



ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE: Geology and geochemical Report on the **Rateria-West Valley Property**

TOTAL COST: \$20,989.51

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STATEMENT OF WORK EVENT NUMBER(S)/DATE(S): 5630701, Dec 29 2016

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PROPERTY NAME: Rateria-West Valley

CLAIM NAMES (on which work was done): 590952, 513870,522356,563796

COMMODITIES SOUGHT: Copper, Molybdenum, Gold, Rhenium

MINFILE NUMBERS: 092iSE062

MINING DIVISION: Kamloops

NTS / BCGS: 0921.036

LATITUDE: 50° 21' 17" North **LONGITUDE:** 120° 59' 23" West (at centre of work)

UTM: 643000E; 5580000N Zone 10

OWNER(S): Happy Creek Minerals Ltd. (FMC 203169)

MAILING ADDRESS: #460 – 789 West Pender St.; Vancouver, B.C.; V6C 1H2

OPERATOR(S) [who paid for the work]: Same as above

MAILING ADDRESS: Same as above

REPORT KEYWORDS: the Rateria-West Valley property is underlain by granodiorite, quartz diorite, quartz monzonite, and crowded quartz feldspar porphyry dykes. These lithologies are tentatively assigned to the Bethsaida, Skeena and Chataway phases of the Upper Triassic - Lower Jurassic Guichon Creek batholith which hosts the Valley Copper, Lornex, Highmont, JA deposits to the northwest. The copper sulphide minerals are comprised predominantly of bornite, chalcocite and minor chalcopyrite, molybdenite with associated copper, molybdenum, gold, silver and rhenium values. It occurs within fracture controlled quartz-sericite and locally k-feldspar alteration. An overprint of argillic alteration also occurs. Pyrite is generally rare in all alteration assemblages, except in outer, more mafic border phases of the batholith.

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TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
Fir and Sho Showing areas, prospecting, sampling	14 rock samples	563796, 590952	\$4,689.51
Geochemical Analyses	105 soil samples	513870, 52356, 563796	\$7,500
Soil sampling	4 days, 6.5km	513870, 52356, 563796	\$8,800
		Total Cost	\$20,989.51

GEOLOGY, GEOCHEMICAL REPORT

on the

RATERIA - WEST VALLEY PROPERTY

Permit Number: MX-4-402, MX-4-559

Event Number: 5630701

Kamloops Mining Division

British Columbia

BCGS: 092I.036,

Map Sheet: 092I/036, 046

UTM East: 643000

UTM North: 5580000

UTM Zone 10N

Prepared for:

HAPPY CREEK MINERALS LTD.

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Standard Metals Exploration Ltd

February 10, 2017

Summary

The Highland Valley (Rateria and West Valley) Property is located approximately 30 kilometres northwest of Merritt, British Columbia, and 10 kilometres south of the Teck Resources Ltd's Highland Valley Copper Mine (HVC) concentrator.

The Rateria and West Valley area is underlain by the Upper Triassic - Lower Jurassic Guichon Creek Batholith. The Guichon batholith is zones inward from older Border phases of diorite composition to Highland Valley, Bethlehem, Skeena and Bethsaida phases that are progressively more felsic in composition. Major structures trend north-south and are cut by a variety of structures trending northwest to northeast and east-west in orientation. The largest known deposits occur in proximity to large scale structures and the younger phases of the batholith and include the Valley, Lornex, Highmont and JA deposits.

Exploration on the Rateria and West Valley properties began in the late 1800's while most work was performed between the 1950's to 1980. Thick glacial till and extensive forest cover limited historical exploration effectiveness; however a number of copper prospects were discovered and explored intermittently. Between 2004 and 2013, Happy Creek Minerals Ltd (the "Company") assembled approximately 160 square kilometres of mineral claims covering portions of the younger intrusive phases to the south of the Highmont and Lornex mines. Work consisted of modern induced polarization (IP) and magnetic geophysical surveys, geochemical and geology surveys and diamond drilling. A recent pine beetle infestation resulted in extensive logging and road building throughout the area, and along with GPS location devices assisted in exploration of the property. The Company was successful in locating two new copper zones on the Rateria property (Zone 1 and 2) beneath thick glacial till by drill testing IP geophysical targets. These deposits contain drill results including 95.0 metres of 0.67% copper and 152.5 metres of 0.35% copper, respectively, and are thought to hold resource potential. Both copper zones remain open to further expansion.

The company has previously performed “C” horizon, MMI soil geochemical surveys over the two known zones seeking to identify the mineralized zone in bedrock beneath the glacial till. Neither survey provided a clear indication of the presence of Zone 1 and 2.

During the 2016 field season, a total of 105 Ah horizon soil samples were collected from the Zone1, Zone 2 and Sho-West areas. It is noted that in clear cut areas, the Ah horizon is very thin to non-existent in places and a great deal of effort was required to collect enough Ah horizon sample. Except for a few samples with copper values up to 607 and 736 ppm in Zone 1 and 2, respectively, other samples returned relatively low copper values. It is concluded that the difficulty and uncertainty with collecting reliable Ah horizon in the clear-cut areas and the analyses showing no clear pattern associated with the known underlying copper mineralization, suggest that the Ah soil sampling method is ineffective or unreliable in these areas.

During 2016, reconnaissance was performed of several areas where recent logging clear cuts provide improved access and observation of the surface. The Company collected fourteen surface rock samples from the West Valley property, north of the Fir prospect, and on the Rateria property, west of the Sho prospect.

Although the Ah horizon soils returned no significant copper values, altered and copper-mineralized boulders found in the glacial till at the Sho-West target occur in proximity to a sizeable IP target at depth. A recently completed logging clear cut located north of the Fir prospect is over 95% covered by glacial till and observations of orange-colored stain and areas of argillic altered glacial till may indicate potential for underlying bedrock to be hydrothermally altered.

It is recommended that further exploration consist of induced polarization surveys and drilling of targets outlined in the deep glacial till covered areas, and additional geological mapping where outcrops may have been uncovered by recent logging activities.

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1 Location and Access, Physiography

The Highland Valley (Rateria and West Valley) Property is located approximately 30 kilometres northwest of Merritt, British Columbia (Figure 1), and 10 kilometres south of the Teck Resources Ltd's Highland Valley Copper Mine (HVC) concentrator (Figure 2). The Rateria and West Valley properties adjoin the east and west sides, respectively, claims owned by Teck. They are centred on: $50^{\circ} 21' 17''$ North latitude, $120^{\circ} 59' 23''$ West longitude on BCGS map sheet 0921036. Access to the Rateria property from Merritt, B.C., is west via Highway 8 to Lower Nicola, then north along the Aberdeen Road to Pimainus Lake Forest Service Road (FSR). The all-weather logging road and secondary logging roads transect the property. Near kilometre 24 is the Rateria Zone 1 prospect. Continuing along this road to KM 34 reaches the north end of the West Valley property. Access to the southern side of the West Valley property is via a westward turnoff at kilometer 16 of the Pimainus FSR onto the Tyner Forest Service Road. With proximity to the town of Merritt, HVC, and large scale pine beetle salvage logging, the infrastructure in the area is excellent.

The Rateria and West Valley Properties are situated within an upland plateau area of approximately 1,400 to 1,600 metres in elevation. The area is covered by a blanket of multi-stage glacial till consisting of complex glacial-fluvial sand, gravel, lacustrine-like clay and boulders of variable thickness from less than 1.0 metre to over 100 metres. Small lakes, swamps and seasonal creeks occur throughout the property. Forested areas locally contain fir, birch, poplar and spruce, however lodge pole pine is predominant and a pine beetle infestation is the focus of ongoing logging activity. Characterized by a dry interior climate, the area has burnt and re-grown several times. Temperatures range from maximums of around -30 to $+40$ degrees Celsius, and 50-100 cm annual precipitation occurs primarily as rain and snow during the winter. Water in suitable quantities for all stages of exploration, is generally available year-round from nearby creeks and lakes. Well trained professional and field personnel as well as heavy equipment, and services are available in Kamloops and Merritt.

2 Claim Status

The Highland Valley Property comprises 98 contiguous mineral claims (Table 1), totally 20934.42 hectares including: The Rateria Property comprises 40 mineral claims, (8970.21 Ha) and the West Valley Property, 58 claims, (11964.15 Ha), (Figure 3). The claims are in the Kamloops Mining Division. All claims are 100% owned by Happy Creek Minerals Ltd. The claims have not been legally surveyed.

3 History

Between 1968 and 1974, the area which presently covers the Rateria and West Valley Properties was subject to regional geochemical surveys, soil sampling, geological mapping, induced polarization surveys, bulldozer trenching, road building, and percussion and minor diamond drilling. On and around the Rateria property and during 1970, Asarco drilled percussion holes on a 2,000-foot grid pattern. This was done to test up to 100 feet of bedrock typically with a total depth of approximately 90-120 feet, and locally to a depth of 200 feet or more (Bayley, 1970; Blann, 2007). Numerous holes did not reach bedrock, leaving large areas untested. Percussion hole 70-D8c returned 0.57% copper in the bottom 30 feet of the hole. This area was later determined to be near the edge of Zone 1, discovered by Happy Creek Minerals in 2006.

From 1956 through 1985 the area of the West Valley property was explored intermittently by several operators. The work conducted has generally been reconnaissance in nature and consisted primarily of soil geochemical surveys, magnetic surveys, induced polarization (IP) surveys and VLF-EM surveys. In addition, minor trenching and shallow diamond drilling was conducted at one or two of the known showings. Much of this work is poorly documented and the locations of work programs are somewhat ambiguous.

During 1972, International Mogul Mines Ltd. drilled four diamond drill holes on the Chataway Exploration Co. property, now the Rateria property. Drill hole M72-4 was located 45 metres west of 70-D8c and drilled eastward at -45 degrees to a depth of 225 feet (Willars, 1972). The deepest sample contained 0.06% copper and strong oxidation as noted in drill logs, indicating that M72-4 may have stopped short of intersecting the mineralized zone noted in 70-D8c (Willars, 1972; Blann, 2007).

Mineral claims in the Roscoe Lake area lapsed, and in 1976 the Roscoe 1 claim was staked by Highmont Operating Corporation for the National Trust Company Ltd., and remains in good standing. Cominco Ltd. carried out reconnaissance induced polarization surveys over the Gump property located north and east of the Three Creeks prospect. Highmont Operating Corporation performed 123.4 metres of diamond drilling on the Yubet north prospect for National Trust Company (Sanford, 1983). In 1984, Highmont drilled 8 percussion holes, including three holes on the Yubet south prospect, returning 0.40% copper, 0.005% molybdenum, and 4.2 g/t silver over the final 24.4 metres of drill hole RL-84-8 (Tsang, 1985).

In 1992, Hudson Bay Mining funded Aucumo Resources to perform geological mapping, stream sediment sampling and an induced polarization geophysical survey over a large area. Drilling of 6 holes in 1993 was also conducted that returned locally elevated copper values.

By 1999 a large number of claims in the area had lapsed and Brian Malahoff staked the Rateria property. Cominco Ltd. optioned the Rateria property in 2000 and contracted Scott Geophysics of Vancouver, B.C., to conduct an induced polarization survey on the property. Grid lines were oriented east - west with generally 300 metre spacing. The north (Zone 1) and south (Moss 4) portions of the property were not covered by this survey, however, several strong through-going structural features comprising weakly anomalous chargeability and resistivity values were identified (Bond, 2000).

The Rateria property was optioned to Happy Creek Minerals Ltd. in December of 2004. Silt geochemistry as well as GPS surveying of historical work and features was completed in 2004 and early 2005. During 2005, property work included a 341 metre, two hole, diamond drill program, 13.5 kilometres of line cutting, and a subsequent 3D-IP survey. The two drill holes tested IP anomalies from the 2000 geophysical survey, and consequently DDH05-2 returned 13.8 metres of 0.071% copper and 9.7 metres of 0.063% copper in the area now known as Zone 1. Near this area, the 2005 IP survey identified an anomaly approximately 1.6 kilometres by 600 metres in dimension (Blann, 2006).

During 2006, a 2,400 metre diamond drill program was completed in the area of the 2005 induced polarization anomaly. The 14 diamond drill holes were designed to test the central portion of the IP anomaly from west to east (Blann, 2007). Diamond drill holes R06-08 returned 32.0 metres grading 0.24% copper and R06-14 returned 94 metres grading 0.15% copper. Locally higher grade intervals include up to 1.0 metre containing 3.88% copper and 126.0 g/t silver. This program is considered the initial discovery of Zone 1.

During 2007, Happy Creek Minerals Ltd., completed 14 diamond drill holes totalling 3,082 metres in Zone 1. From drill hole R07-13, which intersected over 189 metres of 0.22% copper, mineralization was traced for approximately 600 metres along strike, extending Zone 1.

During the period January to May 2008 Happy Creek Minerals completed a 91 line kilometre 3D-IP survey on the Rateria Property. This program expanded upon the 2005 IP grid. The results of this survey indicated an untested and positive chargeability anomaly located two km northeast of Zone 1. Later in 2008, a nine hole, 3,072 metre, diamond drill program was conducted. Some highlights include hole R08-01 intersecting 103.25 m of 0.335% Cu and R08-05 intersecting 177.00 m of 0.366% Cu. This program was the discovery of Zone 2. In 2008, Happy Creek Minerals Ltd. conducted stream sediment and rock geochemical sampling in west Valley.

In 2009, reconnaissance mapping and prospecting was performed over portions of the property followed by a 3 dimensional induced polarization (3D IP) and magnetic survey covering several new copper showings (NTP and Nord) located on the south side of Pimainus Lakes, in the north part of the claims. Positive results from the geophysical IP survey and rock sampling resulted in Happy Creek returning to carry out drilling and mapping in 2010. Between July 11 and July 26, 2010, the Company completed 791 metres of drilling in three widely spaced holes at the Nord and NTP showings located at the northern end of the West Valley Property. Results include long intervals of geochemically anomalous copper values within propylitic altered Border phase rocks that are cut by younger more felsic dikes thought to be Bethsaida, Bethlehem or younger in age. Also during that period, geological mapping and sampling was performed to the south of the NTP and Nord prospect. Mapping covered several widely spaced historical showings around and including the Fir prospect.

During the period August to December 2009 Happy Creek Minerals conducted an exploration program in Rateria consisting of geological mapping, prospecting and diamond drilling. A nine hole, 2,026 metre, diamond drill program was conducted on the Rateria Property. This program was designed to test geophysical targets generated during the 2008 3D-IP program and to follow up 2008 drilling. The drilling program confirmed the presence of copper within the well mineralized area known as Zone 2 (R09-1, 7 and 9) and extended the strike of known mineralization by some 125 m to the north (R09-6). Geology and analytical results suggest Zone 2 is associated in part with a north trending fault structure in proximity to the Bethlehem-Guichon phase contact.

During 2010, the company conducted 6327.53 metres of drilling in 28 holes expanding the Zone 1 and Zone 2 targets. Drilling intersected phyllic and propylitic altered granodiorite/quartz monzonite containing dominantly chalcocite. The drill program extended the size of both mineralized zones and confirmed the presence of copper between some of the widely spaced previous drill holes. Several diamond drill holes

returned substantial copper grades. The mineralized zones remain open to the east, north, south and to depth (Liaghat and Blann, 2011).

During 2010, soil, silt and rock sampling was also performed in the area. 566 soil samples covered a 2.8 square km area between Zone 1 and the Moss 4 showing, 56 rock and silt samples collected from south Yubet (Copper Creek), and Sho Showing, returned positive values of copper. Widespread silt sampling in the area returned low to strong values of copper.

In July 2010, a Lidar (laser topographic and photograph) airborne survey was completed at the Rateria Property, and covered Zone 1 and Zone 2 areas. The survey was approximately 15.25 square km in area.

During 2011, 41 NQ size diamond drill holes were completed in Rateria. The drilling program was designed to test for depth extensions of Zone 1 as well as additional mineralization nearby. Drilling to the west of Zone 1 located the southern extension of the Yubet area (Liaghat and Blann 2012). A few holes were also drilled in Zone 2. 3D-IP and magnetic surveys were performed at the Sho Property covering approximately 51 line km between Feb 25 and March 24, 2012. In addition, a GPS collar survey was completed by Meridian Mapping Ltd. at the Rateria Property in 2011. In 2011, geological reconnaissance and wide spread stream sediment and rock sampling were completed in various locations on West Valley Property.

Geological mapping, and rock and silt sampling on the West Valley Property during 2011 and 2012 were completed. Samples from the Abbott claims have returned up to 15100 ppm (1.51%) copper, 15.7 ppm silver and 0.02 ppm gold (Liaghat and Blann 2012).

On the Abbott claims, exploration activity started around 1959. Subsequently, geological prospecting, sampling, trenching, and geophysical (magnetometer) surveys were completed in various areas of these claims by a number of companies. Several copper anomalies associated with outcrop were delineated. During 2009, Christopher

James Gold Corp. compiled existing geological information from historic assessment reports and completed a geochemical and geological survey over the western claims.

In 2012, two NQ size diamond drill holes were completed in Zone 2. The program was successful in expanding the mineralized zone to the north and confirmed the orientation of the zone is subvertical with a width of between 75 and 125 metres. Drill results included 92.8 metres of 0.30% copper, 0.15 g/t gold at the north end and 152.5 metres of 0.35% copper, 0.06 g/t gold and 0.57 g/t rhenium at the south end. Zone 2 remains undefined and open in extent (Liaghat and Blann, 2013).

The Tyner Lake Property was acquired in 2013 and adjoins the Company's Rateria and Teck's Highland Valley Property to the north and west, respectively. Happy Creek has also acquired by staking, a number of claims that connect the Rateria-Tyner Property to the company's West Valley Property.

The area of the Tyner Property was explored intermittently between 1950 and 1982 and limited in effectiveness due largely to the extensive glacial till cover. Between 2006 and 2008, TNR Gold conducted a more modern induced polarization (IP) survey covering a small portion of the Property that mainly focused on historical positive copper values occurring in glacial till. The IP survey returned relatively low chargeability values that were subsequently drill tested, however results are not known and the property was allowed to lapse.

In 2013, one NQ size diamond drill hole (R13-01) was completed east of Zone 1 and southwest of Zone 2, on the Rateria Property. The drill hole was planned to test a historical prospect called the SKY, where in 1967, significant chalcocite was reported over approximately one metre of drill core, although the location of the hole was uncertain. R13-01 returned locally moderately fractured and quartz-sericite altered rocks containing malachite and bornite. The core remains un-sampled. (Liaghat and Blann, 2014). It is thought the SKY showing as found in historical holes may be located west of this hole.

