REVEGETATION TRIALS

ON THE PESO SITE ON THE DUBLIN GULCH PROPERTY

2012 to 2018

Volunteer spruce and shrubs growing with the alder on a plot at the Waste Rock Dump

For
Victoria Gold Corp.

Submitted by

Laberge
ENVIRONMENTAL SERVICES

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EXECUTIVE SUMMARY

A six year revegetation trial was conducted at the old Peso mine site on Victoria Gold's Dublin Gulch property located in central Yukon. The latest mining activity and disturbance at Peso occurred in the 1960s and very little natural revegetation had taken place over the ensuing decades. Blocks of plots were established on two sites; an old trenched area and the waste rock dump below the adit. Plots in each block received no treatment or a variety of amendments including biochar, compost, leonardite and dolomite lime prior to seeding with native grasses and locally collected alder seed.

The soil at Peso is acidic, nutrient poor and highly mineralized. Biochar was chosen as one of the amendments due to its ability to transform degraded land. It increases the pH of acidic soils, adds moisture retention to arid soils, provides surface area for microbes and nutrients to use, immobilizes metals and can sequester carbon into the ground for very long periods. Biochar itself is not a fertilizer, and is combined with compost in this trial, to provide nutrients for initial plant growth.

Annual assessments were conducted midsummer from 2013 to 2018. Unsurprisingly, there was minimal, if any, growth on the plots that were seeded but received no amendments, analogous to the surrounding areas. Although grasses are not the dominant growth form in the nearby local environment, native grasses were initially planted as they germinate quickly, assist in retaining moisture and help to build up the soil through litter decomposition. By year two most of the treated plots supported relatively healthy growth of various grass species. Alder seeds that were also added to the plots began noticeably growing in years two and three. In year four grasses were gradually dying back and shrubs, mainly alder, were taking over. Willow, dwarf birch, Labrador tea, blueberry and Alaska birch were also beginning to colonize some of the plots, all of which are present in the neighbouring forest. The shrubs increased in growth over the final years and in 2018 some of the alders had produced seed cones.

Alder is a nitrogen fixing woody plant. Nitrogen is an essential element in plant development and the primary limiting factor for plant growth in boreal forests. The successful growth of this species on the plots provides nitrogen to the soil increasing soil fertility. During the 2018 assessment nitrogen nodules were observed on alder roots. In addition, the decomposition of alder leaves and other alder parts contributes nitrogen to the soil.

In the final year of the trial, soil and foliar tissue samples were collected and analysed for metals. Soil analysis indicated that the growth medium is acidic, nutrient poor and mineralized with very high concentrations of several metals. It appeared biochar was sequestering some metals in the treated plots. Although metal concentrations were extremely high in the soil (i.e arsenic, antimony and lead), these metals were not taken up in large amounts by the plants. Concentrations in the tissues appear relatively similar to those collected at other locations at Dublin Gulch and at other Yukon mine sites.

In summary, these trials have proven successful. With minimal effort, the use of appropriate species and soil amendments have produced healthy plants that have grown, propagated and even thrived on these acidic, highly mineralized soils.

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1.0 INTRODUCTION

1.1 Background

The claims at the Peso site were first staked in June 1910 by J. Alverson and G. Huffman, who sank a 4.9 m shaft in 1912 and trenched until 1916 (Yukon Minfile). In 1948, with antimony in demand, Cecil D. Poli re-staked Alverson's old silver-lead-antimony property as the Peso 1 – 12 claims and trenched the vein by hand. On route back to Haggart Creek he discovered the Rex vein two miles to the southeast. The Peso vein gave 40 ounces of silver per ton and a sample from the Rex vein gave 25 ounces per ton. These properties were optioned in the early 1950s at the height of the boom, but no significant work was done on them (Aho, 2006).

In 1961 Tanar Gold Mines Ltd transferred the claims to a new company, Peso Silver Mines Ltd who carried out extensive exploration from 1961 to 1965, including underground development on the Peso vein. The two main vein zones at Peso Rex contained a reasonably well proven-probable reserve of about 154,000 tons at 20.9 ounces of silver per ton and 3.7% lead (Campbell, 1965). The veins contain abundant pyrite and arsenopyrite, with jamesonite, tetrahedrite and minor shalerite and bismuthinite, including the metallic minerals galena and chalcopyrite (Aurum Geological Consultants, 1992).

M.J. Moreau explored with hand trenching in 1986 and bought the Peso and Rex claims at a Sheriff's sale in August 1988 (Yukon Minfile).

In 1991, M. J. Moreau Enterprises Ltd made a request of Aurum Geological Consultants to prepare a report summarizing the economic potential of the Pierre Property, which included the Peso claims. Results from samples collected in 1991 from the No. 1 Vein (Peso) returned a high silver value of 318.5 ppm which when fire assayed returned 37.8 oz/ton silver (Aurum Geological Consultants, 1992).

In 1994 First Dynasty Mines Ltd acquired claims throughout the area and in 1996 its wholly owned subsidiary, New Millennium Mining Ltd carried out a major drilling program in the Dublin Gulch area.

Stratagold acquired the Dublin Gulch property in 2004 and commenced a drilling program in 2005 to delineate the Eagle Zone. Victoria Gold Corp. assumed control in 2009.

Recent exploration work has been undertaken by Victoria Gold in the Rex/Peso area, however the locations of the trial plots are outside of the active zone and provide a representative site for the revegetation experiment.

1.2 Scope of Work

Victoria Gold Corp has sponsored revegetation research in support of reclamation planning for the Eagle Gold Project at their Dublin Gulch Property. The objective of the revegetation program at Peso is to test the viability of incorporating biochar and other soil amendments into the site with a goal of creating an ultimate reclamation and revegetation plan that will be transferable to the Eagle Gold Project Reclamation and Closure Plan (StrataGold 2014). The Peso site was chosen because 1) there were existing and un-reclaimed facilities (waste dump

and trenches) at the site that were located in similar terrain and with similar climatic conditions and geologic properties as the Eagle Gold Project, and 2) unlike other areas within the Eagle Gold Project area subject to exploration, construction and other activities, the established plots at Peso would remain undisturbed.

Biochar is a light charcoal material produced by heating or combusting biomass under low or no oxygen conditions, a process known as pyrolysis. Residues of incomplete organic pyrolysis (e.g., from cooking fires), are thought to be the key component of terra preta soils, a very dark fertile anthropogenic soil known most commonly from the Amazon basin. It was most likely intentionally developed by humans between 450BC and 950AD to improve the poor soil conditions in the Amazonian basin. Terra preta is characterized by high concentrations of low temperature charcoal; quantities of pottery shards; and organic matter such as plants, animals, bones and feces (Bates, 2010). While the biochar process has been known for over a century, recent efforts are underway to recreate the fertile Terra preta like soils through the biochar process (Economist 2009).

One of the greatest benefits of biochar is its capacity to transform degraded land. It adds moisture retention to arid soils, it provides surface area for microbes and nutrients to use, it immobilizes metals and it can lock carbon into the ground for very long periods (Bruges, 2009, Chen et al, 2018). The agronomic and environmental benefits of adding biochar to soils have been investigated for many years, but in the past several years research has begun into the use of biochar for bioremediation of mine-affected soil (Laberge Environmental Services, 2012). For example, Fellet *et al* (2011) found that an increase in biochar content in mine tailings reduced the bioavailability of cadmium, lead, thallium and zinc. In column leaching tests, the sorption of cadmium and zinc to biochar's surfaces reduced their leachate concentrations by 300 and 45 fold respectively (Beesley and Marmiroli, 2011). Therefore, as well as enhancing growing conditions in the soil for successful plant growth, biochar can also help to sequester metals and mitigate leachate water quality.

The organic material (i.e., trees, shrubs and organic surface cover) that will be cleared from the various development areas to make way for mining operations at Eagle Gold, can be processed into biochar on site thus creating a local source and thereby eliminating the introduction of unknown or unwanted components of outsourced biochar. The pyrolysis of plant biomass to generate biochar converts much of the carbon into a form of carbon which is very stable in soils for thousands of years. Thus, by creating biochar from the plant overburden, instead of allowing it to naturally decompose and consequently release carbon dioxide (a greenhouse gas) into the atmosphere, the carbon becomes unavailable and is sequestered. If applicable, Victoria Gold could earn carbon credits by 1) producing its own biochar as a soil amendment for the site's closure activities and 2) planting vegetation. With the introduction of a tax on carbon in the Yukon, the sequestration of carbon through these activities offsets at least some of the carbon dioxide that the mine will emit and thus lowers its carbon footprint.

The Peso plots were established in 2012 and assessed annually until 2018. Additional monitoring was completed in the final year (2018) of the trial, including soil testing, metal analysis of plant tissues, height of above ground growth and rooting depth.

2.0 STUDY AREA

The Eagle Gold Project at Dublin Gulch is located approximately 85 km northeast of the village of Mayo in central Yukon and lies wholly within the traditional territory of the First Nation of the Na Cho Nyak Dun. The project is 100% owned by Victoria Gold Corp and covers an area of approximately 650 square kilometers. Its centre is situated at the confluence of Haggart Creek and Dublin Gulch at the UTM Coordinates 7100950N / 453750E, Zone 8, NAD 83 Datum.

The historic Peso Minesite is located approximately 6.5 km west of the camp at the Eagle Gold Project, near Secret Creek, a tributary to Haggart Creek (Figure 1). The study area lies within the northern region of the Yukon Plateau North ecoregion in the Stewart River sub-basin of the Yukon River watershed. This area is generally characterized by rolling uplands with steep slopes leading into U-shaped valleys (Smith *et al,* 2006). There are two zones within the Eagle Gold Site; subalpine, and open black spruce forests at lower elevations. The subalpine zones (above 1225 masl) are generally dominated by dwarf birch and willows. Other species occurring within the forested areas are Alaska birch, aspen, balsam poplar and white spruce, depending on aspect. Subalpine fir is also found in small pockets at higher elevations (Stantec, 2011).

Climate stations are operational within the Eagle Gold Project area at the Potato Hills Station (1420 masl) and at the Camp Station (782 masl). Knight Piesold Consulting (KPC) examined and summarized the meteorological data collected over a four year period, 2009 to 2012 (KPC, 2013). Since the two climate stations are located at significantly different elevations and thus will have varied temperature and precipitation results due to orographic tendencies, KPC used a reference elevation of 1125m for their analysis and summary. Table 1 summarizes selected climatic parameters for this elevation.

TABLE 1 MEANS FOR SELECTED CLIMATIC PARAMENTERS AT ELEVATION 1125m

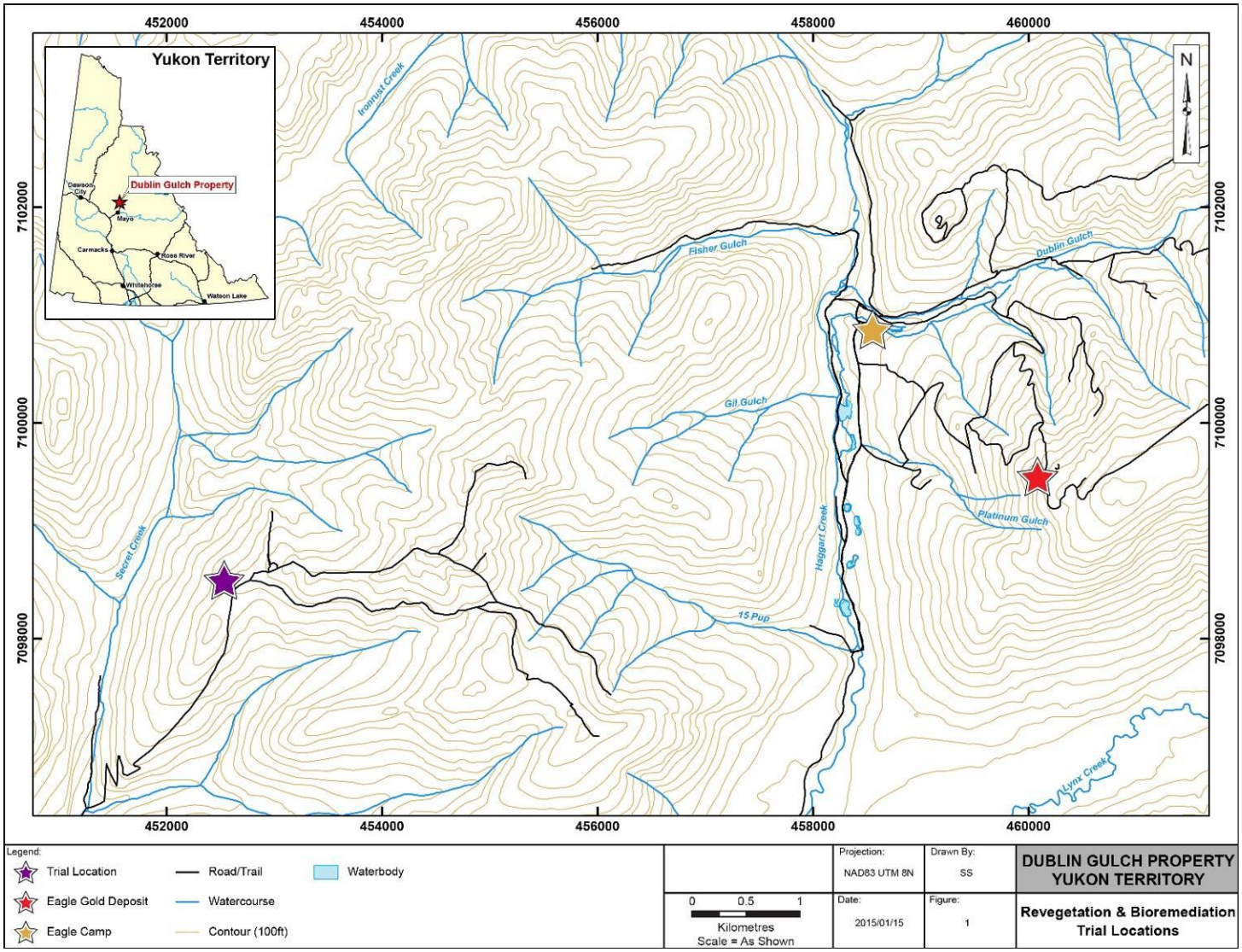
Parameter	Value
Mean annual temperature	-4.2
Mean January temperature	-19.7
Mean July temperature	11.4
Mean annual precipitation	500 mm
Mean annual rainfall	190 mm
Mean annual snowfall (water-equivalent)	310 mm
Mean annual rainfall/snowfall distribution	38% / 62%

Taken from KPC 2013

Since the elevation of the vegetation trials is slightly lower than 1125 m (see Table 2), the above values should be relatively representative of temperature and rainfall at the Peso plots.

The majority of the exploration work at the Peso site was completed during the early 1960s. With the exception of dense growth of alders at the less disturbed sites, very little natural revegetation has taken place in the areas disturbed by historical activities in the Peso area over this time period. Vegetation in the adjacent undisturbed and lesser disturbed sites consists of subalpine fir, white spruce, black spruce and Alaska birch, with occasional balsam poplar and trembling aspen. Mountain alder, dwarf birch, Scouler's willow and blue-green willow are the most common medium to tall shrub species (Laberge and Nacho Nyak Dun Development Corporation, 2004).

FIGURE 1 PESO REVEGETATION TRIAL LOCATIONS ON THE DUBLIN GULCH PROPERTY



The ground cover includes low shrubs such as Labrador tea, Beauverd's spiraea, kinnikinick, lingonberry, blueberry and crowberry. Dwarf dogwood, toadflax, lupine and fireweed are the most common forb species (Laberge Environmental Services and NND-DC, 2004).

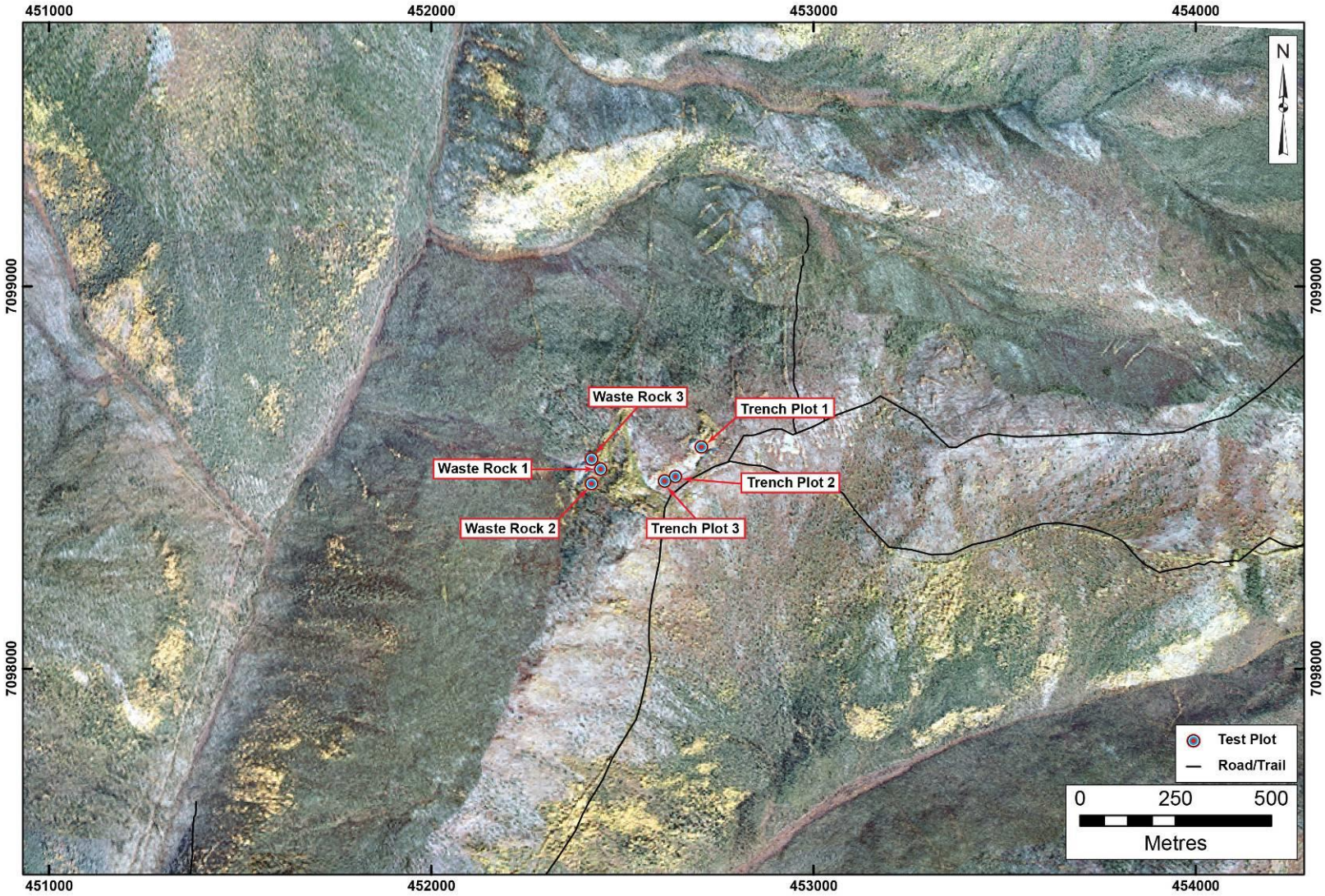
During a reconnaissance trip in June 2012, two sites at Peso were selected for the revegetation trials, an exploration trench and the waste rock dump. Although trenching has been undertaken at the site since the early 1900s, mostly hand trenching, it is assumed that the trench chosen for the trials was a result of bulldozer exploration in the early 1960s by Peso Silver Mines. Three blocks, each containing 5 test plots, were established at the trench site. Block #1 is located north of an exploration trail and the other 2 Blocks are located south.

The Peso adit is located approximately 250 m west of the trench. Peso Silver Mines conducted underground development on the Peso vein resulting in the formation of the waste rock dump on the west facing slope. The waste rock dump covers an area approximately 50 m by 70 m. It is comprised of three lifts varying in thickness from two to six meters. A total of three blocks, each containing 5 test plots, were established on each tier. The locations of the blocks are detailed below in Table 2 and shown on Figure 2.

TABLE 2 BLOCK LOCATIONS AT PESO

Site	Latitude	Longitude	Elevation (m)
Trench:			
Block #1	64° 00.649'	135° 58.038'	1040
Block #2	64° 00.607'	135° 58.119'	1030
Block #3	64° 00.601'	135° 58.154'	1042
Waste Rock:			
Block #1	64° 00.616'	135° 58.360'	992
Block #2	64° 00.595'	135° 58.388'	986
Block #3	64° 00.630'	135° 58.390'	973

FIGURE 2 TEST PLOT LOCATIONS AT THE OLD PESO MINESITE



3.0 STUDY DESIGN

3.1 Soil Analysis

The success of a revegetation project depends firstly on characterizing site-specific conditions such as soil fertility, climate, aspect, elevation, slope, drainage, etc, prior to making any decisions regarding seed mixes and amendments.

For the purposes of this study, a reconnaissance visit to the old Peso mine site was initially conducted on June 24th, 2012. After assessing the area, two areas were chosen for the revegetation trials and are described in Section 2.0. Soil samples were collected from these sites and sent to Maxxam Analytical Laboratory in Burnaby, BC. The complete analytical report can be found in Appendix A and a summary of data in Section 4.1.

The soil was extremely acidic at the waste rock site and strongly acidic at the trench site. Acid tolerant plant species consequently were selected for the revegetation project. Soil samples collected from the waste rock in 2003 showed it to be extremely acidic with a pH value of 2.8 (Laberge, 2004). Soil samples collected near the portal and from the easternmost lobe of the waste rock in 1997 were potentially acid generating following bottle roll tests (Environmental Services, 1998). The soil samples collected in 2012 confirm the strong acidity of the waste rock dump (pH 2.6). Soil testing of the trench area had not been done previously.

All available nutrients were extremely low where detected. Organic matter and total organic carbon were very low at the waste rock site and below the detection limits at the trench site.

Concentrations of antimony, arsenic and lead were extremely high at both sites. Antimony is a trace element and background levels are generally very low. Antimony concentrations are usually much greater at mining and contaminated sites.

Background levels of arsenic in soils are low and rarely exceed 15 mg/kg (Singh, 2005). Arsenic concentrations were very high at the Peso site with much higher levels that appear atypical when compared to other sites sampled for soil geochemistry at the Dublin Gulch site (Burns, 2013, Laberge Environmental Services, 2018a).

Lead concentrations were also extremely high in the two soil samples at Peso and were much greater than documented at other locations at Dublin Gulch.

Generally the metal concentrations were similar at both of the selected trial sites.

3.2 Field Design

3.2.1 Site Preparation

The plots at the two sites were installed on July 19th, 2012. Three blocks of plots were situated on relatively level ground with the same aspect at each site. Each block measured 5m by 2m and contained 10 one-meter square plots. The blocks and plots were measured and demarked with orange fluorescent painted rebar. Labeled flagging tape was added to each corner pin of the plots.

The plots were prepared and seeded from September 18th to 20th, 2012. Each plot to be seeded was scarified first with a hand-cultivator (tine length 15 cm), and then raked with a fine-toothed rake (see Photo #1, Appendix B). Soil amendments were well mixed into the prepared plot and then the seeds were hand broadcast throughout the plot. Each plot was tamped gently but firmly with the back of a rake to create micro-sites and achieve good seed placement.

Every other plot within each block was seeded, allowing the unseeded/untreated plots to represent buffer zones. The implementation of buffer plots ensures that each test plot is isolated and uninfluenced from neighboring plots. As well, each plot can be assessed and closely examined without the risk of trampling on plants on the other test plots. Further details, including photographs are included in a report prepared for Victoria Gold (Laberge, 2013). As described below, due to the differences in acidity at the two sites, slightly different seed mixes and treatments were prepared.

3.2.2 Treatments

The intention of these trials was to determine in a relatively simple manner which amendments might be utilized for successful native plant growth to initiate the restoration process. The amendments used in these trials were biochar, compost, leonardite and dolomite.

Raw biochar chips were obtained locally from Zakuas Farms, Whitehorse, Yukon. Prior to application they were ground in a steel-blade seed grinder to produce a fine, almost powdery mix. It has been well established that biochar on its own (due to the lack of nutrients) is insufficient as an amendment on poor soils (Peltz *et al*, Beesley and Marmiroli, 2011, Beesley *et al*, 2010), hence it was combined with nutrient rich compost for each plot.

Bags of compost were obtained from the co-operative project at the Whitehorse Solid Waste Facility which produces commercial quantities of high quality compost.

Leonardite is defined as a naturally occurring oxidized form of lignite coal that is rich in humic acids. Its main use is as a soil amendment in agriculture and reclamation. For the purposes of this study, leonardite was obtained from Tisdale, Saskatchewan. This leonardite consisted mostly of humic acid with small amounts of fluvic acid and required minimal processing. It was also included with the amendments for some of the plots as an additional source of nutrients.

Due to the relatively higher acidity at the waste rock dump site, commercially available dolomite, purchased from Canadian Tire, was added to the amendment mix at some of the plots to create some buffering capacity.

No other fertilization was used and the plots were not watered at any time. The plots were exposed to the natural conditions that existed at each of the local areas throughout the seasons. Thus, aside from the initial site development and treatment, no other treatment or site modification was implemented.

3.2.2.1 Waste Rock Site

In attempts to control acid generation and enhance soil rehabilitation, the following amendments were used on the waste rock sites; biochar, compost, leonardite and dolomite lime.

The application rates per plot are as follows:

- 6 liters of biochar (just under 1 kg)
- 15 liters (1/2 bag) of compost
- 0.15 kg/m^2 of leonardite
- 3.3 kg/m^2 of dolomite

There were five treatments per block of plots:

Treatment Method #	Treatment Composition
1	Seed only
2	Seed, biochar, compost
3	Seed, biochar, compost, leonardite
4	Seed, biochar, compost, dolomite lime
5	Seed, biochar, compost, leonardite, dolomite lime

The layout of the plots and treatments per block is presented in Figure 3. Each treatment is represented once per block and three times in total for the site. The shaded plots received no treatments and represent buffers between plots.

FIGURE 3 LAYOUT OF TREATMENTS AND PLOTS AT WASTE ROCK

Waste Rock Block #1 (on top tier near the adit) – seeded and amendments added Sept 18, 2012 @13:00

1 Plot # 1-1		**3** Plot # 1-3		**5** Plot # 1-5
	2 Plot # 1-2		**4** Plot # 1-4	

Waste Rock Block #2 – (on second tier) seeded and amendments added on September 18, 2012 @ 14:30

	2 Plot # 2-2		**4** Plot # 2-4	
1 Plot # 2-1		**3** Plot # 2-3		**5** Plot # 2-5

Waste Rock Block #3 – (on third tier from top) seeded and amendments added on September 18, 2012 @ 16:00

1 Plot # 3-1		**3** Plot # 3-3		**5** Plot # 3-5
	2 Plot # 3-2		**4** Plot # 3-4	

3.2.2.2 Trench Site

The soil at the trench site was not as acidic as on the waste rock dump, with a pH of 5.15, consequently dolomite lime was not included as an amendment. Biochar, compost and leonardite were again applied to the trench plots at the following application rates:

- 3 liters of biochar
- 15 liters (1/2 bag) of compost
- 0.15 kg/m2 of leonardite

There were three treatments per block of plots:

Treatment Method #	Treatment Composition
1	Seed only
2	Seed, biochar, compost
3	Seed, biochar, compost, leonardite

The layout of the plots and treatments per block is presented in Figure 4. Each treatment is represented five times for the site. The shaded plots received no treatments and represent buffers between plots.

FIGURE 4 LAYOUT OF TREATMENTS AND PLOTS AT TRENCH SITE

Trench Block #1 – seeded and amendments added on September 19, 2012 @ 11:00

1 Plot #1-1A		**3** Plot #1-3		**2** Plot #1-2B
	2 Plot #1-2A		**1** Plot #1-1B	

Trench Block #2 – seeded and amendments added on September 18, 2012 @ 18:00

	1 Plot # 2-1A		**3** Plot # 2-3A	
3 Plot # 2-3B		**2** Plot # 2-2		**1** Plot # 2-1B

Trench Block #3 – seeded and amendments added on September 19th, 2012 @ 10:00.

2 Plot #3-2A		**1** Plot #3-1		**3** Plot #3-3B
	3 Plot #3-3A		**2** Plot #3-2B	

3.2.3 Seed Mix

The species chosen for the trials were determined through consultation of the Yukon Revegetation Manual (Matheus and Omtzigt, 2012) as well as through the observation of species currently growing in the near vicinity of the sites. The appropriate seed mixes were distributed for each plot as per the quantities noted in Table 3. In addition, because alder grows prolifically around the site and is well adapted to localized conditions, a small handful of local alder seeds was collected on site and distributed with the seed mix. Furthermore, alder fixes nitrogen and all parts of the plants contribute nitrogen to the soil during decomposition. Seeds from Hedysarum plants (a nitrogen fixing legume) were also added to the seed mix to increase the nitrogen potential.

