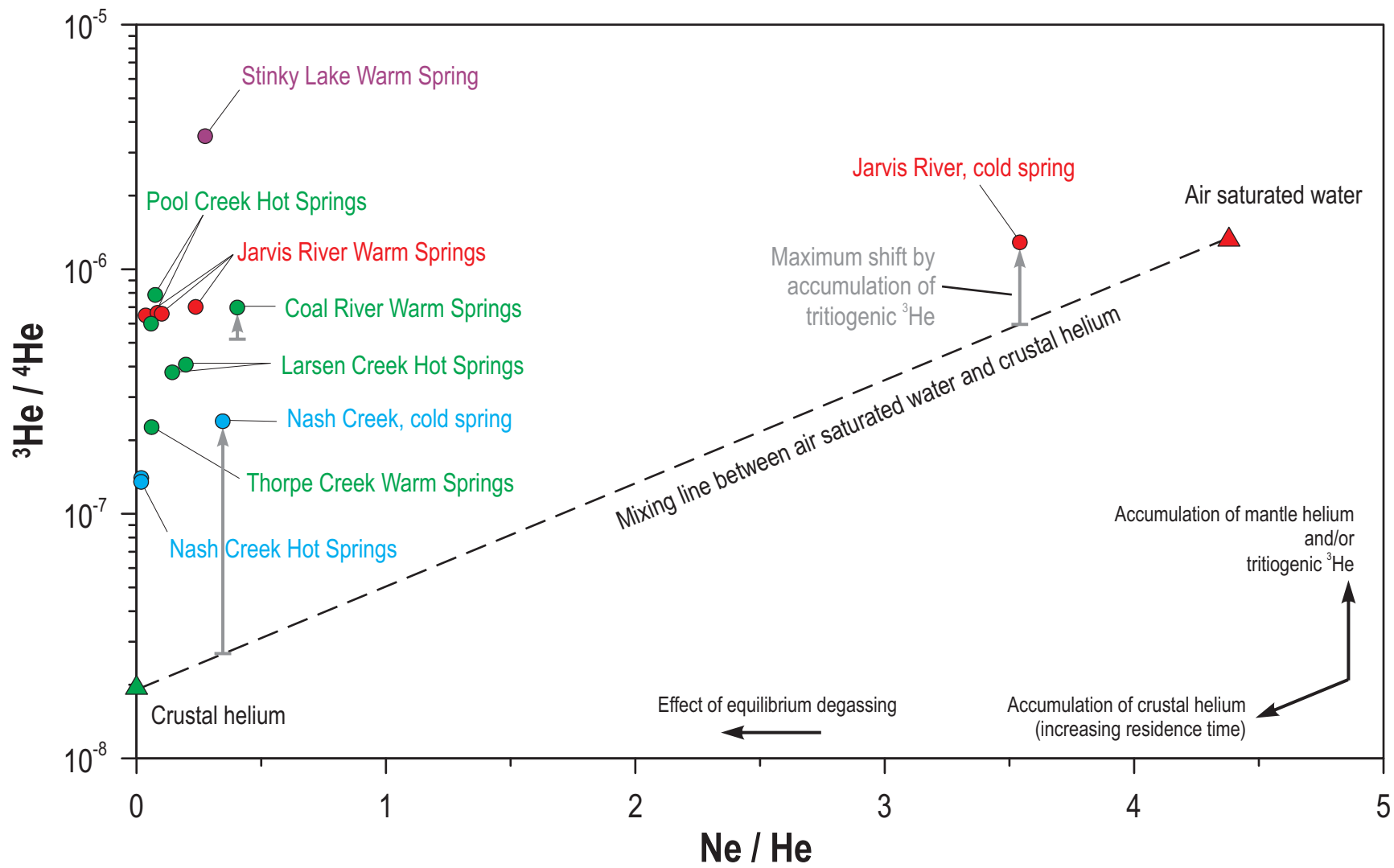


EBA Engineering Consultants Ltd.



Figure 1

ISSUED FOR REVIEW



LEGEND

- Jarvis River area samples
- Nash Creek area samples
- Larsen Creek / Beaver River area samples
- Whitehorse area samples

CLIENT

YUKON ENERGY



EBA Engineering Consultants Ltd.



**2009 GEOTHERMAL EXPLORATION PROGRAM
MULTIPLE AREAS, YUKON**

Noble Gas Data

PROJECT NO. W23101159.022	DWN SK	CKD RMM	REV 0
OFFICE EBA-WHSE	DATE March 2010		

Figure 3



APPENDIX

APPENDIX A GENERAL CONDITIONS



GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

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

1.0 USE OF REPORT AND OWNERSHIP

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

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

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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.