The copper mineralization in this area appears associated with the geological contact between Chataway and Bethlehem or Skeena Phases, and may indicate a potential continuous trend of mineralization from Zone 2 to the southwest toward the Three Creeks copper prospect area.

The 2013 reconnaissance geology program was performed in the southern portion of the West Valley Property and includes 9 rock samples collected from outcrops in the area. Several new copper showings were found along a recently constructed logging road. The samples returned geochemical values of 5070 ppm Cu from the Pole 383 Showing, 11400 ppm Cu from the Pole 346 Showing, and 5250 ppm Cu and 4.4 ppm Mo from the historical N-W Trenches area.

The 2013 prospecting program on the Tyner Lake area includes 9 rock and 3 soil samples. One sample located north-west of an historical Caper adit, returned 0.27% copper and 1.33 ppm moly and is thought to reflect part of a large scale northwest trending fault structure that trends from the Caper to Sho Prospects.

During 2014, geological and geochemical investigation on the Rateria and West Valley property included Zone 1, Zone 2, Sho, Fir, Tyner Lake and Abbot Lake prospects. These studies (Liaghat and Blann, 2015) include:

Prospecting, geological (alteration) mapping and geochemical studies: Fourteen rock and two soil samples were collected from the Sho, Fir and Abbot Lake areas for petrology and geochemical analyses. Samples returned high copper values locally, including the Fir showing with 7.3% copper, and Abbott Lake with 2% copper. A sample of the Sho prospect was analyzed using complete element scan and returned 3.23% copper, 137 ppb gold, 21.94 ppm silver and 8.4 ppb palladium.

Petrographic and mineralogy: Drill core from Zone 1 (hole R09 07) and Zone 2 (hole R10-11) were submitted for Tescan Integrated Mineral Analyser (TIMA) analyses for

detailed mineralogy and petrographic information. Predominantly bornite, chalcocite, chalcopyrite and variable concentrations of molybdenite are associated with quartz and k-feldspar zones; these are enveloped and in part overprinted by phyllic and propylitic alteration.

Copper leach test: A composite sample of drill core from Zone 1 was tested for amenability to acid leaching by bottle roll for 72 hours. Zone 1 contains abundant chalcocite. The tests determined that the copper leach recoveries up to 61.9 % Cu can be achieved within 72 hours and suggest that higher copper recoveries could be achieved with longer leach times.

Lidar Survey: The survey covered approximately 23.5 square kilometres with one metre contour intervals over the Tyner Lake property. This work has identified strong regional and local scale northerly trending lineaments in the eastern portion of survey area. These are thought to be part of a corridor of fault structures extending from the Highmont Mine in the north to the south of Happy Creek's minerals claims.

4 Regional Geology

The Rateria and West Valley area (Figure 4) is underlain by the Upper Triassic - Lower Jurassic Guichon Creek Batholith (198 ± 8 my; McMillan, 1976). This multi-phase calc-alkaline intrusion is approximately 1,000 square kilometres in area and is elongated in a north-northwesterly direction. Nearly concentric intrusive phases have contacts ranging from gradational to locally sharp or partially brecciated, and are progressively younger and more felsic toward the central core of the batholith. Textural and compositional criteria have been used to characterize the various intrusive phases after Northcote (1969) and McMillan (1976).

The oldest phase of the Guichon Creek Batholith is the Border or Hybrid Phase, a fine to medium grained, mafic rich diorite to quartz diorite, which locally contains xenoliths of amphibolite and monzonite. The Highland Valley Phase consists of Guichon and

Chataway Varieties. The Guichon Variety is a quartz diorite to granodiorite, typically containing 15% mafic minerals of uneven distribution. The Chataway Variety is a hornblende granodiorite normally containing 12% evenly distributed mafic minerals. The Bethlehem Phase, a fine to medium grained granodiorite with approximately 8% mafic minerals, is characterized by amoeboid quartz crystals and several percent poikilitic hornblende crystals. The Skeena Variety of granodiorite is texturally similar to the Bethlehem and in part Bethsaida Phase, but is distinguished by its coarser grain size, slightly lower mafic content, and subhedral to anhedral quartz. The youngest intrusive phase of the Guichon Creek Batholith is the Bethsaida, biotite \pm hornblende quartz monzonite to granodiorite in composition, and containing approximately 6% mafic minerals, predominantly coarse-grained euhedral biotite books. The core of the Guichon Creek Batholith is within a regional magnetic low.

A porphyry dyke swarm extending northward cuts Bethlehem granodiorite, and locally dykes and small plugs of porphyry cut the Skeena Variety. Some of these porphyries appear to be offshoots or derivatives of the Bethsaida Phase (McMillan, 1976).

Alkaline and felsic volcanic dykes, flow and tuff, Eocene to Miocene in age, cut the Guichon Creek Batholith rocks. Some areas of the Batholith are reported to have Tertiary sedimentary fill. During the last glacial period, portions of the Tertiary and older rocks and surficial sediments were eroded, and between one and over 100 metres of till, glaciofluvial and lacustrine cover was deposited towards a 165° azimuth.

Highland Valley copper \pm molybdenum deposits are generally associated with or near the dyke swarm or occur within Bethsaida Phase and related dykes. Two phases of copper mineralization are thought to occur with intrusive phases; syn to post Bethlehem and syn to post Bethsaida Phase.

Dominant ore controlling fracture sets at the Valley and Lornex deposits trend north-northwest to northeast and locally east-southeast. The regionally extensive, north trending

Lornex Fault cuts the length of the Guichon Creek Batholith with a steep to locally moderate west dip and has a dextral sense slip. This fault cuts the Lornex and Valley Copper deposits on the west and east sides, respectively. Sulphide mineralization is strongly associated with veins, fractures, faults and/or breccias.

In the Highland Valley deposits, potassic alteration is variably developed and hydrothermal biotite or k-feldspar occurs as fracture-controlled flooding and veins. Phyllic alteration is typified by quartz and fine grained to coarse grained flakey sericite or muscovite occurring in fracture-associated zones or as vein envelopes. Phyllic alteration cuts potassic alteration. In argillic zones, which often occur within and beyond the mineralized zones, feldspars and locally mafic minerals are altered to sericite and kaolinite +/- montmorillonite. Sericite, carbonate and clay alteration of feldspars, as well as chlorite-carbonate alteration of mafic minerals is characteristic of propylitic alteration. Calcite and zeolite occur primarily as late stage veins and fracture coatings.

Sulphide zoning is common in the Highland Valley deposits. Bornite and chalcopyrite occur within ore zones, with bornite more predominant in certain areas, and then outward to pyrite. Main hypogene copper sulphides include chalcopyrite, bornite and minor digenite. Topographically above hypogene mineralization, oxide-supergene enriched zones may contain limonite, native copper, malachite, chalcocite, and occasionally tenorite. Chalcocite variably replaces bornite locally to depths over 400 metres in the larger fault zones such as Zone 1. Pyrite occurs mainly in peripheral propylitic alteration in concentrations less than one percent. Mafic phases of the batholith have much greater concentrations of pyrite such as Border phases. Distribution and concentration of molybdenite is highly variable throughout the Highland Valley deposits, with economically significant occurrences having similar distribution as that of the copper. Deposits having an assumed deeper depth of formation have less molybdenite. The relative abundance and importance of molybdenum in the ore deposits increases from the Valley, Lornex to Highmont.

5 Property Geology

5.1 Lithology, Alterations

Rateria and West Valley Properties are underlain by geology having similarities to the Highland Valley deposits currently in production to the north (Figure 4). The property is largely covered by 3 to 20 metres or more of glacial till that affected historical geological work and exploration. Rock outcrops comprise less than 5% of the Rateria Property and occur in limited exposures such as glacial meltwater channels or creek beds, therefore property geology is largely derived from recent and historical drilling and from scattered outcrops.

The Rateria and West Valley Properties are underlain by multiple phases of the Guichon Batholith. The younger phases of the Guichon Batholith host five large copper deposits totaling over 1.8 billion tonnes of resources. The oldest, outer phase rocks are Border Phase that are comprised of hornblende rich diorite, gabbro or pyroxenite and occur peripherally to younger phases of the Batholith. The Rateria Property covers portions of the younger phases of the Batholith that includes from youngest to oldest, Bethsaida, Skeena, Bethlehem and Chataway-Guichon Phases, respectively. These rocks vary from quartz monzonite to quartz diorite and granodiorite in composition. Syn to post-Bethlehem and Bethsaida age dykes consist of fine to medium grained grey to pale green colored quartz feldspar phyrlic or porphyry and orange-tan colored fine grained k-feldspar rich aplite. Locally aplite appears with a micro feldspar porphyritic texture and can contain or is cut by strong copper mineralization.

2014 geological study (Liaghat and Blann 2014) on the Rateria property with the objective to study alteration zones was accompanied by reviewing of rock alteration in drill core from Zone 1 and 2. The result provides an alteration pattern for the area. Zone 2, Sho and 3 Creek zones are dominated by propylitic and potassic alteration (chlorite>epidote>k-spar>sericite/muscovite-quartz). Phyllic alteration (sericite+clay> chlorite>quartz) is common in and around Zone 1. At depths of over 350 metres in Zone 1, sericite decreases and potassic + propylitic (k-spar-chlorite-sericite) alteration increases, although both

alteration assemblages contain copper sulphides. In the Yubet area, located west of Zone 1, quartz-muscovite-epidote-sericite alteration occurs within Bethsaida phase rocks and hosts the copper sulphide.

The western portion of the Rateria Property is underlain by quartz rich, mafic poor intrusive rocks of quartz diorite, granodiorite and quartz monzonite composition, likely of the Bethsaida Phase. Adjacent to these rocks, along a northerly trending contact to the east, are medium-grained granodiorite and biotite quartz diorite interpreted as the Skeena Variety. Further east, a north striking contact occurs between the Skeena Variety and medium to coarse grained granodiorite of the Chataway Variety. Dykes and small plugs of quartz monzonite, aplite, quartz and feldspar porphyry, and crowded quartz - k-feldspar porphyry occur.

On the West Valley Property, the younger phases of the Batholith outcrop along the east side, in proximity to the Lornex fault, and also appear as dikes that cut the Chataway, Guichon and Border Phase rocks further west. Based on the widespread presence of the younger felsic phase dykes, associated copper prospects and broad areas of propylitic to locally phyllic and argillic alteration, there is thought to be potential for porphyry systems to occur within older phases of the Batholith. At least four large target areas have been identified for follow up exploration.

The West Valley Property is underlain in part by the younger phases of the Guichon Batholith which are important in the generation of Highland Valley-type copper deposits. The airborne (Liaghat and Blann, 2012) survey shows numerous strong cross-cutting fault structures that provide opportunity for copper deposits to occur in several areas. The property also covers a portion of the Lornex fault, a key structure that cuts through the world class Valley and Lornex deposits and extends southward onto Happy Creeks' property. Some new and historical copper showings lies along the Lornex Fault.

Proximity with geological contacts of the younger intrusive phases and dykes are spatially associated with hydrothermal alteration and copper mineralization. Regional to district scale fault zones cut the batholith in north, northwest and northeast to east-west orientations that also, in part, control emplacement of the various intrusive rocks, associated hydrothermal alteration and copper sulphides. Pre-mineral, syn-mineral and post-mineral faults occur. Displacement of mineralized zones by faults may be significant in the district and at the south end of Zone 1 an east-west oriented fault is thought to have displaced the zone. Faults may be strike-slip, normal or reverse in sense. Rock alteration varies from potassic (biotite, k-feldspar, quartz), propylitic (chlorite, epidote, carbonate), phyllic (quartz, sericite/2M1 muscovite) and argillic (kaolinite, montmorillonite, dickite and other clay). Phyllic and argillic alteration and laumontite, heulandite or other zeolite minerals appear in part to overprint potassic and propylitic alteration. Magnetite can be variably altered and martite, hematite, jarosite, goethite and specularite occurs.

The copper sulphide minerals identified to date are comprised bornite (63.3% copper), chalcocite (79.8% copper) and minor chalcopyrite (34.6% copper). Pyrite is generally rare in all alteration assemblages, and less than 1% in proximity to Zone 1 and 2. Pyrite appears in greater quantity where chalcopyrite greatly exceeds bornite and also in the outer Border Phase rocks on the Rateria and West Valley properties.

The intra-batholith setting, strong structural controls, predominance of bornite copper sulphides, minimal pyrite within younger phases and more pyrite in the older outer phases of the batholith respectively, suggest in part, that the porphyry copper systems reflect a relatively deep level of formation and have potential to be very large in size.

5.2 Mineralization in Rateria Property

Zone 1 and Zone 2 were discovered by Happy Creek Minerals Ltd. Close to one decade of encouraging exploration results, the zones are thought to hold resource potential and remain open in extent. Near surface mineralization, low concentrations of pyrite and deleterious elements, and dominantly bornite-chalcocite copper minerals with accessory

molybdenum, gold, silver and rhenium are thought to be additional positive qualities. Metallurgical testing (Liaghat and Blann, 2013) on Zone 1 material suggests standard flotation processing to be relatively simple with a concentrate produced grading 39.6% copper and 398.6 g/t silver.

Several other targets have been identified on the property. Three dimensional induced polarization (3D IP) and magnetic geophysical surveys (in 2006 and 2008 on Rateria; in 2009 on West Valley and in 2011 on Sho Prospect) identified multiple new targets within a very favorable geological area that remain untested by drilling. Most of the West Valley property has not been subject to modern induced polarization geophysical surveys.

Zone 1 was first discovered by the Company in 2006 and is located approximately 6.5 kilometres south-southeast of Teck's Highmont mine. The zone extends to over 450 metres in depth, 1.2 kilometres in length and 50 to 200 metres in width. Zone 1 is located near the contact between the Bethsaida and Skeena Phase and dykes of aplite to feldspar porphyry occur. Bethlehem Phase rocks may occur but are not confirmed. Fractures are filled by quartz and sericite/muscovite, forming veins, veinlets, stringers, and locally stockwork and locally, breccia textures occur. Dominantly bornite, chalcocite and associated copper and silver values occur. Chalcocite in part replaces bornite that in part replaces chalcopyrite to over 350 metres depth in Zone 1. At depth and adjacent the bornite-chalcocite zone, relatively more chalcopyrite occurs.

In Zone 1, drilling results include 367.3 metres of 0.10% copper, 250.0 metres of 0.25% copper and 95 metres of 0.67% copper. West of Zone 1, drilling in 2011 returned 7.5 metres of 1.70% copper, 30.7 g/t silver and 7.5 metres of 1.35% copper, 12.4 g/t silver. Many of the recent and historical holes around Zone 1 were generally relatively shallow in depth. They ended in rock with hydrothermal alteration suggesting the underlying mineral system is widespread and larger than previously thought.

Zone 2 was discovered in 2008, about two kilometres northeast of Zone 1. The Zone 2 occurs near the contact of Skeena, Bethlehem and Chataway Phases of the Batholith, and dikes of quartz feldspar porphyry and aplite occur. Major structures trend north, northeast and northwest and these faults and conjugate fractures form stockwork and breccia textures locally. Glacial till in Zone 2 is between 3 and 18 metres in thickness. Zone 2 is less well defined than Zone 1. Significant copper values occur in an area approximately 1.5 kilometres by 1.0 kilometre in dimension and are undefined and open in extent. A better defined zone is approximately 450 metres in length and between 75 and 125 metres in width and extends to at least 350 metres in depth. Zone 2 is comprised of predominantly bornite, minor chalcocite, chalcopyrite and locally molybdenite, with associated copper, molybdenum, gold, silver and rhenium values. Rhenium appears associated with molybdenum. Zone 2 is part of a "corridor" defined by the contact between the younger and older phases of the batholith that can be seen in geophysical surveys for over five kilometres through the Rateria Property.

Drill results from Zone 2 include R08-05 with 126.0 metres of 0.46% copper, 0.008% molybdenum and 0.10 g/t gold. R11-36 returned 152.5 metres grading 0.26% copper, 0.008% molybdenum, 0.07 g/t gold and 0.67 g/t rhenium. This includes 42.5 metres of 0.37% copper, 0.17 g/t gold, 0.025% molybdenum, 1.82 g/t rhenium. R12-01 returned 92.8 metres of 0.30% copper, 0.15 g/t gold from bedrock surface and R12-02 contains 152.5 metres of 0.35% copper and 0.57 g/t rhenium. Zone 2 remains undefined and open in extent.

Metallurgy study for Zone 2 (Liaghat and Blann, 2013) provides more detailed information on the copper, gold, silver and molybdenum-rhenium found in this style of mineralization. Rhenium is obtained largely as a byproduct of copper-molybdenum mining and is a rare metal used to impart high-temperature strength in steel. It is used in materials such as jet engine turbine parts and petroleum catalysts.

In general, the mineralized zones are controlled by proximity to geological contacts between younger phases of the Guichon Batholith including dikes, the intensity of fracturing and a phyllic to argillic overprint on potassic alteration. The copper oxides malachite, azurite and native copper occur in minor amounts and generally very near the surface. However, very fine grained native copper averaging 0.02 to 0.09% copper occurs with weak sericite alteration to depths of at least 250 to 300 metres in several widely spaced drill holes to the east of Zone 2.

Yubet Showing is comprised of a series of northerly trending, mineralized structures covering approximately 250 metres in width that have now been traced for over one kilometre southward. The width and strike remain open in extent. These zones consist of dominantly quartz veins containing bornite and locally chalcopyrite and are hosted within sericite altered Bethsaida and Skeena phases of the Guichon Batholith. Drilling has returned 7.5 metres of 1.70% copper, 30.7 g/t silver in drill hole R11-16 that is approximately 125 metres beneath an intercept in R11-14 containing 7.5 metres of 1.35% copper, 12.4 g/t silver. These holes confirm positive grade and vertical continuity of mineralization. Approximately 600 metres south of these holes, R11-34 intersected 7.5 metres of 0.60% copper, 3.5 g/t silver, as well as 12.5 metres of 0.13% copper.

Tyner Lake Area is approximately 90% covered by glacial till, however airborne magnetic and other surveys suggest several strong northerly and northwesterly trending structures occur. Locally, younger phases of the Guichon Batholith that are associated with copper deposits in the district also occur on the property. The northeastern portion of the property hosts several outcrops containing positive copper values. Historical induced polarization geophysical surveys to the west identify several sizable zones of interest that are open in extent onto the Tyner Property.