The seed mix is slightly different for the two sites due to soil conditions. The soil at the waste rock site was extremely acidic, had little to no nutrient values and was highly mineralized. Several plant species were chosen due to their tolerances to acidic, low nutrient levels, drought and/or heavy metal conditions in the growth medium. The seed rate, adjusted to $1m^2$ plot size, is also provided in Table 3. The soil at the trench site was not as acidic as on the waste rock dump and slight alterations were made to the seed mix (Table 3).

TABLE 3 SEED MIX AND RATE OF APPLICATION FOR WASTE ROCK AND TRENCH SITES

Common Name	Scientific Name	Application rate/plot at Waste Rock	Application rate/plot at Trench
Sheep fescue	*Festuca ovina*	0.4 g	0.4 g
Tufted hairgrass	*Deschampsia caespitosa*	0.14 g	0.14 g
Glaucous bluegrass	*Poa glauca*	0.19 g	---
Alpine bluegrass	*Poa alpina*	---	0.21 g
Tickle grass	*Agrostis scabra*	0.04 g	---
Spike Trisetum	*Trisetum spicatum*	---	0.9 g
Bear root	*Hedysarum alpinum*	20 seeds	20 seeds
Alder	*Alnus viridus*	small handful	small handful

The first six plant species are native occurring plants with commercially available accredited seed obtained from BrettYoung$_{TM}$ of Calmar, Alberta. Alder seeds were hand collected from local plants near the plots on the day of planting and spread onto each plot. Hedysarum seeds, previously collected from various sites in the Yukon, were also added to the plots.

4.0 ASSESSMENTS

4.1 Soil

Soil samples were collected from each plot in 2018, including the plots that received no treatment. Surface samples were collected to a depth of 5 to 10 cm, using a stainless steel trowel and placed into resealable plastic bags. All samples were kept cool until delivered to the ALS lab in Whitehorse, Yukon.

The soil was analyzed for pH, organic content, available nutrients and metals. The complete analytical report is presented in Appendix A.

Selected parameters were compared from the untreated plots to the soil samples collected in 2012 (Table 4). As actual plot locations were not yet determined in June 2012, the soil samples were not collected from the exact locations on both years. The results for the 2018 soil sample analysis collected from the untreated plots in each block were averaged to represent the concentrations existing at the Trench and Waste Rock Dump sites.

It appears that the organic matter content has slightly increased over the time period. It was noted that scant vegetation was gradually colonizing the untreated plots as well as the buffer plots. The pH at each location is consistent. Available phosphate was similar however available potassium concentrations were higher in 2018 than in 2012. Some of the metal concentrations were quite different in the two time periods, notably at the waste rock dump, and likely is reflective of the distribution of the disturbed terrain as the waste material was removed from the adit.

TABLE 4 EXISTING SOIL CONCENTRATIONS, 2012 AND 2018

Parameter	MDL	Units	NO TREATMENT			
			Waste Rock		Trench	
			2018	2012	2018	2012
			N=3	N=1	N=3	N=1
Loss on Ignition @ 375 C	1.0	%	1.7	6.1	1.6	4.0
Organic Matter	1.0	%	1.6	0.6	1.5	<0.35
pH (1:2 soil:water)	0.10	pH	2.70	2.62	5.8	5.15
Total Carbon by Combustion	0.05	%	0.50	0.37	0.4	<0.20
Available Phosphate-P	2.0	mg/kg	2.2	2.9	2.9	1.8
Available Potassium	20	mg/kg	27.0	<2.0	28.3	8.5
Aluminum (Al)	50	mg/kg	5,030	2,690	3,230	2,350
Antimony (Sb)	0	mg/kg	1,777	3,680	3,567	3,580
Arsenic (As)	0	mg/kg	2,743	6,150	7,863	9,810
Cadmium (Cd)	0.020	mg/kg	1.3	4.88	4.7	4.28
Chromium (Cr)	0.50	mg/kg	11.7	6.7	11.7	12.2
Cobalt (Co)	0.10	mg/kg	6.04	3.54	5.31	5.33
Copper (Cu)	0.50	mg/kg	161.0	210	125.4	75.9
Iron (Fe)	50	mg/kg	40,700	57,500	50,300	46,300
Lead (Pb)	1	mg/kg	2,427	9,070	7,057	7,330
Mercury (Hg)	0.005	mg/kg	0.131	0.796	0.428	0.410
Nickel (Ni)	0.50	mg/kg	17.6	9.1	11.7	12.0
Selenium (Se)	0.20	mg/kg	5.4	19.30	7.9	12.70
Silver (Ag)	0.10	mg/kg	23.2	89.4	44.4	103.0
Zinc (Zn)	2.0	mg/kg	133.3	252.0	194.3	129.0

Soil samples were also collected from each of the treated plots in 2018 and the analytical data is presented in Tables A-1 (Trench) and A-2 (Waste Rock) in Appendix A. Means for each treatment

was calculated and selected parameters tabulated for the Trench (Table 5) and the Waste Rock Dump (Table 6).

Soil pH was raised slightly with the amendments except for plots where leonardite was also included. Leonardite is rich in humic acid and this additional acid limited buffering by the biochar.

Organic matter (%), Total Kjeldahl Nitrogen and total carbon by combustion increased with the addition of amendments.

TABLE 5 MEAN CONCENTRATIONS (N=3) OF EACH TREATMENT, TRENCH

Parameter	MDL	Units	No treatment	Biochar and compost	Biochar, Compost and Lenardite
pH (1:2 soil:water)	0.10	pH	5.8	6.7	6.6
Organic matter	1.00	%	1.5	2.3	2.5
Total Kjeldahl Nitrogen	0.020	%	0.066	0.086	0.094
Total Carbon by Combustion	0.05	%	0.4	1.3	1.3
Available Ammonium-N	1.0	mg/kg	1.8	2.5	2.3
Available Phosphate-P	2.0	mg/kg	2.9	23.0	21.1
Available Potassium	20	mg/kg	28.3	43.3	42.0
Aluminum (Al)	50	mg/kg	3230	3037	2973
Antimony (Sb)	0.10	mg/kg	3567	920	3036
Arsenic (As)	0.10	mg/kg	7863	2697	5007
Cadmium (Cd)	0.020	mg/kg	4.7	0.8	2.6
Calcium (Ca)	50	mg/kg	620	1215	2137
Chromium (Cr)	0.50	mg/kg	11.7	8.6	10.1
Cobalt (Co)	0.10	mg/kg	5.3	3.7	4.0
Copper (Cu)	0.50	mg/kg	125.4	66.4	74.7
Iron (Fe)	50	mg/kg	50300	32100	33367
Lead (Pb)	0.50	mg/kg	7057	1933	3273
Magnesium (Mg)	20	mg/kg	102.0	250.0	253.3
Manganese (Mn)	1.0	mg/kg	246.3	200.7	181.3
Mercury (Hg)	0.0050	mg/kg	0.4	0.3	0.5
Nickel (Ni)	0.50	mg/kg	11.7	8.6	9.4
Phosphorus (P)	50	mg/kg	762	678	805
Selenium (Se)	0.20	mg/kg	7.9	2.4	5.0
Silver (Ag)	0.10	mg/kg	44.4	14.2	21.6
Sulfur (S) *	1000	mg/kg	1733	1100	1600
Zinc (Zn)	2.0	mg/kg	194.3	107.5	96.8

* less than values (<) were excluded from the averaging MDL = method detection limit

The requisite macro nutrients required for all plant growth are nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), sulfur (S) and magnesium (Mg) (DalCorso *et al*, 2014). Total Kjeldahl Nitrogen (TKN) is the amount of nitrogen that is in organic form. TKN was present in all of the plots and generally increased with the applied amendments. Phosphorus was present in all plots however available phosphate was absent in a few plots, more so at the waste rock site (probably a function of pH). Total potassium and available potassium were documented at each site and concentrations increased with amendments at the Trench site. There was little

change in potassium with the amendments at the waste rock site. Calcium concentrations increased considerably with the amendments at both locations. Magnesium levels fluctuated throughout the study area. Sulphur levels were low at the Trench plots and frequently not detected (Table A-1), whereas high Sulphur concentrations were documented at the waste rock site, reflective of the acid rock drainage potential here.

Essential micro nutrients include iron (Fe), boron (B), nickel (Ni), copper (Cu), manganese (Mn), zinc (Zn) and molybdenum (Mo). Iron concentrations were high throughout the study area and ranged from 17,900 mg/kg to 70,100 mg/kg. Boron and molybdenum levels were very low and were barely detected at some plots. Nickel, copper, manganese and zinc were present at all plots.

Elements that are not essential but however benefit plant growth are sodium (Na), selenium (Se), aluminum (Al) and cobalt (Co). Aluminum is one of the most abundant elements in the earth's crust. Although low levels of aluminum are beneficial for plants due to its role in increasing the bioavailability of nutrient metal ions, high concentrations are toxic to most plants, especially in acidic soils. High concentrations were recorded at all plots. Cobalt was present in low concentrations at all plots. Selenium was also present at all plots, but concentrations increased with amendments at the Waste Rock site. Sodium was not detected at the plots at the Trench site but was present with fluctuating concentrations at the Waste Rock plots.

TABLE 6 MEAN CONCENTRATIONS (N=3) OF EACH TREATMENT, WASTE ROCK DUMP

Parameter	MDL	Units	No treatment	Biochar and compost	Biochar, compost and leonardite	Biochar, compost, dolomite lime	Biochar, compost, dolomite lime, leonardite
pH (1:2 soil:water)	0.10	pH	2.7	3.4	2.7	3.9	3.6
Total Kjeldahl Nitrogen	0.020	%	0.049	0.080	0.103	0.129	0.113
Total Carbon by Combustion	0.05	%	0.50	1.42	2.69	3.10	3.48
Available Ammonium-N	1.0	mg/kg	4.4	6.3	8.4	5.1	6.9
Available Phosphate-P	2.0	mg/kg	2.2	5.1	6.4	ND	15.6
Available Potassium	20	mg/kg	27.0	23.0	20.0	28.5	45.0
Aluminum (Al)	50	mg/kg	5030.0	4863.3	4336.7	4130.0	3360.0
Antimony (Sb)	0.10	mg/kg	1776.7	2855.0	2527.0	2952.7	4283.3
Arsenic (As)	0.10	mg/kg	2743.3	3653.3	4206.7	5466.7	5430.0
Cadmium (Cd)	0.020	mg/kg	1.3	2.4	2.9	3.0	3.2
Calcium (Ca)	50	mg/kg	476.7	918.7	588.7	4916.7	10726.7
Chromium (Cr)	0.50	mg/kg	11.7	12.0	10.0	10.1	6.7
Cobalt (Co)	0.10	mg/kg	6.0	6.0	8.9	6.5	2.0
Copper (Cu)	0.50	mg/kg	161.0	176.8	209.3	280.3	269.7
Iron (Fe)	50	mg/kg	40700.0	38233.3	45566.7	50600.0	47466.7
Lead (Pb)	0.50	mg/kg	2426.7	6400.3	5137.0	5223.3	9410.0
Magnesium (Mg)	20	mg/kg	1427.3	1477.3	677.3	3033.7	5464.0
Manganese (Mn)	1.0	mg/kg	171.0	170.6	161.7	147.9	127.3
Mercury (Hg)	0.0050	mg/kg	0.1	0.3	0.4	0.4	0.6
Nickel (Ni)	0.50	mg/kg	17.6	15.3	20.8	17.1	6.7
Phosphorus (P)	50	mg/kg	437.0	849.7	1011.0	1093.3	1144.0
Selenium (Se)	0.20	mg/kg	5.4	10.6	10.9	12.2	18.0
Silver (Ag)	0.10	mg/kg	23.2	11.8	30.8	45.8	62.9
Zinc (Zn)	2.0	mg/kg	133.3	137.8	174.9	126.2	93.5

* less than values (<) were excluded from the averaging

Plants must deal with the non-essential elements such as arsenic (As), mercury (Hg), silver (Ag), antimony (Sb), cadmium (Cd), lead (Pb) and uranium (U), which may potentially be harmful. Arsenic

concentrations were very high throughout the soils in the study area and ranged from 1,240 mg/kg to 11,400 mg/kg. Mercury was detected at all plots. Silver is widely distributed in the earth's crust with an average abundance estimated at 0.07 mg/kg (Taylor, 1964). High concentrations of silver were documented in the soil samples collected from all the plots with some results greater than what the analytical method could determine. Antimony concentrations were very high at the plots with levels ranging from 369 mg/kg to 6,410 mg/kg. The earth's crustal average has been estimated at 0.2 mg/kg (Taylor, 1964). Lead concentrations were also high throughout ranging from 331 mg/kg to 16,600 mg/kg. Cadmium and uranium were present at all plots in fairly low concentrations.

4.2 Vegetation

4.2.1 Annual Assessments on Growth

The trial plots have been assessed on seven different occasions; twice in 2013 (July and September), early August 2014, early August 2015, mid July 2016, early August 2017 and late July 2018. All plots have had six full years of growth opportunity. Photographs chronicling each block and selected plots over the time period are provided in Appendix B.

The results for all seven assessments are presented in Table C-1 for the Trench Site and Table C-2 for the Waste Rock Site, both in Appendix C. The percentage of vegetative cover, species composition and overall health were observed for each plot. Vegetation cover is determined through point-based methods or ocular estimates. Due to the small size of the examined plots ocular estimates were made for the cover of each plot. Ocular estimates have a subjective element. In order to minimize observer variance, one member of the initial field team was present for each of the annual assessments.

The plots that were seeded but received no amendments supported very little, if any, growth over the six years. This is consistent with the general area as the acidic and mineral soils here have limited natural revegetation in the disturbed areas. The other plots with the different amendments sustained various levels of growth over time.

Although grasses are not the dominant growth form in the nearby local environment, native grasses were initially planted as they germinate quickly, assist in retaining moisture and helping to build up the soil. By year two most of the treated plots supported relatively healthy growth of various grass species. Hedysarum germinated in some plots during year one but was absent in the following years. Alder seeds that were also added to the plots began noticeably growing in years two and three. In year four grasses were gradually dying back and shrubs, mainly alder, were taking over. Willow, dwarf birch, Labrador tea, blueberry and Alaska birch were also beginning to colonize some of the plots, all of which are present in the neighbouring forest. Grasses were also dying back in the plots where alder was not prevalent. Table C-3 in Appendix C lists the species, planted and volunteer, that were identified in the plots over the course of the study period.

As the grasses and shrubs lose their leaves, organic matter builds up, which leads to an increase in soil fertility. During the 2018 assessment, nitrogen fixing nodules were observed on the roots of several alder plants on both the trench and waste rock plots (see Photos 40 and 55). Nitrogen is an essential element in plant development and generally the most limiting nutrient in boreal ecosystems. Plants however, cannot directly access nitrogen gas, which makes up about 80% of the atmosphere. Plants absorb the dissolved nitrogen in the soil

through their roots in the form of ammonium and nitrates. Legumes (Fabaceae) host a bacteria that fixes nitrogen in root nodules which then becomes available to plants. Alder, of the family Betulaceae, is a non-legume which also fixes nitrogen. The presence of these nodules on the alder roots indicates that nitrogen is being produced on the treated plots both on the Trench and the Waste Rock Dump. The decomposition of alder leaves and plant parts likewise provides available nitrogen. This in turn increases the nutrient levels in the soil allowing other species to grow and become established.

Initially the vegetative cover of the plots increased but generally decreased in years three and four, coinciding with grass die off. Cover typically increased in following years as the shrubs grew larger. The exception to this was the plots that received no amendments (seed only). On some of these plots there initially was some minor growth however it had died back in later assessments. Cover at all of the treated plots in Block 3 of the Waste Rock site also decreased over time.

Plant growth was stressed in the plots that were seeded with no treatment (Treatment #1). The healthiest plots generally occurred at those treated with biochar and compost (Treatment #2), and the addition of dolomite tended to assist in the health at some of the plots at the Waste Rock site. The inclusion of Leonardite did not show any marked improvements in the plots and actually tended to decrease the health in the plants on some of the plots on the Waste Rock site. Although most of the alder on the waste rock amended plots exhibited healthy growth, some plants appeared to be suffering from necrosis – browning of leaves and yellow venation (Photo #81). This is likely the result of high concentrations of metals in the soil coupled with nutrient deficiency.

Some of the grass species were mature and producing seed at several plots commencing in the second year. For the first time, several alder had produced seed cones (Photos 28 and 54) in 2018.

During the annual assessments there had been occasional signs of herbivory.

Rooting depth and length were measured on several of the plants in 2018. Rooting depth ranged from 2 to 5 cm depending on the depth of the humus layer that had been built up over time. The roots then grew laterally above the mineral substrate and tended to average around 7 to 9 cm (Table C-4). The root lengths are likely underestimated due to their fragility and the difficulty involved in removing them from the substrate.

4.2.2 Metals in Foliar Tissues

Foliar samples were collected in 2018 from each plot where possible. Several plots, primarily those that received no treatment, supported very little, if any, growth, preventing the collection of sufficient biomass for analysis. Alder was growing at most of the other plots and was the principal tissue collected. There was insufficient growth of grasses in any of the plots by the sixth year of the trial preventing the analysis of this tissue type. Willow was growing in adequate volume to warrant the individual collection of this shrub at Plot 1-4 on the Waste Rock Dump only. Table 7 describes which species were collected at the various plots.

TABLE 7 FOLIAR SAMPLES COLLECTED PER PLOT

SITE	BLOCK #	PLOT #	ALDER LEAVES	ALDER STEMS	ALDER LEAVES & STEMS	WILLOW LEAVES & STEMS
TRENCH	1	1-1B			√	
		1-2AB	√	√		
		1-3	√	√		
	2	2-3A	√	√		
		2-2	√	√		
	3	3-2AB	√	√		
		3-3AB	√	√		
WASTE ROCK DUMP	1	1-2	√	√		
		1-3	√	√		
		1-4	√	√		√
		1-5	√	√		
	2	2-2	√	√		
		2-3	√	√		
		2-4	√	√		
		2-5	√	√		
	3	3-4			√	√
# of individual samples:			14	14	3*	

* samples collected at Plot #3-4 were combined into one sample due to low biomass

New disposable nitrile gloves were worn for each collection. Where possible, separate samples were collected for the shrub leaves and the current season's growth of twigs. Samples were placed in resealable plastic bags and kept cool until delivered to the ALS laboratory in Whitehorse, Yukon. After the samples were logged in, they were frozen and shipped to the lab in Burnaby, BC, for analysis. The foliar samples were rinsed thoroughly with de-ionized water, homogenized and sub-sampled prior to hot-block digestion with nitric and hydrochloric acids, in combination with the addition of hydrogen peroxide. Metals were analyzed using collision cell inductively coupled plasma-mass spectrometry. Analysis for mercury was done by atomic fluorescence or atomic absorption spectrophotometry.

The complete analytical report is provided in Appendix C. The data has been summarized according to the type of treatment and according to tissue type and is presented below per site.

4.2.2.1 Trench Site

There were three treatments applied to the Trench Site; no treatment, biochar and compost, and biochar, compost and leonardite. There were five plots per block so some treatments were repeated in each block. The tissue samples collected from the same treatment in the same block were combined and analyzed as a single sample. The analytical data for each of the plots is presented in Table C-5 in Appendix C. There were five metals that were below detection at all plots: beryllium, lithium, tellurium, vanadium and zirconium.

The data per treatment has been averaged and tabulated (Table 8). There are no guidelines regarding metal concentrations in vegetation with respect to wildlife consumption (e.g., moose and/or caribou). For reference, Stantec (2011) compared the 2009 baseline Eagle Gold foliar data to the dietary tolerances for beef cattle. These toxic values have also been included in Table 8.

TABLE 8 METALS (mg/kg) IN TISSUES PER AMENDMENT, TRENCH SITE

Parameter	Lowest Detection Limit	No treatment N=1	Biochar and compost N=6	Biochar, compost and leonardite N=6	Toxicity Thresholds
Aluminum (Al)-Total	2.0	33.5	16.40	9.66	>1200
Antimony (Sb)-Total	0.010	5.59	0.915	0.447	
Arsenic (As)-Total	0.020	17.0	2.42	1.72	>10*
Barium (Ba)-Total	0.050	39.5	38.74	32.75	>20**
Bismuth (Bi)-Total	0.010	0.219	0.07	0.035	
Boron (B)-Total	1.0	7.7	7.15	8.33	>200
Cadmium (Cd)-Total	0.0050	ND	0.011	0.01	50 - 500
Calcium (Ca)-Total	20	11000	6156.67	7056.67	
Cesium (Cs)-Total	0.0050	0.136	0.246	0.149	
Chromium (Cr)-Total	0.050	0.22	0.06	ND	>40
Cobalt (Co)-Total	0.020	0.121	0.120	0.088	>30
Copper (Cu)-Total	0.10	6.54	8.06	6.39	>100
Iron (Fe)-Total	3.0	222	54.67	48.37	>4000
Lead (Pb)-Total	0.020	48.0	11.00	6.06	>100
Magnesium (Mg)-Total	2.0	2430	1513.83	1451.67	
Manganese (Mn)-Total	0.050	214	62.68	61.28	2000 - 4000
Mercury (Hg)-Total	0.0050	0.0067	ND	ND	
Molybdenum (Mo)-Total	0.020	3.71	3.39	4.74	10 - 20
Nickel (Ni)-Total	0.20	5.54	2.07	1.34	>1500
Phosphorus (P)-Total	10	938	2122	2013	
Potassium (K)-Total	20	7510	5907	6108	
Rubidium (Rb)-Total	0.050	7.81	11.44	7.82	
Selenium (Se)-Total	0.050	ND	0.14	0.12	5 - 20
Sodium (Na)-Total	20	29	ND	ND	
Strontium (Sr)-Total	0.050	44.0	34.13	31.37	>2000
Thallium (Tl)-Total	0.0020	0.0060	0.0041	0.004	
Tin (Sn)-Total	0.10	0.21	ND	ND	
Uranium (U)-Total	0.0020	0.0180	0.0042	0.00	
Zinc (Zn)-Total	0.50	48.5	31.27	31.42	>5000

* There is no actual toxic value, only what is considered normal or adequate in the referenced table.

** There is no actual toxic value, only what is considered high in the referenced table. ND = not detected

In one of the six plots that received no treatment at the Trench site (Plot #1-1B), there was enough alder growing to warrant tissue analysis. This has allowed for the comparison of no treatment versus treatment on the effects of metal uptake.

The addition of treatments significantly decreased the uptake of the following metals: antimony, arsenic, iron, lead and to a lesser extent chromium, nickel and uranium.

The addition of treatments significantly increased the uptake of the nutrient phosphorus.

There is no actual toxic threshold assigned for arsenic, but the value given is the concentration that is considered “normal” (Stantec, 2011). This value was exceeded in foliar tissues collected from the untreated plot only. Likewise there is no defined toxic concentration for barium although the value presented in the table is considered high. This value was exceeded in all of the treated plots and concentrations were similar.

Alder were the only plants sampled at the Trench site owing to the lack of other species. Due to the small size of alders in Plots 1-1B, alder leaves and twigs were combined and analyzed as one sample. The other plots had sufficient biomass that leaves and stems could be analyzed separately (Table 9). Concentrations of metals were generally higher in leaves than in stems. The exceptions to this include barium, boron, manganese, molybdenum, strontium and zinc where concentrations were greater in the stems.

TABLE 9 FOLIAR METALS (mg/kg) PER TISSUE TYPE, TRENCH SITE

PARAMETER	MDL	ALDER LEAVES AND TWIGS N=1	ALDER LEAVES N=6	ALDER STEMS N=6
Aluminum (Al)-Total	2.0	33.5	18.08	7.64
Antimony (Sb)-Total	0.010	5.59	0.791	0.571
Arsenic (As)-Total	0.020	17.0	2.50	1.64
Barium (Ba)-Total	0.050	39.5	22.35	49.13
Bismuth (Bi)-Total	0.010	0.219	0.059	0.051
Boron (B)-Total	1.0	7.7	6.92	8.57
Cadmium (Cd)-Total	0.0050	ND	0.0057	0.0118
Calcium (Ca)-Total	20	11000	7401.67	5811.67
Cesium (Cs)-Total	0.0050	0.136	0.212	0.183
Chromium (Cr)-Total	0.050	0.22	ND	0.06
Cobalt (Co)-Total	0.020	0.121	0.132	0.073
Copper (Cu)-Total	0.10	6.54	7.21	7.24
Iron (Fe)-Total	3.0	222	65.52	37.52
Lead (Pb)-Total	0.020	48.0	9.06	8.00
Magnesium (Mg)-Total	2.0	2430	1888.33	1077.17
Manganese (Mn)-Total	0.050	214	53.52	70.45
Mercury (Hg)-Total	0.0050	0.0067	ND	ND
Molybdenum (Mo)-Total	0.020	3.71	3.69	4.44
Nickel (Ni)-Total	0.20	5.54	1.90	1.51
Phosphorus (P)-Total	10	938	2456.67	1678.33
Potassium (K)-Total	20	7510	6471.67	5543.33
Rubidium (Rb)-Total	0.050	7.81	10.85	8.41
Selenium (Se)-Total	0.050	ND	0.156	0.10
Strontium (Sr)-Total	0.050	44.0	29.20	36.30
Thallium (Tl)-Total	0.0020	0.0060	0.00	0.0047
Tin (Sn)-Total	0.10	0.21	ND	ND
Uranium (U)-Total	0.0020	0.0180	0.00	0.0025
Zinc (Zn)-Total	0.50	48.5	26.28	36.40

MDL = method detection limit ND = not detected

4.2.2.2 Waste Rock Site

There were five amendments applied to the blocks at the waste rock dump site: no treatment; biochar and compost; biochar, compost and leonardite; biochar, compost and dolomite lime; and biochar, compost, leonardite and dolomite lime. The data per treatment has been averaged and

tabulated (Table 10). Sodium, tellurium and zirconium were not detected in any samples and are not included in Table 10.

TABLE 10	**METALS IN TISSUES (mg/kg) PER AMENDMENT, WASTE ROCK DUMP**					
Parameter	**MDL**	**Biochar and compost** N=4	**Biochar, compost & leondardite** N=3	**Biochar, compost & dolomite lime** N=5	**Biochar, compost, leondarite & dolomite lime** N=4	**Toxicity**
Aluminum (Al)-Total	2.0	22.7	43.1	11.4	7.4	>1200
Antimony (Sb)-Total	0.010	1.47	0.81	2.73	2.30	
Arsenic (As)-Total	0.020	4.25	3.34	4.38	2.93	>10*
Barium (Ba)-Total	0.050	4.66	3.09	0.78	0.48	>20**
Beryllium (Be)-Total	0.010	ND	0.019	ND	ND	
Bismuth (Bi)-Total	0.010	0.14	0.09	0.29	0.33	
Boron (B)-Total	1.0	11.9	8.9	5.0	9.5	>200
Cadmium (Cd)-Total	0.0050	0.059	0.036	0.544	0.060	50 - 500
Calcium (Ca)-Total	20	4603	2240	5010	6715	
Cesium (Cs)-Total	0.0050	0.394	0.616	0.566	0.364	
Chromium (Cr)-Total	0.050	0.082	ND	0.078	ND	>40
Cobalt (Co)-Total	0.020	0.308	0.197	0.206	0.140	>30
Copper (Cu)-Total	0.10	10.9	19.0	11.7	10.6	>100
Iron (Fe)-Total	3.0	105.9	104.4	92.7	65.1	>4000
Lead (Pb)-Total	0.020	5.19	2.05	5.04	5.14	>100
Lithium (Li)-Total	0.50	ND	0.6	ND	ND	
Magnesium (Mg)-Total	2.0	937	809	2678	2278	
Manganese (Mn)-Total	0.050	294.5	247.3	70.3	101.6	2000 - 4000
Mercury (Hg)-Total	0.0050	0.0051	ND	ND	0.0051	
Molybdenum (Mo)-Total	0.020	1.01	1.42	2.66	5.00	10 - 20
Nickel (Ni)-Total	0.20	3.3	7.0	2.1	2.2	>1500
Phosphorus (P)-Total	10	1658	1523	1778	1935	
Potassium (K)-Total	20	3645	3737	3634	3755	
Rubidium (Rb)-Total	0.050	11.1	14.7	11.4	11.3	
Selenium (Se)-Total	0.050	0.110	ND	0.062	0.138	5 - 20
Strontium (Sr)-Total	0.050	13.26	7.07	3.08	4.09	>2000
Thallium (Tl)-Total	0.0020	0.0028	0.0061	0.0033	0.0091	
Tin (Sn)-Total	0.10	ND	ND	ND	ND	
Uranium (U)-Total	0.0020	0.0061	0.0128	0.0079	0.0040	
Vanadium (V)-Total	0.10	0.1	ND	ND	ND	
Zinc (Zn)-Total	0.50	43.7	23.0	45.5	58.5	>5000
Note: did not include the multiple species, W3-4. MDL = method detection limit. ND = not detected						

There were no plants growing on any of the three untreated plots so comparisons can only be made regarding actual amendment type. The tissues collected from one plot only at Block 3 (Plot #3-4), were excluded from the table as there were a variety of species collected from this plot to increase tissue biomass for analysis. Also, the high metal concentrations had the potential to skew

the results and as there were no other tissues from Block 3 it is not possible to tell if the other amendments would have had different uptake concentrations. It has been left out as an outlier in these calculations, however the data is presented in Table C-1 in Appendix C. Generally the highest metal concentrations were documented in the tissues from Plot 3-4, notably antimony, arsenic, bismuth, cadmium, iron, lead, magnesium, manganese and zinc. Of these, only arsenic exceeded the referenced toxicity level.