A prospecting report on the Tyner Property in 2012 includes samples returning values of 0.16, 0.91 and 0.83% copper from the northeastern portion of the property- where several outcrops occur. One sample located north of an historical adit returned 4.82 %

copper, 0.19 g/t gold and 27.1 g/t silver is thought to reflect part of a large scale northwest trending structure that trends through the Tyner and onto the Company's Rateria Property further north.

Sho Showing. geologically the area is underlain by the Chataway Variety granodiorite of the Highland Valley Phase of the Guichon Creek Batholith. The area is covered extensively by glacial till with less than 10% outcrop exposure. Along the north side of a southeast draining creek, a steep cliff has exposed Chataway Variety rocks.

The Sho prospect contains an area 15.0 metres by 4.1 metres in dimension that averages 1.49% copper, 8.4 g/t (grams per tonne) silver and remains open in extent. Approximately 400 metres to the south of the Sho is a northwest trending mineralized zone, over 250 metres in length and 50 to 100 metres in width. Geochemical rock samples returned from 0.20 to 2.84% copper and up to 12.8 g/t silver. Seven samples contain from 0.05 to 0.11 g/t gold. During 2011, the Company performed a three dimensional induced polarization (3D IP) and magnetic geophysical survey that identified the surface mineralization and shows potential to expand it. In addition, the surveys identified other targets beneath glacial till that are along the southern trend of Zone 1.

Approximately 2 km southeast of the Sho prospect, an old cat road and trenches has exposed significant malachite staining and traces of bornite. Around the northern showing some percussion drill holes were completed, with a reported maximum depth of about 60 feet. No results are available.

5.3 Mineralization on the West Valley Property

The West Valley Property contains a number of widely spaced historical prospects with positive copper grades in proximity to dykes of the younger phases of the Guichon Batholith. The Company has performed airborne magnetic and spectral geophysical and geochemical surveys, geology and prospecting that have identified potential for copper deposits to occur in several areas.

The West Valley Property is located in part on and to the west of the Lornex Fault, a major north-south trending structure that is thought to be an important control to mineralization at the Lornex and Valley copper deposits to the north. The Fir, Jay 2 and LL prospects occur near the intersection of the Lornex fault and the major east-west trending Skuhun Creek fault. Dykes of feldspar porphyry, quartz feldspar porphyry and mafic composition also occur.

NTP and Nord Showings, located approximately 6 kilometres southwest of Teck's Highmont mine, an induced polarization (IP) and strongly positive magnetic geophysical anomaly, approximately 1.6 by 1.0 kilometres in dimension occurs. At the NTP prospect, two grab samples approximately 65 metres apart returned 1.7 percent copper, 0.37 g/t gold and 1.4 percent copper, 0.27 g/t gold. Three reconnaissance drill holes in 2010 returned long intervals of low grade copper values propylitic alteration and felsic dykes at depth are thought to be consistent with the periphery of a porphyry system. The three drill holes were collared approximately 200 to 400 metres apart along the western edge of the anomaly, and directed eastward at -60 degrees dip towards the strongest IP and magnetic geophysical values. Pyrite, bornite and chalcopyrite occur and samples average approximately 300 parts per million (ppm) copper from top to bottom of the holes and values up to 900 ppm copper occur. Drill hole WV10-3 returned 11.0 metres of 0.06 % copper and 27.5 metres of 0.06% copper. Locally, magnetite veins approximately 10 centimetres in thickness contain strong chalcopyrite mineralization. Drill hole WV10-1 returned 2.5 metres containing 1.20 g/t (grams per tonne) gold near the top of the hole, and several other 2.5 metre samples returned 0.02 to 0.03 g/t gold with low copper values. The presence of the positive gold values and magnetite is consistent with surface samples containing 0.27 and 0.37 g/t gold and is thought to be encouraging as the host rocks in this area of the Guichon Batholith is very similar in age to the Afton copper-gold camp to the northeast. The drill results are interpreted to be peripheral style alteration and mineralization of a porphyry copper system and further exploration in this area is planned.

Fir, LL and Jay 2 Showings. The Fir is comprised of several historical copper showings including the Jay 2 and LL prospects that cover an area approximately two kilometres by two kilometres in dimension. Showings include cat trenches, blast pits and an inclined shaft dating from around the 1950's or earlier. Initial sampling by the Company in 2008 returned positive results and in 2010, additional mineralization was located and sampled.

Rock sampling at the Fir Prospect have returned values of 0.32% to 1.2% copper and an old trench returned 0.70% copper over 10 metres of grab samples. Approximately one kilometre northeast of the Fir, at the Jay 2 historical inclined shaft, a dump sample assayed 2.82% copper, 10.4 g/t silver and 0.12 g/t gold. An historical shallow drill hole near the shaft returned two mineralized zones adjacent to dykes. The only two samples taken from the hole returned about 1.0 metre each of 1.87% copper and 1.29% copper, respectively. At the LL Prospect located approximately 1.5 kilometres to the northeast, chip samples returned 0.40% copper over 6.0 metres and mineralization remains open in extent.

Based on detailed mapping the Fir project area is underlain by diorite and related intermediate intrusive varieties that are locally cut by sulphide-bearing quartz vein/breccia and stockwork with accompanying strong bleaching and zoned argillic, phyllic and propylitic alteration styles. Malachite stains rock surfaces are underlain by chalcopyrite-bornite-chalcocite mineralogy. Sulphide-quartz zones are often developed along north trending and steeply west dipping shear/fracture zones and are spatially associated with mafic dykes. Pronounced conjugate joint and intersecting fractures sets with radiating dips around the central core of the property suggest a "dome" effect that may indicate a shallow buried intrusive.

Abbot Lake Area. The area is underlain by quartz diorite, granodiorite with minor diorite rocks of the Guichon–Chataway variety of the Guichon Batholith. The few outcrops that occur in the area indicate the presence of Guichon Variety rocks; a medium to coarse grained, weakly foliated, biotite- hornblende granodiorite and locally quartz diorite. The rock contains approximately 20% mafic minerals with probably 2-5% magnetite. The mafics are

medium grained, in small, evenly distributed clusters. Quartz is closed interstitial (wedgy), fine grained, and makes up about 10% of the rock. Plagioclase ranges from approximately 50 - 60%. Orthoclase makes up 0 - 8% of the rock, is poikilitic and interstitial to all other minerals. Weak sericite and hematite alteration is common throughout the observed samples. The amphibole tends to alter more to chlorite and epidote, along and in selvages of fractures. The more mafic phase intrusive rocks display more dominant chlorite, epidote and hematite alteration, some of which is fairly intense.

In the Abbott area, zones of chalcopyrite and malachite occur. These copper showings are in part within younger phases of the Guichon Batholith, believed to be Bethlehem, Skeena or Bethsaida phase. The rocks appear to have variable propylitic, phyllic to argillic style alteration. This area also covers the southern extension of the Lornex fault, a key feature found at the Lornex and Valley mines to the north. 2013 samples returned geochemical values of 5070 ppm Cu from the Pole 383 Showing, 11400 ppm Cu from the Pole 346 Showing, and 5250 ppm Cu and 4.4 ppm Mo from the historical N-W Trenches area.

6 2016 Exploration Activities and Results

Between May and December 2016 the company completed the following studies:

- Ah Horizon soil sampling in Rateria: From August 3rd to August 6th total 105 soil samples from Ah Horizon were collected in Rateria and submitted to SGS analytical Laboratories. These samples include: 45 soil samples from Zone 1, 45 samples from Zone 2 and 15 samples from Sho-West areas (Figure 5).
- Geological mapping and reconnaissance survey: From July 13th to July 16th two geological field traverses (totalling covered appx 1 km²) were undertaken on the Rateria and West Valley Properties and 14 rock samples collected (Figure 5). The objective of the survey was to improve geological knowledge and evaluate the underlying copper potential in the Sho West and Fir prospect areas.

6.1 Ah Horizon Soil Sampling

A total of 105 soil samples were collected on the Rateria property in 2016. Soil samples were collected from Ah horizon from pits dug along nine E-W grid lines over Zone 1 and Zone 2 and the Sho West targets, totaling 6.5km in length. Figure 6a, 6b, and 6c show soil sample locations with ID numbers in Zone1, Zone2 and Sho-West prospects, respectively.

The Zone 1 grid passes over a part of the mineralized body that occurs beneath glacial till of less than 30 metres in thickness and continues from bedrock surface to depths of approximately 500 metres below the surface. The Zone 2 grid crosses mineralization that underlies the glacial till, between 4 to 30 metres in thickness. The Sho West grid passes over a high IP chargeability target situated over 100 metres below surface. Geophysics suggest glacial till may be locally up to 100 metres in thickness in the area. Analyses of some rock samples at surface from this area in the past returned minor copper values (Liaghat and Blann 2015).

A typical soil profile in the area may include a thin surface horizon consisting of partially decomposed wood, twigs, needles and mosses, and a thin (~5cm) black to dark brown, organic-rich Ah horizon. The organic-rich layers overlie a distinct white to grey or pinkish, sandy textured of variable thickness. Below this, the B horizon is enriched with iron oxide, and, which grades into medium to dark grey sand or gravel of the C horizon.

The samplers (Hendex Exploration Ltd.) have had instruction and experience collecting Ah horizon in B.C. From communication with the samplers, the collection of the Ah horizon proved difficult and problematic in open clear-cuts. In some cases, limited quantities of Ah horizon material may have been collected due to an extremely thin and poorly developed or patchy horizon in a number of locations.

Soil samples were collected by hand and trowel, with an emphasis on collecting material <2mm (i.e. silt or clay size). Samples were not sieved. Sample ID were recorded

in a sample booklet and a field book. The sample ID tag was also inserted into the sample bag prior to sealing to SGS Laboratories Ltd in Burnaby. The field sampling site was labeled with the sample ID number. Soil samples were photographed on the site; two typical photos are presented in Figure 7.

6.1.1 Analytical Procedures

The following preparation and analytical methods are carried out by SGS labs:

- Preparation processing, sorting, logging boxing.
- Weighing of samples and reporting of weights,
- Dry and macerate vegetation,
- Dry Screening to -180 micron, >1kg,
- Dry Screening to -180 micron, <1kg,
- Aqua Regia Digest 25g-300 ml, ICPMS (Au only)
- Aqua Regia digestion/ ICP-AES finish,
- Aqua Regia digestion/ ICP-MS finish,
- Gravimetric determination at 1000°C

SGS's quality system is compliant with the International Organization for Standardization's ISO/IEC 17025, 'General Requirements for the Competence of Testing and Calibration Laboratories' and the ISO 9000 series of Quality Management standards.

6.1.2 Geochemical Results and Discussion

Results are presented in Table 2, Figures 8a, 8b, 8c. Ah soil sampling in Zone 1 includes values of up to 607 ppm Cu. Except two samples with grades of 289 and 222 ppm Cu, the rest of the samples returned copper values less than 100 ppm (Table 2, Figures 8a). The original soil sampling (AR-ICP) method on 361 "C" horizon sites over Zone 1, performed by Happy Creek Minerals in 2010 provided a more clearly defined soil pattern (Figure 9), that at least in part, may reflect mineralized material within transported glacial till that is sourced from within the bedrock of Zone 1. Zone 1 was also subject to soil samples

using the Mobile Metal Ion (MMI) method (Liaghat and Blann, 2011). The result showed north-south trend of weak copper anomaly covering the area between Zone 1 and the Moss 4 Showing (Figure. 9). This anomaly was described as continuous mineralization trending from Zone 1 to Moss 4, as well as surficial factors caused distribution and transportation of ore minerals (Liaghat, Blann 2011). The MMI and “C” horizon appears to have produced similar patterns.

In Zone 2, four Ah soil samples from the 2016 program returned 736 ppm, 379 ppm, 247 ppm and 233 ppm copper (Table 4, Figure 8b). These positive samples are also thought to potentially originate from mineralized material sourced in part from local outcrop beneath the till cover in this area, however no clear pattern is evident to identify the presence of Zone 2 mineralization in bedrock beneath the glacial till.

In the Sho West area, Ah soil sampling over a deeply situated and positive induced polarization (IP) geophysical target failed to detect positive copper values (Table 4, Figure 8c). Although copper oxide minerals occur in boulders and cobble sized rocks within the glacial till, the geophysics, prospecting and mapping in this area suggest glacial till may be up to 100 metres in thickness in places. There does not appear to have been any diamond drill holes completed in the area. The only drill holes recorded are shallow percussion holes from 1970 (F14, F15 and F16), that ended in overburden. With no previously recorded work, it is thought this area may have escaped previous exploration attention and is considered a strong candidate for another zone of porphyry copper system to occur.

Geochemical results and the uncertainty and difficulty in collecting consistent Ah horizon material suggests the Ah horizon soil sampling method is largely ineffective in the areas tested. This method, which has been recognized in some areas of B.C. to detect deeply buried mineralization in a variety of environments (Heberlein and Samson, 2010-13), did not produce convincing copper responses, and positive values may reflect mineralized particles or boulders within the transported glacial till.

6.2 Geological Mapping and Reconnaissance survey

6.2.1 Fir prospect, West Valley Property

In 2016, prospecting and rock sampling to the north of the Fir copper prospect was to review and investigate a recently completed logging clear cut. The area is approximately 1km north of the main Fir Showing; where the series of historic showings and trenches represent an interesting target (Liaghat and Blann, 2014, 2015).

A total of 7 rock samples were collected from boulders and outcrops. Samples from outcrops are described as medium to coarse grained granodiorite-diorite. Biotite and amphibole comprise 40-50% of the rock, quartz 10-20% and plagioclase about 30%. Some rocks show moderate epidote-sericite-chlorite alteration. Minor K-spar and/or hematite alteration occurs in the selvage of epidote veins that are a few mm in widths.

Rock sample locations and descriptions are provided in Table 3. Sample numbers and their locations are presented in Figure 10. These samples do not show any sign of mineralization and important alteration, and were not considered for assay analyses. During traverses through the clear cut, it was observed that over 95% is covered by glacial till and areas of white colored, clay alteration and orange stain occur within the glacial till.

6.2.2 Sho-West Region, Rateria Property

The 2016 field work and sampling was performed approximately 2 km west of the Sho prospect in proximity to the Pimainus logging road. The area is inferred to be underlain by the Chataway Variety granodiorite of the Highland Valley Phase of the Guichon Creek Batholith that is in contact with Bethlehem, Skeena and Bethsaida rocks a little further west. Interest in this area is largely based on a positive IP chargeability feature in proximity with the inferred geological contact mentioned above, and large scale through-going faults trending north and east-west. Although 95% or more of this area is covered by glacial till, rocks found in boulders, subcrop and outcrop around the target display weak chlorite

altered mafic minerals (biotite and hornblende). Sparse epidote veinlets are evident in some areas. Locally quartz-k-feldspar-epidote-sericite veinlets are present in larger scale fracturing. These rocks display quartz over sericite style alteration along with trace malachite.

No rock samples were collected for analysis, although seven reference samples consisting of grab samples from outcrops and talus were collected. These samples are listed and described, including UTM locations in Table 3. Weak malachite mineralization is observed in sparse scattered small pieces in talus and outcrops. Sample locations are plotted in Figure 11.

7 Conclusions and Recommendations

The Rateria, West Valley Properties are situated in the south portion of the Guichon Creek Batholith and underlain by granodiorite, quartz diorite, quartz monzonite and dykes and small plugs of crowded quartz feldspar porphyry and aplite occur. Lithology encountered in recent years by drilling is consistent with descriptions of Bethsaida, Skeena, Bethlehem, Highland Valley and Border Phases of the composite Guichon Batholith. These are the host rocks for the Valley and Lornex copper deposits found approximately 10 kilometres northwest of Rateria.

During the 2016 field season, a total of 105 Ah horizon soil samples were collected from the Zone1, Zone 2 and Sho-West areas. Except for a few samples with copper values up to 607 and 736 ppm in Zone 1 and 2, respectively, other samples returned low copper values. As a result, geochemical data and the difficulty in collecting reliable Ah horizon suggest that the Ah soil sampling method is ineffective or unreliable in these areas and does not likely reflect underlying copper mineralization.

The 2016 reconnaissance survey collected fourteen surface rock samples from north of the Fir prospect at the West Valley property and west of the Sho prospect at the Rateria

property. The purpose of the geological reconnaissance was to collect any surface data for potential mineralization in recently logged, clear-cut areas.

The source of the altered and copper-mineralized rocks observed at the Sho-West area is uncertain; however they occur in proximity to a sizeable IP anomaly in bedrock beneath the glacial till. As such they have added to the understanding of the geology and in part support potential for a copper deposit to occur within the buried IP anomaly. The area north of the Fir prospect is over 95% covered by glacial till and observations of orange-colored stain and areas of argillic altered glacial till may indicate potential for underlying bedrock to be hydrothermally altered.

It is recommended that further exploration consist of induced polarization surveys and drilling of targets outlined in the deep glacial till covered areas, and additional geological mapping where outcrops may have been uncovered by recent logging activities.

Respectfully Submitted,

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9 Statement of Costs

Exploration Work type	Comment	Days			Totals
Personnel (Name)* / Position	Field Days	Days	Rate	Subtotal	
Sassan Liaghat, PhD., project manager	July 12-14	3	\$650.00	\$1,950.00	
D. Blann, P.Eng. Project Supervision	July -August	3.6	\$650.00	\$2,311.43	
Hendex Exploration. Brent P. and R. Henderson	August 2-6 includes travel and accomodation and supplies	4.0	\$1,314.41	\$5,257.63	
		10.6		\$9,519.06	\$9,519.06
Office Studies					
Database, data entry, map plotting Arc-GIS, Target	S Liaghat, PhD Geology	3.0	\$650.00	\$1,950.00	
Data Analyses and Report preparation	S Liaghat & D Blann			\$2,500.00	
				\$4,450.00	\$4,450.00
Assaying/Geochemical	Number of Samples	No.	Rate	Subtotal	
Soil	SGS Labs ICP-MS, AES + LOI carbon	77	\$85.09	\$6,552.00	
				\$6,552.00	\$6,552.00
Transportation		No.	Rate	Subtotal	
kilometers	HPY Truck Toyota 4X4	475.00	\$0.65	\$308.75	
				\$308.75	\$308.75
Accommodation & Food					
hotel/ food		1.00	\$110.00	\$110.00	
				\$110.00	\$110.00
Communications					
InfoSat- Satellite phone, cell phone communications				\$50.00	
				\$50.00	\$50.00
TOTAL Expenditures					\$20,989.81

10 Statement of Qualifications

Sassan Liaghat, M Sc, PhD Coquitlam, British Columbia, do hereby certify that:

- I am a senior geologist, and project manager of the project.
- I graduated from the Universities of McGill and Ecole Polytechnique of Montreal in Master and Ph.D degrees in 1990 and 1994 respectively.
- That I have been actively engaged in the mineral exploration research and industry since 1990.
- I am the author or co-author of several scientific papers and reports, published in international and local journals.
- Since 2006, I have been involved in mineral exploration for base and precious metals in BC.
- I conducted the work on the Rateria and West Valley property described in this report.

Dated at Vancouver, BC February 2017

"Sassan liaghat" (Signed)

Sassan Liaghat Ph.D

I, **David E. Blann**, P.Eng., of Squamish, British Columbia, do hereby certify:

- That I am a Professional Engineer registered in the Province of British Columbia since 1990.
- That I am a B.Sc. graduate in Geological Engineering from the Montana College of Mineral Science and Technology, Butte, Montana, 1987.
- That I am a graduate with a Diploma in Mining Engineering Technology from the B.C. Institute of Technology, 1984.
- That I have been actively engaged in the mining and mineral exploration industry since 1984.
- That I have worked directly on the Rateria and West Valley properties on an on-going basis since 2004, and conducted work on and supervised the exploration activities described in this report.

Dated in Vancouver, B.C., February 2017

“David Blann” (Signed)

David E Blann, P.Eng (Standard Metals Exploration Ltd.)

Tables

Table 1: Highland Valley (Rateria, West Valley) Mineral Tenures

	Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)
Rateria Claims						
1	511809	NEW RATERIA	203169 (100%)	2005/apr/28	2023/dec/31	144.27
2	513870	RATERIA	203169 (100%)	2005/jun/03	2023/dec/31	1154.21
3	522356	RATERIA NE	203169 (100%)	2005/nov/17	2023/dec/31	494.41
4	528775	MAL	203169 (100%)	2006/feb/23	2023/dec/31	494.42
5	528778	MAL 2	203169 (100%)	2006/feb/23	2023/dec/31	514.86
6	529011	RATERIA NORTH	203169 (100%)	2006/feb/27	2023/dec/31	514.80
7	529013	RATERIA NORTH-2	203169 (100%)	2006/feb/27	2023/dec/31	515.10
8	563796	SHO	203169 (100%)	2007/jul/29	2023/dec/31	989.93
9	571030		203169 (100%)	2007/nov/30	2023/dec/31	20.59
10	571031		203169 (100%)	2007/nov/30	2023/dec/31	82.36
11	572518	SHO 2	203169 (100%)	2007/dec/27	2023/dec/31	20.63
12	572519		203169 (100%)	2007/dec/27	2023/dec/31	20.63
13	572520		203169 (100%)	2007/dec/27	2023/dec/31	20.63
14	573338	COPPER 16	203169 (100%)	2008/jan/09	2023/dec/31	165.04
15	591057	COPPER CONNECTOR	203169 (100%)	2008/sep/08	2023/dec/31	82.55
16	591058	COPPER CONNECTOR 2	203169 (100%)	2008/sep/08	2023/dec/31	41.25
17	954808		203169 (100%)	2012/mar/02	2022/dec/31	144.42
18	954819	Sho South	203169 (100%)	2012/Mar/02	2022/dec/31	165.00
19	1021006	RATERIA NE3	203169 (100%)	2013/Jul/15	2017/dec/31	61.80
20	954840	BROWN 10	203169 (100%)	2012/Mar/02	2017/dec/31	41.27
21	954801	BROWN 3	203169 (100%)	2012/Mar/02	2017/dec/31	433.38
22	954820	BROWN 6	203169 (100%)	2012/Mar/02	2017/dec/31	227.08
23	955173	BROWN FRAC	203169 (100%)	2012/Mar/03	2017/dec/31	20.64
24	954858	MORE BROWN	203169 (100%)	2012/Mar/02	2017/dec/31	20.64
25	954609	SOUTH CRAIGMONT	203169 (100%)	2012/Mar/02	2017/dec/31	20.65
26	954837	BROWN 9	203169 (100%)	2012/Mar/02	2017/dec/31	61.95
27	954815	BROWN 5	203169 (100%)	2012/Mar/02	2017/dec/31	247.80
28	954796	BROWN 2	203169 (100%)	2012/Mar/02	2017/dec/31	289.02
29	954807	BROWN 4	203169 (100%)	2012/Mar/02	2017/dec/31	123.85
30	954842	BROWN 11	203169 (100%)	2012/Mar/02	2017/dec/31	20.64
31	954832	BROWN 7	203169 (100%)	2012/Mar/02	2017/dec/31	41.27
32	954824	BROWN	203169 (100%)	2012/Mar/02	2017/dec/31	515.82
33	955171	BROWN FRACTION	203169 (100%)	2012/Mar/03	2017/dec/31	20.63
34	954855	BROWN 12	203169 (100%)	2012/Mar/02	2017/dec/31	41.27
35	955170	BROWN FRACTION2	203169 (100%)	2012/Mar/03	2017/dec/31	20.63
36	955169	BROWN FRACTION	203169 (100%)	2012/Mar/03	2017/dec/31	20.63
37	1017470	BROWN	203169 (100%)	2013/Mar/03	2017/dec/31	82.54
38	1022304	RAT-WV CONNECTOR	203169 (100%)	2013/Sep/13	2017/dec/31	433.79
39	1022443	IDANO	203169 (100%)	2013/Sep/18	2017/dec/31	185.77
40	1043294	ABBY	203169 (100%)	2016/Apr/06	2021/dec/31	454.12
					Sub Total	8970.27

Table 1: Highland Valley (Rateria, West Valley) Mineral Tenures

	Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)
West Valley Claims						
	Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)
41	532667	COPPER 10	203169 (100%)	2006/apr/19	2017/dec/31	82.487
42	544901	COPPER B	203169 (100%)	2006/nov/05	2019/dec/31	20.5935
43	544902	COPPER C	203169 (100%)	2006/nov/05	2019/dec/31	20.5937
44	544903	COPPER D	203169 (100%)	2006/nov/05	2019/dec/31	20.5939
45	544905	COPPER F	203169 (100%)	2006/nov/05	2019/dec/31	20.6067
46	566312	COPPER 8	203169 (100%)	2007/sep/20	2017/dec/31	535.9551
47	568146	NEW COPPER 1	203169 (100%)	2007/oct/17	2017/dec/31	473.7434
48	568147	NEW COPPER 3	203169 (100%)	2007/oct/17	2017/dec/31	494.3451
49	568148	NEW COPPER 3	203169 (100%)	2007/oct/17	2017/dec/31	721.1797
50	568149	NEW COPPER 4	203169 (100%)	2007/oct/17	2017/dec/31	1030.454
51	570358	NEW COPPER 5	203169 (100%)	2007/nov/20	2017/dec/31	20.6252
52	570359	NEW COPPER 6	203169 (100%)	2007/nov/20	2017/dec/31	20.6253
53	570360	NEW COPPER 7	203169 (100%)	2007/nov/20	2017/dec/31	61.8043
54	582066	HIGHLAND VALLEY	203169 (100%)	2008/apr/20	2017/dec/31	433.2434
55	587379	COPPER 11	203169 (100%)	2008/jul/04	2017/dec/31	20.6245
56	587380	COPPER 12	203169 (100%)	2008/jul/04	2017/dec/31	206.24
57	587382		203169 (100%)	2008/jul/04	2017/dec/31	41.2436
58	587383		203169 (100%)	2008/jul/04	2017/dec/31	20.621
59	587384		203169 (100%)	2008/jul/04	2017/dec/31	61.8725
60	587385		203169 (100%)	2008/jul/04	2017/dec/31	61.8723
61	587386		203169 (100%)	2008/jul/04	2017/dec/31	20.6226
62	587387		203169 (100%)	2008/jul/04	2017/dec/31	41.2419
63	587388		203169 (100%)	2008/jul/04	2017/dec/31	82.5083
64	587389		203169 (100%)	2008/jul/04	2017/dec/31	20.6252
65	587390		203169 (100%)	2008/jul/04	2017/dec/31	20.6271
66	589580	COPPER IB	203169 (100%)	2008/aug/06	2017/dec/31	412.7557
67	589581	COPPER IA	203169 (100%)	2008/aug/06	2017/dec/31	392.042
68	589723	COPPER GA	203169 (100%)	2008/aug/09	2017/dec/31	495.1829
69	589725	COPPER GB	203169 (100%)	2008/aug/09	2017/dec/31	268.1685
70	589726	COPPER GC	203169 (100%)	2008/aug/09	2017/dec/31	41.2508
71	589728	COPPER GD	203169 (100%)	2008/aug/09	2017/dec/31	20.6253
72	589892		203169 (100%)	2008/aug/14	2017/dec/31	20.6381
73	589893		203169 (100%)	2008/aug/14	2017/dec/31	247.6054
74	589896		203169 (100%)	2008/aug/14	2017/dec/31	20.6326
75	589897	COPPER H B	203169 (100%)	2008/aug/14	2017/dec/31	330.2502
76	589898		203169 (100%)	2008/aug/14	2017/dec/31	20.6362
77	589900	COPPER H C	203169 (100%)	2008/aug/14	2017/dec/31	144.4705
78	589901		203169 (100%)	2008/aug/14	2017/dec/31	20.6344
79	589902		203169 (100%)	2008/aug/14	2017/dec/31	20.6401
80	590283	COPPER GC	203169 (100%)	2008/aug/22	2017/dec/31	20.6254
81	590284	COPPER GD	203169 (100%)	2008/aug/22	2017/dec/31	41.251
82	590285	COPPER GE	203169 (100%)	2008/aug/22	2017/dec/31	41.2655

Table 1: Highland Valley (Rateria, West Valley) Mineral Tenures

	Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)
83	590286	COPPER HC	203169 (100%)	2008/aug/22	2017/dec/31	41.2763
84	590287	COPPER HD	203169 (100%)	2008/aug/22	2017/dec/31	20.6419
85	590949	COPPER 7A	203169 (100%)	2008/sep/07	2017/dec/31	453.5745
86	590952	COPPER 7B	203169 (100%)	2008/sep/07	2017/dec/31	515.6008
87	590953	COPPER 7C	203169 (100%)	2008/sep/07	2017/dec/31	20.6137
88	664864	WV-SW	203169 (100%)	2009/nov/04	2017/dec/31	515.5698
89	1020413	WV SOUTH TRIM	203169 (100%)	2013/Jun/19	2017/dec/31	165.26
90	1020414	WV SOUTH TRIM2	203169 (100%)	2013/Jun/19	2017/dec/31	206.65
91	929369	NW TRENCHES	203169 (100%)	2011/nov/16	2018/dec/31	41.2901
92	930037	COPPER TOP	203169 (100%)	2011/nov/21	2018/dec/31	227.0854
93	930050	COPPER TOP 1	203169 (100%)	2011/nov/21	2018/dec/31	433.6851
94	945669	ABBOTT	203169 (100%)	2012/feb/02	2017/dec/31	516.3493
95	945670	ABBOTT 1	203169 (100%)	2012/feb/02	2018/dec/31	495.5674
96	945672	ABBOTT 2	203169 (100%)	2012/feb/02	2017/dec/31	392.2786
97	950869	VIKING	203169 (100%)	2012/feb/20	2018/dec/31	247.7437
98	950872	FIN	203169 (100%)	2012/feb/20	2018/dec/31	557.3399
					Sub Total	11964.15
					Total	20934.42

Table 2, Rh Soil Sample Location and Assay, 2016

Sample #	Sample_ID	Northing	Easting	Cu-ppm
1	84600 46900	5584592	646879	57.1
2	84600 47000	5584601	647000	102
3	84600 47050	5584600	647039	91.3
4	84600 47150	5584579	647144	20.1
5	84600 47250	5584600	647246	180
6	84600 47300	5584586	647288	133
7	84600 47350	5584589	647351	63.1
8	84600 47400	5584592	647392	98.5
9	84600 47450	5584603	647442	73.9
10	84600 47500	5584630	647497	379
11	84600 47600	5584622	647587	82.8
12	84600 47650	5584607	647634	78
13	84600 47700	5584606	647694	26.8
14	78500 46350	5578513	646382	48.6
15	78500 46450	5578509	646442	40.3
16	78500 46550	5578504	646545	36
17	78500 46700	5578492	646710	46.5
18	78500 46750	5578503	646750	40.3
19	78500 46850	5578499	646854	34.7
20	78500 46950	5578500	646951	49.6
21	77500 46550	5577479	646538	35.3
22	77500 46650	5577512	646634	38.1
23	77500 46750	5577527	646738	43.9
24	77500 46850	5577508	646854	33.3
25	77500 46950	5577511	646945	37.1
26	77500 47050	5577484	647047	43.9
27	77500 47150	5577476	647149	44.7
28	77500 47250	5577501	647251	39.5
29	81900 45450	5581900	645457	78.2
30	81900 45500	5581901	645511	53.3
31	81900 45550	5581875	645544	48.5
32	81900 45600	5581885	645609	222
33	81900 45650	5581895	645653	113
34	81900 45700	5581921	645690	73
35	81900 45750	5581892	645755	47.6
36	81900 45800	5581903	645803	73.6
37	81900 45850	5581896	645855	67.9
38	81900 45900	5581896	645900	119
39	81900 45950	5581896	645954	64.9
40	81900 46000	5581901	646001	607
41	81900 46050	5581890	646065	37.4
42	81900 46100	5581909	646099	60.4
43	81900 46150	5581899	646150	77.4
44	81900 46200	5581904	646208	39.2
45	82200 45400	5582193	645390	48.7

Table 2, Rh Soil Sample Location and Assay, 2016

Sample #	Sample_ID	Northing	Easting	Cu-ppm
46	82200 45450	5582180	645460	110
47	82200 45550	5582222	645560	31.1
48	82200 45600	5582203	645611	176
49	82200 45650	5582201	645651	120
50	82200 45700	5582199	645695	147
51	82200 45750	5582192	645741	50.4
52	82200 45800	5582200	645795	61.6
53	82200 45850	5582199	645848	30.8
54	82200 45900	5582207	645893	75.6
55	82200 45950	5582189	645916	46.9
56	82200 46000	5582195	646012	25.3
57	82200 46050	5582165	646031	40.9
58	82200 46100	5582185	646092	58.7
59	82200 46150	5582182	646142	75.4
60	82200 46200	5582204	646201	57.2
61	84000 47100	5583988	647099	76.3
62	84000 47150	5584009	647143	233
63	84000 47200	5584003	647205	49.3
64	84000 47250	5584004	647246	55.6
65	84000 47300	5584018	647302	63.9
66	84000 47350	5584000	647349	58.5
67	84000 47400	5583960	647399	57.2
68	84000 47450	5583976	647443	55.3
69	84000 47500	5583997	647496	68.1
70	84000 47550	5583996	647555	56.6
71	84000 47600	5584033	647589	103
72	84000 47650	5583997	647649	81.8
73	84000 47700	5583998	647701	58.5
74	84000 47750	5583989	647755	79.5
75	84000 47800	5583996	647811	45.3
76	84000 47850	5583998	647840	94.3
77	84300 47000	5584300	646983	104
78	84300 47050	5584306	647049	78.6
79	84300 47100	5584303	647112	95.6
80	84300 47150	5584300	647148	107
81	84300 47200	5584296	647206	87.2
82	84300 47300	5584291	647295	61.1
83	84300 47350	5584281	647337	63.6
84	84300 47400	5584325	647414	159
85	84300 47450	5584298	647450	59.1
86	84300 47500	5584289	647498	67.2
87	84300 47550	5584301	647558	90.8
88	84300 47600	5584314	647589	58
89	84300 47650	5584302	647648	158
90	84300 47700	5584298	647699	63.5

Table 2, Rh Soil Sample Location and Assay, 2016

Sample #	Sample_ID	Northing	Easting	Cu-ppm
91	84300 47750	5584300	647741	247
92	84300 47800	5584325	647798	736
93	82500 45350	5582502	645367	289
94	82500 45400	5582516	645400	46.9
95	82500 45450	5582501	645444	92
96	82500 45500	5582498	645481	15.4
97	82500 45550	5582500	645556	50.2
98	82500 45600	5582504	645601	60.9
99	82500 45800	5582469	645791	48.2
100	82500 45850	5582499	645848	132
101	82500 45950	5582504	645951	172
102	82500 46000	5582504	646001	181
103	82500 46050	5582500	646049	142
104	82500 46100	5582500	646100	59.5
105	82500 46150	5582500	646150	54.3

Table 3 Rock Sampling ; Rateria (West Sho) and West Valley (North Fir) Properties, 2016

Sample ID	Area	Sample type	Location	Easing	Northing	Description
Sho-W-16-1	Sho West	Rock, boulder	Creek-side west of Pamainus rd, km19	647172	5574405	Float boulder from west side of creek. Med-fine grained GD, probably Chataway variety, whitish, bio and mafic minerals are almost fresh, mild ser, chl alteration in groundmass , epi in fine fractures. No sulfide minerals observed.
Sho-W-16-2	Sho West	Rock, outcrop-subcrop	Power line pole	647195	5574410	Chip sample from outcrop/subcrop close to power line pole site. Med grained GD, probably Highland Valley phase. Strongly broken and silicified. Groundmass potassic and sericite-clay altered, more stronger in selvage of qtz-carb -epi veins. Mal in fractures and patchy in groundmass.
Sho-W-16-3	Sho West	Rock, boulder	Creek side	647175	5574409	Boulder, light green granodiorite, Equigranular groundmass, fresh 20% fine-medium grained anhedral quartz , 15% whitish subhedral-euhedral feldspar. Trace chl-epi in fractures, No sulfide minerals observed, as reported in historical report.
Sho-W-16-4	Sho West	Rock, boulder	Overburden	646510	5574512	Float boulder, Med- coarse grained GD-QM, probably Bethlehem -Highland Valley phase, whitish, fresh, trace chl-epi in fractures. Mal stains in fractures
Sho-W-16-5	Sho West	Rock, boulder	Overburden	646399	5575574	Float boulder in OVB, fine grained GD, probably Bethlehem - Highland Valley phase. Moderate ser-chl- carb alteration. iron oxide staining, small piece of mal.
Sho-W-16-6	Sho West	Rock, boulder	Overburden	646000	5575500	Grab rock from Chataway variety, fresh, several fractures with chl, epi and hem. Carb veins are common. Mal in fractures and stained.
Sho-W-16-7	Sho West	Rock, boulder	Creek side	647141	5575627	Float boulder, Med- coarse grained GD, probably Chataway variety, with moderate epi-ser-chl alteration of mafic minerals.
Fir-N-16-1	Fir North	Rock, subcrop boulder	Clear cut area	647800	5575630	Subcrop-boulder. Med-fine grained GD-Dio, irregular grain size texture with dark green diorite, mafic rich minerals, chl and epi in fine fractures. In contact with massive epi carb, and quartz veins are common.
Fir-N-16-2	Fir North	Rock, boulder	Clear cut area	648543	5576619	Float-boulder, fine grained diorite, slat and papper texture. More than 50% of rock minerals are mafics (biotite, hornblende, and pyroxene). Locally shows thin banding with chl-epi. Grounmass weakly altered to chlorite and in minor amount to epidote. No copper minerals are determined.
Fir-N-16-3	Fir North	Rock, boulder	Clear cut area	650112	5575582	Boulder, fine grained, dark brown- green. Moderate chlorite argillic altered, Iron oxide in fractures and locally stained grounmass.
Fir-N-16-4	Fir North	Rock, boulder	Clear cut area	650462	5576790	Float boulder, med- coarse grained GD, probably Chataway variety, fine grained, yellowish, rusty and argillic altered.
Fir-N-16-5	Fir North	Rock, subcrop boulder	Clear cut area	647316	5575592	Grab sample from suboutcrop close to creek. probably Chataway variety, whitish, bio and mafic minerals are chloritized, mild ser, chl alteration in groundmass , epi in fine fractures..