There generally was not a great range in tissue concentrations for the different treatments and it cannot be suggested that any one of these treatments is obviously better than another in reducing metal uptake. It appears however that for the waste rock dump site an additional amendment to biochar and compost is beneficial.

Similar to the Trench site, the Waste Rock data has been compared to the dietary tolerances for beef cattle in Table 10. There were no exceedances for any parameter. Unlike the Trench site, barium concentrations were low throughout the plots.

The mean concentrations of metals in the types of tissues have been tabulated (Table 11). Alder was also the principal vegetation type at the Waste Rock Dump and leaves and stems were sampled and analyzed separately. There was sufficient willow biomass to allow the analysis of tissues from a different species.

The single sample of willow leaves and stems collected from Plot #1-3 generally had the lowest concentrations of most metals. The combination sample of willow leaves, willow stems, alder leaves and alder stems collected from Plot #3-4 had the greatest concentration of the majority of the metals. When comparing just the alder tissues, levels were frequently lower in the stems than the leaves, or were relatively similar. During an ecological health assessment at the decommissioned Sä Dena Hes mine north of Watson Lake, Azimuth (2014) found that metal concentrations in alder leaves tended to be approximately double of that of twigs. The combination sample containing alder leaves and stems collected from Plot #1-3 typically reported higher concentrations than either those in the leaves or in the stems.

TABLE 11 MEAN METAL CONCENTRATIONS IN FOLIAR TISSUES PER SPECIES AND TYPE, WASTE ROCK

Species	Alder	Alder	Alder	Willow	Alder & Willow
Tissue type	Leaves	Stems	Leaves & Stems	Leaves & Stems	Leaves & Stems
N	7	7	1	1	1
Aluminum (Al)-Total	25.2	5.2	82.6	11.0	40.8
Antimony (Sb)-Total	3.5	0.7	0.910	1.15	32.4
Arsenic (As)-Total	5.3	1.7	7.36	3.88	68.7
Barium (Ba)-Total	1.2	2.9	4.41	0.595	1.88
Beryllium (Be)-Total	ND	ND	0.019	ND	ND
Bismuth (Bi)-Total	0.4	0.1	0.139	0.164	4.29
Boron (B)-Total	8.7	8.7	9.7	5.9	30.7
Cadmium (Cd)-Total	0.016	0.064	0.0737	2.14	6.44
Calcium (Ca)-Total	6202.9	3470.0	3300	6030	9190
Cesium (Cs)-Total	0.573	0.404	0.777	0.0901	0.188
Chromium (Cr)-Total	0.080	ND	ND	ND	0.099
Cobalt (Co)-Total	0.284	0.100	0.256	0.466	0.769
Copper (Cu)-Total	11.1	12.0	34.8	4.68	9.20
Iron (Fe)-Total	131.1	45.5	166	58.5	530
Lead (Pb)-Total	7.6	2.0	2.66	2.60	68.6
Lithium (Li)-Total	ND	ND	0.63	ND	ND
Magnesium (Mg)-Total	2419.1	883.3	791	4770	4840
Manganese (Mn)-Total	134.5	183.3	360	93.0	414
Mercury (Hg)-Total	0.005	ND	ND	ND	0.0121
Molybdenum (Mo)-Total	2.1	3.5	2.22	0.049	1.15
Nickel (Ni)-Total	3.9	1.9	11.3	1.30	1.67
Phosphorus (P)-Total	1985.7	1411.4	1710	2340	3700
Potassium (K)-Total	4268.6	3042.9	3400	4400	7890
Rubidium (Rb)-Total	14.8	8.9	18.1	6.97	18.9
Selenium (Se)-Total	0.101	ND	ND	0.067	0.655
Strontium (Sr)-Total	6.1	7.5	8.47	2.70	8.04
Thallium (Tl)-Total	0.006	0.005	0.0061	ND	0.0165
Tin (Sn)-Total	ND	ND	ND	ND	0.59
Uranium (U)-Total	0.006	ND	0.0203	ND	0.0313
Vanadium (V)-Total	0.1	ND	ND	ND	ND
Zinc (Zn)-Total	34.0	47.2	29.7	107	304
Zirconium (Zr)-Total	0.22	ND	ND	ND	0.23

ND = not detected

5.0 DISCUSSION

No mining activity has taken place at the Peso site since the 1960s. After 50 years the disturbed areas of Peso have had very little natural colonization. There has been sporadic growth in the trench area, mainly shrubs, but the waste rock dump was devoid of any growth.

Phytoremediation, the use of plants to decontaminate soils and waters, has been developed over recent decades. The purpose of phytoremediation is to remove the contaminant from the media into plants. Heavy metals can be removed through plant processes such as uptake, adsorption, transport and translocation, sequestration into vacuoles, hyperaccumulation and, in some cases, volatilization (Bieby Voijant Tangahu et al, 2011). The strategy is to extract metals from contaminated soil and transfer it to the smaller volume of harvestable plants for disposal (Capuana, 2011). However, the purpose of this trial was to determine how to cover the contaminated soils with a sustaining plant community but leave the metals in situ. Uptake of metals into the tissues is not desirable as the resulting vegetation may be consumed by

herbivores (from mice to moose). Biochar has the ability to immobilize metals thereby reducing their bioavailability for plant uptake and hence was chosen as an amendment for the Peso trials.

The objective of on-site treatment of contaminated lands using soil amendments is to establish a self-sustaining system that does not rely on additional care, and, ideally, is similar to and provides nearly equal ecological value as the undisturbed adjacent landscape. Without the necessity of an application of a layer of till, the Peso site could be revegetated using biochar and some form of nutrient rich amendment. Dolomite should also be added for the waste rock site. This has implications for the revegetation of other areas eventually requiring reclamation at the Eagle Gold Project site. As areas are cleared, the woody material in the overburden could be turned into biochar on site in easily constructed pits. The remaining stockpiled overburden material can be spread over the area to be revegetated, providing soil material, nutrients, seed banks, and the associated mycorrhiza to allow healthy growth of native plants through direct seeding, planting and natural colonization.

As described in Section 4.1, all of the plots had very high concentrations of metals in the soils, notably antimony, arsenic and lead. This has not been reflected in the tissue samples. With the exception of a couple of plots, very low concentrations of these metals were taken up by the plants. The soil samples from Block 3 at the Waste Rock Dump had the highest concentrations of antimony, arsenic and lead in the study area and correspondingly the single foliar sample collected here contained the highest levels of these metals. (There was only sufficient plant biomass from one plot in this block for analysis.)

There currently is not an available database on metals in plant tissues for the Yukon. A compendium has been prepared by the Yukon College (Soprovich and Janin, 2017) discussing metal concentrations in plants from several mine sites in the Yukon, however the presented information and data is limited. A literature search was conducted in attempts to compare the Peso foliar data with other sites. Only studies that also included soil chemistry data were reviewed. Note that the soil samples were not necessarily collected at the same locations as the vegetation samples, however the data does give an idea of the metal concentrations throughout each study area.

Vegetation and soil samples were collected from four permanent sites at the Eagle Gold Project Site in the summer of 2018 to monitor any effects from the construction activities and basically represent baseline conditions (Laberge, 2018b). Willow and dwarf birch comprised the majority of the foliar samples. Stantec (2011) undertook baseline soil and foliar sampling in 2009 throughout the footprint of the Eagle Gold Project. Vegetation types analyzed included willow, sedge and grasses. Access Consulting Group (2015) devised a vegetation monitoring plan for the Minto Mine and collected soil and vegetation samples in areas that may be influenced by mining activities. Grasses, willows and aspen were the tissues analyzed. As part of a human health and ecological risk assessment, Azimuth (2014) conducted extensive soil sampling throughout the project area at Sä Dena Hes, and submitted several willow and alder twig samples for vegetation analysis.

Neither arsenic nor lead have any beneficial value to plants. These metals were extremely high in the soils at Peso and Table 12 summarizes the range of concentrations in the soil and in the vegetation at each project site. The two sites at Peso have been presented separately. The

numbers in brackets after the maximum value indicated the next highest concentration after the outlier is eliminated from the range. As significant numbers of willow and alder samples were collected at Sa Dena Hes, these have been included as separate entries. Only twigs were analyzed.

TABLE 12 METAL CONCENTRATIONS IN SOIL AND FOLIAR TISSUES FROM VARIOUS PROJECTS

Metal	Site	Year	Author	Range of Concentration (mg/kg)			
				Soil	N	Foliar	N
Arsenic	Peso - Trench	2018	LES	1490 to 11,400	15	0.4 to 17.0 (4.09)	13
	Peso - Waste Rock	2018	LES	1240 to 10,900	15	0.7 to 68.7 (7.4)	17
	Eagle Gold	2018	LES	15.1 to 302	4	0.090 to 7.73	60
	Eagle Gold	2009	Stantec	9.4 to 1350	20	<0.1 to 0.4	16
	Minto	2015	Access	1.1 to 9.0	12	0.06 to 0.49	10
	Sa Dena Hes	2013	Azimuth	1.0 to 357	69	willow: 0.006 to 0.012	16
						alder: 0.004 to 7.36	16
	Keno Valley	2003	LES	12.9 to 373	11	<2 to 2.0	18
Lead	Peso - Trench	2018	LES	1160 to 8680	15	2.5 to 48.0 (18.5)	13
	Peso - Waste Rock	2018	LES	331 to 16,600	15	1.0 to 68.6 (15.3)	17
	Eagle Gold	2018	LES	19.8 to 40.6	4	0.036 to 1.55	60
	Eagle Gold	2009	Stantec	5.7 to 85.8	20	<0.1 to 0.2	16
	Minto	2015	Access	2.4 to 7.5	12	0.13 to 0.53	10
	Sa Dena Hes	2013	Azimuth	76 to 10,400	115	willow: 0.042 to 61.4	16
						alder: 0.045 to 5.35	16
	Keno Valley	2003	LES	22.3 to 1350	11	<5 to 3.3	18

The arsenic concentrations in the soil at Peso were far greater than at the other sites, especially when comparing the minimums. The maximum concentration of arsenic documented at Eagle Gold by Stantec was similar to the minimum concentrations reported at Peso. Arsenic concentrations were slightly higher in the tissues collected from Peso than the other sites, although the maximum concentration from alder tissues at Sä Dena Hes were similar to the maximums at Peso (which were mostly alder) when the outliers are excluded.

Generally lead concentrations were much greater in the soils at Peso than the other sites, however there was a comparable maximum lead concentration collected from a site at Sä Dena Hes. Again, the minimum concentrations of lead in the soils were much higher at Peso. Lead in tissues from Peso were somewhat higher than the other sites, even when the outliers where excluded. The exception to this was a willow sample analyzed from Sä Dena Hes which had concentrations almost as great as the sample analyzed from Block 3 at the Waste Rock Dump.

Although Peso is a highly contaminated site regarding metals, the potentially harmful metals do not appear bioavailable as evidenced by the low concentrations in the foliar tissues. Only two samples had a concentration greater than the referenced dietary tolerances for cattle. Arsenic concentrations in the foliar sample collected from an untreated plot at the Trench site slightly exceeded what is considered “normal”. Arsenic in the vegetation sample from Block 3 on the Waste Rock Dump exceeded the tolerance level to a greater extent. All other metals were well below the referenced tolerances. It appears that biochar has been effective in

reducing the uptake of metals in plant tissues. The biochar application rate must be sufficient to match and treat the amount of heavy metals that are contained in the soil (Chen et al, 2018). The application rate for the plots on the waste rock was twice that applied to the Trench plots, however, an increase in the application rate may have reduced uptake more efficiently, notably at Block 3.

There is little doubt that amendments are required for plants to grow in the study area. All non-treated seeded plots produced no to very little growth. The acidic soil conditions at the Peso trench and the waste rock sites present a challenging scenario in relation to the site conditions at the majority of other disturbed sites in the Dublin Gulch area. However, the success of using compost and biochar to achieve robust plant growth on these highly mineralized and acidic soils, especially on the waste rock dump, indicates that nothing is impossible.

With minimal effort and resources, native plants were able to grow on the majority of the treated plots, including on the highly acidic (pH 2.6) waste rock dump.

In summary, these trials have proven successful. By using appropriate species and soil amendments, healthy plants have grown, propagated and even thrived on acidic, highly mineralized soils.

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APPENDIX A

SOILS DATA

- **TABLE A-1**
- **TABLE A-2**
- **MAXXAM JOB #: B256252, 2012**
- **ALS Lab Work Order #: L2139940,2018**

TABLE A-1 SOIL DATA, TRENCH SITE 2018

Parameter	Lowest Detection Limit	Units	Block #1			Block #2			Block #3		
			T1-1AB	T1-2AB	T1-3	T2-1AB	T2-2	T2-3A	T3-1	T3-2AB	T3-3AB
Physical Tests (Soil)											
Loss on Ignition @ 375 C	1.0	%	1.2	3.1	3.6	1.3	1.3	1.4	2.3	3.3	3.5
Organic Matter	1.0	%	1.2	2.7	3.1	1.3	1.3	1.4	2.0	2.9	3.0
pH (1:2 soil:water)	0.10	pH	6.30	7.17	6.74	5.88	7.12	6.12	5.17	5.75	6.79
Particle Size (Soil)											
% Sand (2.0mm - 0.05mm)	1.0	%	83.3	83.8	82.5	65.0	65.7	65.2	60.9	64.2	58.0
% Silt (0.05mm - 2um)	1.0	%	15.3	14.1	15.7	28.9	28.6	28.3	34.7	31.0	37.9
% Clay (<2um)	1.0	%	1.4	2.1	1.7	6.1	5.7	6.5	4.4	4.7	4.1
Texture		-	Loamy sand	Loamy sand	Loamy sand	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Leachable Anions & Nutrients (Soil)											
Total Kjeldahl Nitrogen	0.020	%	0.069	0.118	0.132	0.059	0.064	0.063	0.070	0.077	0.088
Organic / Inorganic Carbon (Soil)											
C:N Ratio		-	5.8:1	15.7:1	14.5:1	7:01	8.9:1	6.8:1	7.2:1	20.1:1	17.5:1
Total Carbon by Combustion	0.05	%	0.40	1.86	1.91	0.42	0.57	0.43	0.50	1.55	1.53
Plant Available Nutrients (Soil)											
Available Ammonium-N	1.0	mg/kg	1.8	2.5	3.1	2.0	2.3	1.4	1.7	2.6	2.5
Calcium (Ca)	0.50	meq/100g	0.92	5.33	3.74	0.74	2.26	1.20	<0.50	3.97	4.48
Magnesium (Mg)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Available Phosphate-P	2.0	mg/kg	3.4	46.9	17.9	<2.0	6.8	<2.0	2.3	15.2	24.2
Available Potassium	20	mg/kg	24	51	51	30	39	29	31	40	46
Potassium (K)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Sodium (Na)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Metals (Soil)											
Aluminum (Al)	50	mg/kg	3220	2050	1630	3440	3390	4620	3030	3670	2670
Antimony (Sb)	0.10	mg/kg	3750	818	6410	2360	492	369	4590	1450	2330
Arsenic (As)	0.10	mg/kg	6380	2190	2690	5810	1490	1730	11400	4410	10600
Barium (Ba)	0.50	mg/kg	47.2	32.6	35.6	70.3	65.7	91.3	42.3	40.6	38.6
Beryllium (Be)	0.10	mg/kg	0.13	<0.10	<0.10	0.13	0.11	0.15	0.12	0.13	<0.10
Bismuth (Bi)	0.20	mg/kg	145	26.1	236	504	53.5	30.5	320	91.5	222
Boron (B)	5.0	mg/kg	10.0	<5.0	7.1	7.4	<5.0	8.2	7.4	<5.0	<5.0
Cadmium (Cd)	0.020	mg/kg	4.08	0.427	3.26	3.89	0.564	0.482	6.21	1.53	3.91
Calcium (Ca)	50	mg/kg	578	1830	3890	947	1180	1330	334	634	1190
Chromium (Cr)	0.50	mg/kg	16.6	7.83	5.92	7.33	7.84	10.6	11.2	10.1	13.8
Cobalt (Co)	0.10	mg/kg	7.91	4.18	2.26	2.93	2.84	3.44	5.08	4.21	6.24
Copper (Cu)	0.50	mg/kg	132	55.6	29.8	74.3	50.9	73.3	170	92.7	121
Iron (Fe)	50	mg/kg	56700	31900	17900	51100	28400	39300	43100	36000	42900
Lead (Pb)	0.50	mg/kg	7790	1440	3670	4700	1160	1260	8680	3200	4890
Lithium (Li)	2.0	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Magnesium (Mg)	20	mg/kg	94	312	475	81	84	92	131	354	193
Manganese (Mn)	1.0	mg/kg	278	290	131	277	142	199	184	170	214
Mercury (Hg)	0.0050	mg/kg	0.227	0.169	0.468	0.358	0.146	0.193	0.700	0.571	0.924
Molybdenum (Mo)	0.10	mg/kg	1.45	1.36	1.05	0.85	1.31	1.05	0.79	1.15	1.27
Nickel (Ni)	0.50	mg/kg	20.3	11.5	5.92	5.34	5.52	7.03	9.32	8.65	15.1
Phosphorus (P)	50	mg/kg	581	500	452	1170	1200	1480	534	333	484
Potassium (K)	100	mg/kg	580	460	320	670	630	790	520	470	590
Selenium (Se)	0.20	mg/kg	5.62	1.70	6.76	9.01	1.98	1.68	9.01	3.54	6.42
Silver (Ag)	0.10	mg/kg	>165	15.8	>126	50.7	8.51	7.37	38.0	18.3	35.8
Sodium (Na)	50	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50
Strontium (Sr)	0.50	mg/kg	93.0	35.7	32.6	337	349	483	108	57.1	79.5
Sulfur (S)	1000	mg/kg	1500	<1000	<1000	1700	<1000	<1000	2000	1100	1600
Thallium (Tl)	0.050	mg/kg	0.262	0.149	0.147	0.282	0.118	0.116	0.263	0.180	0.189
Tin (Sn)	2.0	mg/kg	51.0	16.5	24.7	41.3	17.2	18.0	201	38.3	105
Titanium (Ti)	1.0	mg/kg	22.3	28.9	38.7	19.5	<16	18.4	17.3	37.1	<19
Tungsten (W)	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg	14.3	1.72	4.75	6.05	2.17	2.17	3.49	2.06	3.12
Vanadium (V)	0.20	mg/kg	18.6	10.4	6.31	10.7	8.41	11.7	10.5	12.7	13.3
Zinc (Zn)	2.0	mg/kg	354	142	70.4	117	85.5	113	112	95.0	107
Zirconium (Zr)	1.0	mg/kg	12.0	3.8	2.1	7.4	7.5	6.2	10.4	8.7	10.2

TABLE A-2 **SOIL DATA, WASTE ROCK SITE 2018**

Parameter	Lowest Detection Limit	Units	Block #1					Block #2					Block #3				
			W1-1	W1-2	W1-3	W1-4	W1-5	W2-1	W2-2	W2-3	W2-4	W2-5	W3-1	W3-2	W3-3	W3-4	W3-5
Physical Tests (Soil)																	
Loss on Ignition @ 375 C	1.0	%	2.0	2.3	4.4	3.0	9.2	1.4	1.5	3.0	4.8	1.9	1.6	6.1	8.0	9.5	7.9
Organic Matter	1.0	%	1.8	2.1	3.7	2.6	7.5	1.4	1.5	2.6	4.1	1.7	1.5	5.0	6.5	7.7	6.5
pH (1:2 soil:water)	0.10	pH	3.04	4.81	3.25	4.10	5.71	2.75	3.11	3.04	3.28	2.84	2.32	2.41	1.77	4.32	2.20
Particle Size (Soil)																	
% Sand (2.0mm - 0.05mm)	1.0	%	59.4	69.2	80.3	82.3	75.5	37.4	42.6	87.1	73.2	71.2	53.3	69.2	63.7	68.6	68.8
% Silt (0.05mm - 2um)	1.0	%	36.4	27.2	17.2	16.0	20.8	59.4	55.6	11.2	23.6	22.4	40.5	25.4	28.6	26.9	25.0
% Clay (<2um)	1.0	%	4.2	3.6	2.4	1.7	3.7	3.1	1.8	1.7	3.2	6.3	6.2	5.4	7.6	4.5	6.2
Texture		-	Sandy loam	Sandy loam	Loamy sand	Loamy sand	Loamy sand	Silt loam	Silt loam	Sand	Sandy loam / Loamy sand	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Leachable Anions & Nutrients (Soil)																	
Total Kjeldahl Nitrogen	0.020	%	0.062	0.073	0.095	0.115	0.152	0.023	0.033	0.063	0.096	0.046	0.061	0.135	0.150	0.175	0.140
Organic / Inorganic Carbon (Soil)																	
C:N Ratio		-	10.5:1	12.2:1	30.7:1	11.5:1	37.6:1	15.1:1	12.9:1	15.6:1	24:01:00	5.7:1	8.7:1	21.9:1	27.6:1	32.4:1	32:01:00
Total Carbon by Combustion	0.05	%	0.64	0.89	2.91	1.33	5.72	0.34	0.42	0.99	2.31	0.26	0.53	2.95	4.16	5.66	4.47
Plant Available Nutrients (Soil)																	
Available Ammonium-N	1.0	mg/kg	4.1	3.4	3.6	3.3	6.3	2.2	1.8	2.9	4.5	2.8	6.9	13.6	18.6	7.5	11.5
Calcium (Ca)	0.50	meq/100g	<0.50	1.27	<0.50	0.75	11.2	<0.50	<0.50	<0.50	2.84	<0.50	<0.50	<0.50	<0.50	3.60	19.4
Magnesium (Mg)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	2.26	<0.50	<0.50	<0.50	0.90	<0.50	<0.50	<0.50	<0.50	1.96	2.12
Available Phosphate-P	2.0	mg/kg	2.2	5.7	6.4	<2.0	15.6	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.4	<2.0	<2.0	<2.0
Available Potassium	20	mg/kg	27	23	<20	25	45	<20	<20	<20	32	<20	<20	<20	20	<20	<20
Potassium (K)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Sodium (Na)	0.50	meq/100g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Metals (Soil)																	
Aluminum (Al)	50	mg/kg	7160	5840	4990	3550	2780	4540	5820	4920	5080	4590	3390	2930	3100	3760	2710
Antimony (Sb)	0.10	mg/kg	1280	542	241	838	3350	1110	333	1320	2100	2360	2940	7690	6020	5920	7140
Arsenic (As)	0.10	mg/kg	3750	3220	2140	3610	3130	1470	1240	2530	2980	2260	3010	6500	7950	9810	10900
Barium (Ba)	0.50	mg/kg	116	72.0	44.3	24.3	46.3	158	196	102	134	86.8	116	47.3	53.7	60.5	48.1
Beryllium (Be)	0.10	mg/kg	0.20	0.18	0.20	0.18	0.13	0.13	0.13	0.27	0.22	0.27	0.14	0.16	0.17	0.17	0.11
Bismuth (Bi)	0.20	mg/kg	110	66.5	21.2	73.4	313	43.5	12.1	132	252	422	246	1020	975	822	1250
Boron (B)	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.2	<5.0	6.7	5.8	<5.0	5.8
Cadmium (Cd)	0.020	mg/kg	1.85	1.29	1.61	1.95	2.40	0.291	0.253	0.442	0.633	0.996	1.81	5.74	6.59	6.44	6.31
Calcium (Ca)	50	mg/kg	452	1150	296	4040	28500	756	1160	899	1540	1390	222	446	571	9170	2290
Chromium (Cr)	0.50	mg/kg	14.2	12.2	11.9	9.60	5.22	10.4	13.9	8.69	8.62	6.91	10.6	9.91	9.40	12.0	7.89
Cobalt (Co)	0.10	mg/kg	9.72	11.6	22.5	14.0	2.54	3.00	4.69	2.24	2.38	1.39	5.39	1.80	1.82	3.01	2.13
Copper (Cu)	0.50	mg/kg	145	172	120	214	229	88.0	59.4	194	194	180	250	299	314	433	400
Iron (Fe)	50	mg/kg	46500	45400	50500	48600	27200	38500	33500	53900	48900	45100	37100	35800	32300	54300	70100
Lead (Pb)	0.50	mg/kg	1870	4570	391	1380	6770	1600	331	2220	3590	4860	3810	14300	12800	10700	16600
Lithium (Li)	2.0	mg/kg	7.5	5.8	5.3	3.2	<2.0	4.7	6.9	2.2	2.2	<2.0	2.4	<2.0	<2.0	<2.0	<2.0
Magnesium (Mg)	20	mg/kg	2250	1820	1620	3190	14800	1410	2350	307	731	212	622	262	105	5180	1380
Manganese (Mn)	1.0	mg/kg	272	238	320	225	207	112	179	83.4	86.7	66.9	129	94.8	81.8	132	108
Mercury (Hg)	0.0050	mg/kg	0.0935	0.0853	0.0327	0.105	0.654	0.0933	0.0465	0.182	0.361	0.302	0.207	0.701	1.05	0.797	0.706
Molybdenum (Mo)	0.10	mg/kg	0.78	1.60	1.69	1.04	2.20	0.77	0.80	1.04	1.89	1.09	1.30	2.57	1.79	2.57	1.94
Nickel (Ni)	0.50	mg/kg	27.6	27.6	48.7	34.2	7.42	8.91	13.2	8.26	8.19	6.94	16.2	5.14	5.46	8.84	5.78
Phosphorus (P)	50	mg/kg	461	827	594	410	914	561	602	1670	1640	1730	289	1120	769	1230	788
Potassium (K)	100	mg/kg	640	580	420	400	700	970	980	1130	1240	1460	670	900	850	870	750
Selenium (Se)	0.20	mg/kg	3.93	5.46	1.04	4.02	12.2	2.46	1.14	4.04	6.75	6.31	9.79	25.1	27.5	25.8	35.5
Silver (Ag)	0.10	mg/kg	17.6	18.9	3.50	16.3	62.9	19.5	4.72	58.0	75.3	>108	32.5	>122	>112	>111	>135
Sodium (Na)	50	mg/kg	149	184	73	<50	55	392	353	92	162	75	106	58	53	94	106
Strontium (Sr)	0.50	mg/kg	26.0	32.8	13.3	17.8	193	90.6	39.4	407	458	565	41.2	188	215	168	141
Sulfur (S)	1000	mg/kg	2900	3400	1600	2400	6700	6300	4000	5900	9000	9800	3900	6300	8500	8400	16600
Thallium (Tl)	0.050	mg/kg	<0.10	<0.15	0.062	<0.10	<0.35	0.151	0.078	0.242	0.301	0.418	<0.20	<0.30	<0.35	0.265	<35
Tin (Sn)	2.0	mg/kg	6.9	7.6	2.6	7.6	33.2	11.3	5.1	21.0	32.2	26.5	33.9	64.0	131	81.7	68.5
Titanium (Ti)	1.0	mg/kg	99.7	75.9	49.8	26.8	<31	274	314	31.1	78.7	10.6	74.2	39.6	39.9	46.0	<47
Tungsten (W)	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg	2.41	2.27	2.73	2.99	2.21	0.967	0.785	2.32	2.46	3.87	2.52	6.00	7.07	5.62	6.01
Vanadium (V)	0.20	mg/kg	19.5	15.7	12.9	10.0	8.13	28.0	29.3	14.5	18.0	12.2	17.1	8.07	7.03	9.26	7.35
Zinc (Zn)	2.0	mg/kg	258	249	333	210	121	47.8	54.5	88.7	68.5	69.2	94.1	110	103	100	90.2
Zirconium (Zr)	1.0	mg/kg	3.3	1.4	2.5	7.1	<1.0	4.6	2.5	4.6	4.4	6.8	9.8	1.2	9.7	<1.0	2.9

Success Through Science®

Your Project #: BIOCHAR RESEARCH
Your C.O.C. #: EB492312

Attention: Ken Nordin
LABERGE ENVIRONMENTAL SERVICES
WHITEHORSE
405 Ogilvie Street
PO Box 21072
Whitehorse, YT
CANADA Y1A 6P7

Report Date: 2012/07/13

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B256252
Received: 2012/06/29, 14:00

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cation Exchange Capacity (1)	4	2012/07/10	2012/07/10	AB SOP-00009	SSMA 18.2, EPA 200.7
Carbon Nitrogen Ratio (1)	4	2012/07/05	2012/07/13	Calc	
Elements by ICPMS (total)	4	2012/07/05	2012/07/05	BBY7SOP-00001	EPA 6020A
Potassium (Available) (1)	4	2012/07/09	2012/07/09	AB SOP-00042	EPA 200.7
Loss on Ignition, Org. & Inorg. Residue (2)	4	N/A	2012/07/06	BBY6SOP-00040	Carter SSMA 44.3
Nitrate-N (Available) (1)	4	2012/07/09	2012/07/09	AB SOP-00023	SM 4110-B
Organic Matter - Calculated from LOI	4	N/A	2012/07/06	BBY6SOP-00040	Carter SSMA 44.3
Phosphorus (Available by ICP) (1)	4	2012/07/09	2012/07/09	AB SOP-00042	EPA 200.7
pH (2:1 DI Water Extract)	4	2012/07/05	2012/07/05	BBY6SOP-00028	Carter, SSMA 16.2
Texture by Hydrometer (1)	3	N/A	2012/07/13	AB SOP-00030	MMFSPA Ch9
Texture Class (1)	3	N/A	2012/07/13	AB SOP-00030	MMFSPA Ch9
Total Kjeldahl Nitrogen - Soil (1)	4	2012/07/13	2012/07/13	AB SOP-00008	EPA 351.1, 351.2
Organic Carbon and Organic Matter (1)	4	2012/07/11	2012/07/11	AB SOP-00012	MMFSPA Ch6

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental
(2) Loss on Ignition was reported on a dry weight basis.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Tabitha Rudkin, Burnaby Project Manager
Email: TRudkin@maxxam.ca
Phone# (604) 638-2639

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

Maxxam Job #: B256252
Report Date: 2012/07/13

CARBON NITROGEN RATIO (TKN,TOC)

Maxxam ID		DV0612	DV0613	DV0614	DV0615		
Sampling Date		2012/06/24 12:00	2012/06/24 12:00	2012/06/26 12:00	2012/06/26 12:00		
COC Number		EB492312	EB492312	EB492312	EB492312		
	UNITS	**PESO WASTE ROCK**	**PESO TRENCHES**	**WHC A,B,C**	**MSGM A,B,C**	**RDL**	**QC Batch**
Misc. Inorganics							
Total Kjeldahl Nitrogen	mg/kg	180	98	18	18	10	6000949
Misc. Inorganics							
Carbon Nitrogen Ratio	N/A	20.1	0.000	0.000	142	N/A	5976738
Organic Matter	%	0.64	<0.35	<0.35	0.44	0.35	5991753
Total Organic Carbon (C)	%	0.37	<0.20	<0.20	0.25	0.20	5991753

RDL = Reportable Detection Limit

Maxxam Job #: B256252
Report Date: 2012/07/13

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

NPK (AVAILABLE)

Maxxam ID		DV0612	DV0613	DV0614	DV0615		
Sampling Date		2012/06/24 12:00	2012/06/24 12:00	2012/06/26 12:00	2012/06/26 12:00		
COC Number		EB492312	EB492312	EB492312	EB492312		
	UNITS	**PESO WASTE ROCK**	**PESO TRENCHES**	**WHC A,B,C**	**MSGM A,B,C**	**RDL**	**QC Batch**
Nutrients							
Available (NH4F) Nitrogen (N)	mg/kg	<2.0	<2.0	<2.0	22	2.0	5985283
Available (NH4F) Phosphorus (P)	mg/kg	2.9	1.8	<1.0	<1.0	1.0	5978596
Available (NH4OAc) Potassium (K)	mg/kg	<2.0	8.5	72	150	2.0	5978595

RDL = Reportable Detection Limit

Maxxam Job #: B256252
Report Date: 2012/07/13

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		DV0612	DV0613	DV0614	DV0615		
Sampling Date		2012/06/24 12:00	2012/06/24 12:00	2012/06/26 12:00	2012/06/26 12:00		
COC Number		EB492312	EB492312	EB492312	EB492312		
	UNITS	**PESO WASTE ROCK**	**PESO TRENCHES**	**WHC A,B,C**	**MSGM A,B,C**	**RDL**	**QC Batch**
Elements							
Cation exchange capacity	cmol+/Kg	<10	<10	48	38	10	5984044
Misc. Inorganics							
Organic Matter	%	6.1	4.0	2.2	1.8	1.0	5976739
Physical Properties							
% sand by hydrometer	%		70	39	23	2.0	5999590
% silt by hydrometer	%		25	48	54	2.0	5999590
Clay Content	%		5.6	12	23	2.0	5999590
Loss on Ignition	%	6.1	4.0	2.2	1.8	1.0	5978220
Texture	N/A		SANDY LOAM	LOAM	SILT LOAM	N/A	5970847

RDL = Reportable Detection Limit

Maxxam Job #: B256252
Report Date: 2012/07/13

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		DV0612	DV0613	DV0614	DV0615		
Sampling Date		2012/06/24 12:00	2012/06/24 12:00	2012/06/26 12:00	2012/06/26 12:00		
COC Number		EB492312	EB492312	EB492312	EB492312		
	UNITS	**PESO WASTE ROCK**	**PESO TRENCHES**	**WHC A,B,C**	**MSGM A,B,C**	**RDL**	**QC Batch**
Physical Properties							
Soluble (2:1) pH	pH Units	2.62	5.15	8.56	8.30	0.010	5974214
Total Metals by ICPMS							
Total Aluminum (Al)	mg/kg	2690	2350	10100	12200	100	5974132
Total Antimony (Sb)	mg/kg	3680	3580	1.32	1.45	0.10	5974132
Total Arsenic (As)	mg/kg	6150	9810	16.3	74.2	0.50	5974132
Total Barium (Ba)	mg/kg	46.0	46.8	90.9	31.5	0.10	5974132
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	1.29	0.40	5974132
Total Bismuth (Bi)	mg/kg	527	372	9.59	0.14	0.10	5974132
Total Cadmium (Cd)	mg/kg	4.88	4.28	0.223	0.571	0.050	5974132
Total Calcium (Ca)	mg/kg	306	332	31300	35300	100	5974132
Total Chromium (Cr)	mg/kg	6.7	12.2	20.0	19.3	1.0	5974132
Total Cobalt (Co)	mg/kg	3.54	5.33	32.5	7.92	0.30	5974132
Total Copper (Cu)	mg/kg	210	75.9	2420	105	0.50	5974132
Total Iron (Fe)	mg/kg	57500	46300	143000	27900	100	5974132
Total Lead (Pb)	mg/kg	9070	7330	6.27	27.0	0.10	5974132
Total Lithium (Li)	mg/kg	<5.0	<5.0	7.3	20.7	5.0	5974132
Total Magnesium (Mg)	mg/kg	512	<100	46400	7890	100	5974132
Total Manganese (Mn)	mg/kg	927	189	803	640	0.20	5974132
Total Mercury (Hg)	mg/kg	0.796	0.410	<0.050	<0.050	0.050	5974132
Total Molybdenum (Mo)	mg/kg	0.87	0.74	36.1	3.16	0.10	5974132
Total Nickel (Ni)	mg/kg	9.06	12.0	13.9	3.14	0.80	5974132
Total Phosphorus (P)	mg/kg	500	623	527	738	10	5974132
Total Potassium (K)	mg/kg	475	340	2020	839	100	5974132
Total Selenium (Se)	mg/kg	19.3	12.7	1.01	1.13	0.50	5974132
Total Silver (Ag)	mg/kg	89.4	103	2.57	1.21	0.050	5974132
Total Sodium (Na)	mg/kg	<100	<100	104	468	100	5974132
Total Strontium (Sr)	mg/kg	114	134	88.9	77.4	0.10	5974132
Total Thallium (Tl)	mg/kg	0.259	0.169	0.064	0.077	0.050	5974132
Total Tin (Sn)	mg/kg	35.0	38.8	0.75	0.52	0.10	5974132
Total Titanium (Ti)	mg/kg	31.1	5.8	380	549	1.0	5974132
Total Uranium (U)	mg/kg	3.73	4.81	3.31	0.419	0.050	5974132
Total Vanadium (V)	mg/kg	9.8	12.2	43.3	32.0	2.0	5974132

RDL = Reportable Detection Limit

Maxxam Job #: B256252
Report Date: 2012/07/13

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		DV0612	DV0613	DV0614	DV0615		
Sampling Date		2012/06/24 12:00	2012/06/24 12:00	2012/06/26 12:00	2012/06/26 12:00		
COC Number		EB492312	EB492312	EB492312	EB492312		
	UNITS	**PESO WASTE ROCK**	**PESO TRENCHES**	**WHC A,B,C**	**MSGM A,B,C**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/kg	252	129	59.7	135	1.0	5974132
Total Zirconium (Zr)	mg/kg	9.15	9.77	3.24	6.91	0.50	5974132

RDL = Reportable Detection Limit

LABERGE ENVIRONMENTAL SERVICES
Client Project #: BIOCHAR RESEARCH

Maxxam Job #: B256252
Report Date: 2012/07/13

General Comments

Results relate only to the items tested.

LABERGE ENVIRONMENTAL SERVICES
Attention: Ken Nordin
Client Project #: BIOCHAR RESEARCH
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: VB256252

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
5974132	DJ	Matrix Spike	Total Antimony (Sb)	2012/07/05		94	%	75 - 125
			Total Arsenic (As)	2012/07/05		99	%	75 - 125
			Total Barium (Ba)	2012/07/05		NC	%	75 - 125
			Total Beryllium (Be)	2012/07/05		105	%	75 - 125
			Total Cadmium (Cd)	2012/07/05		100	%	75 - 125
			Total Chromium (Cr)	2012/07/05		97	%	75 - 125
			Total Cobalt (Co)	2012/07/05		99	%	75 - 125
			Total Copper (Cu)	2012/07/05		90	%	75 - 125
			Total Lead (Pb)	2012/07/05		97	%	75 - 125
			Total Lithium (Li)	2012/07/05		102	%	75 - 125
			Total Manganese (Mn)	2012/07/05		NC	%	75 - 125
			Total Mercury (Hg)	2012/07/05		106	%	75 - 125
			Total Molybdenum (Mo)	2012/07/05		100	%	75 - 125
			Total Nickel (Ni)	2012/07/05		89	%	75 - 125
			Total Selenium (Se)	2012/07/05		102	%	75 - 125
			Total Silver (Ag)	2012/07/05		98	%	75 - 125
			Total Strontium (Sr)	2012/07/05		97	%	75 - 125
			Total Thallium (Tl)	2012/07/05		101	%	75 - 125
			Total Tin (Sn)	2012/07/05		95	%	75 - 125
			Total Titanium (Ti)	2012/07/05		NC	%	75 - 125
			Total Uranium (U)	2012/07/05		99	%	75 - 125
			Total Vanadium (V)	2012/07/05		NC	%	75 - 125
			Total Zinc (Zn)	2012/07/05		NC	%	75 - 125
		QC Standard	Total Aluminum (Al)	2012/07/05		100	%	70 - 130
			Total Antimony (Sb)	2012/07/05		86	%	70 - 130
			Total Arsenic (As)	2012/07/05		89	%	70 - 130
			Total Barium (Ba)	2012/07/05		96	%	70 - 130
			Total Cadmium (Cd)	2012/07/05		91	%	70 - 130
			Total Calcium (Ca)	2012/07/05		89	%	70 - 130
			Total Chromium (Cr)	2012/07/05		98	%	70 - 130
			Total Cobalt (Co)	2012/07/05		87	%	70 - 130
			Total Copper (Cu)	2012/07/05		72	%	70 - 130
			Total Iron (Fe)	2012/07/05		92	%	70 - 130
			Total Lead (Pb)	2012/07/05		94	%	70 - 130
			Total Magnesium (Mg)	2012/07/05		88	%	70 - 130
			Total Manganese (Mn)	2012/07/05		93	%	70 - 130
			Total Mercury (Hg)	2012/07/05		114	%	70 - 130
			Total Molybdenum (Mo)	2012/07/05		91	%	70 - 130
			Total Nickel (Ni)	2012/07/05		72	%	70 - 130
			Total Phosphorus (P)	2012/07/05		87	%	70 - 130
			Total Strontium (Sr)	2012/07/05		82	%	70 - 130
			Total Thallium (Tl)	2012/07/05		90	%	70 - 130
			Total Titanium (Ti)	2012/07/05		105	%	70 - 130
			Total Uranium (U)	2012/07/05		82	%	70 - 130
			Total Vanadium (V)	2012/07/05		99	%	70 - 130
			Total Zinc (Zn)	2012/07/05		72	%	70 - 130
		Spiked Blank	Total Antimony (Sb)	2012/07/05		97	%	75 - 125
			Total Arsenic (As)	2012/07/05		98	%	75 - 125
			Total Barium (Ba)	2012/07/05		97	%	75 - 125
			Total Beryllium (Be)	2012/07/05		104	%	75 - 125
			Total Cadmium (Cd)	2012/07/05		101	%	75 - 125
			Total Chromium (Cr)	2012/07/05		97	%	75 - 125
			Total Cobalt (Co)	2012/07/05		99	%	75 - 125
			Total Copper (Cu)	2012/07/05		100	%	75 - 125
			Total Lead (Pb)	2012/07/05		96	%	75 - 125

LABERGE ENVIRONMENTAL SERVICES
Attention: Ken Nordin
Client Project #: BIOCHAR RESEARCH
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: VB256252

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
5974132	DJ	Spiked Blank	Total Lithium (Li)	2012/07/05		98	%	75 - 125
			Total Manganese (Mn)	2012/07/05		95	%	75 - 125
			Total Mercury (Hg)	2012/07/05		106	%	75 - 125
			Total Molybdenum (Mo)	2012/07/05		97	%	75 - 125
			Total Nickel (Ni)	2012/07/05		97	%	75 - 125
			Total Selenium (Se)	2012/07/05		102	%	75 - 125
			Total Silver (Ag)	2012/07/05		97	%	75 - 125
			Total Strontium (Sr)	2012/07/05		95	%	75 - 125
			Total Thallium (Tl)	2012/07/05		93	%	75 - 125
			Total Tin (Sn)	2012/07/05		93	%	75 - 125
			Total Titanium (Ti)	2012/07/05		95	%	75 - 125
			Total Uranium (U)	2012/07/05		95	%	75 - 125
			Total Vanadium (V)	2012/07/05		96	%	75 - 125
			Total Zinc (Zn)	2012/07/05		104	%	75 - 125
		Method Blank	Total Aluminum (Al)	2012/07/05	<100		mg/kg	
			Total Antimony (Sb)	2012/07/05	<0.10		mg/kg	
			Total Arsenic (As)	2012/07/05	<0.50		mg/kg	
			Total Barium (Ba)	2012/07/05	<0.10		mg/kg	
			Total Beryllium (Be)	2012/07/05	<0.40		mg/kg	
			Total Bismuth (Bi)	2012/07/05	<0.10		mg/kg	
			Total Cadmium (Cd)	2012/07/05	<0.050		mg/kg	
			Total Calcium (Ca)	2012/07/05	<100		mg/kg	
			Total Chromium (Cr)	2012/07/05	<1.0		mg/kg	
			Total Cobalt (Co)	2012/07/05	<0.30		mg/kg	
			Total Copper (Cu)	2012/07/05	<0.50		mg/kg	
			Total Iron (Fe)	2012/07/05	<100		mg/kg	
			Total Lead (Pb)	2012/07/05	<0.10		mg/kg	
			Total Lithium (Li)	2012/07/05	<5.0		mg/kg	
			Total Magnesium (Mg)	2012/07/05	<100		mg/kg	
			Total Manganese (Mn)	2012/07/05	<0.20		mg/kg	
			Total Mercury (Hg)	2012/07/05	<0.050		mg/kg	
			Total Molybdenum (Mo)	2012/07/05	<0.10		mg/kg	
			Total Nickel (Ni)	2012/07/05	<0.80		mg/kg	
			Total Phosphorus (P)	2012/07/05	<10		mg/kg	
			Total Potassium (K)	2012/07/05	<100		mg/kg	
			Total Selenium (Se)	2012/07/05	<0.50		mg/kg	
			Total Silver (Ag)	2012/07/05	<0.050		mg/kg	
			Total Sodium (Na)	2012/07/05	<100		mg/kg	
			Total Strontium (Sr)	2012/07/05	<0.10		mg/kg	
			Total Thallium (Tl)	2012/07/05	<0.050		mg/kg	
			Total Tin (Sn)	2012/07/05	<0.10		mg/kg	
			Total Titanium (Ti)	2012/07/05	<1.0		mg/kg	
			Total Uranium (U)	2012/07/05	<0.050		mg/kg	
			Total Vanadium (V)	2012/07/05	<2.0		mg/kg	
			Total Zinc (Zn)	2012/07/05	<1.0		mg/kg	
			Total Zirconium (Zr)	2012/07/05	<0.50		mg/kg	
		RPD	Total Aluminum (Al)	2012/07/05	3.5		%	35
			Total Antimony (Sb)	2012/07/05	NC		%	30
			Total Arsenic (As)	2012/07/05	2.1		%	30
			Total Barium (Ba)	2012/07/05	23.3		%	35
			Total Beryllium (Be)	2012/07/05	NC		%	30
			Total Bismuth (Bi)	2012/07/05	NC		%	30
			Total Cadmium (Cd)	2012/07/05	NC		%	30
			Total Calcium (Ca)	2012/07/05	2.1		%	30
			Total Chromium (Cr)	2012/07/05	3.1		%	30

LABERGE ENVIRONMENTAL SERVICES
Attention: Ken Nordin
Client Project #: BIOCHAR RESEARCH
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: VB256252

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
5974132	DJ	RPD	Total Cobalt (Co)	2012/07/05	0.5		%	30
			Total Copper (Cu)	2012/07/05	4.5		%	30
			Total Iron (Fe)	2012/07/05	0.2		%	30
			Total Lead (Pb)	2012/07/05	4.7		%	35
			Total Lithium (Li)	2012/07/05	NC		%	30
			Total Magnesium (Mg)	2012/07/05	4.3		%	30
			Total Manganese (Mn)	2012/07/05	1.7		%	30
			Total Mercury (Hg)	2012/07/05	NC		%	35
			Total Molybdenum (Mo)	2012/07/05	NC		%	35
			Total Nickel (Ni)	2012/07/05	2.2		%	30
			Total Phosphorus (P)	2012/07/05	3.0		%	30
			Total Potassium (K)	2012/07/05	5.4		%	35
			Total Selenium (Se)	2012/07/05	NC		%	30
			Total Silver (Ag)	2012/07/05	NC		%	35
			Total Sodium (Na)	2012/07/05	NC		%	35
			Total Strontium (Sr)	2012/07/05	12.8		%	35
			Total Thallium (Tl)	2012/07/05	NC		%	30
			Total Tin (Sn)	2012/07/05	NC		%	35
			Total Titanium (Ti)	2012/07/05	2.2		%	35
			Total Uranium (U)	2012/07/05	NC		%	30
			Total Vanadium (V)	2012/07/05	4.4		%	30
			Total Zinc (Zn)	2012/07/05	0.6		%	30
			Total Zirconium (Zr)	2012/07/05	NC		%	30
5974214	NS6	Spiked Blank	Soluble (2:1) pH	2012/07/05		101	%	96 - 104
		RPD	Soluble (2:1) pH	2012/07/05	0.5		%	20
5978220	JGD	Method Blank	Loss on Ignition	2012/07/06	<1.0		%	
		RPD [DV0615-01]	Loss on Ignition	2012/07/06	NC		%	35
5978595	PL	Spiked Blank	Available (NH4OAc) Potassium (K)	2012/07/09		95	%	80 - 120
		Method Blank	Available (NH4OAc) Potassium (K)	2012/07/09	<2.0		mg/kg	
		RPD	Available (NH4OAc) Potassium (K)	2012/07/09	0.4		%	35
5978596	PL	Spiked Blank	Available (NH4F) Phosphorus (P)	2012/07/09		101	%	80 - 120
		Method Blank	Available (NH4F) Phosphorus (P)	2012/07/09	<1.0		mg/kg	
		RPD	Available (NH4F) Phosphorus (P)	2012/07/09	NC		%	35
5984044	DL6	RPD [DV0612-02]	Cation exchange capacity	2012/07/10	NC		%	35
5985283	RP0	Matrix Spike	Available (NH4F) Nitrogen (N)	2012/07/09		100	%	80 - 120
		Spiked Blank	Available (NH4F) Nitrogen (N)	2012/07/09		98	%	90 - 110
		Method Blank	Available (NH4F) Nitrogen (N)	2012/07/09	<2.0		mg/kg	
		RPD	Available (NH4F) Nitrogen (N)	2012/07/09	NC		%	35
5991753	DL6	QC Standard	Organic Matter	2012/07/11		94	%	83 - 118
			Total Organic Carbon (C)	2012/07/11		94	%	83 - 118
		RPD [DV0613-02]	Organic Matter	2012/07/11	NC		%	35
			Total Organic Carbon (C)	2012/07/11	NC		%	35
5999590	KVD	QC Standard	% sand by hydrometer	2012/07/13		99	%	88 - 112
			% silt by hydrometer	2012/07/13		101	%	85 - 115
			Clay Content	2012/07/13		100	%	79 - 121
		RPD	% sand by hydrometer	2012/07/13	4.2		%	35
			% silt by hydrometer	2012/07/13	7.6		%	35
			Clay Content	2012/07/13	15.7		%	35
6000949	IA0	Matrix Spike [DV0615-02]	Total Kjeldahl Nitrogen	2012/07/13		90	%	75 - 125
		QC Standard	Total Kjeldahl Nitrogen	2012/07/13		90	%	75 - 125
		Spiked Blank	Total Kjeldahl Nitrogen	2012/07/13		105	%	75 - 125
		Method Blank	Total Kjeldahl Nitrogen	2012/07/13	<10		mg/kg	
		RPD [DV0615-02]	Total Kjeldahl Nitrogen	2012/07/13	NC		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

LABERGE ENVIRONMENTAL SERVICES
Attention: Ken Nordin
Client Project #: BIOCHAR RESEARCH
P.O. #:
Site Location:

Quality Assurance Report (Continued)

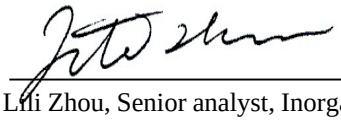
Maxxam Job Number: VB256252

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B256252

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Lili Zhou, Senior analyst, Inorganic department.

Rob Reinert, Data Validation Coordinator

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5 Ph: (604) 734-7276 Fax: (604) 731-2386, Toll Free: (800) 665-8566

CHAIN OF CUSTODY RECORD

Maxxam Job #: B256252 COC #: EB492312 Click here to get the COC number Page: 1 of 1

Invoice To: Require Report? Yes ☐ No ☐

Company Name: Laberge Environmental Services
Contact Name: Ken Nordin
Address: Box 21072 Whitehorse Yukon PC: Y1A 6P7
Phone / Fax#: Ph: 867 668 6838 Fax: 867 667 6956
E-mail

Report To:

Company Name: same
Contact Name:
Address: PC:
Phone / Fax#: Ph: Fax:
E-mail

PO #:
Quotation #:
Project # : Biochar Research
Proj. Name:
Location:
Sampled by: Ken Nordin

REGULATORY REQUIREMENTS:

☐ CSR
☐ CCME
☐ BC Water Quality
☐ Other
☐ DRINKING WATER

SERVICE REQUESTED:

◉ Regular Turn Around Time (TAT)
(5 days for most tests)
RUSH (Please contact the lab)
○ 1 Day ○ 2 Day ○ 3 Day
Date Required:

SPECIAL INSTRUCTIONS:
Return Cooler ☐ **Ship Sample Bottles (please specify)** ☐

ANALYSIS REQUESTED

Lab Use Only

	* Sample Identification	Lab Identification	Sample Type	Date/Time(24hr) Sampled	Dissolved Metals (DM) Y☐N☐	Field Filtered? Y☐N☐	Total Metals Y☐N☐	Field Acidified? Y☐N☐	Cation Exchange Capacity (CEC)	Water Holding Capacity	% Organic Matter	metals	NPK (Nutrients)	pH	Particle size	C:N Ratio	Number of Containers
1	Peso Waste Rock	DV0612		12/06/24 12:00					x	x	x	x	x	x	x	x	
2	Peso Trenches	DV0613		12/06/24 12:00					x	x	x	x	x	x	x	x	
3	WHC A,B,C	DV0614		12/06/26 12:00					x	x	x	x	x	x	x	x	
4	MSGM A,B,C	DV0615		12/06/26 12:00					x	x	x	x	x	x	x	x	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	

Ken Nordin:
Please Homogenize WHC and MSGM jars A, B and C to form single sample for each.

B256252

Print name and sign | Print name and sign | Laboratory Use Only

*Relinquished By:	Date (yy/mm/dd):	Time (24hr):	Received by :	Date (yy/mm/dd):	Time (24 hr):	Time Sensitive	Temperature on Receipt (°C)	Custody Seal	Yes	No
Ken Nordin	12/06/28	17:00	Noelle Laurel Bertrier	2012/06/29	14:00	☐	A) 18 B) 17 C) 18	Present?	☐	☑
							Just sampled & rec'd on ice: ☐	Intact?	☐	☐ N/A

*IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORDS. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

STRATAGOLD CORPORATION
ATTN: Hugh Coyle
Suite 1000 - 1050 W. Pender St
Vancouver BC V6E 3S7

Date Received: 01-AUG-18
Report Date: 29-AUG-18 12:31 (MT)
Version: FINAL

Client Phone: 604-682-5122

Certificate of Analysis

Lab Work Order #: L2139940

Project P.O. #: NOT SUBMITTED
Job Reference: EAGLE GOLD
C of C Numbers:
Legal Site Desc: Victoria Gold Corp.