Table 3 Rock Sampling ; Rateria (West Sho) and West Valley (North Fir) Properties, 2016

Sample ID	Area	Sample type	Location	Easing	Northing	Description
Fir-N-16-6	Fir North	Rock, outcrop boulder	bourder of Clear cut area	642294	5573205	Grab sample from outcrop , bourder of clearcut area. Coarse grained GD, irregular grain size texture with dark green mafic minerals, chl and epi vein in irregular shape.
Fir-N-16-7	Fir North	Rock, subcrop subcrop	bourder of Clear cut area	642267	5573163	Same as sample in above, outcrop is more rusty and weathered

Figures





Fig. 2 Regional Location, Highland Valley Property

630000 633000 636000 639000 642000 645000 648000 651000 654000 657000 660000



HAPPY CREEK MINERALS LTD.
 DIVERSIFIED METALS EXPLORATION

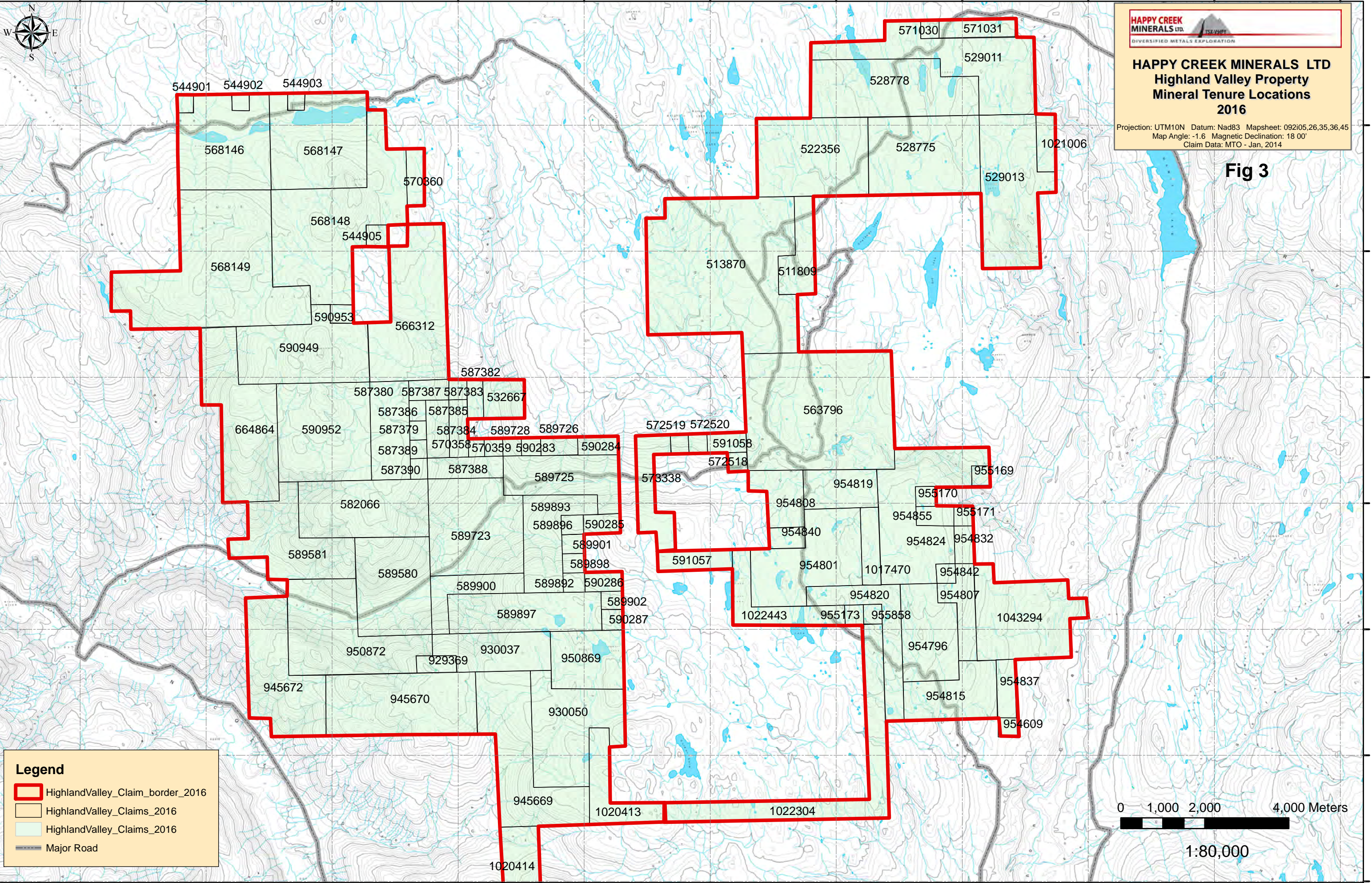
HAPPY CREEK MINERALS LTD
Highland Valley Property
Mineral Tenure Locations
2016

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 Map Angle: -1.6 Magnetic Declination: 18 00'
 Claim Data: MTO - Jan, 2014

Fig 3

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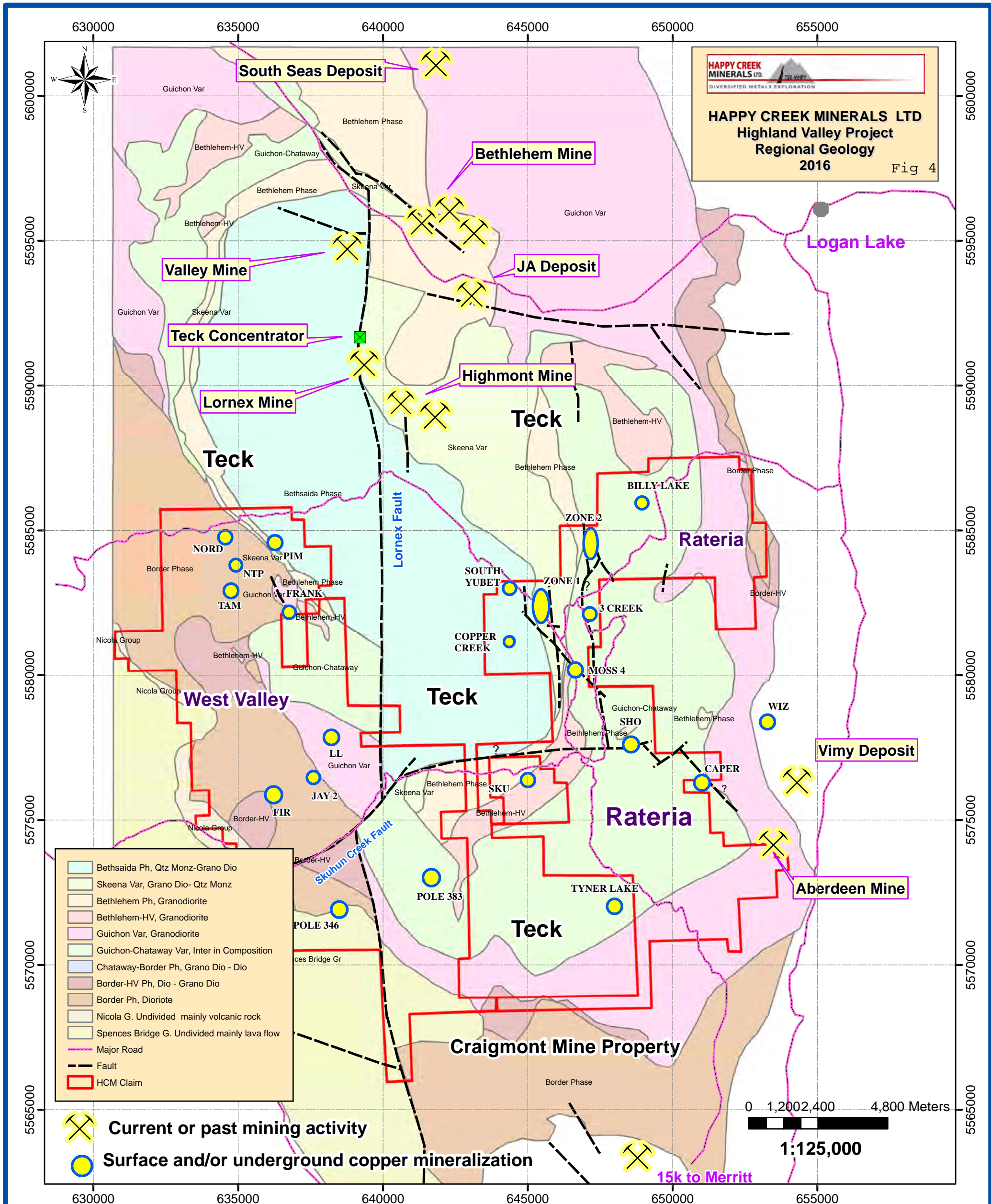
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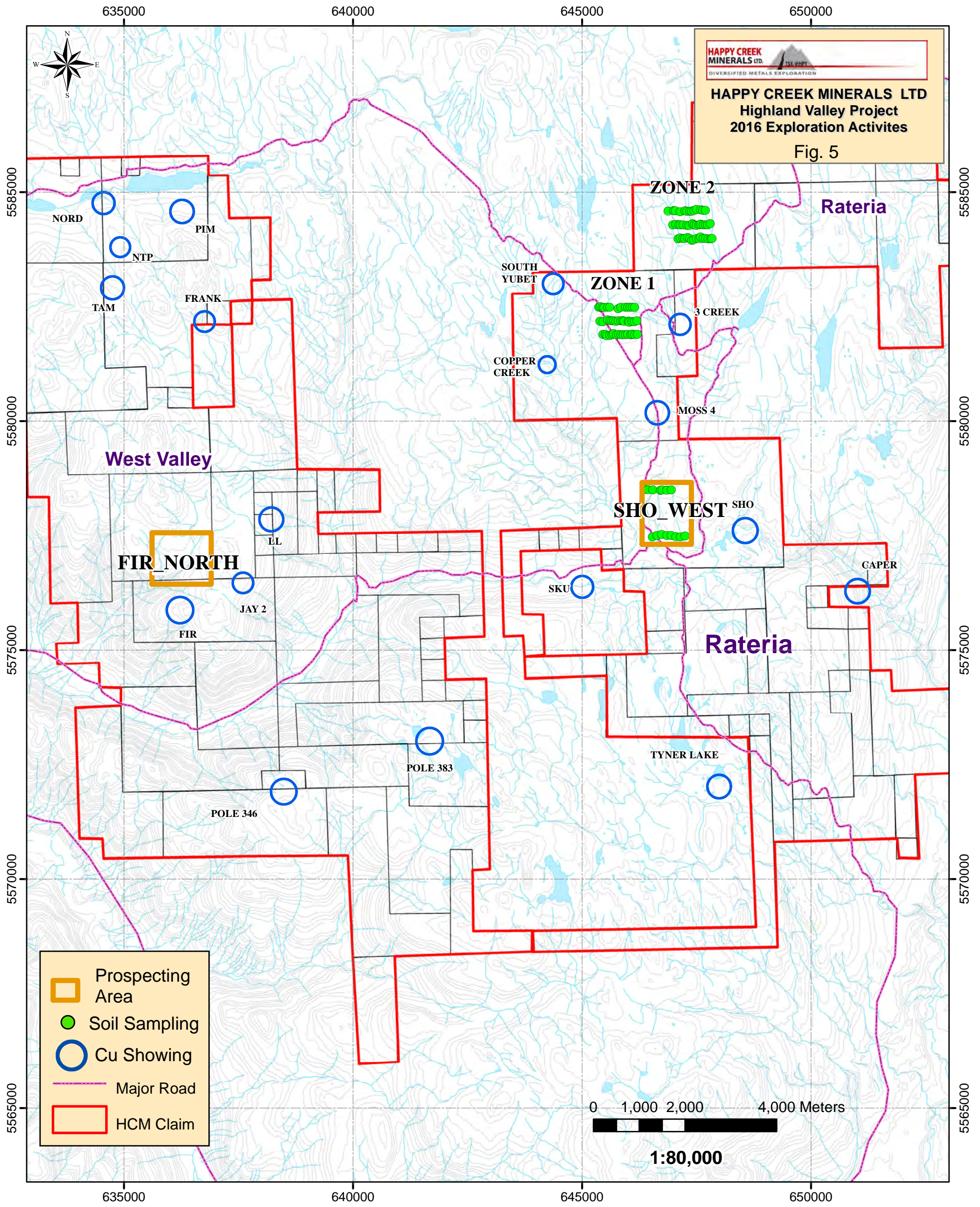
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- HighlandValley_Claims_2016
- HighlandValley_Claims_2016
- Major Road

0 1,000 2,000 4,000 Meters

1:80,000

630000 633000 636000 639000 642000 645000 648000 651000 654000 657000 660000





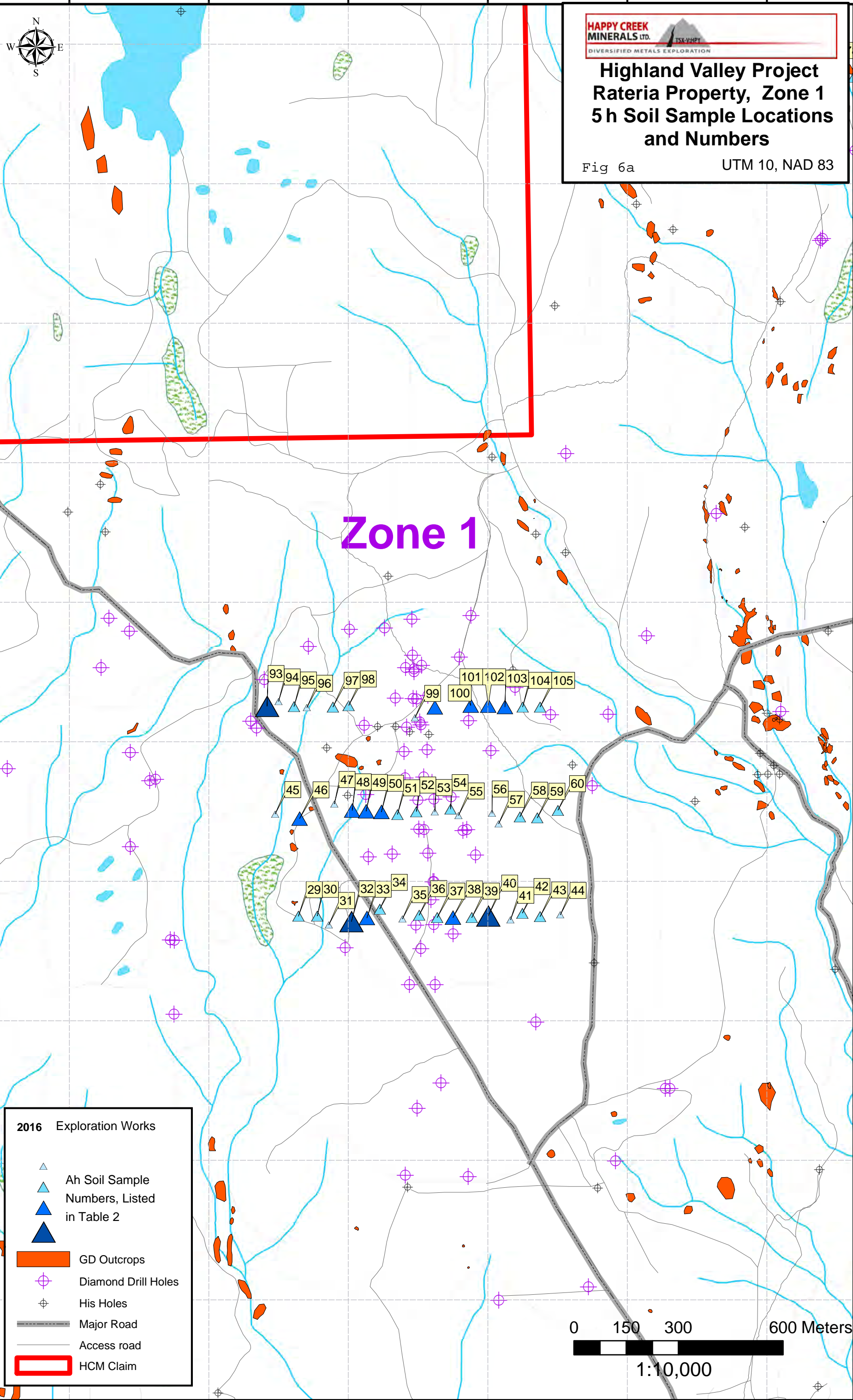
HAPPY CREEK MINERALS LTD.
 Diversified Metals Exploration
HAPPY CREEK MINERALS LTD
Highland Valley Project
2016 Exploration Activities
Fig. 5

- Prospecting Area
- Soil Sampling
- Cu Showing
- Major Road
- HCM Claim

0 1,000 2,000 4,000 Meters
1:80,000

644800 645200 645600 646000 646400 646800

5584400
5584000
5583600
5583200
5582800
5582400
5582000
5581600
5581200
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644800 645200 645600 646000 646400 646800