Heather McKenzie
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-1 Soil 31-JUL-18 T1-1AB	L2139940-2 Soil 31-JUL-18 T1-2AB	L2139940-3 Soil 31-JUL-18 T1-3	L2139940-4 Soil 31-JUL-18 T2-1AB	L2139940-5 Soil 31-JUL-18 T2-2
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
SOIL						
Physical Tests	Loss on Ignition @ 375 C (%)	1.2	3.1	3.6	1.3	1.3
	Organic Matter (%)	1.2	2.7	3.1	1.3	1.3
	pH (1:2 soil:water) (pH)	6.30	7.17	6.74	5.88	7.12
Particle Size	% Sand (2.0mm - 0.05mm) (%)	83.3	83.8	82.5	65.0	65.7
	% Silt (0.05mm - 2um) (%)	15.3	14.1	15.7	28.9	28.6
	% Clay (<2um) (%)	1.4	2.1	1.7	6.1	5.7
	Texture	Loamy sand	Loamy sand	Loamy sand	Sandy loam	Sandy loam
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (%)	0.069	0.118	0.132	0.059	0.064
Organic / Inorganic Carbon	C:N Ratio	5.8:1	15.7:1	14.5:1	7:1	8.9:1
	Total Carbon by Combustion (%)	0.40	1.86	1.91	0.42	0.57
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.8	2.5	3.1	2.0	2.3
	Calcium (Ca) (meq/100g)	0.92	5.33	3.74	0.74	2.26
	Magnesium (Mg) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Phosphate-P (mg/kg)	3.4	46.9 DLHC	17.9	<2.0	6.8
	Available Potassium (mg/kg)	24	51	51	30	39
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Metals	Aluminum (Al) (mg/kg)	3220	2050	1630	3440	3390
	Antimony (Sb) (mg/kg)	3750	818	6410	2360	492
	Arsenic (As) (mg/kg)	6380	2190	2690	5810	1490
	Barium (Ba) (mg/kg)	47.2	32.6	35.6	70.3	65.7
	Beryllium (Be) (mg/kg)	0.13	<0.10	<0.10	0.13	0.11
	Bismuth (Bi) (mg/kg)	145	26.1	236	504	53.5
	Boron (B) (mg/kg)	10.0	<5.0	7.1	7.4	<5.0
	Cadmium (Cd) (mg/kg)	4.08	0.427	3.26	3.89	0.564
	Calcium (Ca) (mg/kg)	578	1830	3890	947	1180
	Chromium (Cr) (mg/kg)	16.6	7.83	5.92	7.33	7.84
	Cobalt (Co) (mg/kg)	7.91	4.18	2.26	2.93	2.84
	Copper (Cu) (mg/kg)	132	55.6	29.8	74.3	50.9
	Iron (Fe) (mg/kg)	56700	31900	17900	51100	28400
	Lead (Pb) (mg/kg)	7790	1440	3670	4700	1160
	Lithium (Li) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Magnesium (Mg) (mg/kg)	94	312	475	81	84
	Manganese (Mn) (mg/kg)	278	290	131	277	142
	Mercury (Hg) (mg/kg)	0.227	0.169	0.468	0.358	0.146

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-6	L2139940-7	L2139940-8	L2139940-9	L2139940-10
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	T2-3A	T3-1	T3-2AB	T3-3AB	W1-1
Grouping / **Analyte**					
SOIL					
Physical Tests Loss on Ignition @ 375 C (%)	1.4	2.3	3.3	3.5	2.0
Organic Matter (%)	1.4	2.0	2.9	3.0	1.8
pH (1:2 soil:water) (pH)	6.12	5.17	5.75	6.79	3.04
Particle Size % Sand (2.0mm - 0.05mm) (%)	65.2	60.9	64.2	58.0	59.4
% Silt (0.05mm - 2um) (%)	28.3	34.7	31.0	37.9	36.4
% Clay (<2um) (%)	6.5	4.4	4.7	4.1	4.2
Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Leachable Anions & Nutrients Total Kjeldahl Nitrogen (%)	0.063	0.070	0.077	0.088	0.062
Organic / Inorganic Carbon C:N Ratio	6.8:1	7.2:1	20.1:1	17.5:1	10.5:1
Total Carbon by Combustion (%)	0.43	0.50	1.55	1.53	0.64
Plant Available Nutrients Available Ammonium-N (mg/kg)	1.4	1.7	2.6	2.5	4.1
Calcium (Ca) (meq/100g)	1.20	<0.50	3.97	4.48	<0.50
Magnesium (Mg) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Available Phosphate-P (mg/kg)	<2.0	2.3	15.2	24.2	2.2
Available Potassium (mg/kg)	29	31	40	46	27
Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Metals Aluminum (Al) (mg/kg)	4620	3030	3670	2670	7160
Antimony (Sb) (mg/kg)	369	4590	1450	2330	1280
Arsenic (As) (mg/kg)	1730	11400	4410	10600	3750
Barium (Ba) (mg/kg)	91.3	42.3	40.6	38.6	116
Beryllium (Be) (mg/kg)	0.15	0.12	0.13	<0.10	0.20
Bismuth (Bi) (mg/kg)	30.5	320	91.5	222	110
Boron (B) (mg/kg)	8.2	7.4	<5.0	<5.0	<5.0
Cadmium (Cd) (mg/kg)	0.482	6.21	1.53	3.91	1.85
Calcium (Ca) (mg/kg)	1330	334	634	1190	452
Chromium (Cr) (mg/kg)	10.6	11.2	10.1	13.8	14.2
Cobalt (Co) (mg/kg)	3.44	5.08	4.21	6.24	9.72
Copper (Cu) (mg/kg)	73.3	170	92.7	121	145
Iron (Fe) (mg/kg)	39300	43100	36000	42900	46500
Lead (Pb) (mg/kg)	1260	8680	3200	4890	1870
Lithium (Li) (mg/kg)	<2.0	<2.0	<2.0	<2.0	7.5
Magnesium (Mg) (mg/kg)	92	131	354	193	2250
Manganese (Mn) (mg/kg)	199	184	170	214	272
Mercury (Hg) (mg/kg)	0.193	0.700	0.571	0.924	0.0935

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-11 Soil 31-JUL-18 W1-2	L2139940-12 Soil 31-JUL-18 W1-3	L2139940-13 Soil 31-JUL-18 W1-4	L2139940-14 Soil 31-JUL-18 W1-5	L2139940-15 Soil 31-JUL-18 W2-1
SOIL						
Physical Tests	Loss on Ignition @ 375 C (%)	2.3	4.4	3.0	9.2	1.4
	Organic Matter (%)	2.1	3.7	2.6	7.5	1.4
	pH (1:2 soil:water) (pH)	4.81	3.25	4.10	5.71	2.75
Particle Size	% Sand (2.0mm - 0.05mm) (%)	69.2	80.3	82.3	75.5	37.4
	% Silt (0.05mm - 2um) (%)	27.2	17.2	16.0	20.8	59.4
	% Clay (<2um) (%)	3.6	2.4	1.7	3.7	3.1
	Texture	Sandy loam	Loamy sand	Loamy sand	Loamy sand	Silt loam
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (%)	0.073	0.095	0.115	0.152	0.023
Organic / Inorganic Carbon	C:N Ratio	12.2:1	30.7:1	11.5:1	37.6:1	15.1:1
	Total Carbon by Combustion (%)	0.89	2.91	1.33	5.72	0.34
Plant Available Nutrients	Available Ammonium-N (mg/kg)	3.4	3.6	3.3	6.3	2.2
	Calcium (Ca) (meq/100g)	1.27	<0.50	0.75	11.2	<0.50
	Magnesium (Mg) (meq/100g)	<0.50	<0.50	<0.50	2.26	<0.50
	Available Phosphate-P (mg/kg)	5.7	6.4	<2.0	15.6	<2.0
	Available Potassium (mg/kg)	23	<20	25	45	<20
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Metals	Aluminum (Al) (mg/kg)	5840	4990	3550	2780	4540
	Antimony (Sb) (mg/kg)	542	241	838	3350	1110
	Arsenic (As) (mg/kg)	3220	2140	3610	3130	1470
	Barium (Ba) (mg/kg)	72.0	44.3	24.3	46.3	158
	Beryllium (Be) (mg/kg)	0.18	0.20	0.18	0.13	0.13
	Bismuth (Bi) (mg/kg)	66.5	21.2	73.4	313	43.5
	Boron (B) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	1.29	1.61	1.95	2.40	0.291
	Calcium (Ca) (mg/kg)	1150	296	4040	28500	756
	Chromium (Cr) (mg/kg)	12.2	11.9	9.60	5.22	10.4
	Cobalt (Co) (mg/kg)	11.6	22.5	14.0	2.54	3.00
	Copper (Cu) (mg/kg)	172	120	214	229	88.0
	Iron (Fe) (mg/kg)	45400	50500	48600	27200	38500
	Lead (Pb) (mg/kg)	4570	391	1380	6770	1600
	Lithium (Li) (mg/kg)	5.8	5.3	3.2	<2.0	4.7
	Magnesium (Mg) (mg/kg)	1820	1620	3190	14800	1410
	Manganese (Mn) (mg/kg)	238	320	225	207	112
	Mercury (Hg) (mg/kg)	0.0853	0.0327	0.105	0.654	0.0933

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-16	L2139940-17	L2139940-18	L2139940-19	L2139940-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	W2-2	W2-3	W2-4	W2-5	W3-1
Grouping / **Analyte**					
SOIL					
Physical Tests Loss on Ignition @ 375 C (%)	1.5	3.0	4.8	1.9	1.6
Organic Matter (%)	1.5	2.6	4.1	1.7	1.5
pH (1:2 soil:water) (pH)	3.11	3.04	3.28	2.84	2.32
Particle Size % Sand (2.0mm - 0.05mm) (%)	42.6	87.1	73.2	71.2	53.3
% Silt (0.05mm - 2um) (%)	55.6	11.2	23.6	22.4	40.5
% Clay (<2um) (%)	1.8	1.7	3.2	6.3	6.2
Texture	Silt loam	Sand	Sandy loam / Loamy sand	Sandy loam	Sandy loam
Leachable Anions & Nutrients Total Kjeldahl Nitrogen (%)	0.033	0.063	0.096	0.046	0.061
Organic / Inorganic Carbon C:N Ratio	12.9:1	15.6:1	24:1	5.7:1	8.7:1
Total Carbon by Combustion (%)	0.42	0.99	2.31	0.26	0.53
Plant Available Nutrients Available Ammonium-N (mg/kg)	1.8	2.9	4.5	2.8	6.9
Calcium (Ca) (meq/100g)	<0.50	<0.50	2.84	<0.50	<0.50
Magnesium (Mg) (meq/100g)	<0.50	<0.50	0.90	<0.50	<0.50
Available Phosphate-P (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Available Potassium (mg/kg)	<20	<20	32	<20	<20
Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
Metals Aluminum (Al) (mg/kg)	5820	4920	5080	4590	3390
Antimony (Sb) (mg/kg)	333	1320	2100	2360	2940
Arsenic (As) (mg/kg)	1240	2530	2980	2260	3010
Barium (Ba) (mg/kg)	196	102	134	86.8	116
Beryllium (Be) (mg/kg)	0.13	0.27	0.22	0.27	0.14
Bismuth (Bi) (mg/kg)	12.1	132	252	422	246
Boron (B) (mg/kg)	<5.0	<5.0	<5.0	5.2	<5.0
Cadmium (Cd) (mg/kg)	0.253	0.442	0.633	0.996	1.81
Calcium (Ca) (mg/kg)	1160	899	1540	1390	222
Chromium (Cr) (mg/kg)	13.9	8.69	8.62	6.91	10.6
Cobalt (Co) (mg/kg)	4.69	2.24	2.38	1.39	5.39
Copper (Cu) (mg/kg)	59.4	194	194	180	250
Iron (Fe) (mg/kg)	33500	53900	48900	45100	37100
Lead (Pb) (mg/kg)	331	2220	3590	4860	3810
Lithium (Li) (mg/kg)	6.9	2.2	2.2	<2.0	2.4
Magnesium (Mg) (mg/kg)	2350	307	731	212	622
Manganese (Mn) (mg/kg)	179	83.4	86.7	66.9	129
Mercury (Hg) (mg/kg)	0.0465	0.182	0.361	0.302	0.207

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-21	L2139940-22	L2139940-23	L2139940-24	
Description	Soil	Soil	Soil	Soil	
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	
Sampled Time					
Client ID	W3-2	W3-3	W3-4	W3-5	
Grouping	**Analyte**				
SOIL					
Physical Tests	Loss on Ignition @ 375 C (%)	6.1	8.0	9.5	7.9	
	Organic Matter (%)	5.0	6.5	7.7	6.5	
	pH (1:2 soil:water) (pH)	2.41	1.77	4.32	2.20	
Particle Size	% Sand (2.0mm - 0.05mm) (%)	69.2	63.7	68.6	68.8	
	% Silt (0.05mm - 2um) (%)	25.4	28.6	26.9	25.0	
	% Clay (<2um) (%)	5.4	7.6	4.5	6.2	
	Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (%)	0.135	0.150	0.175	0.140	
Organic / Inorganic Carbon	C:N Ratio	21.9:1	27.6:1	32.4:1	32:1	
	Total Carbon by Combustion (%)	2.95	4.16	5.66	4.47	
Plant Available Nutrients	Available Ammonium-N (mg/kg)	13.6	18.6 DLHC	7.5	11.5	
	Calcium (Ca) (meq/100g)	<0.50	<0.50	3.60	19.4	
	Magnesium (Mg) (meq/100g)	<0.50	<0.50	1.96	2.12	
	Available Phosphate-P (mg/kg)	4.4	<2.0	<2.0	<2.0	
	Available Potassium (mg/kg)	<20	20	<20	<20	
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
Metals	Aluminum (Al) (mg/kg)	2930	3100	3760	2710	
	Antimony (Sb) (mg/kg)	7690	6020	5920	7140	
	Arsenic (As) (mg/kg)	6500	7950	9810	10900	
	Barium (Ba) (mg/kg)	47.3	53.7	60.5	48.1	
	Beryllium (Be) (mg/kg)	0.16	0.17	0.17	0.11	
	Bismuth (Bi) (mg/kg)	1020	975	822	1250	
	Boron (B) (mg/kg)	6.7	5.8	<5.0	5.8	
	Cadmium (Cd) (mg/kg)	5.74	6.59	6.44	6.31	
	Calcium (Ca) (mg/kg)	446	571	9170	2290	
	Chromium (Cr) (mg/kg)	9.91	9.40	12.0	7.89	
	Cobalt (Co) (mg/kg)	1.80	1.82	3.01	2.13	
	Copper (Cu) (mg/kg)	299	314	433	400	
	Iron (Fe) (mg/kg)	35800	32300	54300	70100	
	Lead (Pb) (mg/kg)	14300	12800	10700	16600	
	Lithium (Li) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Magnesium (Mg) (mg/kg)	262	105	5180	1380	
	Manganese (Mn) (mg/kg)	94.8	81.8	132	108	
	Mercury (Hg) (mg/kg)	0.701	1.05	0.797	0.706	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-1	L2139940-2	L2139940-3	L2139940-4	L2139940-5
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	T1-1AB	T1-2AB	T1-3	T2-1AB	T2-2
Grouping / **Analyte**					
SOIL					
Metals Molybdenum (Mo) (mg/kg)	1.45	1.36	1.05	0.85	1.31
Nickel (Ni) (mg/kg)	20.3	11.5	5.92	5.34	5.52
Phosphorus (P) (mg/kg)	581	500	452	1170	1200
Potassium (K) (mg/kg)	580	460	320	670	630
Selenium (Se) (mg/kg)	5.62	1.70	6.76	9.01	1.98
Silver (Ag) (mg/kg)	>165	15.8	>126	50.7	8.51
Sodium (Na) (mg/kg)	<50	<50	<50	<50	<50
Strontium (Sr) (mg/kg)	93.0	35.7	32.6	337	349
Sulfur (S) (mg/kg)	1500	<1000	<1000	1700	<1000
Thallium (Tl) (mg/kg)	0.262	0.149	0.147	0.282	0.118
Tin (Sn) (mg/kg)	51.0	16.5	24.7	41.3	17.2
Titanium (Ti) (mg/kg)	22.3	28.9	38.7	19.5	<16 DLM
Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U) (mg/kg)	14.3	1.72	4.75	6.05	2.17
Vanadium (V) (mg/kg)	18.6	10.4	6.31	10.7	8.41
Zinc (Zn) (mg/kg)	354	142	70.4	117	85.5
Zirconium (Zr) (mg/kg)	12.0	3.8	2.1	7.4	7.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-6 Soil 31-JUL-18 T2-3A	L2139940-7 Soil 31-JUL-18 T3-1	L2139940-8 Soil 31-JUL-18 T3-2AB	L2139940-9 Soil 31-JUL-18 T3-3AB	L2139940-10 Soil 31-JUL-18 W1-1
Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**						
SOIL						
Metals	Molybdenum (Mo) (mg/kg)	1.05	0.79	1.15	1.27	0.78
	Nickel (Ni) (mg/kg)	7.03	9.32	8.65	15.1	27.6
	Phosphorus (P) (mg/kg)	1480	534	333	484	461
	Potassium (K) (mg/kg)	790	520	470	590	640
	Selenium (Se) (mg/kg)	1.68	9.01	3.54	6.42	3.93
	Silver (Ag) (mg/kg)	7.37	38.0	18.3	35.8	17.6
	Sodium (Na) (mg/kg)	<50	<50	<50	<50	149
	Strontium (Sr) (mg/kg)	483	108	57.1	79.5	26.0
	Sulfur (S) (mg/kg)	<1000	2000	1100	1600	2900
	Thallium (Tl) (mg/kg)	0.116	0.263	0.180	0.189	<0.10 DLM
	Tin (Sn) (mg/kg)	18.0	201	38.3	105 DLM	6.9
	Titanium (Ti) (mg/kg)	18.4	17.3	37.1	<19	99.7
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	2.17	3.49	2.06	3.12	2.41
	Vanadium (V) (mg/kg)	11.7	10.5	12.7	13.3	19.5
	Zinc (Zn) (mg/kg)	113	112	95.0	107	258
	Zirconium (Zr) (mg/kg)	6.2	10.4	8.7	10.2	3.3

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-11	L2139940-12	L2139940-13	L2139940-14	L2139940-15
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	W1-2	W1-3	W1-4	W1-5	W2-1
Grouping / **Analyte**					
SOIL					
Metals Molybdenum (Mo) (mg/kg)	1.60	1.69	1.04	2.20	0.77
Nickel (Ni) (mg/kg)	27.6	48.7	34.2	7.42	8.91
Phosphorus (P) (mg/kg)	827	594	410	914	561
Potassium (K) (mg/kg)	580	420	400	700	970
Selenium (Se) (mg/kg)	5.46	1.04	4.02	12.2	2.46
Silver (Ag) (mg/kg)	18.9	3.50	16.3	62.9	19.5
Sodium (Na) (mg/kg)	184	73	<50	55	392
Strontium (Sr) (mg/kg)	32.8	13.3	17.8	193	90.6
Sulfur (S) (mg/kg)	3400	1600	2400	6700	6300
Thallium (Tl) (mg/kg)	<0.15 DLM	0.062	<0.10 DLM	<0.35 DLM	0.151
Tin (Sn) (mg/kg)	7.6	2.6	7.6	33.2	11.3
Titanium (Ti) (mg/kg)	75.9	49.8	26.8	<31 DLM	274
Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U) (mg/kg)	2.27	2.73	2.99	2.21	0.967
Vanadium (V) (mg/kg)	15.7	12.9	10.0	8.13	28.0
Zinc (Zn) (mg/kg)	249	333	210	121	47.8
Zirconium (Zr) (mg/kg)	1.4	2.5	7.1	<1.0	4.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-16	L2139940-17	L2139940-18	L2139940-19	L2139940-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	W2-2	W2-3	W2-4	W2-5	W3-1
Grouping / **Analyte**					
SOIL					
Metals Molybdenum (Mo) (mg/kg)	0.80	1.04	1.89	1.09	1.30
Nickel (Ni) (mg/kg)	13.2	8.26	8.19	6.94	16.2
Phosphorus (P) (mg/kg)	602	1670	1640	1730	289
Potassium (K) (mg/kg)	980	1130	1240	1460	670
Selenium (Se) (mg/kg)	1.14	4.04	6.75	6.31	9.79
Silver (Ag) (mg/kg)	4.72	58.0	75.3	>108	32.5
Sodium (Na) (mg/kg)	353	92	162	75	106
Strontium (Sr) (mg/kg)	39.4	407	458	565	41.2
Sulfur (S) (mg/kg)	4000	5900	9000	9800	3900
Thallium (Tl) (mg/kg)	0.078	0.242	0.301	0.418	<0.20 DLM
Tin (Sn) (mg/kg)	5.1	21.0	32.2	26.5	33.9
Titanium (Ti) (mg/kg)	314	31.1	78.7	10.6	74.2
Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U) (mg/kg)	0.785	2.32	2.46	3.87	2.52
Vanadium (V) (mg/kg)	29.3	14.5	18.0	12.2	17.1
Zinc (Zn) (mg/kg)	54.5	88.7	68.5	69.2	94.1
Zirconium (Zr) (mg/kg)	2.5	4.6	4.4	6.8	9.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-21	L2139940-22	L2139940-23	L2139940-24	
Description	Soil	Soil	Soil	Soil	
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	
Sampled Time					
Client ID	W3-2	W3-3	W3-4	W3-5	
Grouping / **Analyte**					
SOIL					
Metals Molybdenum (Mo) (mg/kg)	2.57	1.79	2.57	1.94	
Nickel (Ni) (mg/kg)	5.14	5.46	8.84	5.78	
Phosphorus (P) (mg/kg)	1120	769	1230	788	
Potassium (K) (mg/kg)	900	850	870	750	
Selenium (Se) (mg/kg)	25.1	27.5	25.8	35.5	
Silver (Ag) (mg/kg)	>122	>112	>111	>135	
Sodium (Na) (mg/kg)	58	53	94	106	
Strontium (Sr) (mg/kg)	188	215	168	141	
Sulfur (S) (mg/kg)	6300	8500	8400	16600	
Thallium (Tl) (mg/kg)	<0.30 DLM	<0.35 DLM	0.265	<35 DLM	
Tin (Sn) (mg/kg)	64.0	131	81.7	68.5	
Titanium (Ti) (mg/kg)	39.6	39.9	46.0	<47 DLM	
Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	
Uranium (U) (mg/kg)	6.00	7.07	5.62	6.01	
Vanadium (V) (mg/kg)	8.07	7.03	9.26	7.35	
Zinc (Zn) (mg/kg)	110	103	100	90.2	
Zirconium (Zr) (mg/kg)	1.2	9.7	<1.0	2.9	

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

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L2139940-1	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-10	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-11	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-12	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-13	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-14	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-15	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-16	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-17	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-18	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-19	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-2	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-20	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-21	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-22	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-23	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-24	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-3	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-4	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-5	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-6	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-7	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-8	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	
L2139940-9	Soil	Note: Method variance: analysis performed by ICPMS, this method variance is not accredited.	

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)	DUP-H	L2139940-10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -24
Duplicate	Strontium (Sr)	DUP-H	L2139940-10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -24
Duplicate	Zinc (Zn)	DUP-H	L2139940-10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -24
Certified Reference Material	Chromium (Cr)-Total	RRQC	L2139940-40, -41, -42, -43, -44, -45, -46, -47, -48, -49, -50, -51, -52, -53, -54

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RRQC	Refer to report remarks for information regarding this QC result.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AG-200.2-A-CCMS-VA	Soil	Elevated Ag in Soil by CRC ICPMS	EPA 200.2/6020A
This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Analysis is by Collision/Reaction Cell ICPMS.			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7
Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.			
ETL-C:N-RATIO-SK	Soil	Carbon:Nitrogen Ratio - Calculation	Calculation
HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with hot nitric and hydrochloric acids, followed by CVAAS analysis. This method is fully compliant with the BC SALM strong acid leachable metals digestion method.			
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
N-TOTKJ-COL-SK	Soil	Total Kjeldahl Nitrogen	CSSS (2008) 22.2.3
The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colrimetrically at 660 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	Comm Soil Sci 19(6)
Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
OM-LOI-SK	Soil	Organic Matter by LOI at 375 deg C.	CSSS (1978) p. 160
The dry-ash method involves the removal of organic matter by combustion at 375 degrees C for a minimum of 16 hours. Samples are dried prior to combustion. Reference: McKeague, J.A. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1978) method 4.23			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

Reference Information

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PO4/K-AVAIL-SK Soil Plant Available Phosphorus and Potassium Comm. Soil Sci. Plant Anal, 25 (5&6)

Plant available phosphorus and potassium are extracted from the soil usng Modified Kelowna solution. Phosphorous in the soil extract is determined colorimetrically at 880 nm, while potassiumis determined by flame emission at 770 nm.

PSA-1-SK Soil Particle Size Analysis:Mini-Pipet Method SSIR-51 Method 3.2.1

Dry, < 2 mm soil is treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. The homogenized suspension is allowed to settle in accordance with Stoke's Law so that only clay particles remain in suspension.To determine the clay fraction, an aliquot of the clay suspension is removed, then dried and weighed. The sand fraction is determined by wet sieving the remaining suspension, then drying and weighing the sand retained on the sieve. The silt fraction is determined by calculation where % Silt = 100 - (%Sand+%Clay)

Reference:
Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

Kalra, Y.P., Maynard, D.G. 1991. Methods manual for forest soil and plant analysis. Forestry Canada. p. 42-45.

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

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

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

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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

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

L2139940-COFC

ALS Environmental

Chain of Custody / A COC #

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Report To				**Report Format / Distribution**				**Service Requested** (Rush for routine analysis subject to availability)
Company:	StrataGold Corporation			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Hugh Coyle			☑ PDF	☑ Excel	☑ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1000 - 1050 West Pender Street			Email 1:	hcoyle@vitgoldcorp.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6E 3S7			Email 2:	bonnieburns@northwestel.net			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-696-6600	Fax:		Email 3:	jknox@vitgoldcorp.com, cbeaudry@vitgoldcorp.c			**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	Eagle Gold			
Company:				PO / AFE:				
Contact:				LSD:	Victoria Gold Corp.			
Address:								
Phone:		Fax:		Quote #:	Q69293, Peso Samples			
Lab Work Order # (lab use only)				**ALS Contact:**	Heather Mackenzie	**Sampler:**	Bonnie Burns &Crystal Beaudry	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Carbon to Nitrogen Ratio	Cation Exchange Capacity	Metals, CCME	Particle Size Analysis	Available Ammonium	Organic matter by LOI	Plant Available P and K						Number of Containers
	T1-1AB	31-7-17		Soil	X	X	X	X	X	X	X						2
	T1-2AB	31-7-17		Soil	X	X	X	X	X	X	X						2
	T1-3	31-7-17		Soil	X	X	X	X	X	X	X						2
	T2-1AB	31-7-17		Soil	X	X	X	X	X	X	X						2
	T2-2	31-7-17		Soil	X	X	X	X	X	X	X						2
	T2-3A	31-7-17		Soil	X	X	X	X	X	X	X						2
	T3-1	31-7-17		Soil	X	X	X	X	X	X	X						2
	T3-2AB	31-7-17		Soil	X	X	X	X	X	X	X						2
	T3-3AB	31-7-17		Soil	X	X	X	X	X	X	X						2
	W1-1	31-7-17		Soil	X	X	X	X	X	X	X						2
	W1-2	31-7-17		Soil	X	X	X	X	X	X	X						2
	W1-3	31-7-17		Soil	X	X	X	X	X	X	X						2
	W1-4	31-7-17		Soil	X	X	X	X	X	X	X						2

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Bonnie Burns			EHF	1 Aug 2018	16:30	12 D °C	HA	8/L	1 pm	

GENF 20.00 Front

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L2139940-COFC

ALS Environmental

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Report To				**Report Format / Distribution**				**Service Requested** (Rush for routine analysis subject to availability)
Company:	StrataGold Corporation			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Hugh Coyle			☑ PDF	☑ Excel	☑ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1000 - 1050 West Pender Street			Email 1:	hcoyle@vitgoldcorp.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6E 3S7			Email 2:	bonnieburns@northwestel.net			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-696-6600	Fax:		Email 3:	Jknox@vitgoldcorp.com, cbeaudry@vitgoldcorp.c			**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	Eagle Gold			
Company:				PO / AFE:				
Contact:				LSD:	Victoria Gold Corp.			
Address:								
Phone:		Fax:		Quote #:	Q69293, Peso Samples			

Lab Work Order # (lab use only)		**ALS Contact:**	Heather Mackenzie	**Sampler:**	Bonnie Burns & Crystal Beaudry

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Carbon to Nitrogen Ratio	Cation Exchange Capacity	Metals, CCME	Particle Size Analysis	Available Ammonium	Organic matter by LOI	Plant Available P and K						Number of Containers
	W1-5	31-7-17		Soil	X	X	X	X	X	X	X						2
	W2-1	31-7-17		Soil	X	X	X	X	X	X	X						2
	W2-2	31-7-17		Soil	X	X	X	X	X	X	X						2
	W2-3	31-7-17		Soil	X	X	X	X	X	X	X						2
	W2-4	31-7-17		Soil	X	X	X	X	X	X	X						2
	W2-5	31-7-17		Soil	X	X	X	X	X	X	X						2
	W3-1	31-7-17		Soil	X	X	X	X	X	X	X						2
	W3-2	31-7-17		Soil	X	X	X	X	X	X	X						2
	W3-3	31-7-17		Soil	X	X	X	X	X	X	X						2
	W3-4	31-7-17		Soil	X	X	X	X	X	X	X						2
	W3-5	31-7-17		Soil	X	X	X	X	X	X	X						2

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Bonnie Burns			EHF	1 Aug 2017	1630	12 °C	HA	8/2	1pm	

GENF 20.00 Front

7

APPENDIX B

PHOTOGRAPHS,
SEPTEMBER 2012 TO AUGUST 2018

TRENCH – BLOCK #1

Photo #1: Trench - Block #1 staked out, July 2012

Photo #2: Each plot was decompacted using a 5-pronged cultivator

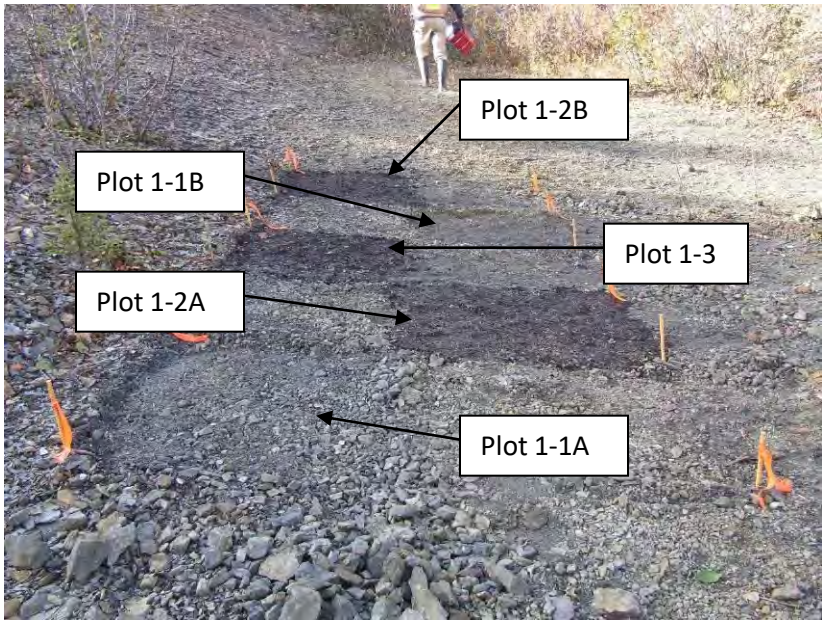


Photo #3: Trench - Block #1 plots prepared, seeded and treated.

Photo #4: Trench – Block #1, July 2013, grass has started growing.

Photo #5: Trench – Block #1, Aug 2014.

Photo #6: Trench – Block #1, alders becoming established, July 2016.

Photo #7: Trench – Block #1, increased growth of alders, Aug 2017.

Photo #8: Trench – Block #1, July 2018.

Photo #9: Trench – Plot #1-3, July 2013.

Photo #10: Trench – Plot #1-3, August 2014.

Photo #11: Trench – Plot #1-3, August 2015.

Photo #12: Trench – Plot #1-3, July 2016.

Photo #13: Trench – Plot #1-3, August 2017.