646400 646800 647200 647600 648000 648400 648800

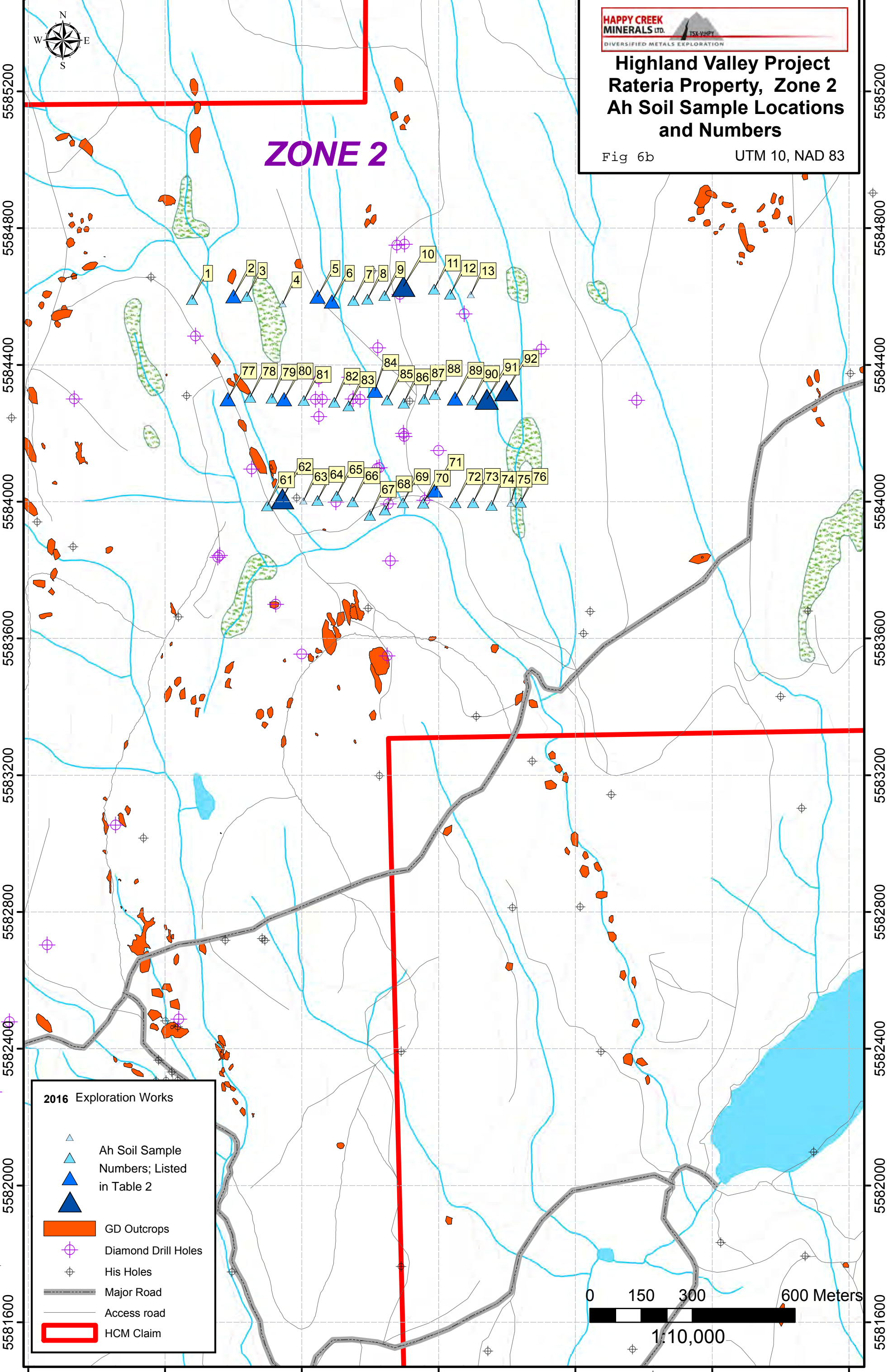
HAPPY CREEK
MINERALS LTD.
DIVERSIFIED METALS EXPLORATION

Highland Valley Project Rateria Property, Zone 2 Ah Soil Sample Locations and Numbers

Fig 6b

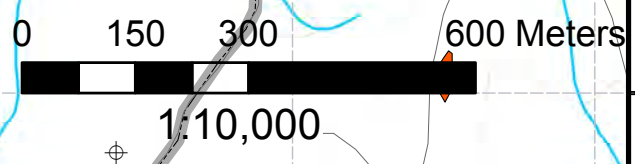
UTM 10, NAD 83

ZONE 2



2016 Exploration Works

- Ah Soil Sample Numbers; Listed in Table 2
- Ah Soil Sample Numbers; Listed in Table 2
- Ah Soil Sample Numbers; Listed in Table 2
- GD Outcrops
- Diamond Drill Holes
- His Holes
- Major Road
- Access road
- HCM Claim



646400 646800 647200 647600 648000 648400 648800

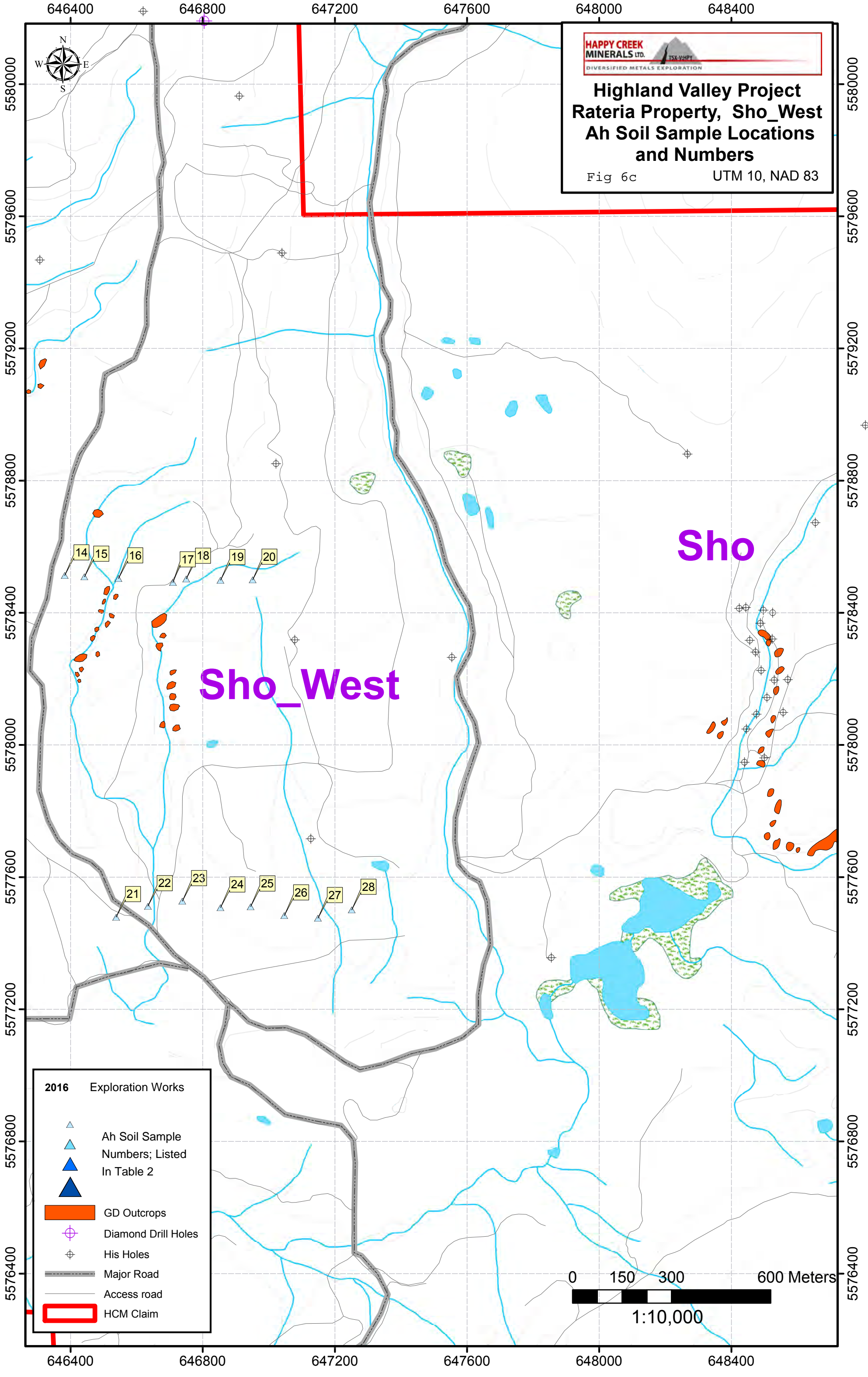
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5582400
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5585200
5584800
5584400
5584000
5583600
5583200
5582800
5582400
5582000
5581600



Highland Valley Project Rateria Property, Sho_West Ah Soil Sample Locations and Numbers

Fig 6c UTM 10, NAD 83



2016 Exploration Works

- Ah Soil Sample Numbers; Listed In Table 2
- GD Outcrops
- Diamond Drill Holes
- His Holes
- Major Road
- Access road
- HCM Claim

0 150 300 600 Meters
1:10,000

EVIL E CROSBY INDUSTRIES
 THE NATIONAL ASSOCIATION OF FORESTRY EQUIPMENT SUPPLIERS
 11111 Highway 100, Box 100, Vancouver, B.C. V6A 1Z7
 Tel: (604) 882-8103 x 4440 Fax: (604) 882-8103
 Website: www.nafes.com

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 SL-6-2
 114956 1017R

No. 46 Binder

Indian Forestry Equipment
 The National Association of Forestry Equipment Suppliers
 11111 Highway 100, Box 100, Vancouver, B.C. V6A 1Z7
 Tel: (604) 882-8103 x 4440 Fax: (604) 882-8103
 Website: www.nafes.com

INCH
 CM

84000
 47700



2/18/2016 1:16





2/8/2016 1:31

Fig. 7

645200

645600

646000

646400

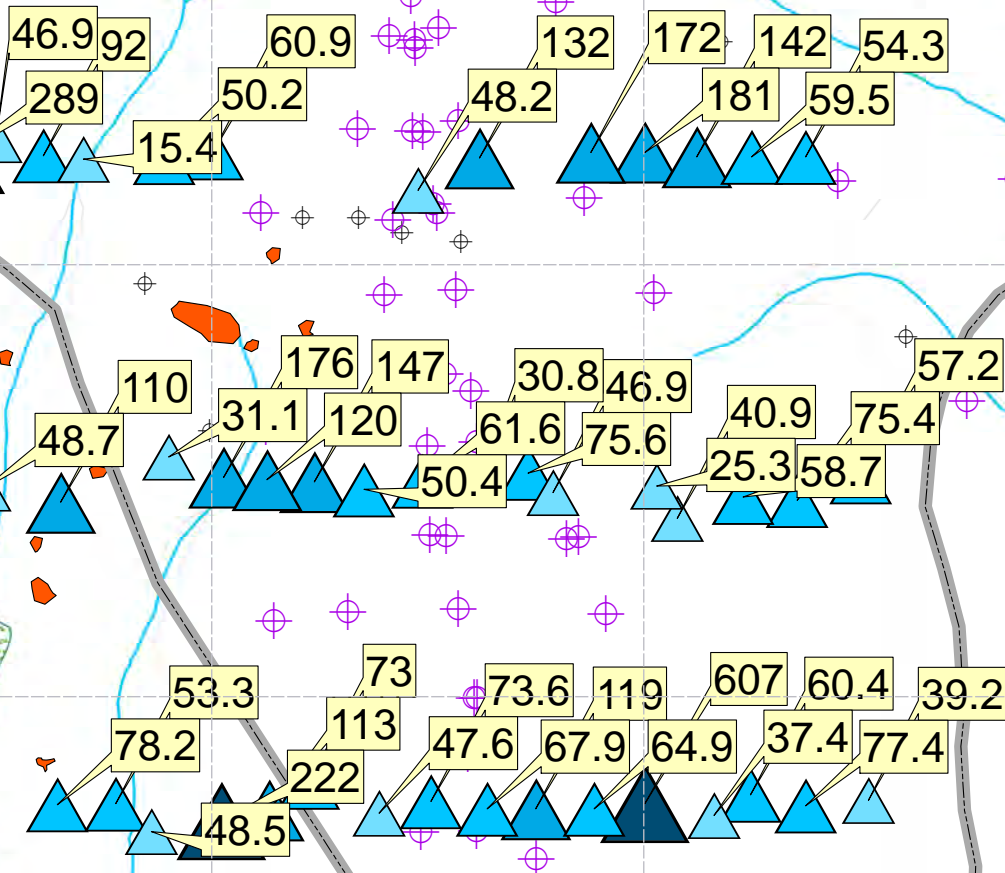


Highland Valley Project Rateria Property, Zone 1 Ah Soil Sample Cu Assay

Fig 8a

UTM 10, NAD 83

Zone 1



**Soil Ah 2016
Cu ppm**

- 15.40 - 50.00
- 50.01 - 100.00
- 100.01 - 200.00
- 200.01 - 736.00
- GD Outcrops
- Diamond Drill Holes
- His Holes
- Major Road
- HCM Claim

0 105 210 420 Meters

1:7,000

645200

645600

646000

646400

5583200
5582800
5582400
5582000
5581600
5581200
5580800

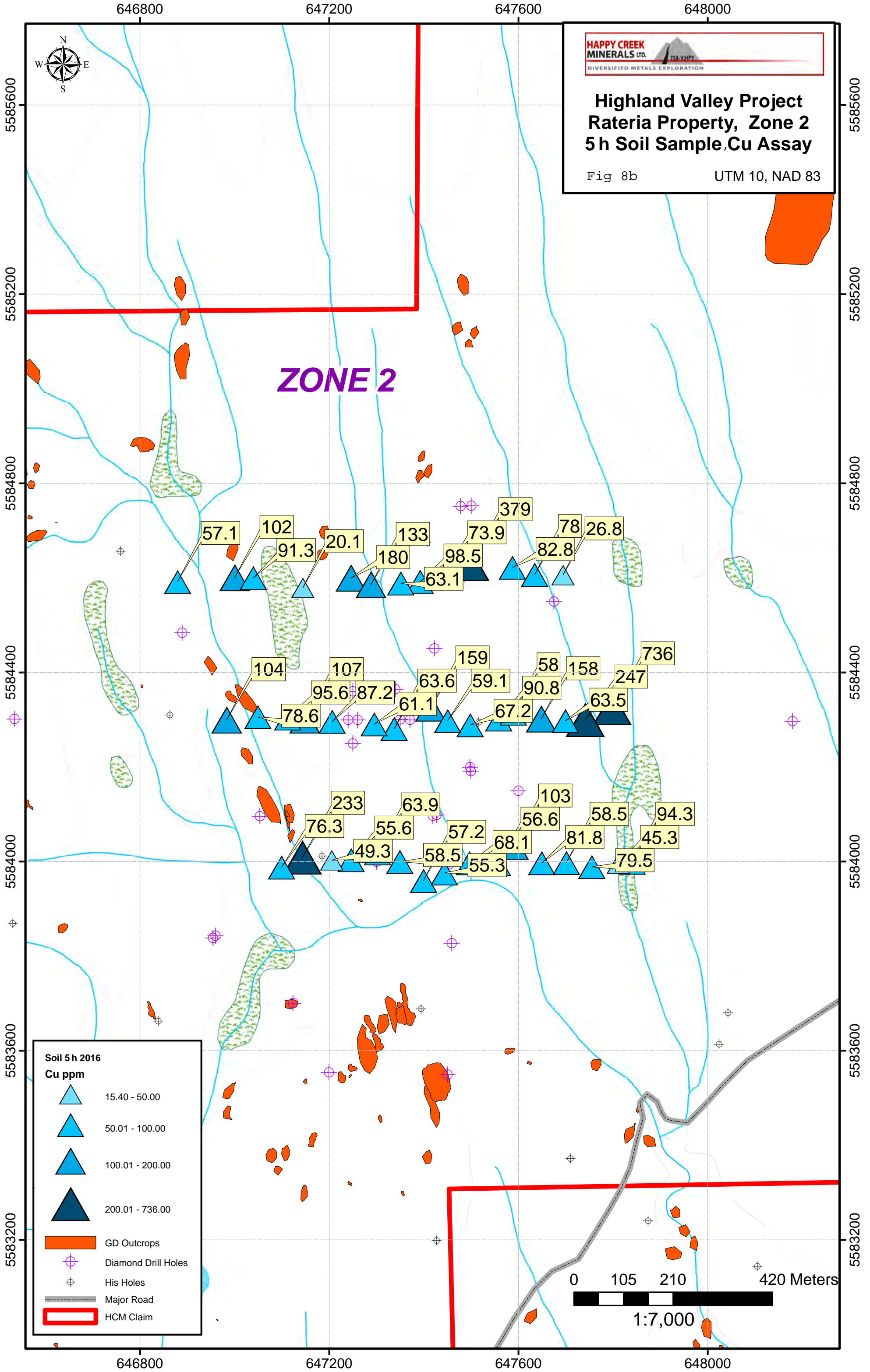
5583200
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5582000
5581600
5581200
5580800