Photo #14: Trench – Plot #1-3, July 2018.

Photo #15: Trench, Block #1, young alder with long lateral root. 2018.

Photo #16: Root ball of alder plant from Plot #1-2B, July 2018.

TRENCH – BLOCK #2

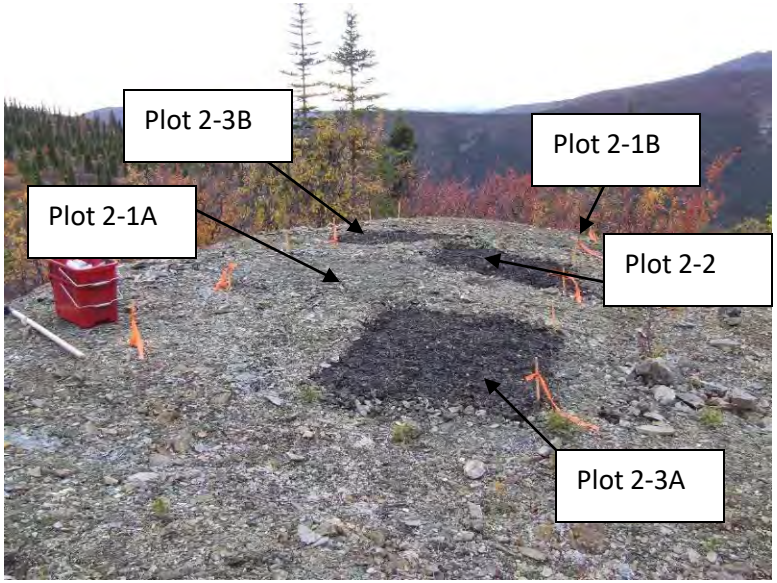


Photo #17: Trench – Block #2 prepared, seeded and treated. September 2012.

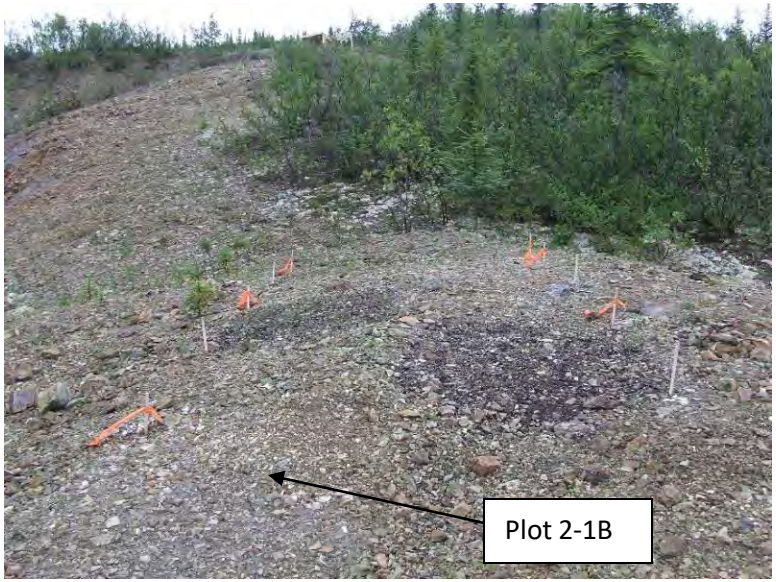


Photo #18: Trench – Block #2, July 2013.

Photo #19: Trench – Block #2, July 2016.

Photo #20: Trench – Block #2, Aug 2017.

Photo #21: Trench – Block #2, July 2018.

Photo #22: Trench, Plot #2-2, July 2013.

Photo #23: Trench, Plot #2-2, August 2014.

Photo #24: Trench, Plot #2-2, July 2015.

Photo #25: Trench, Plot #2-2, July 2016.

Photo #26: Trench, Plot #2-2, August 2017.

Photo #27: Trench, Plot #2-2, July 2018.

Photo #28: The alder in Plot #2-2 has produced seed cones in 2018.

TRENCH – BLOCK #3

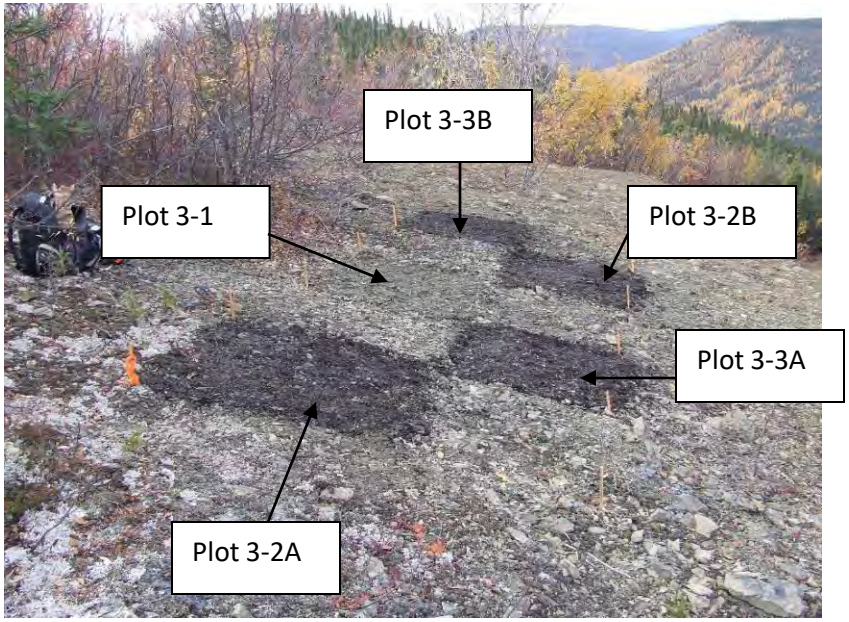


Photo #29: Trench Block #3, prepared, seeded and treated, Sept/12

Photo #30: Trench – Block #3, July 2013.

Photo #31: Trench – Block #3, August 2014, increased growth.

Photo #32: Trench – Block #3, July 2016.

Photo #33: Trench – Block #3, August 2017.

Photo #34: Trench – Block #3, July 2018. Increase alder growth.

Photo #35: Trench, Plot 3-2B, July 2013.

Photo #36: Trench, Plot 3-2B, Aug 2014, healthy grasses.

Photo #37: Trench, Plot #3-2B, August 2015.

Photo #38: Trench, Plot #3-2B, August 2017.

Photo #39: Trench, Plot #3-2B, July 2018

Photo #40: Nitrogen nodule on alder from Plot 3-2B, July 2018.

WASTE ROCK DUMP – BLOCK #1

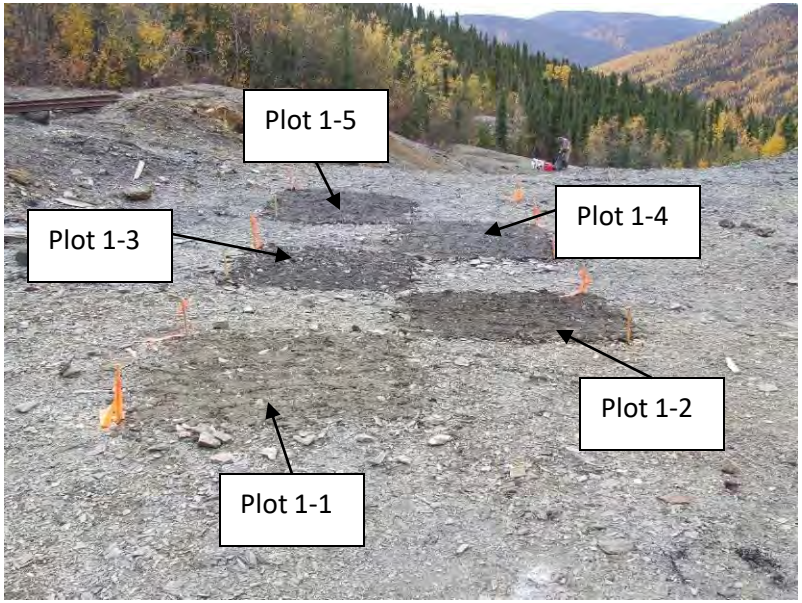


Photo #41: Waste Rock, Block #1, prepared, seeded and treated, Sept 2012.

Photo #42: Waste Rock, Block #1, July 2013.

Photo #43: Waste Rock, Block #1, August 2014, increased grass growth.

Photo #44: Waste Rock, Block #1, July 2016.

Photo #45: Waste Rock, Block #1, August 2017.

Photo #46: Waste Rock, Block #1, July 2018.

Photo #47: Waste Rock, Plot #1-5, very little growth, July 2013.

Photo #48: Waste Rock, Plot #1-5, healthy grass growth, Aug 2014.

Photo #49: Waste Rock, Plot #1-5, alders appearing, Aug 2015.

Photo #50: Waste Rock, Plot #1-5, grasses dying back, July 2016.

Photo #51: Waste Rock, Plot 1-5, August 2017.

Photo #52: Waste Rock, Plot 1-5, July 2018.

Photo #53: Waste Rock, healthy spruce growing among volunteer willow, paper birch and the alders at Plot #1-4.

Photo #54: Waste rock. Seed cones on an alder growing on Plot #1-4. July 2018.

Photo #55: Waste Rock, nitrogen nodules on alder root, Plot #1-2.

WASTE ROCK – BLOCK #2

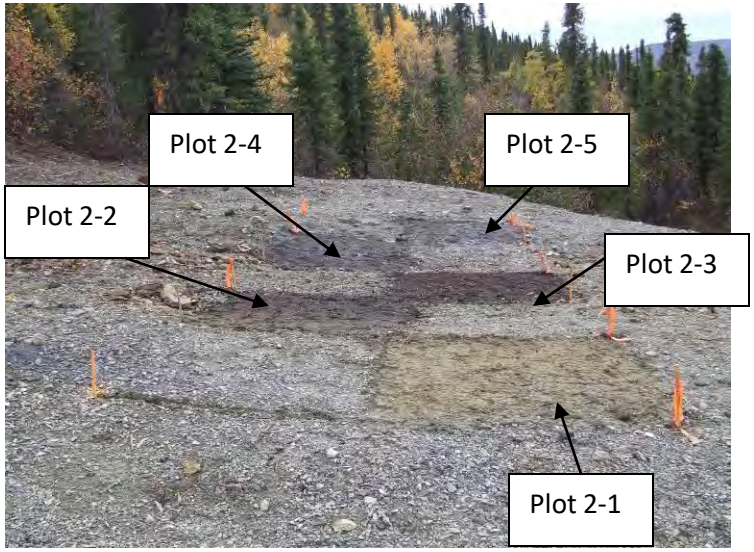


Photo #56 : Waste Rock, Block #2, prepared, seeded and treated, September 2012.

Photo #57: Waste Rock, Block #2, July 2013, good germination.

Photo #58: Waste Rock Block #2, August 2014. Healthy grasses.

Photo #59: Waste Rock, Block #2, July 2016. Alders growing.

Photo #60: Waste Rock, Block #2, August 2017. Alders have increased in growth.

Photo #61: Waste Rock, Block #2, July 2018.

Photo #62: Waste Rock, Plot 2-4, July 2013. Dolomite granules can still be seen.

Photo #63: Waste Rock, Plot 2-4, August 2014. Mature grasses.

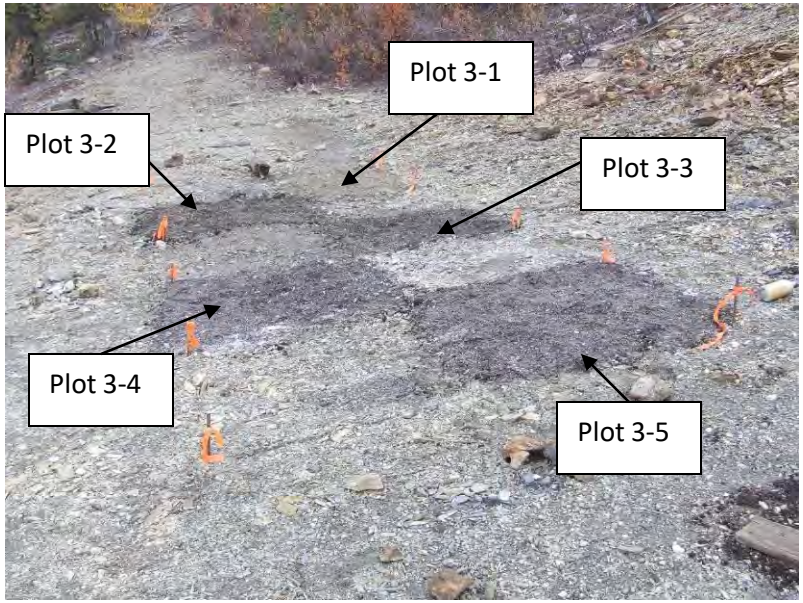
Photo #64: Waste Rock, Plot 2-4, July 2015. Alders growing.

Photo #65: Waste Rock, Plot 204, August 2016.

Photo #66: Waste Rock, Plot #2-4, August 2017.

Photo #67: Waste Rock, Plot #2-4, July 2018. Defoliation evident on stems both in 2017 and 2018.

WASTE ROCK – BLOCK #3



Photo# 68: Waste Rock, Block #3, prepared, seeded and treated. September 2012.

Photo #69: Waste Rock, Block #3, July 2013.

Photo #70: Waste Rock, Block #3, August 2014.

Photo #71: Waste Rock, Block #3, July 2016.

Photo #72: Waste Rock, Block #3, August 2017.

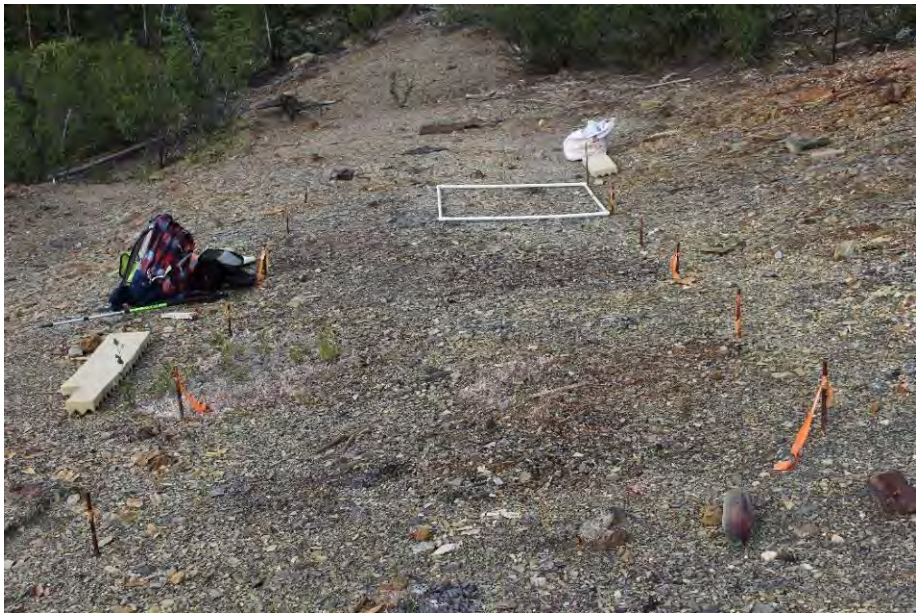


Photo #73: Waste Rock, Block #3, July 2018.

Photo #74: Waste Rock, Plot 3-4, July 2013.

Photo #75: Waste Rock, Plot #3-4, August 2014. Note mature grass.

Photo #76: Waste Rock, Plot #3-4, August 2015.

Photo #77: Waste Rock, Plot #3-4, July 2016. Young willow in plot.

Photo #78: Waste Rock, Plot #3-4, August 2017.

Photo #79: Waste Rock, Plot #3-4, July 2018.

Photo #80: Waste Rock, willows and dwarf birch in Plot 3-4, July 2018.

Photo #81: Necrosis on leaf edges on several alder at Waste Rock, Plot 2-3, July 2018.

APPENDIX C

VEGETATION DATA

- **TABLE C-1**
- **TABLE C-2**
- **TABLE C-3**
- **TABLE C-4**
- **TABLE C-5**
- **TABLE C-6**
- **ALS Lab Work Order #: L2139940, 2018**

TABLE C-1 ASSESSMENTS OF THE PLOTS AT THE TRENCH SITE, 2013, 2014, 2015, 2016, 2017 & 2018

BLOCK #1

Plot #	Date	% Cover	Species, avg height cm and/or # of individuals	Overall Health	Comments
1-1A	Jul-13	<1	sparse scraggly grass growth 1 hedysarum	stressed	a few shoots deep in gravel
	Sep-13	<1	unidentifiable grass, mostly brown, 2-3 cm	stressed	some green growth
	Aug-14	0			no growth
	Aug-15	<1	4 alder	good	small, seem healthy
	Jul-16	<1	2 alder 3 dwarf birch, up to 4.5 cm	good	plants are small but appear healthy, no grass
	Aug-17	<1	5 dwarf birch, very small	good	no grass
	Jul-18	<1	1 dwarf birch, 5 cm 3 small alder, <1 cm	struggling stressed	no grass browning of leaves
1-2A	Jul-13	45 - 50	alpine bluegrass unidentifiable grass hedysarum, 7 plants	good	even grass cover
	Sep-13	50	alpine bluegrass < 2cm 2 other grass species up to 4cm alder < 1cm hedysarum, < 2cm	good	Signs of grazing.
	Aug-14	60	alpine bluegrass ticklegrass, max 30 cm sheep fescue, max 30 cm alder, 13 plants	good	lots of tufts of unidentifiable grass 5 - 7 cm tall
	Aug-15	40	alpine bluegrass tickle grass unidentified grasses 12 alder	good	grass shows signs of grazing
	Jul-16	60	unidentified grasses, some possible immature hairgrass alpine bluegrass tickle grass spike trisetum, some in seed sheep fescue 12 alder, robust growth up to 21 cm	good	some accumulated leaf litter, a few small mushrooms present.
	Aug-17	40	Fescue, several mature and producing seed, dominant tufted harigrass, 1 is mature alpine bluegrass ticklegrass spike trisetum, 1 is mature 10 alder , robust growth unidentified small forbs	good	lots of leaf litter and last year's grasses.
	Jul-18	65	alpine bluegrass, 9 cm mature sheep fescue, 33 cm mature tufted hairgrass, 35 cm unidentified grasses, 23, 27 cm 12 alder, 43.5, 65.5, 76 and 58 cm moss	good	all plants look healthy lots of leaf litter - both alder and grasses
1-3	Jul-13	40	alpine bluegrass unidentified grasses hedysarum, 8 plants alder, 3 plants	good	most robust growth in Block #1
	Sep-13	50 - 60	alpine bluegrass, dominant species, < 3cm 3 other grass species up to 5 cm alder, <2 cm hedysarum, < 2cm	good	Signs of grazing.
	Aug-14	70	ticklegrass, max 30 cm, more mature plants than 1-2A alpine bluegrass, avg 4 cm alder, 8 plants sheep fescue, max 22 cm, 1 mature plant	good	Lots of tufts of unidentifiable grass 5 - 6 cm tall. Signs of grazing.
	Aug-15	50	alpine bluegrass tickle grass unidentified grasses 20 alder	good	alders growing significantly Signs of grazing. alder leaf litter
	Jul-16	70	unidentified grasses alpine bluegrass tickle grass spike trisetum sheep fescue tufted hairgrass, 1 in seed, 50.5 cm 1 willow 24 alder, some heights: 30 cm, 21.5 cm, 18.5 cm	good	lots of leaf litter plants look healthy
	Aug-17	60	Fescue, several mature, dominant alpine bluegrass tickle grass 25 alder - robust unidentifed small forbs	good	all plants appear healthy lots of leaf litter % cover includes leaf litter,
	Jul-18	80	alpine bluegrass, 42.5, 38 cm sheep fescue, 52, 48, 56 cm spike trisetum, 27, 40 cm tufted hairgrass, 33.5 cm 25 alder, 50.5, 87, 78, 67, 71 volunteer willow	good	all species of grasses had mature specimens, healthy growth

Plot #	Date	% Cover	Species, avg height cm and/or # of individuals	Overall Health	Comments
1-1B	Jul-13	<5	unidentified grass hedysarum, 4 plants alder, 1 plant	stressed	but some green growth
	Sep-13	<5	brown grasses, 2 - 4 cm hedysarum	stressed	
	Aug-14	<1	hedysarum, 1 plant	stressed	dead grass from last year
	Aug-15	<1	alder unidentified grasses	stressed	alder stunted
	Jul-16	<1	8 alder, all ≤ 1 cm		1 dwarf birch just ouside plot
	Aug-17	1	14 alder 1 spruce seedling	good	no grasses
	Jul-18	2	ticklegrass, 20.5 cm 20 alder, 4.5 cm 1 spruce seedling lichen moss,	fairly healthy	all alder were very small
1-2B	Jul-13	35	alpine bluegrass unidentified grasses hedysarum alder	good	even coverage of plot
	Sep-13	45	alpine bluegrass, 2 - 3 cm 3 other grass species, 2 - 4 cm alder, < 1cm	good	Signs of grazing. scat in plot
	Aug-14	60	tickle grass, many mature, max 38 cm alpine bluegrass, 3-4 cm, not as many as 1-3 alder, 4 plants some small hedysarum	good	Several tufts of unidentifiable grass. Alder leaf litter from near by.
	Aug-15	45	alpine bluegrass tickle grass unidentified grasses 20 alder	good	Signs of grazing. rabbit scat leaf litter 1 juvenile willow
	Jul-16	55	unidentified grasses tickle grass alpine bluegrass sheep fescue 51 alder, up to 8 cm 7 Salix spp		small black bugs on some plants
	Aug-17	60	alpine bluegrass, some mature, dominant grass ticklegrass tufted harigrass, 1 is mature 48 alder 1 spruce seedling a few willow seedlings	good	even coverage of plot lots of leaf litter
	Jul-18	80	sheep fescue, 73, 49, 45 cm tufted hairgrass, 31, 36, 33 cm alpine bluegrass, immature, 11.5, 13, 16 cm >40 alder, 52, 49, 35, 55, 54 cm several volunteer willow, 13, 11 cm spruce seedling moss		lots of alder leaf litter

TABLE C-1 ASSESSMENTS OF THE PLOTS AT THE TRENCH SITE, 2013, 2014, 2015, 2016, 2017 & 2018

BLOCK #2

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
2-3A	Jul-13	25 - 30	unidentified grasses alder, 2 plants hedysarum, 1 plant	good	Buffer plot above 2-3A and beside 2-1A has 14 alder and 1 labrador tea.
	Sep-13	35	alpine bluegrass, <2cm 3 other species of grass alder	good	Signs of grazing. Rabbit pellet spruce seedling
	Aug-14	45	spiked trisetum, 2 mature, up to 27 cms sheep fescue, 5 mature, up to 27 cm alpine bluegrass, <2cm lots of tufts of unidentified grasses alder, 6 plants	good	1 possible volunteer blueberry plant in plot
	Aug-15	40	alpine bluegrass spiked trisetum sheep fescue 6 alder	good	blueberry plant on edge of plot, 2 willow spp, 1 labrador tea in plot
	Jul-16	30	alpine bluegrass sheep fescue 2 alder, one large 53 cm, robust growth 11 dwarf birch 20 Salix spp	somewhat stressed	1 small spruce in plot 3 probable paper birch blueberry on plot edge
	Aug-17	35	unidentified stressed grasses are dominant grass alpine bluegrass, none mature 4 alder, up to 80 cm labrador tea willow seedlings blueberry several dwarf birch moss spruce seedling	grasses - poor others - good	The grasses are stressed but the alders and the volunteer plants are healthy.
	Jul-18	80	1 large alder, 122 cm, ~ a dozen small alder several willow, 18, 12 cm dwarf birch 32 cm labrador tea blueberry, 5.5 cm spike trisetum - sparse growth alpine bluegrass fescue, very small spruce, 12 cm moss	good	large alder has cones
2-1A	Jul-13	<5	sparse straggly grass shoots alder, 3 plants	stressed	
	Sep-13	<5	2 grasses, 2 - 3 cm hedysarum, 1 plant alder	stressed	Most grasses were brown
	Aug-14	<1	small grasses alder, 3 plants	stressed	1 labrador tea in plot
	Aug-15	<1	alder unidentified grass species	stressed	1 labrador tea in plot 1 spruce and willow
	Jul-16	<1	a few unidentified blades of grass 9 dwarf birch subalpine fir Salix spruce	stressed	all plants very small
	Aug-17	<5	labrador tea dwarf birch blueberry spruce seedlings small tufts of dead grass from previous years	good	no grasses, all volunteer plants in plot
	Jul-18	1 to 2	1 alder, 17 cm 19 dwarf birch 4 spruce seedlings	good	

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
2-2	Jul-13	40	alpine bluegrass unidentified grasses	good	even distribution
	Sep-13	45	alpine bluegrass, 2 cm unidentified grass species up to 5 cm	good	
	Aug-14	50	sheep fescue, several mature, up to 25 cm lots of immature alpine bluegrass, <3 cm spiked trisetum, 3 mature, up to 15 cms tickle grass, 1 mature, up to 23 cm alder, 2 plants	good	good healthy coverage see Photo #23
	Aug-15	45	alpine bluegrass spiked trisetum sheep fescue alder	good	4 willow spp 1 labrador tea in plot
	Jul-16	45	sheep fescue, up to 46 cm alpine bluegrass spike trisetum 2 alder, one large 73 cm 12 Salix spp dwarf birch spruce	good	1 blueberry plant in plot 1 labrador tea below plot
	Aug-17	50	fescue, several mature alpine bluegrass 1 large alder - 130 cm, also small ones labrador tea blueberry spruce seedling	good	some leaf litter
	Jul-18	95	1 giant alder, 189 cm labrador tea dwarf birch several small willow, 4.5 cm fescue, 48 cm moss		the large alder takes up almost the whole plot, has cones (see Photos #27 & 28)
2-3B	Jul-13	20	unidentified tufts of grasses hedysarum, 1 plant	good	
	Sep-13	30	alpine bluegrass, 2 cm 2 species of grass, <4 cm hedysarum	good	Tiny capped mushrooms in plot.
	Aug-14	40	tickle grass, 2 plants up to 20 cm alpine bluegrass, 1 mature, up to 10 cm several tufts of unknown grasses alder, 1 plant	good	2 alders growing just outside of plot
	Aug-15	35	alpine bluegrass spiked trisetum sheep fescue alder	good	1 spruce seedling in plot labrador tea and willow spp
	Jul-16	25	sheep fescue, up to 23.5 cm alpine bluegrass spike trisetum, up to 19 cm unidentified grasses dwarf birch, 19.5 cm 9 Salix spp 4 labrador tea	good	many small shrubs growing in the neighbouring buffer plot (dwarf birch, salix, labrador tea) and 3 paper birch and 3 spruce
	Aug-17	25	unidentified tufts of grasses alpine bluegrass several willow seedlings labrador tea dwarf birch spruce seedling	fair	leaf litter from grasses
	Jul-18	5	dwarf birch, 27.5, 13 cm willows 11, 11, 8.5, 6 cm labrador tea mostly dead grasses moss	volunteer plants appear healthy	very different from 2-3A even tho they both have the same amendments
2-1B	Jul-13	<5	a few blades of unidentified grass hedysarum, 1 plant	stressed	1 spruce seedling in plot
	Sep-13	5	unidentified grass, 3 - 4 cm alder, <1 cm, 4 plants	stressed	most grasses are brown
	Aug-14	<1	quite a bit of dead grass - didn't survive alder, 3 plants	stressed	possible 3 willows in plot
	Aug-15	<1	alder	stressed	willow spp in plot
	Jul-16	1 to 5	unidentified grasses 4 Salix spp 8 dwarf birch 1 paper birch	stressed shrubs fairly healthy	
	Aug-17	1	a few blades of unidentified grass dwarf birch willow seedlings labrador tea spruce seedling	grasses - poor others - good	only 1 tuft of spindly grass volunteer shrubs doing well
	Jul-18	2 to 3	18 dwarf birch, 3.5, 19 cm 5 labrador tea, 8, 12 cm 2 willow, 12, 8 cm spruce	good	volunteer plants are small but healthy

TABLE C-1 ASSESSMENTS OF THE PLOTS AT THE TRENCH SITE, 2013, 2014, 2015, 2016, 2017 & 2018

BLOCK #3

Plot #	Date	% Cover	Species, avg height cm and/or # of individuals	Overall Health	Comments
3-2A	Jul-13	40	unidentified tufts of grass - lots alpine bluegrass, alder, 1 plant hedysarum, 2 plants	good	robust healthy plot
	Sep-13	40	alpine bluegrass, 2 cm 2 other grass species, <4 cm hedysarum, <1 cm alder, <1 cm	good	Sign of grazing. Some moss in plot
	Aug-14	60	tufted hairgrass, 4 mature plants, up to 70 cm ticklegrass, mature up to 35 cm sheep fescue, mature up to 35 cm spiked trisetum, mature up to 33 cm alpine bluegrass, lots of immature, < 3cm alder, 1 plant	good	4 volunteer willow in plot, very diverse plot, has the most mature plants
	Aug-15	50	tufted hairgrass sheep fescue alpine bluegrass spiked trisetum tickle grass alder	good	lots of moss, clover willow
	Jul-16	70*	unidentified grasses tickle grass tufted hairgrass alpine bluegrass (only a few plants) 5 alder, tallest 71 cm 11 Salix spp 5 dwarf birch	grasses are stressed other plants appear healthy	lots of moss, large tuft of alsike clover
	Aug-17	65	unhealthy grasses likely fescue - dominant grass alpine bluegrass, immature ticklegrass, mature 1 large alder, 118 cm 3 smaller alder willow labrador tea dwarf birch 1 large tuft of alsike clover moss	poor to good	most plants appear robust and healthy
	Jul-18	65 to 70	alder, 80, 82, 173, 13 cm alsike clover willows, 3 cm fescue spruce seedling dwarf birch, 5 cm	grass - poor others - good	alsike colver is dying back due to shading from the growing alder caterpillar in plot rabbit pellet in plot
3-3A	Jul-13	35	unidentified tufts of grass - lots tufted hairgrass, 1 mature plant	good	
	Sep-13	40	tufted hairgrass, mature, up to 30 cm alpine bluegrass, 2 cm other grasses, 3 cm alder	good	Sign of grazing.
	Aug-14	50	tufted hairgrass, mature, up to 42 cm ticklegrass, mature up to 36 cm sheep fescue, mature up to 30 cm spiked trisetum, mature up to 20 cm alpine bluegrass, lots of immature, 2 - 4 cm alder, 4	good	1 willow in plot
	Aug-15	40	tufted hairgrass alpine bluegrass spiked trisetum sheep fescue tickle grass alder	good	willow lots of moss, 1 mushroom
	Jul-16	65	unidentified grasses tickle grass sheep fescue alpine bluegrass 7 alder up to 37 cm 8 Salix spp 1 possible Hedysarum plant	good	Some moss in plot
	Aug-19	50	tufted hairgrass, mature ticklegrass, mature alpine bluegrass Calamagrotis canadensis, mature fescues, mature 7 alder up to 88 cm dwarf birch willows, labrador tea spruce	good	good biodiversity healthy growth of all plants
	Jul-18	80	alder, 134, 95, 63 cm spike trisetum, 19, 24 cm trufted hairgrass, 19, 26 cm willow, 15, 9, 5.5 cm spruce seedlings moss	good	

Plot #	Date	% Cover	Species, avg height cm and/or # of individuals	Overall Health	Comments
3-1	Jul-13	5	sparse unhealthy unidentified grass	stressed	in upper right corner only
	Sep-13	5 - 10	unidentified grass, <3 cm alder, <1 cm	stressed	grass is brown
	Aug-14	<5	sheep fescue, immature - small but healthy ticklegrass, 1 mature, 10 cm alder, 10 plants, very small	good	1 labrador tea and 1 tiny spruce seedling in plot, one fairly large aspen growing downhill of plot
	Aug-15	5	tickle grass unidentified grass species alder	good	1 labrador tea 1 willow
	Jul-16	5	unidentified grasses tickle grass alder 8 dwarf birch 2 small spruce		small amount of moss 1 very small blueberry labrador tea
	Aug-17	5 to 10	sparse unhealthy fescue 1 ticklegrass dwarf birch labrador tea willow spruce moss	grasses - poor others - good	grasses appear somewhat stressed, volunteer plants appear to be doing well
	Jul-18	3 to 5	3 alder, 7, 10, 17 cm dwarf birch 5, 4 cm tufted harigrass, 27, 25, 17 cm spruce seedlings, 3 cm labrador tea, 5 cm willow, 6.5, 4.5 cm	grasses - fair others - good	
3-2B	Jul-13	20	unidentified small tufts of grasses alpine bluegrass alder, 3 plants hedysarum, 5 plants	good	
	Sep-13	30	alder, <2cm, 12 plants alpine bluegrass, < 2cm unidentified grass, < 4cm hedysarum, < 2cm	partially stressed	But lots of green healthy plants.
	Aug-14	40	tickle grass up to 15 cm alpine bluegrass unidentified immature grasses alder, approx 20	good	1 willow growing in plot
	Aug-15	35	sheep fescue spiked trisetum alpine bluegrass tickle grass unidentified grasses alder	good	willow, clover in flower
	Jul-16	45	unidentified grasses (may be some sheep fescue) alpine bluegrass tickle grass tufted hairgrass, 40.5 cm 11 alder 13 dwarf birch 7 Salix spp	overall good but some grasses appear slightly stressed	some moss signs of grazing on upper leaves of alder alsike clover in plot 2 paper birch
	Aug-17	40	struggling fescue alpine bluegrass 9 robust alder up to 80 cm willows, spruce seedlings moss dwarf birch	fair to good	the fescues appear somewhat stressed. alders appear very healthy
	Jul-18	75	alder, 26, 120, 139, 94 cm dwarf birch, 21, 8.5 cm willow, 6.5 cm spruce seedling mostly dead grasses - unidentified moss	grasses - poor others - good	alders have grown quite a bit since the previous year - see Photo #39. Alder has nitrogen nodule on root, see Photo #40
3-3B	Jul-13	10 - 15	small tufts of unidentified grasses alpine bluegrass alder, 5 plants hedysarum, 1 plant	fairly good	possible willow in plot
	Sep-13	15 - 20	alpine bluegrass, < 1cm unidentified grass, < 3cm alder, < 1cm hedysarum, < 2cm	good	plants appear healthy although small
	Aug-14	30	unidentified tufts of grass - several alpine bluegrass, immature alder, 9 plants	good	no mature grasses 1 spruce in plot 1 willow in plot
	Aug-15	25	spiked trisetum alpine bluegrass unidentified grasses alder	good	1 spruce seedling willow lots of moss,
	Jul-16	5 to 10	unidentified grasses alpine bluegrass, a few plants 5 alder 8 dwarf birch 5 Salix spp 1 spruce	grasses are stressed other plants appear healthy	lots of moss, not included in cover estimate.
	Aug-17	20	alpine bluegrass fescues 6 alder up to 44 cm dwarf birch willows spruce moss	stressed to healthy	all grasses appear to be struggling, however the grasses growing near the alder appear more healthy. Alder and volunteer plants appear healthy
	Jul-18	45	7 alder, 67, 76, 49 cm dwarf birch, 14, 28, 13, 6.5 cm willow, 9, 4.5, 6 cm grass - mostly dead moss - lots (approx 85 % cover if moss included)	grass - poor others - good	many small dwarf birch sprouting

* = includes moss cover, without moss, approximately 35 % cover

TABLE C-2 ASSESSMENTS OF THE PLOTS AT THE WASTE ROCK SITE, 2013, 2014, 2015, 2016, 2017 AND 2018

BLOCK #1

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
1-1	Jul-13	0			bare plot
	Sep-13	<1	1 blade of unidentifiable grass	stressed	bare plot
	Aug-14	0			bare plot, moist soil
	Aug-15	0			bare plot
	Jul-16	0			bare plot
	Aug-17	0			bare plot
	Jul-18	0			bare plot, ants in plot
1-2	Jul-13	40 - 50	2 species of grass - unidentified alder, 8 plants hedysarum, 2 plants	good	tallest and most robust growth of all plots in block
	Sep-13	60 - 65	tickle grass, some in seed, max 30 cm glaucous bluegrass up to 12 cm sheep fescue (?), 8 cm alder < 1cm hedysarum, < 2cm	good	green healthy growth, signs of grazing
	Aug-14	70	tufted hairgrass, 2 plants up to 40 cm ticklegrass, many plants, avg 35 cm sheep fescue, 3 mature plants, max 35 to 40 cm alder, 7 plants	good	even coverage of plot, 1 willow in plot
	Aug-15	55	tufted hairgrass glaucous bluegrass tickle grass sheep fescue alder	good	willow in plot
	Jul-16	50	unidentified grasses tickle grass sheep fescue tufted hairgrass glaucous bluegrass 5 alders up to 34.5 cm 10 Salix spp	good	some moss lady bug in plot
	Aug-17	50	fescue, some mature 15 alder up to 61 cm spruce willows	stressed to good	mostly dead or stressed grasses, trees are healthy
	Jul-18	50 - 60	6 large alder; heights: 71, 97, 90, 20, 13 cm willows; heights: 15, 9, 4 cm spruce sapling, 12 cm fescue, some mature; 38, 42, 25 cm unidentified grass moss	good some grasses are stressed	several small alder herbivory on one willow nitrogen nodule on alder root - see Photo #55. lots of dead grass ant in plot
1-3	Jul-13	15 - 20	small tufts of unidentified grass alder, 2 plants - very small	good	
	Sep-13	30 - 35	glaucous bluegrass up to 8 cm unidentified grass up to 10 cm alder, <1 cm	good	sporadic cover
	Aug-14	40	ticklegrass, max 35 cm alder, 1 plant	fairly good	uneven distribution, bare sections
	Aug-15	15	tickle grass tufted hairgrass unidentified grasses alder	some grasses are stressed	
	Jul-16	5	ticklegrass unidentified tufts of stressed grasses 2 alders up to 11.5 cm	stressed	
	Aug-17	5	live grasses growing next to alders only 2 alder plants - healthy small dwarf birch	stressed to good	lots of dead or stressed grasses
	Jul-18	~10	3 alder plants	nodule on alder root	dead grasses in plot

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
1-4	Jul-13	10 - 15	small tufts of unidentified grass, at least 2 species	fairly good	
	Sep-13	30 - 35	glaucous bluegrass up to 8 cm unidentified grass up to 4 cm alder, <1 cm	partially stressed	
	Aug-14	50	ticklegrass, many mature plants, up to 30 cm sheep fescue, a few plants, up to 15 cm alder, 5 plants	good	uneven distribution
	Aug-15	20	tickle grass glaucous bluegrass alder	good	willow in plot
	Jul-16	15 to 20	unidentified grasses glaucous bluegrass ticklegrass 13 alder 22 Salix spp 3 spruce	grasses appear somewhat stressed, others appear healthy	herbivory on the alders and on some grasses
	Aug-17	40	fescue, several in seed alders up to 68 cm willows - healthy and growing spruce - growing	good	
	Jul-18	75	alder; heights: 84, 72, 88, 27 cm felt leaf willow; 32, 34 cm another willow species; 34, 30, 15, 12 cm spruce; 28 cm paper birch; 38 cm grass	good	all plants are healthy except for the grasses - only a few green blades and none were mature Some willows had insect damage Seed cones on alder, Photo #54
1-5	Jul-13	5	sparse short growth of grasses	stressed	
	Sep-13	50	glaucous bluegrass, 4 cm tickle grass up to 3 cm unidentified grass up to 4 cm alder, < 2cm hedysarum	good	Signs of grazing. even coverage of growth
	Aug-14	60	tickle grass, mature, max 25 cm immature glaucous bluegrass immature grass - may be sheep fescue alder, 2 plants	good	Several tufts of unidentifiable grass. Photo #48.
	Aug-15	45	sheep fescue tickle grass glaucous bluegrass alpine bluegrass alders	good	willows
	Jul-16	30	unidentified grasses ticklegrass sheep fescue glaucous bluegrass 5 alders up to 61.5 cm 16 Salix spp	grasses appear somewhat stressed, shrubs appear healthy	
	Aug-17	30	ticklegrass - immature fescue 4 large alder up to 111 cm small willow seedlings	fair to good	lots of grass litter grasses appear stressed
	Jul-18	65 - 70	alder; 122, 98, 68, 97 cm fescue; 31, 29 cm spruce seedling willow 8, 6, 8 cm paper birch moss	good	1 of the alders had produced cones previous year's grass litter

TABLE C-2 ASSESSMENTS OF THE PLOTS AT THE WASTE ROCK SITE, 2013, 2014, 2015, 2016, 2017 AND 2018

BLOCK #2

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
2-1	Jul-13	0	no sign of any growth		bare plot
	Sep-13	0	no sign of any growth		bare plot
	Aug-14	0	no sign of any growth		bare plot
	Aug-15	0	no sign of any growth		bare plot
	Jul-16	0	no sign of any growth		bare plot
	Aug-17	0	no sign of any growth		bare plot, moose tracks in plot
	Jul-18	0	no sign of any growth		bare plot
2-2	Jul-13	35	unidentified tufts of grass - healthy alder, 1 plant, very small hedysarum, 2 plants	good	coverage mostly on east half
	Sep-13	50	ticklegrass up to 16 cm sheep fescue up to 12 cm glaucous bluegrass up to 8 cm alder hedysarum,	good	growth covers most of the eastern half of plot
	Aug-14	60	ticklegrass, mature, max 30 cm alder, 7 plants volunteer willow, 6 plants volunteer spruce, 2 plants	good	growth covers most of the eastern half of plot
	Aug-15	60	tickle grass glaucous bluegrass unidentified grasses alders	good	healthy alder growth, many juvenile willow plants, 2 spruce seedlings, leaf litter
	Jul-16	40	ticklegrass unidentified grasses 51 alder up to 34 cm, many small 16 Salix spp 2 spruce 1 subalpine fir	good	moose had walked thru Block leaf litter blue bug on alder leaf
	Aug-17	60	ticklegrass, mature plants immature fescue many alder of various sizes 2 spruce seedlings willows	good	grass leaf litter coverage mostly on east half
	Jul-18	85	alder; heights: 45, 76, 63, 26, 95 cm 7 spruce	good	some alder leaves have brown edges and some alders have no leaves on the top of the stem possible defoliation
2-3	Jul-13	45	unidentified tufts of grass - healthy alder, 9 plants	good	more even coverage
	Sep-13	60	ticklegrass up to 11 cm glaucous bluegrass up to 11 cm alder, several small seedlings	good	even cover of plot
	Aug-14	60	ticklegrass, max 38 cm immature sheep fescue alder, >20 plants	good	even distribution
	Aug-15	60	tickle grass unidentified grasses many alder	good	healthy alder growth willow in plot
	Jul-16	40	ticklegrass unidentified grasses many alder, more than in 2-2, up to 36 cm 6 Salix spp 3 paper birch		
	Aug-17	60	numerous alder 5 paper birch 3 spruce willows	good	some of the alder appear to have suffered from browsers and/or defoliators
	Jul-18	60 - 65	alder; 94, 31, 92, 48, 31 cm paper birch; 45, 21 cm	good	some alders have necrosis on some of their leaves, see Photo #81

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
2-4	Jul-13	50	unidentified tufts of 2 to 3 species of grass - healthy glaucous bluegrass alder, 1 plant	good	even growth on plot
	Sep-13	60	glaucous bluegrass up to 8 cm sheep fescue up to 4 cm ticklegrass up to 3 cm alder, <1 cm	good	even cover of plot
	Aug-14	60	sheep fescue, several mature immature glaucous bluegrass, up to 15 cm alder, 15 plants	good	even distribution 1 volunteer willow plant see Photo #63
	Aug-15	70	tufted hairgrass tickle grass sheep fescue glaucous bluegrass many alder	good	healthy alder growth willow in plot
	Jul-16	80	glaucous bluegrass ticklegrass lots of alder 2 Salix spp 2 spruce 1 paper birch	good	lush growth
	Aug-17	90	tufted hairgrass, several in flower fescue, some mature ticlegrass numerous alder - thick growth willows	good	some of the alder seem to have suffered as in Plot 2-3 (2017)
	Jul-18	95	numerous alder; 45, 103, 82, 94 cm fescue - mature tufted hairgrass mature	good	no leaf disease on alder but tops of stems appear to be stripped by a grazer - Photos #66 & 67
2-5	Jul-13	30	unidentified tufts of grass - healthy hedysarum, 2 plants	good	
	Sep-13	40 - 50	tickle grass up to 30 cm glaucous bluegrass up to 13 cm alder, < 1cm	good	even cover of plot, less robust growth than plot 2-4
	Aug-14	50	tickle grass, many mature, up to 30 cm sheep fescue, several, up to 25 cm alder, 8 plants	good	
	Aug-15	50	ticklegrass glaucous bluegrass unidentified grasses	good	willows in plot
	Jul-16	30	unidentified grasses glaucous bluegrass - couple of plants 16 alder 3 Salix spp 1 paper birch	grasses appear stressed, others look healthy	
	Aug-17	75	numerous alder unhealthy fescue willows spruce seedlings	fair to good	some of the alder seem to have suffered as in Plot 2-3 (2017)
	Jul-18	99	numerous alder some willow dead grass	good	some alders have stripped stems as in Plot 2-4 (2018)

TABLE C-2 ASSESSMENTS OF THE PLOTS AT THE WASTE ROCK SITE, 2013, 2014, 2015, 2016, 2017 AND 2018

BLOCK #3

Plot #	Date	% Cover	Species, height cm and/or # of individuals	Overall Health	Comments
3-1	Jul-13	0	no growth		bare plot
	Sep-13	0	no growth		bare, moist plot
	Aug-14	0	no growth		moose track in plot
	Aug-15	0	no growth		
	Jul-16	0	no growth		bare plot
	Aug-17	0	no growth		bare plot
	Jul-18	0	no growth		old moose prints in bare plot
3-2	Jul-13	30	unidentified tufts of grass alder, 5 plants	partially stressed	growth localized, plants appear stressed on right side
	Sep-13	30	ticklegrass, lots in seed, up to 35 cm glaucous bluegrass up to 8 cm	partially stressed	
	Aug-14	20	ticklegrass, mature, max 33 cm sheep fescue, several mature, max 15 cm	partially stressed	half of plot is bare
	Aug-15	10	tickle grass glaucous bluegrass	stressed	
	Jul-16	<5	ticklegrass glaucous bluegrass	stressed	
	Aug-17	0	no live growth		only dead plant material from previous years
	Jul-18	0	no live growth		only dead plant material from previous years
3-3	Jul-13	5	sparse stressed grass growth	stressed	
	Sep-13	5 - 10	unidentified grass up to 5 cm	stressed	
	Aug-14	0	dead grasses from last year's growth	stressed	
	Aug-15	0	no growth		
	Jul-16	0	no growth		
	Aug-17	0	no growth		bare plot
	Jul-18	0	no growth		bare plot
3-4	Jul-13	40 - 50	many tufts of healthy unidentified grasses	good	good growth in lower half
	Sep-13	50	tickle grass, some in seed, up to 4 cm sheep fescue (?), 7 cm glaucous bluegrass, up to 2 cm	good	
	Aug-14	35	ticklegrass, up to 35 cm tufted hairgrass, 1 mature plant, up to 40 cm sheep fescue, 1 mature plant, up to 34 cm	good	healthiest plot in Block #3 see Photo #74
	Aug-15	25	tufted hairgrass tickle grass sheep fescue glaucous bluegrass	good	willow in plot
	Jul-16	15	unidentified grasses glaucous bluegrass ticklegrass tufted hairgass 4 Salix spp 2 dwarf birch	grasses stressed	
	Aug-17	5	1 ticklegrass in seed 1 tuft of glaucous bluegrass 2 alder a few willows small dwarf birch small tufts of fescue	fair to stressed	
	Jul-18	2	several willow; 7, 12, 13, 8, 11, 15.5 cm alder; 4 cm paper birch; 15 cm ticklegrass; 31, 19 cm, mature dwarf birch; 5.5 cm	healthy	See Photo #80
3-5	Jul-13	<10	unidentified grasses	partially stressed	some tufts quite healthy
	Sep-13	10 - 15	glaucous bluegrass, < 2 cm unidentified grass up to 3 cm	stressed	most plants are brown
	Aug-14	<10	tickle grass, a few mature and immature, up to 25 cm glaucous bluegrass, 1 mature, 25 cm stressed stunted grasses dead grass from last year	stressed	good soil moisture
	Aug-15	10	tickle grass	good	
	Jul-16	<5	glaucous bluegrass unidentified grasses	stressed	
	Aug-17	<5	glaucous bluegrass, mature ticklegrass, mature	fair	
	Jul-18	1	a few tufts of ticklegrass; 29, 19 cm	fair	some mature

NOTE: stressed = brown or withered plants
good = green plants showing vigor

TABLE C-3 SPECIES DOCUMENTED AT THE PLOTS		
	Common Name	**Scientific Name**
Planted	Sheep fescue	*Festuca ovina*
	Tufted hairgrass	*Deschampsia caespitosa*
	Glaucous bluegrass	*Poa glauca*
	Alpine bluegrass	*Poa alpina*
	Tickle grass	*Agrostis scabra*
	Spike Trisetum	*Trisetum spicatum*
	Bear root	*Hedysarum alpinum*
	Alder	*Alnus viridus*
Volunteer	Willow	*Salix* spp
	Dwarf birch	*Betula glandulosa*
	Labrador Tea	*Rhododendron groenlandicum*
	Blueberry	*Vaccinium uliginosum*
	White spruce	*Picea glauca*
	Alaska birch	*Betula neoalaskana*
	Alsike clover	*Trifolium hybridum*
	Bluejoint grass	*Calamagrotis canadensis*

TABLE C-4 ROOT LENGTH OF RANDOMLY SELECTED PLANTS			
Site	**Plot #**	**Species**	**Root Length (cm)**
Trench	1-3A	Alpine Bluegrass	7
	1-3A	Alder	9
	1-1B	Alder	7
	1-2B	Sheep Fescue	8
	1-2B	Alpine Bluegrass	6
	1-2B	Alder	7
	2-1A	Alder	9
	2-1A	Dwarf birch	6
	2-2	Alder	8
	2-2	Willow	7
	2-1B	Dwarf birch	7
	2-1B	Dwarf birch	8
	3-2A	Alder	6
Waste Rock Dump	1-2	Willow	9
	1-3	Alder	8
	1-3	Alder	9
	1-5	Willow	4
	2-2	Alder	18
	2-3	Alder	7
	2-4	Alder	7
	2-5	Alder	3
	2-5	Alder	7

TABLE C-5 METAL CONCENTRATIONS (mg/kg) IN FOLIAR TISSUES AT THE TRENCH SITE, 2018

Plot #	T1-1B	T1-2AB	T1-2AB	T1-3	T1-3	T2-2	T2-2	T2-3A	T2-3A	T3-2AB	T3-2AB	T3-3AB	T3-3AB	Range
Species	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	
Tissue Type	Leaves and stems	Leaves	Stems	Leaves	Stems	Leaves	Stems	Leaves	Stems	Leaves	Stems	Leaves	Stems	
Aluminum (Al)-Total	33.5	14.3	12.1	10.0	4.8	20.0	5.2	8.2	<2.0	37.2	9.6	18.8	6.5	4.8 to 37.2
Antimony (Sb)-Total	5.59	1.16	0.963	0.471	1.32	0.127	0.050	0.117	0.044	2.48	0.709	0.391	0.337	0.044 to 5.590
Arsenic (As)-Total	17.0	4.02	2.88	3.40	3.07	1.37	0.626	0.571	0.411	4.09	1.53	1.54	1.31	0.41 to 17.00
Barium (Ba)-Total	39.5	4.61	12.8	5.60	10.5	37.2	62.5	28.2	58.9	36.2	79.1	22.3	71.0	4.6 to 79.1
Beryllium (Be)-Total	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	ND to ND
Bismuth (Bi)-Total	0.219	0.058	0.044	0.014	0.072	0.020	<0.010	<0.010	<0.010	0.173	0.060	0.028	0.026	0.014 to 0.219
Boron (B)-Total	7.7	5.5	8.3	7.3	7.7	7.8	10.4	9.4	12.0	4.9	6.0	6.6	7.0	4.9 to 12.0
Cadmium (Cd)-Total	<0.010	0.0052	0.0163	<0.0050	0.0055	<0.0050	0.0163	<0.0050	0.0097	0.0062	0.0111	<0.0050	0.0120	ND to 0.016
Calcium (Ca)-Total	11000	7370	5170	10600	6710	7470	6020	6860	5690	5790	5120	6320	6160	5120 to 11000
Cesium (Cs)-Total	0.136	0.0957	0.258	0.149	0.176	0.330	0.225	0.161	0.104	0.379	0.191	0.159	0.145	0.10 to 0.38
Chromium (Cr)-Total	0.22	<0.050	0.060	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	ND to 0.22
Cobalt (Co)-Total	0.121	0.058	0.030	0.065	<0.020	0.100	0.065	0.054	0.034	0.334	0.132	0.180	0.105	0.03 to 0.33
Copper (Cu)-Total	6.54	6.03	6.12	4.34	5.20	9.61	9.16	7.03	7.85	9.51	7.94	6.75	7.16	4.34 to 9.61
Iron (Fe)-Total	222	64.5	42.6	47.2	26.3	71.6	35.9	68.2	42.6	75.9	37.5	65.7	40.2	26.30 to 222.00
Lead (Pb)-Total	48.0	7.39	5.28	2.46	4.43	11.5	8.24	5.15	5.85	18.5	15.1	9.35	9.09	2.46 to 48.00
Lithium (Li)-Total	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	ND to ND
Magnesium (Mg)-Total	2430	1670	983	1660	780	2170	1230	1960	1290	1930	1100	1940	1080	780 to 2430
Manganese (Mn)-Total	214	42.3	71.2	64.2	74.2	44.9	44.0	30.7	35.3	72.7	101	66.3	97.0	30.7 to 214.0
Mercury (Hg)-Total	0.0067	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	ND to 0.0067
Molybdenum (Mo)-Total	3.71	4.34	6.40	8.51	6.59	1.15	1.73	2.16	3.82	1.98	4.74	3.97	3.38	1.15 to 8.51
Nickel (Ni)-Total	5.54	1.08	0.77	0.55	0.39	3.03	2.66	1.65	1.77	3.05	1.83	2.04	1.64	0.39 to 5.54
Phosphorus (P)-Total	938	2820	1980	2470	1450	2270	1780	2330	1770	2350	1530	2500	1560	938 to 2820
Potassium (K)-Total	7510	5850	5110	5330	4110	7080	6590	7970	7750	6000	4810	6600	4890	4110 to 7970
Rubidium (Rb)-Total	7.81	11.4	11.0	7.09	5.92	10.3	8.64	7.58	6.58	17.5	9.79	11.2	8.55	5.92 to 17.50
Selenium (Se)-Total	<0.10	<0.050	<0.050	<0.050	<0.050	0.241	0.124	0.242	0.116	0.054	<0.050	0.087	0.052	0.052 to 0.242
Sodium (Na)-Total	29	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	ND to 29.0
Strontium (Sr)-Total	44.0	18.0	20.5	22.7	22.8	52.1	60.7	37.2	49.3	23.5	30.0	21.7	34.5	18.0 to 60.7
Tellurium (Te)-Total	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.0 to 0.0
Thallium (Tl)-Total	0.0060	0.0021	0.0052	0.0020	0.0058	<0.0020	0.0038	<0.0020	<0.0020	<0.0020	0.0053	<0.0020	0.0032	ND to 0.0060
Tin (Sn)-Total	0.21	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	ND to 0.21
Uranium (U)-Total	0.0180	0.0023	0.0025	<0.0020	<0.0020	0.0092	<0.0020	0.0027	<0.0020	0.0026	<0.0020	<0.0020	<0.0020	ND to 0.0180
Vanadium (V)-Total	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	ND to ND
Zinc (Zn)-Total	48.5	24.6	34.5	34.8	43.6	22.1	40.1	25.7	31.7	29.7	36.6	20.8	31.9	20.8 to 48.5
Zirconium (Zr)-Total	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	ND to ND