**Highland Valley Project
Rateria Property, Zone 2
5 h Soil Sample Cu Assay**










Fig 8b

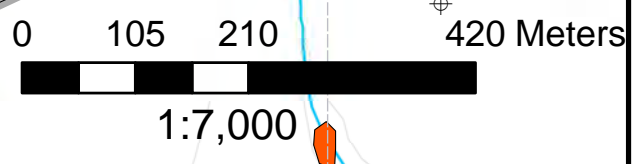
UTM 10, NAD 83

ZONE 2



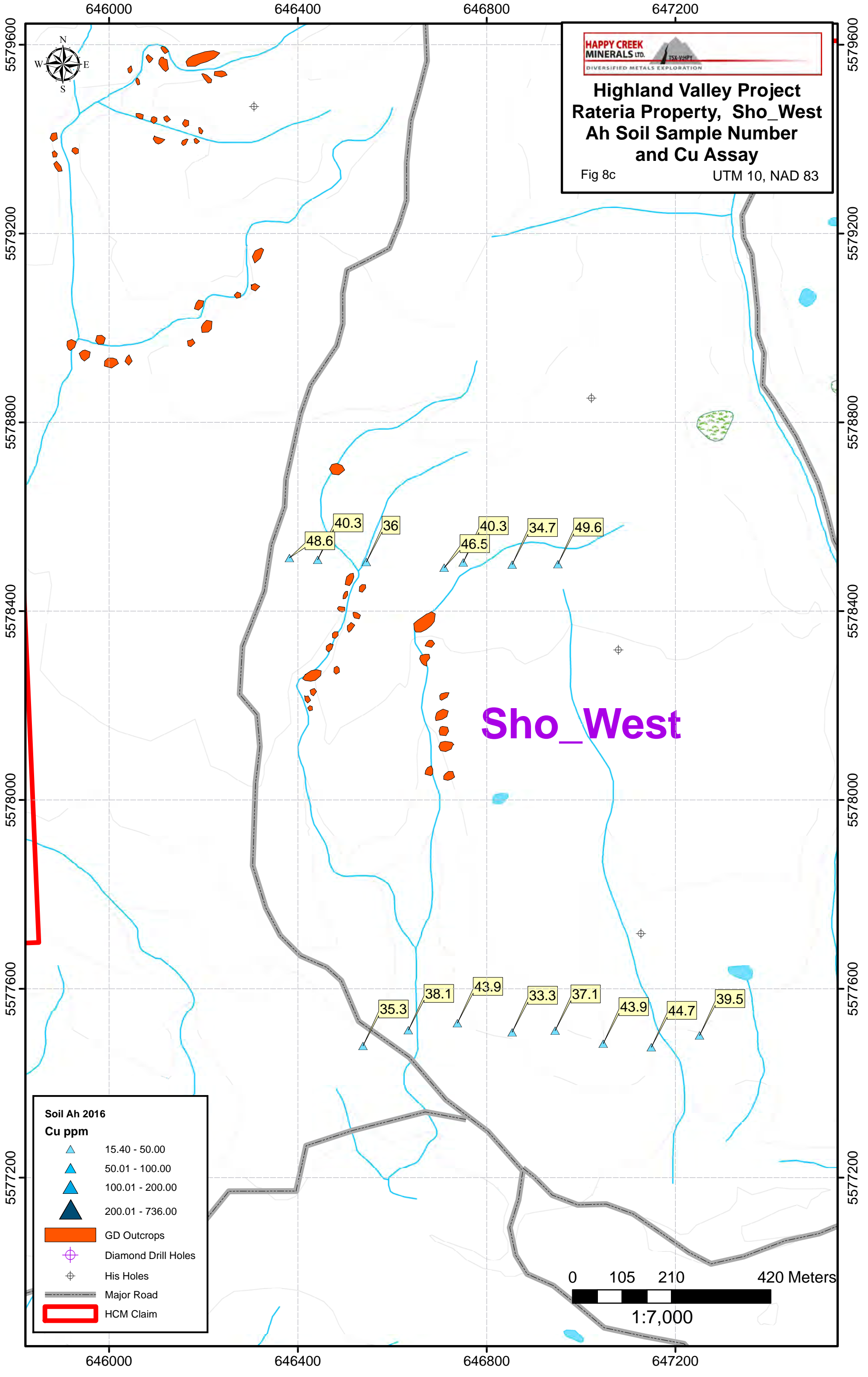
**Soil 5 h 2016
Cu ppm**

-  15.40 - 50.00
-  50.01 - 100.00
-  100.01 - 200.00
-  200.01 - 736.00
-  GD Outcrops
-  Diamond Drill Holes
-  His Holes
-  Major Road
-  HCM Claim



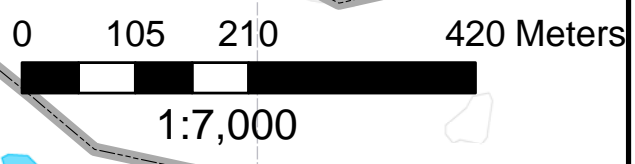
**Highland Valley Project
 Rateria Property, Sho_West
 Ah Soil Sample Number
 and Cu Assay**

Fig 8c UTM 10, NAD 83



**Soil Ah 2016
 Cu ppm**

- ▲ 15.40 - 50.00
- ▲ 50.01 - 100.00
- ▲ 100.01 - 200.00
- ▲ 200.01 - 736.00
- GD Outcrops
- ⊕ Diamond Drill Holes
- ⊕ His Holes
- Major Road
- ▭ HCM Claim



Sho_West

48.6 40.3 36 40.3 46.5 34.7 49.6

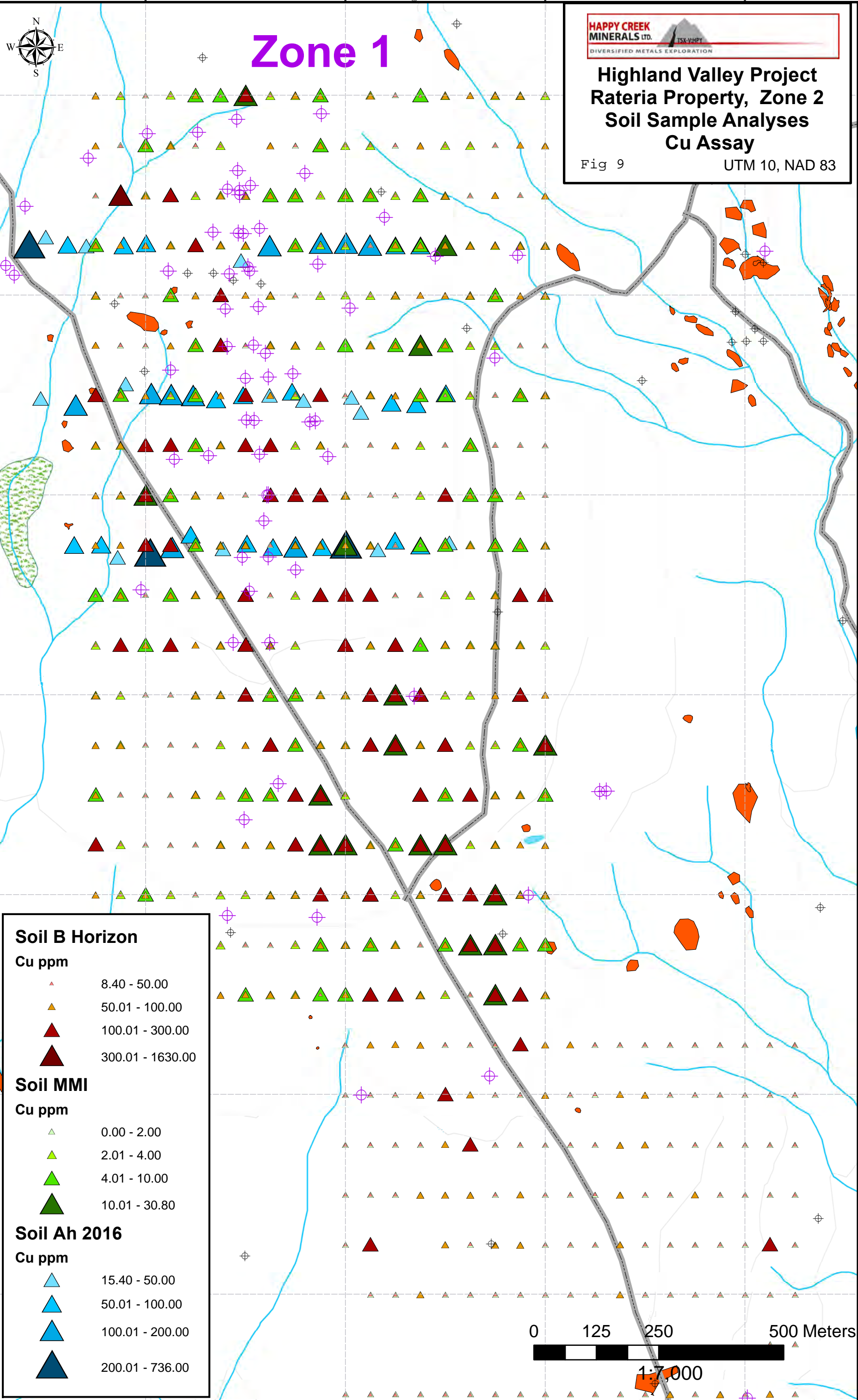
35.3 38.1 43.9 33.3 37.1 43.9 44.7 39.5

645600

646000

646400

646800



Zone 1

HAPPY CREEK
MINERALS LTD.



Highland Valley Project
Rateria Property, Zone 2
Soil Sample Analyses
Cu Assay

Fig 9

UTM 10, NAD 83

Soil B Horizon

Cu ppm

- ▲ 8.40 - 50.00
- ▲ 50.01 - 100.00
- ▲ 100.01 - 300.00
- ▲ 300.01 - 1630.00

Soil MMI

Cu ppm

- ▲ 0.00 - 2.00
- ▲ 2.01 - 4.00
- ▲ 4.01 - 10.00
- ▲ 10.01 - 30.80

Soil Ah 2016

Cu ppm

- ▲ 15.40 - 50.00
- ▲ 50.01 - 100.00
- ▲ 100.01 - 200.00
- ▲ 200.01 - 736.00

0 125 250 500 Meters

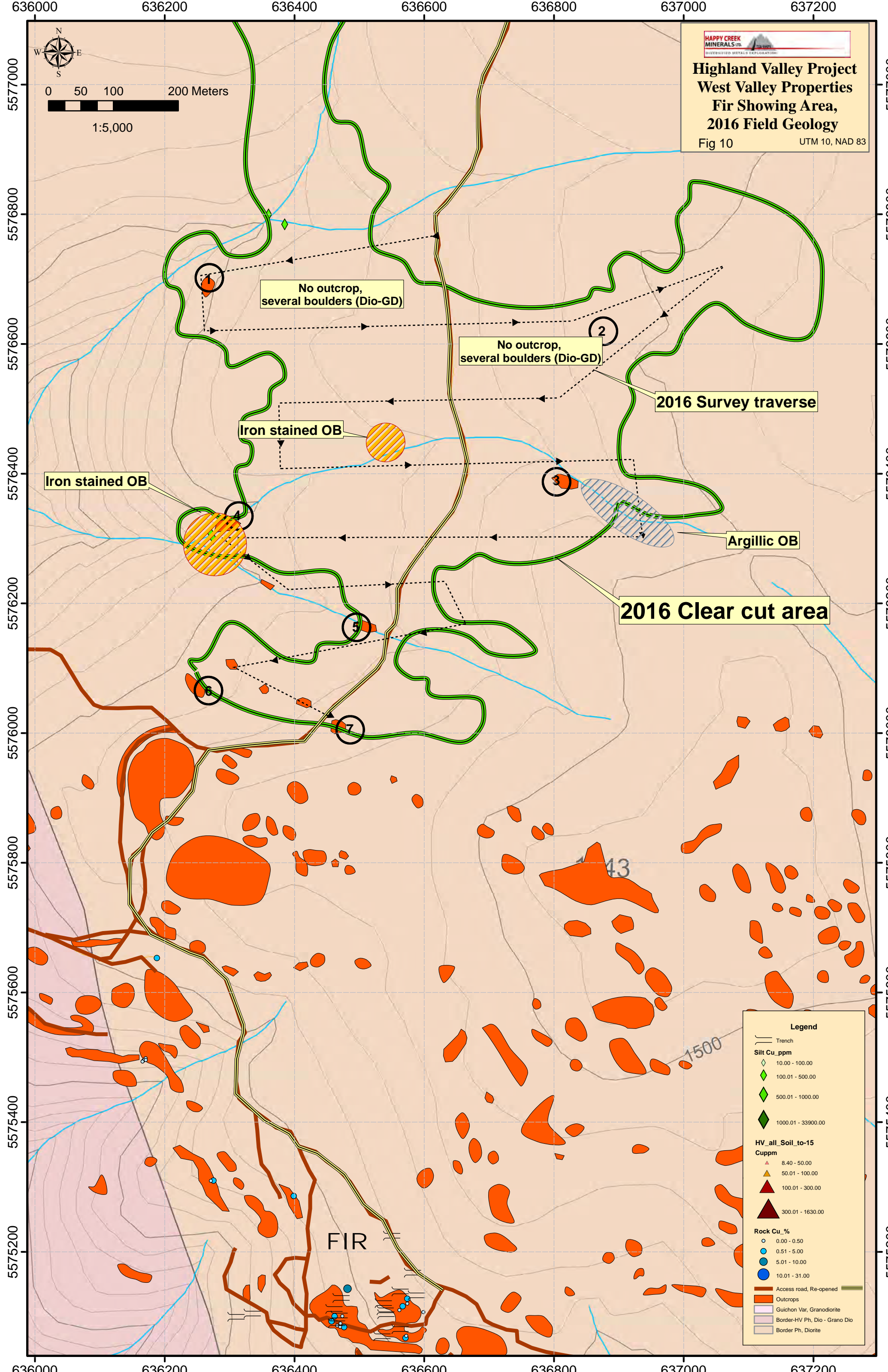
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645600

646000

646400

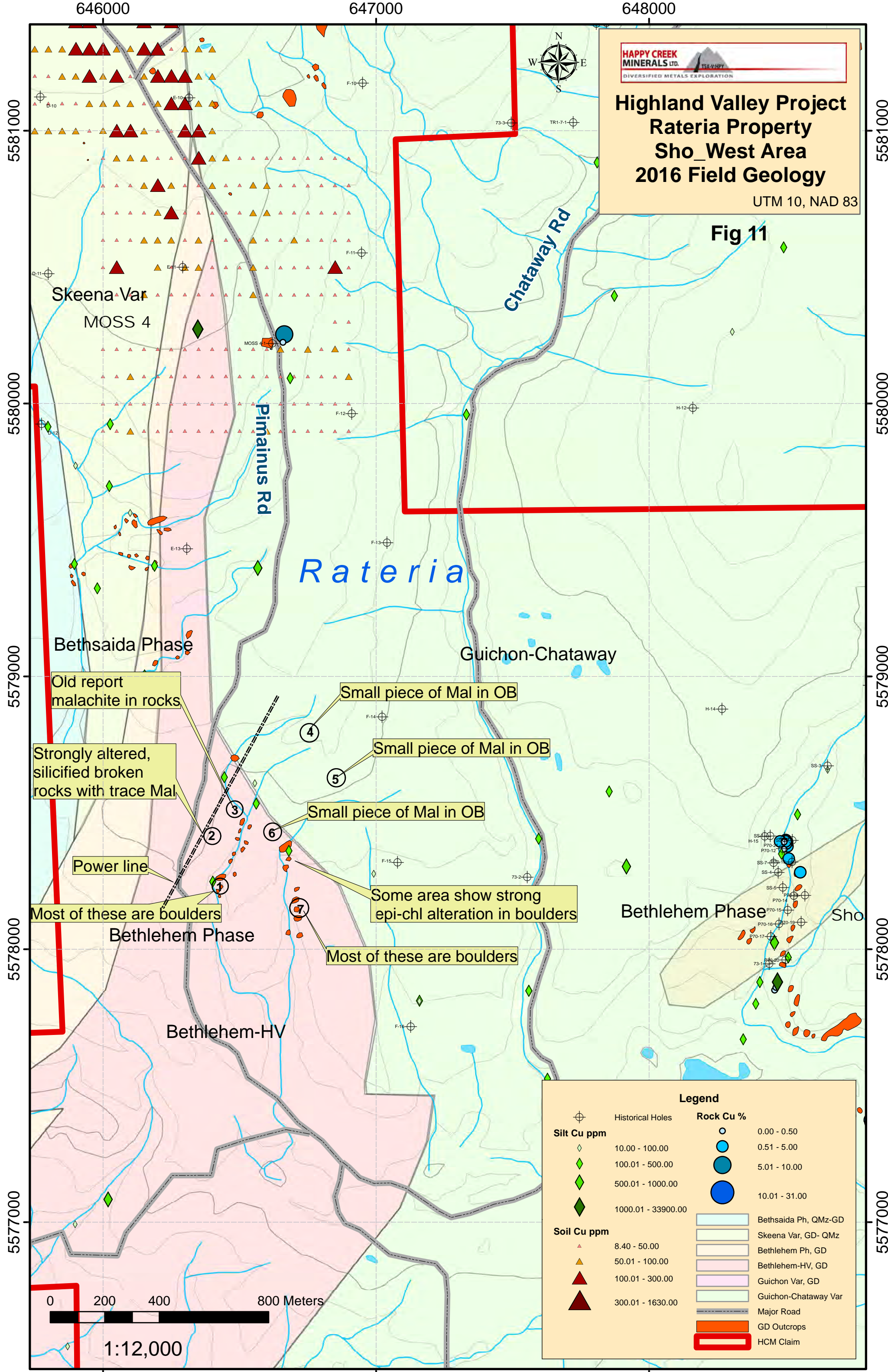
646800



**Highland Valley Project
 Rateria Property
 Sho_West Area
 2016 Field Geology**

UTM 10, NAD 83

Fig 11



Old report malachite in rocks

Strongly altered, silicified broken rocks with trace Mal

Power line

Most of these are boulders

Small piece of Mal in OB

Small piece of Mal in OB

Small piece of Mal in OB

Some area show strong epi-chl alteration in boulders

Most of these are boulders

Legend

⊕	Historical Holes	○	Rock Cu %
◇	Silt Cu ppm	○	0.00 - 0.50
◇	10.00 - 100.00	○	0.51 - 5.00
◇	100.01 - 500.00	○	5.01 - 10.00
◇	500.01 - 1000.00	○	10.01 - 31.00
◇	1000.01 - 33900.00	□	Bethsaida Ph, QMz-GD
▲	Soil Cu ppm	□	Skeena Var, GD- QMz
▲	8.40 - 50.00	□	Bethlehem Ph, GD
▲	50.01 - 100.00	□	Bethlehem-HV, GD
▲	100.01 - 300.00	□	Guichon Var, GD
▲	300.01 - 1630.00	□	Guichon-Chataway Var
		—	Major Road
		■	GD Outcrops
		□	HCM Claim

0 200 400 800 Meters

1:12,000

Appendix 1

Certificates of Analyses



Certificate of Analysis
Work Order : VC162442
[Report File No.: 0000020735]

Date: February 02, 2017

To: DAVID BLANN
HAPPY CREEK MINERALS LTD
 789 PENDER STREET W SUITE 460
 VANCOUVER BC V6C 1H2


P.O. No.: Rateria 77 samples
Project No.: -
Samples: 77
Received: Aug 8, 2016
Pages: Page 1 to 15
 (Inclusive of Cover Sheet)

Methods Summary

<u>No. Of Samples</u>	<u>Method Code</u>	<u>Description</u>
77	G_LOG02	Pre-preparation processing, sorting, logging, boxing
77	G_WGH79	Weighing of samples and reporting of weights
77	G_DRY16	Dry and macerate vegetation
77	GE_ARM133_VA	Aqua Regia Digest 25g-300ml, ICPMS (Vancouver)
77	GE_IC14A	Aqua Regia digestion/ICP-AES finish
77	GE_IC14M	Aqua Regia digestion/ICP-MS finish
77	G_PHY01K	Gravimetric determination at 1000C

Comments:

Boron values are informational only.
 This Report cancels and supersedes the Report No. 018647 dated Aug 22, 2016 issued by SGS Canada (Production Way).
 The locked version is the official copy that SGS retains on file for authentication.