ND = not detected

TABLE C-6 METAL CONCENTRATIONS (mg/kg) IN FOLIAR TISSUES AT THE WASTE ROCK DUMP, 2018

Plot #	W1-2	W1-2	W1-3	W1-4	W1-4	W1-4	W1-5	W1-5	W2-2	W2-2	W2-3	W2-3	W2-4	W2-4	W2-5	W2-5	W3-4	Range
Species	Alder	Alder	Alder	Alder	Alder	Willow	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Alder	Several Species	
Tissue type	Leaves	Stems	Leaves and Stems	Leaves	Stems	Leaves and Stems	Leaves	Stems	Leaves	Stems	Leaves	Stem	Leaves	Stems	Leaves	Stems		
Aluminum (Al)-Total	27.8	6.9	82.6	14.9	5.1	11.0	13.7	3.8	48.3	7.7	40.7	5.9	22.6	3.5	8.7	3.4	40.8	3.4 to 82.6
Antimony (Sb)-Total	1.85	0.640	0.910	2.35	0.903	1.15	6.08	1.08	2.77	0.629	1.11	0.402	8.51	0.726	1.48	0.575	32.4	0.4 to 32.4
Arsenic (As)-Total	7.37	2.97	7.36	7.31	2.96	3.88	6.72	2.19	5.16	1.51	1.97	0.701	6.84	0.900	2.04	0.778	68.7	0.7 to 68.7
Barium (Ba)-Total	3.64	8.78	4.41	0.513	1.02	0.595	0.573	0.591	1.76	4.47	0.609	4.26	0.960	0.820	0.355	0.417	1.88	0.36 to 8.78
Beryllium (Be)-Total	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	ND to 0.01900
Bismuth (Bi)-Total	0.181	0.070	0.139	0.327	0.124	0.164	0.937	0.160	0.252	0.050	0.100	0.037	0.782	0.062	0.156	0.065	4.29	0.037 to 4.290
Boron (B)-Total	17.3	13.3	9.7	3.1	6.7	5.9	15.1	10.8	8.1	9.0	8.3	8.6	4.1	5.2	4.6	7.4	30.7	3.1 to 30.7
Cadmium (Cd)-Total	0.0200	0.166	0.0737	<0.0050	0.0136	2.14	0.0439	0.178	0.0080	0.0420	0.0091	0.0262	0.0088	0.0125	0.0079	0.0093	6.44	0.008 to 6.440
Calcium (Ca)-Total	6860	4550	3300	4790	3450	6030	10900	3670	3570	3430	1490	1930	7640	3140	8170	4120	9190	1490.0 to 10900.0
Cesium (Cs)-Total	0.254	0.148	0.777	1.05	0.578	0.0901	0.239	0.129	0.690	0.483	0.594	0.477	0.668	0.445	0.519	0.569	0.188	0.090 to 1.050
Chromium (Cr)-Total	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.082	<0.050	<0.050	<0.050	0.078	<0.050	<0.050	<0.050	0.099	0.078 to 0.099
Cobalt (Co)-Total	0.515	0.146	0.256	0.274	0.140	0.466	0.228	0.110	0.448	0.124	0.285	0.049	0.094	0.055	0.143	0.079	0.769	0.049 to 0.769
Copper (Cu)-Total	11.3	11.6	34.8	12.0	16.9	4.68	9.73	11.7	10.2	10.3	12.1	10.1	13.2	11.9	9.20	11.7	9.20	4.7 to 34.8
Iron (Fe)-Total	123	47.9	166	130	56.8	58.5	97.1	37.6	195	57.8	111	36.3	177	41.3	84.6	41.0	530	36.3 to 530.0
Lead (Pb)-Total	8.84	3.67	2.66	4.28	1.61	2.60	12.3	3.74	6.86	1.37	2.48	1.01	15.3	1.42	3.21	1.32	68.6	1.0 to 68.6
Lithium (Li)-Total	<0.50	<0.50	0.63	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	ND to 0.6
Magnesium (Mg)-Total	1900	689	791	2950	1180	4770	3920	942	734	426	930	706	3330	1160	3170	1080	4840	426.0 to 4840.0
Manganese (Mn)-Total	206	311	360	45.6	70.5	93.0	117	101	262	399	107	275	94.2	48.1	110	78.4	414	45.6 to 414.0
Mercury (Hg)-Total	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0121	ND to 0.012
Molybdenum (Mo)-Total	1.05	1.88	2.22	1.81	5.78	0.049	4.52	5.81	0.158	0.946	0.297	1.73	2.52	3.16	4.48	5.19	1.15	0.05 to 5.810
Nickel (Ni)-Total	4.68	2.01	11.3	2.71	2.00	1.30	2.93	1.50	4.65	2.01	7.23	2.39	2.86	1.81	2.52	1.79	1.67	1.30 to 11.300
Phosphorus (P)-Total	2170	1390	1710	1570	1410	2340	2390	1570	1840	1230	1730	1130	2020	1550	2180	1600	3700	1130 to 3700
Potassium (K)-Total	4800	2650	3400	3130	2750	4400	3870	2830	4460	2670	4960	2850	4360	3530	4300	4020	7890	2650 to 7890
Rubidium (Rb)-Total	11.8	5.14	18.1	15.1	9.79	6.97	11.7	6.54	18.7	8.82	16.9	9.20	14.6	10.5	14.8	12.3	18.9	5.1 to 18.9
Selenium (Se)-Total	0.110	<0.050	<0.050	0.059	<0.050	0.067	0.159	<0.050	<0.050	<0.050	<0.050	<0.050	0.060	<0.050	0.117	<0.050	0.655	0.059 to 0.655
Sodium (Na)-Total	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	ND to ND
Strontium (Sr)-Total	14.6	17.5	8.47	1.86	2.29	2.70	7.92	4.52	7.53	13.4	2.78	9.95	5.46	3.10	2.29	1.62	8.04	1.62 to 17.50
Tellurium (Te)-Total	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	ND to ND
Thallium (Tl)-Total	<0.0020	0.0022	0.0061	<0.0020	0.0053	<0.0020	0.0085	0.0162	<0.0020	0.0034	<0.0020	<0.0020	0.0026	0.0021	<0.0020	0.0025	0.0165	0.002 to 0.0165
Tin (Sn)-Total	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.59	ND to 0.590
Uranium (U)-Total	0.0049	<0.0020	0.0203	0.0074	<0.0020	<0.0020	0.0048	<0.0020	0.0072	<0.0020	0.0053	<0.0020	0.0084	<0.0020	0.0031	<0.0020	0.0313	ND to 0.0313
Vanadium (V)-Total	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	ND to 0.110
Zinc (Zn)-Total	43.5	76.1	29.7	23.6	41.8	107	82.5	79.7	20.0	35.2	12.6	26.6	24.6	30.7	31.5	40.1	304	12.6 to 304.0
Zirconium (Zr)-Total	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.23	ND to 0.23

STRATAGOLD CORPORATION
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Date Received: 01-AUG-18
Report Date: 29-AUG-18 12:31 (MT)
Version: FINAL

Client Phone: 604-682-5122

Certificate of Analysis

Lab Work Order #: L2139940

Project P.O. #: NOT SUBMITTED
Job Reference: EAGLE GOLD
C of C Numbers:
Legal Site Desc: Victoria Gold Corp.

Heather McKenzie
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-25 Veg 31-JUL-18 T1-1B - ALDER	L2139940-26 Veg 31-JUL-18 T1-2AB - ALDER LEAVES	L2139940-27 Veg 31-JUL-18 T1-2AB - ALDER TWIGS	L2139940-28 Veg 31-JUL-18 T1-3 - ALDER LEAVES	L2139940-29 Veg 31-JUL-18 T1-3 - ALDER TWIGS
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	33.5	14.3	12.1	10.0	4.8
	Antimony (Sb)-Total (mg/kg)	5.59	1.16	0.963	0.471	1.32
	Arsenic (As)-Total (mg/kg)	17.0	4.02	2.88	3.40	3.07
	Barium (Ba)-Total (mg/kg)	39.5	4.61	12.8	5.60	10.5
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.219	0.058	0.044	0.014	0.072
	Boron (B)-Total (mg/kg)	7.7	5.5	8.3	7.3	7.7
	Cadmium (Cd)-Total (mg/kg)	<0.010	0.0052	0.0163	<0.0050	0.0055
	Calcium (Ca)-Total (mg/kg)	11000	7370	5170	10600	6710
	Cesium (Cs)-Total (mg/kg)	0.136	0.0957	0.258	0.149	0.176
	Chromium (Cr)-Total (mg/kg)	0.22	<0.050	0.060	<0.050	<0.050
	Cobalt (Co)-Total (mg/kg)	0.121	0.058	0.030	0.065	<0.020
	Copper (Cu)-Total (mg/kg)	6.54	6.03	6.12	4.34	5.20
	Iron (Fe)-Total (mg/kg)	222	64.5	42.6	47.2	26.3
	Lead (Pb)-Total (mg/kg)	48.0	7.39	5.28	2.46	4.43
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	2430	1670	983	1660	780
	Manganese (Mn)-Total (mg/kg)	214	42.3	71.2	64.2	74.2
	Mercury (Hg)-Total (mg/kg)	0.0067	<0.0050	<0.0050	<0.0050	<0.0050
	Molybdenum (Mo)-Total (mg/kg)	3.71	4.34	6.40	8.51	6.59
	Nickel (Ni)-Total (mg/kg)	5.54	1.08	0.77	0.55	0.39
	Phosphorus (P)-Total (mg/kg)	938	2820	1980	2470	1450
	Potassium (K)-Total (mg/kg)	7510	5850	5110	5330	4110
	Rubidium (Rb)-Total (mg/kg)	7.81	11.4	11.0	7.09	5.92
	Selenium (Se)-Total (mg/kg)	<0.10	<0.050	<0.050	<0.050	<0.050
	Sodium (Na)-Total (mg/kg)	29	<20	<20	<20	<20
	Strontium (Sr)-Total (mg/kg)	44.0	18.0	20.5	22.7	22.8
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0060	0.0021	0.0052	0.0020	0.0058
	Tin (Sn)-Total (mg/kg)	0.21	<0.10	<0.10	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	0.0180	0.0023	0.0025	<0.0020	<0.0020
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	48.5	24.6	34.5	34.8	43.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-30	L2139940-31	L2139940-32	L2139940-33	L2139940-34
Description	Veg	Veg	Veg	Veg	Veg
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	T2-2 - ALDER LEAVES	T2-2 - ALDER TWIGS	T2-3A - ALDER LEAVES	T2-3A - ALDER TWIGS	T3-2AB - ALDER LEAVES
Grouping **Analyte**					
TISSUE					
Metals Aluminum (Al)-Total (mg/kg)	20.0	5.2	8.2	<2.0	37.2
Antimony (Sb)-Total (mg/kg)	0.127	0.050	0.117	0.044	2.48
Arsenic (As)-Total (mg/kg)	1.37	0.626	0.571	0.411	4.09
Barium (Ba)-Total (mg/kg)	37.2	62.5	28.2	58.9	36.2
Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth (Bi)-Total (mg/kg)	0.020	<0.010	<0.010	<0.010	0.173
Boron (B)-Total (mg/kg)	7.8	10.4	9.4	12.0	4.9
Cadmium (Cd)-Total (mg/kg)	<0.0050	0.0163	<0.0050	0.0097	0.0062
Calcium (Ca)-Total (mg/kg)	7470	6020	6860	5690	5790
Cesium (Cs)-Total (mg/kg)	0.330	0.225	0.161	0.104	0.379
Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
Cobalt (Co)-Total (mg/kg)	0.100	0.065	0.054	0.034	0.334
Copper (Cu)-Total (mg/kg)	9.61	9.16	7.03	7.85	9.51
Iron (Fe)-Total (mg/kg)	71.6	35.9	68.2	42.6	75.9
Lead (Pb)-Total (mg/kg)	11.5	8.24	5.15	5.85	18.5
Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium (Mg)-Total (mg/kg)	2170	1230	1960	1290	1930
Manganese (Mn)-Total (mg/kg)	44.9	44.0	30.7	35.3	72.7
Mercury (Hg)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)-Total (mg/kg)	1.15	1.73	2.16	3.82	1.98
Nickel (Ni)-Total (mg/kg)	3.03	2.66	1.65	1.77	3.05
Phosphorus (P)-Total (mg/kg)	2270	1780	2330	1770	2350
Potassium (K)-Total (mg/kg)	7080	6590	7970	7750	6000
Rubidium (Rb)-Total (mg/kg)	10.3	8.64	7.58	6.58	17.5
Selenium (Se)-Total (mg/kg)	0.241	0.124	0.242	0.116	0.054
Sodium (Na)-Total (mg/kg)	<20	<20	<20	<20	<20
Strontium (Sr)-Total (mg/kg)	52.1	60.7	37.2	49.3	23.5
Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total (mg/kg)	<0.0020	0.0038	<0.0020	<0.0020	<0.0020
Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Uranium (U)-Total (mg/kg)	0.0092	<0.0020	0.0027	<0.0020	0.0026
Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc (Zn)-Total (mg/kg)	22.1	40.1	25.7	31.7	29.7
Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-35 Veg 31-JUL-18 T3-2AB - ALDER TWIGS	L2139940-36 Veg 31-JUL-18 T3-3AB - ALDER LEAVES	L2139940-37 Veg 31-JUL-18 T3-3AB - ALDER TWIGS	L2139940-38 Veg 31-JUL-18 W1-2 - ALDER LEAVES	L2139940-39 Veg 31-JUL-18 W1-2 - ALDER TWIGS
Sample ID		L2139940-35	L2139940-36	L2139940-37	L2139940-38	L2139940-39
Description		Veg	Veg	Veg	Veg	Veg
Sampled Date		31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time						
Client ID		T3-2AB - ALDER TWIGS	T3-3AB - ALDER LEAVES	T3-3AB - ALDER TWIGS	W1-2 - ALDER LEAVES	W1-2 - ALDER TWIGS
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	9.6	18.8	6.5	27.8	6.9
	Antimony (Sb)-Total (mg/kg)	0.709	0.391	0.337	1.85	0.640
	Arsenic (As)-Total (mg/kg)	1.53	1.54	1.31	7.37	2.97
	Barium (Ba)-Total (mg/kg)	79.1	22.3	71.0	3.64	8.78
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.060	0.028	0.026	0.181	0.070
	Boron (B)-Total (mg/kg)	6.0	6.6	7.0	17.3	13.3
	Cadmium (Cd)-Total (mg/kg)	0.0111	<0.0050	0.0120	0.0200	0.166
	Calcium (Ca)-Total (mg/kg)	5120	6320	6160	6860	4550
	Cesium (Cs)-Total (mg/kg)	0.191	0.159	0.145	0.254	0.148
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Cobalt (Co)-Total (mg/kg)	0.132	0.180	0.105	0.515	0.146
	Copper (Cu)-Total (mg/kg)	7.94	6.75	7.16	11.3	11.6
	Iron (Fe)-Total (mg/kg)	37.5	65.7	40.2	123	47.9
	Lead (Pb)-Total (mg/kg)	15.1	9.35	9.09	8.84	3.67
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1100	1940	1080	1900	689
	Manganese (Mn)-Total (mg/kg)	101	66.3	97.0	206	311
	Mercury (Hg)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	0.0051	<0.0050
	Molybdenum (Mo)-Total (mg/kg)	4.74	3.97	3.38	1.05	1.88
	Nickel (Ni)-Total (mg/kg)	1.83	2.04	1.64	4.68	2.01
	Phosphorus (P)-Total (mg/kg)	1530	2500	1560	2170	1390
	Potassium (K)-Total (mg/kg)	4810	6600	4890	4800	2650
	Rubidium (Rb)-Total (mg/kg)	9.79	11.2	8.55	11.8	5.14
	Selenium (Se)-Total (mg/kg)	<0.050	0.087	0.052	0.110	<0.050
	Sodium (Na)-Total (mg/kg)	<20	<20	<20	<20	<20
	Strontium (Sr)-Total (mg/kg)	30.0	21.7	34.5	14.6	17.5
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0053	<0.0020	0.0032	<0.0020	0.0022
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0049	<0.0020
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	36.6	20.8	31.9	43.5	76.1
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	0.22	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2139940-40	L2139940-41	L2139940-42	L2139940-43	L2139940-44
	Description	Veg	Veg	Veg	Veg	Veg
	Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
	Sampled Time					
	Client ID	W1-3 - ALDER LEAVES AND TWIGS	W1-4 - ALDER LEAVES	W1-4 - ALDER STEMS	W1-4 - WILLOW LEAVES AND TWIGS	W2-2 - ALDER LEAVES
Grouping	**Analyte**					
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	82.6	14.9	5.1	11.0	48.3
	Antimony (Sb)-Total (mg/kg)	0.910	2.35	0.903	1.15	2.77
	Arsenic (As)-Total (mg/kg)	7.36	7.31	2.96	3.88	5.16
	Barium (Ba)-Total (mg/kg)	4.41	0.513	1.02	0.595	1.76
	Beryllium (Be)-Total (mg/kg)	0.019	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.139	0.327	0.124	0.164	0.252
	Boron (B)-Total (mg/kg)	9.7	3.1	6.7	5.9	8.1
	Cadmium (Cd)-Total (mg/kg)	0.0737	<0.0050	0.0136	2.14	0.0080
	Calcium (Ca)-Total (mg/kg)	3300	4790	3450	6030	3570
	Cesium (Cs)-Total (mg/kg)	0.777	1.05	0.578	0.0901	0.690
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	0.082
	Cobalt (Co)-Total (mg/kg)	0.256	0.274	0.140	0.466	0.448
	Copper (Cu)-Total (mg/kg)	34.8	12.0	16.9	4.68	10.2
	Iron (Fe)-Total (mg/kg)	166	130	56.8	58.5	195
	Lead (Pb)-Total (mg/kg)	2.66	4.28	1.61	2.60	6.86
	Lithium (Li)-Total (mg/kg)	0.63	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	791	2950	1180	4770	734
	Manganese (Mn)-Total (mg/kg)	360	45.6	70.5	93.0	262
	Mercury (Hg)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Molybdenum (Mo)-Total (mg/kg)	2.22	1.81	5.78	0.049	0.158
	Nickel (Ni)-Total (mg/kg)	11.3	2.71	2.00	1.30	4.65
	Phosphorus (P)-Total (mg/kg)	1710	1570	1410	2340	1840
	Potassium (K)-Total (mg/kg)	3400	3130	2750	4400	4460
	Rubidium (Rb)-Total (mg/kg)	18.1	15.1	9.79	6.97	18.7
	Selenium (Se)-Total (mg/kg)	<0.050	0.059	<0.050	0.067	<0.050
	Sodium (Na)-Total (mg/kg)	<20	<20	<20	<20	<20
	Strontium (Sr)-Total (mg/kg)	8.47	1.86	2.29	2.70	7.53
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0061	<0.0020	0.0053	<0.0020	<0.0020
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	0.0203	0.0074	<0.0020	<0.0020	0.0072
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.11
	Zinc (Zn)-Total (mg/kg)	29.7	23.6	41.8	107	20.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2139940-45	L2139940-46	L2139940-47	L2139940-48	L2139940-49
Description	Veg	Veg	Veg	Veg	Veg
Sampled Date	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time					
Client ID	W2-2 - ALDER STEMS	W2-3 - ALDER LEAVES	W2-3 - ALDER STEMS	W2-4 - ALDER LEAVES	W2-4 - ALDER STEMS
Grouping / **Analyte**					
TISSUE					
Metals Aluminum (Al)-Total (mg/kg)	7.7	40.7	5.9	22.6	3.5
Antimony (Sb)-Total (mg/kg)	0.629	1.11	0.402	8.51	0.726
Arsenic (As)-Total (mg/kg)	1.51	1.97	0.701	6.84	0.900
Barium (Ba)-Total (mg/kg)	4.47	0.609	4.26	0.960	0.820
Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth (Bi)-Total (mg/kg)	0.050	0.100	0.037	0.782	0.062
Boron (B)-Total (mg/kg)	9.0	8.3	8.6	4.1	5.2
Cadmium (Cd)-Total (mg/kg)	0.0420	0.0091	0.0262	0.0088	0.0125
Calcium (Ca)-Total (mg/kg)	3430	1490	1930	7640	3140
Cesium (Cs)-Total (mg/kg)	0.483	0.594	0.477	0.668	0.445
Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	0.078	<0.050
Cobalt (Co)-Total (mg/kg)	0.124	0.285	0.049	0.094	0.055
Copper (Cu)-Total (mg/kg)	10.3	12.1	10.1	13.2	11.9
Iron (Fe)-Total (mg/kg)	57.8	111	36.3	177	41.3
Lead (Pb)-Total (mg/kg)	1.37	2.48	1.01	15.3	1.42
Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium (Mg)-Total (mg/kg)	426	930	706	3330	1160
Manganese (Mn)-Total (mg/kg)	399	107	275	94.2	48.1
Mercury (Hg)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)-Total (mg/kg)	0.946	0.297	1.73	2.52	3.16
Nickel (Ni)-Total (mg/kg)	2.01	7.23	2.39	2.86	1.81
Phosphorus (P)-Total (mg/kg)	1230	1730	1130	2020	1550
Potassium (K)-Total (mg/kg)	2670	4960	2850	4360	3530
Rubidium (Rb)-Total (mg/kg)	8.82	16.9	9.20	14.6	10.5
Selenium (Se)-Total (mg/kg)	<0.050	<0.050	<0.050	0.060	<0.050
Sodium (Na)-Total (mg/kg)	<20	<20	<20	<20	<20
Strontium (Sr)-Total (mg/kg)	13.4	2.78	9.95	5.46	3.10
Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
Thallium (Tl)-Total (mg/kg)	0.0034	<0.0020	<0.0020	0.0026	0.0021
Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Uranium (U)-Total (mg/kg)	<0.0020	0.0053	<0.0020	0.0084	<0.0020
Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc (Zn)-Total (mg/kg)	35.2	12.6	26.6	24.6	30.7
Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2139940-50 Veg 31-JUL-18 W2-5 - ALDER LEAVES	L2139940-51 Veg 31-JUL-18 W2-5 - ALDER STEMS	L2139940-52 Veg 31-JUL-18 W3-4 - SEVERAL SPECIES	L2139940-53 Veg 31-JUL-18 W1-5 ALDER STEMS	L2139940-54 Veg 31-JUL-18 W1-5 ALDER LEAVES
Sample ID		L2139940-50	L2139940-51	L2139940-52	L2139940-53	L2139940-54
Description		Veg	Veg	Veg	Veg	Veg
Sampled Date		31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18	31-JUL-18
Sampled Time						
Client ID		W2-5 - ALDER LEAVES	W2-5 - ALDER STEMS	W3-4 - SEVERAL SPECIES	W1-5 ALDER STEMS	W1-5 ALDER LEAVES
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	8.7	3.4	40.8	3.8	13.7
	Antimony (Sb)-Total (mg/kg)	1.48	0.575	32.4	1.08	6.08
	Arsenic (As)-Total (mg/kg)	2.04	0.778	68.7	2.19	6.72
	Barium (Ba)-Total (mg/kg)	0.355	0.417	1.88	0.591	0.573
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.156	0.065	4.29	0.160	0.937
	Boron (B)-Total (mg/kg)	4.6	7.4	30.7	10.8	15.1
	Cadmium (Cd)-Total (mg/kg)	0.0079	0.0093	6.44	0.178	0.0439
	Calcium (Ca)-Total (mg/kg)	8170	4120	9190	3670	10900
	Cesium (Cs)-Total (mg/kg)	0.519	0.569	0.188	0.129	0.239
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	0.099	<0.050	<0.050
	Cobalt (Co)-Total (mg/kg)	0.143	0.079	0.769	0.110	0.228
	Copper (Cu)-Total (mg/kg)	9.20	11.7	9.20	11.7	9.73
	Iron (Fe)-Total (mg/kg)	84.6	41.0	530	37.6	97.1
	Lead (Pb)-Total (mg/kg)	3.21	1.32	68.6	3.74	12.3
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	3170	1080	4840	942	3920
	Manganese (Mn)-Total (mg/kg)	110	78.4	414	101	117
	Mercury (Hg)-Total (mg/kg)	<0.0050	<0.0050	0.0121	<0.0050	0.0051
	Molybdenum (Mo)-Total (mg/kg)	4.48	5.19	1.15	5.81	4.52
	Nickel (Ni)-Total (mg/kg)	2.52	1.79	1.67	1.50	2.93
	Phosphorus (P)-Total (mg/kg)	2180	1600	3700	1570	2390
	Potassium (K)-Total (mg/kg)	4300	4020	7890	2830	3870
	Rubidium (Rb)-Total (mg/kg)	14.8	12.3	18.9	6.54	11.7
	Selenium (Se)-Total (mg/kg)	0.117	<0.050	0.655	<0.050	0.159
	Sodium (Na)-Total (mg/kg)	<20	<20	<20	<20	<20
	Strontium (Sr)-Total (mg/kg)	2.29	1.62	8.04	4.52	7.92
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0025	0.0165	0.0162	0.0085
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.59	<0.10	<0.10
	Uranium (U)-Total (mg/kg)	0.0031	<0.0020	0.0313	<0.0020	0.0048
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	31.5	40.1	304	79.7	82.5
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	0.23	<0.20	<0.20

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AG-200.2-A-CCMS-VA	Soil	Elevated Ag in Soil by CRC ICPMS	EPA 200.2/6020A
This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Analysis is by Collision/Reaction Cell ICPMS.			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7
Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.			
ETL-C:N-RATIO-SK	Soil	Carbon:Nitrogen Ratio - Calculation	Calculation
HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with hot nitric and hydrochloric acids, followed by CVAAS analysis. This method is fully compliant with the BC SALM strong acid leachable metals digestion method.			
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
N-TOTKJ-COL-SK	Soil	Total Kjeldahl Nitrogen	CSSS (2008) 22.2.3
The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colrimetrically at 660 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	Comm Soil Sci 19(6)
Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
OM-LOI-SK	Soil	Organic Matter by LOI at 375 deg C.	CSSS (1978) p. 160
The dry-ash method involves the removal of organic matter by combustion at 375 degrees C for a minimum of 16 hours. Samples are dried prior to combustion. Reference: McKeague, J.A. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1978) method 4.23			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

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Company:	StrataGold Corporation		☑Standard	☐Other			◉Regular (Standard Turnaround Times - Business Days)
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Address:	1000 - 1050 West Pender Street		Email 1:	hcoyle@vitgoldcorp.com			○Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6E 3S7		Email 2:	bonnieburns@northwestel.net			○Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-696-6600	Fax:	Email 3:	Jknox@vitgoldcorp.com, cbeaudry@vitgoldcorp.c			**Analysis Request**
Invoice To	Same as Report ? ☑Yes	☐No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐Yes	☑No	Job #:	Eagle Gold			
Company:			PO / AFE:				
Contact:			LSD:	Victoria Gold Corp.			
Address:							
Phone:		Fax:	Quote #:	Q69293, Peso Samples			

Lab Work Order # (lab use only)		**ALS Contact:**	Heather Mackenzie	**Sampler:**	Bonnie Burns & Crystal Beaudry

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals											Number of Containers
	T1-1B - alder	31-7-17			X											1
	T1-2AB - alder leaves	31-7-17			X											1
	T1-2AB - alder twigs	31-7-17			X											1
	T1-3 - alder leaves	31-7-17			X											1
	T1-3 - alder twigs	31-7-17			X											1
	T2-2 - alder leaves	31-7-17			X											1
	T2-2 - alder twigs	31-7-17			X											1
	T2-3A - alder leaves	31-7-17			X											1
	T2-3A - alder twigs	31-7-17			X											1
	T3-2AB - alder leaves	31-7-17			X											1
	T3-2AB - alder twigs	31-7-17			X											1
	T3-3AB - alder leaves	31-7-17			X											1
	T3-3AB - alder twigs	31-7-17			X											1

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

NOTE: THERE IS NO TISSUE OPTION IN THE PULL DOWN MENU FOR SAMPLE TYPE ON THIS FORM, BUT THESE ARE TISSUE SAMPLES.

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Bonnie Burns			EHF	1 Aug 2017	16:30	12.0 °C	ItA	8/2	1pm	

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Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
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	Vancouver, BC V6E 3S7		Email 2:	bonnieburns@northwestel.net			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-696-6600	Fax:	Email 3:	Jknox@vitgoldcorp.com, cbeaudry@vitgoldcorp.c			
Invoice To	Same as Report ? ☑ Yes	☐ No	**Client / Project Information**				**Analysis Request**
Hardcopy of Invoice with Report?	☐ Yes	☑ No	Job #:	Eagle Gold			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:			PO / AFE:				
Contact:			LSD:	Victoria Gold Corp.			
Address:							
Phone:		Fax:	Quote #:	Q69293, Peso Samples			
Lab Work Order # (lab use only)			**ALS Contact:**	Heather Mackenzie	**Sampler:**	Bonnie Burns & Crystal Beaudry	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	Number of Containers
	W1-2 - alder leaves	31-7-17			X	1
	W1-2 - alder twigs	31-7-17			X	1
	W1-3 - alder leaves and twigs	31-7-17			X	1
	W1-4 - alder leaves	31-7-17			X	1
	W1-4 - alder stems	31-7-17			X	1
	W1-4 - willow leaves and twigs	31-7-17			X	1
	W2-2 - alder leaves	31-7-17			X	1
	W2-2 - alder stems	31-7-17			X	1
	W2-3 - alder leaves	31-7-17			X	1
	W2-3 - alder stems	31-7-17			X	1
	W2-4 - alder leaves	31-7-17			X	1
	W2-4 - alder stems	31-7-17			X	1
	W2-5 - alder leaves	31-7-17			X	1

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

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Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Bonnie Burns			EHF	1 AUG 2018	1630	12.0 °C	HA	8/2	1pm	

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Report To			**Report Format / Distribution**				**Service Requested** (Rush for routine analysis subject to availability)
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	Vancouver, BC V6E 3S7		Email 2:	bonnieburns@northwestel.net			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-696-6600	Fax:	Email 3:	Jknox@vitgoldcorp.com, cbeaudry@vitgoldcorp.c			**Analysis Request**
Invoice To	Same as Report ? ☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes	☑ No	Job #:	Eagle Gold			
Company:			PO / AFE:				
Contact:			LSD:	Victoria Gold Corp.			
Address:							
Phone:		Fax:	Quote #:	Q69293, Peso Samples			
Lab Work Order # (lab use only)			**ALS Contact:**	Heather Mackenzie	**Sampler:**	Bonnie Burns & Crystal Beaudry	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals												Number of Containers
	W2-5 - alder stems	31-7-17			X												1
	W3-4 - several species	31-7-17			X												1

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Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Bonnie Burns			EHF	1 Aug 18	16:30	12.0°C	HA	8/2	1 pm	

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