Certified By : 
 John Chiang
 QC Chemist

SGS Minerals Services Geochemistry Vancouver conforms to the requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation which can be found at <http://www.scc.ca/en/search/palcan/sgs>

Report Footer: L.N.R. = Listed not received I.S. = Insufficient Sample
 n.a. = Not applicable -- = No result
 *INF = Composition of this sample makes detection impossible by this method
 M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion
 Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
 Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

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Element Method Det.Lim. Units	WtKg G_WGH79 kg	Au GE_ARM133 ppb	@Ag_ GE_ICM14B ppm	@Al GE_ICM14B %	@B GE_ICM14B ppm	@Ba GE_ICM14B ppm	@Ca GE_ICM14B %	@Cr GE_ICM14B ppm
81900-45450	0.145	<1	0.14	0.69	<10	401	1.28	6
81900-45500	0.125	<1	0.15	0.22	<10	255	1.90	2
81900-45550	0.110	<1	0.11	0.31	<10	166	0.75	4
81900-45600	0.115	3	0.30	1.25	<10	385	0.88	7
81900-45650	0.090	3	0.27	0.66	<10	447	1.14	5
81900-45700	0.190	2	0.16	0.50	<10	146	0.53	5
81900-45750	0.145	<1	0.17	0.56	<10	101	0.47	5
81900-45800	0.105	2	0.24	0.74	<10	429	0.91	5
81900-45850	0.110	3	0.14	0.56	<10	401	1.03	5
81900-45900	0.150	<1	0.46	1.77	<10	360	0.64	11
81900-45950	0.125	<1	0.28	0.41	<10	118	0.55	4
81900-46000	0.205	<1	0.59	3.30	<10	694	1.50	20
81900-46050	0.175	4	0.17	0.62	<10	78	0.29	6
81900-46100	0.110	<1	0.16	0.39	<10	254	1.17	4
81900-46150	0.160	<1	0.13	0.65	<10	255	1.93	5
81900-46200	0.110	<1	0.10	0.32	<10	143	0.56	4
82200-45400	0.135	<1	0.09	0.20	<10	232	0.77	2
82200-45450	0.290	<1	0.13	0.49	<10	260	0.83	10
82200-45550	0.135	1	0.14	0.38	<10	395	1.05	4
82200-45600	0.245	1	0.38	0.34	<10	416	2.47	3
82200-45650	0.135	<1	0.67	2.40	<10	917	1.40	9
82200-45700	0.230	<1	0.74	1.59	<10	753	1.70	10
82200-45750	0.100	<1	0.49	0.45	<10	257	0.64	5
82200-45800	0.065	1	0.10	0.55	<10	304	0.93	6
82200-45850	0.105	1	0.22	0.65	<10	255	0.40	7
82200-45900	0.115	1	0.14	1.40	<10	255	0.61	9
82200-45950	0.135	2	0.11	0.41	<10	58	0.31	4
82200-46000	0.105	1	0.10	0.31	<10	219	0.74	5
82200-46050	0.070	2	0.05	0.63	<10	172	0.57	8
82200-46100	0.085	<1	0.15	0.41	<10	268	0.93	4
82200-46150	0.170	<1	0.23	0.37	<10	165	1.52	3
82200-46200	0.210	<1	0.14	0.79	<10	168	0.75	7
84000-47100	0.105	<1	0.10	0.54	<10	134	0.39	5
84000-47150	0.165	<1	0.16	1.45	<10	604	1.62	12
84000-47200	0.090	<1	0.10	0.32	<10	83	0.58	3
84000-47250	0.110	<1	0.06	0.60	<10	181	0.80	7
84000-47300	0.100	<1	0.16	0.50	<10	87	0.53	7
84000-47350	0.100	4	0.09	0.40	<10	193	0.91	6
84000-47400	0.075	2	0.13	0.42	<10	167	0.80	5
84000-47450	0.085	1	0.17	0.29	<10	148	0.73	4

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84000-47500	0.115	1	0.16	0.26	<10	140	1.27	3
84000-47550	0.075	1	0.06	0.38	<10	208	0.79	4
84000-47600	0.125	2	0.27	0.82	<10	343	2.09	6
84000-47650	0.100	2	0.12	0.54	20	168	2.34	5
84000-47700	0.070	1	0.08	0.44	<10	100	0.55	5
84000-47750	0.110	<1	0.11	0.41	<10	73	0.53	6
84000-47800	0.120	<1	0.04	0.39	<10	117	0.72	5
84000-47850	0.100	1	0.10	0.65	<10	99	2.05	6
84300-47000	0.085	<1	0.09	0.70	<10	95	0.53	5
84300-47050	0.085	<1	0.09	0.34	<10	87	0.47	3
84300-47100	0.095	<1	0.11	0.54	<10	141	0.39	5
84300-47150	0.125	1	0.14	1.36	<10	236	0.75	12
84300-47200	0.090	<1	0.27	0.65	<10	99	0.58	6
84300-47300	0.135	<1	1.52	0.68	<10	135	0.99	5
84300-47350	0.085	2	0.16	0.42	<10	159	0.90	5
84300-47400	0.155	<1	0.21	1.46	<10	213	1.82	12
84300-47450	0.100	<1	0.24	0.28	<10	162	0.68	3
84300-47500	0.085	<1	0.09	0.74	<10	170	0.98	10
84300-47550	0.145	<1	0.10	0.81	<10	138	0.88	7
84300-47600	0.105	<1	0.10	0.50	<10	143	0.47	5
84300-47650	0.105	<1	0.11	1.48	<10	239	0.74	12
84300-47700	0.090	1	0.10	0.47	<10	145	0.53	6
84300-47750	0.095	<1	0.27	0.99	<10	221	1.70	7
84300-47800	0.245	3	0.45	1.76	<10	261	3.24	15
82500-45350	0.150	<1	0.27	0.56	<10	271	1.60	6
82500-45400	0.120	<1	0.07	0.20	<10	187	0.56	5
82500-45450	0.110	1	0.14	0.44	<10	355	0.58	6
82500-45500	0.120	<1	0.11	0.16	<10	163	0.64	2
82500-45550	0.100	<1	0.18	0.33	<10	150	0.40	6
82500-45600	0.075	<1	0.22	0.38	<10	126	0.40	5
82500-45800	0.170	<1	0.07	0.29	<10	70	0.39	3
82500-45850	0.170	1	0.33	0.88	<10	459	1.17	6
82500-45950	0.200	<1	0.13	2.08	<10	547	1.32	15
82500-46000	0.205	<1	0.27	2.32	<10	729	2.63	16
82500-46050	0.160	2	0.20	1.53	<10	526	2.22	10
82500-46100	0.110	<1	0.04	0.49	<10	208	1.10	5
82500-46150	0.095	<1	0.07	0.39	<10	242	0.60	4

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Element Method Det.Lim. Units	@Cu	@Fe	@K	@Li	@Mg	@Mn	@Na	@Ni
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.5 ppm	0.01 %	0.01 %	1 ppm	0.01 %	2 ppm	0.01 %	0.5 ppm
81900-45450	78.2	0.96	0.11	3	0.12	1440	0.02	5.4
81900-45500	53.3	0.28	0.08	<1	0.12	257	0.02	2.1
81900-45550	48.5	0.43	0.08	1	0.09	550	0.01	3.7
81900-45600	222	1.21	0.08	3	0.13	1860	0.02	8.9
81900-45650	113	0.70	0.10	2	0.15	1940	0.02	6.6
81900-45700	73.0	0.89	0.06	2	0.12	1080	0.01	4.5
81900-45750	47.6	0.77	0.06	2	0.10	986	0.02	4.6
81900-45800	73.6	0.79	0.09	2	0.13	3050	0.02	6.7
81900-45850	67.9	0.60	0.09	1	0.11	2790	0.02	4.6
81900-45900	119	1.93	0.08	5	0.17	1360	0.02	8.7
81900-45950	64.9	0.53	0.08	1	0.07	492	0.02	3.8
81900-46000	607	2.99	0.08	11	0.27	785	0.02	14.9
81900-46050	37.4	0.87	0.05	3	0.08	184	0.02	4.9
81900-46100	60.4	0.64	0.08	1	0.12	1410	0.02	3.6
81900-46150	77.4	0.79	0.05	2	0.14	782	0.02	5.3
81900-46200	39.2	0.40	0.09	<1	0.07	384	0.02	3.0
82200-45400	48.7	0.23	0.12	<1	0.06	269	0.02	2.2
82200-45450	110	1.00	0.05	5	0.10	119	0.01	6.7
82200-45550	31.1	0.60	0.05	2	0.09	2250	0.02	3.8
82200-45600	176	0.58	0.05	2	0.13	864	0.02	3.1
82200-45650	120	1.90	0.13	6	0.19	>10000	0.02	10.9
82200-45700	147	1.51	0.08	10	0.17	203	0.02	8.3
82200-45750	50.4	0.60	0.06	1	0.08	333	0.02	4.7
82200-45800	61.6	0.85	0.08	2	0.15	909	0.01	5.6
82200-45850	30.8	0.92	0.06	2	0.10	6170	0.02	6.9
82200-45900	75.6	1.18	0.06	3	0.11	96	0.02	6.1
82200-45950	46.9	0.70	0.04	2	0.10	224	0.01	3.9
82200-46000	25.3	0.58	0.07	<1	0.10	638	0.02	4.2
82200-46050	40.9	1.00	0.07	2	0.13	1530	0.02	6.3
82200-46100	58.7	0.50	0.10	<1	0.11	879	0.01	4.9
82200-46150	75.4	0.45	0.10	1	0.16	1880	0.02	3.5
82200-46200	57.2	1.03	0.06	4	0.16	795	0.02	6.0
84000-47100	76.3	0.83	0.06	3	0.10	1600	0.01	5.1
84000-47150	233	3.20	0.08	9	0.31	2110	0.02	10.4
84000-47200	49.3	0.39	0.07	<1	0.08	228	0.01	3.4
84000-47250	55.6	1.07	0.08	3	0.15	1060	0.01	6.0
84000-47300	63.9	0.88	0.08	1	0.14	296	0.02	5.9
84000-47350	58.5	0.80	0.08	2	0.17	1220	0.02	5.3
84000-47400	57.2	0.65	0.08	1	0.11	1320	0.02	4.4
84000-47450	55.3	0.44	0.09	<1	0.09	657	0.02	4.5

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Element Method Det.Lim. Units	@Cu	@Fe	@K	@Li	@Mg	@Mn	@Na	@Ni
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.5 ppm	0.01 %	0.01 %	1 ppm	0.01 %	2 ppm	0.01 %	0.5 ppm
84000-47500	68.1	0.48	0.08	<1	0.11	343	0.02	3.2
84000-47550	56.6	0.52	0.09	<1	0.11	620	0.02	5.1
84000-47600	103	0.81	0.24	2	0.18	994	0.03	6.4
84000-47650	81.8	0.52	0.29	2	0.33	1510	0.03	4.8
84000-47700	58.5	0.67	0.08	1	0.10	610	0.02	4.6
84000-47750	79.5	0.77	0.07	2	0.13	871	0.02	5.0
84000-47800	45.3	0.61	0.05	1	0.11	144	0.02	3.3
84000-47850	94.3	0.85	0.08	2	0.18	111	0.02	5.3
84300-47000	104	0.90	0.07	2	0.10	1870	0.02	4.8
84300-47050	78.6	0.31	0.07	<1	0.06	307	0.02	3.2
84300-47100	95.6	0.55	0.10	<1	0.06	1040	0.02	3.8
84300-47150	107	1.60	0.08	4	0.15	1340	0.02	8.0
84300-47200	87.2	0.69	0.07	2	0.12	1970	0.01	4.8
84300-47300	61.1	0.92	0.08	3	0.19	116	0.03	4.8
84300-47350	63.6	0.59	0.06	1	0.09	231	0.02	3.9
84300-47400	159	1.78	0.07	4	0.19	119	0.02	8.3
84300-47450	59.1	0.36	0.06	<1	0.07	218	0.02	3.5
84300-47500	67.2	1.02	0.06	2	0.15	482	0.02	6.4
84300-47550	90.8	1.19	0.05	3	0.11	250	0.02	5.8
84300-47600	58.0	0.61	0.06	2	0.08	283	0.02	4.7
84300-47650	158	1.85	0.07	4	0.13	629	0.02	10.0
84300-47700	63.5	0.73	0.06	2	0.09	346	0.02	4.9
84300-47750	247	0.83	0.09	3	0.16	1060	0.02	8.3
84300-47800	736	1.90	0.06	13	0.23	1090	0.03	19.6
82500-45350	289	0.73	0.05	3	0.09	53	0.02	3.9
82500-45400	46.9	0.32	0.07	<1	0.06	94	0.02	3.7
82500-45450	92.0	0.69	0.07	<1	0.07	53	0.02	4.0
82500-45500	15.4	0.15	0.06	<1	0.05	43	0.02	2.2
82500-45550	50.2	0.53	0.07	1	0.08	452	0.02	5.3
82500-45600	60.9	0.48	0.08	2	0.09	483	0.01	4.6
82500-45800	48.2	0.50	0.04	1	0.07	274	0.02	3.5
82500-45850	132	1.28	0.06	1	0.10	419	0.02	8.0
82500-45950	172	2.37	0.09	6	0.20	1410	0.02	11.6
82500-46000	181	2.43	0.20	8	0.25	2210	0.03	12.4
82500-46050	142	1.41	0.06	6	0.18	908	0.02	9.1
82500-46100	59.5	0.59	0.08	2	0.11	1770	0.01	4.8
82500-46150	54.3	0.43	0.06	1	0.07	506	0.02	4.4

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Element Method Det.Lim. Units	@P	@S	@Sr	@Ti	@V	@Zn	@Zr	@As
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.005 %	0.01 %	0.5 ppm	0.01 %	1 ppm	1 ppm	0.5 ppm	1 ppm
81900-45450	0.109	0.06	73.4	0.03	24	87	<0.5	1
81900-45500	0.091	0.12	82.6	0.01	8	39	1.0	<1
81900-45550	0.079	0.10	43.0	0.02	10	37	0.7	<1
81900-45600	0.108	0.09	74.8	0.04	25	29	1.1	2
81900-45650	0.105	0.10	90.6	0.02	16	38	<0.5	1
81900-45700	0.067	0.07	30.2	0.03	25	39	0.5	<1
81900-45750	0.063	0.07	21.5	0.03	20	39	0.8	<1
81900-45800	0.097	0.10	66.1	0.02	16	34	0.6	1
81900-45850	0.094	0.09	58.2	0.02	12	41	<0.5	<1
81900-45900	0.100	0.06	55.6	0.05	41	32	1.8	2
81900-45950	0.061	0.09	27.7	0.02	13	42	0.8	<1
81900-46000	0.066	0.06	67.8	0.06	61	30	11.6	2
81900-46050	0.051	0.04	19.8	0.04	23	27	1.8	<1
81900-46100	0.069	0.10	56.8	0.02	17	40	0.6	<1
81900-46150	0.067	0.09	71.5	0.03	37	13	2.2	<1
81900-46200	0.069	0.08	35.7	0.02	10	25	<0.5	<1
82200-45400	0.095	0.12	48.7	0.01	5	29	0.6	<1
82200-45450	0.037	0.04	36.2	0.03	24	12	1.0	2
82200-45550	0.046	0.06	68.2	0.03	16	39	<0.5	1
82200-45600	0.068	0.11	105	0.01	11	25	1.4	<1
82200-45650	0.197	0.09	79.9	0.05	34	115	0.6	2
82200-45700	0.055	0.09	75.7	0.05	32	20	8.6	2
82200-45750	0.072	0.08	36.0	0.03	17	55	0.7	<1
82200-45800	0.094	0.09	60.4	0.03	20	43	<0.5	1
82200-45850	0.081	0.05	23.5	0.04	23	57	<0.5	<1
82200-45900	0.101	0.07	63.3	0.03	19	17	<0.5	<1
82200-45950	0.046	0.05	18.1	0.02	19	17	1.2	<1
82200-46000	0.058	0.05	43.7	0.02	17	38	<0.5	<1
82200-46050	0.079	0.07	39.1	0.04	30	37	0.5	1
82200-46100	0.091	0.10	74.4	0.02	13	40	0.5	<1
82200-46150	0.126	0.10	56.8	0.02	12	79	0.5	<1
82200-46200	0.059	0.05	35.3	0.04	23	27	0.7	<1
84000-47100	0.075	0.07	29.9	0.03	21	29	<0.5	1
84000-47150	0.082	0.08	153	0.06	58	38	4.3	3
84000-47200	0.072	0.11	30.2	0.01	11	26	0.9	<1
84000-47250	0.051	0.06	59.8	0.04	28	18	0.7	<1
84000-47300	0.071	0.08	25.8	0.04	27	30	1.2	1
84000-47350	0.090	0.11	46.2	0.03	22	32	<0.5	1
84000-47400	0.085	0.10	44.8	0.02	19	20	0.5	1
84000-47450	0.078	0.10	36.6	0.02	10	22	0.6	<1

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Element Method Det.Lim. Units	@P	@S	@Sr	@Ti	@V	@Zn	@Zr	@As
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.005 %	0.01 %	0.5 ppm	0.01 %	1 ppm	1 ppm	0.5 ppm	1 ppm
84000-47500	0.089	0.13	69.6	0.01	13	122	1.0	<1
84000-47550	0.075	0.09	47.5	0.02	14	36	0.6	<1
84000-47600	0.221	0.08	115	0.03	15	57	0.9	<1
84000-47650	0.213	0.08	96.7	0.02	15	44	0.7	<1
84000-47700	0.086	0.09	32.6	0.03	19	22	0.6	<1
84000-47750	0.092	0.09	23.7	0.03	23	36	<0.5	<1
84000-47800	0.058	0.09	48.5	0.02	17	13	2.1	<1
84000-47850	0.085	0.12	129	0.02	29	10	4.0	1
84300-47000	0.106	0.11	31.3	0.03	22	34	0.7	1
84300-47050	0.085	0.11	26.9	0.01	6	29	<0.5	1
84300-47100	0.103	0.09	24.1	0.02	11	34	<0.5	1
84300-47150	0.105	0.10	48.1	0.04	33	38	1.2	1
84300-47200	0.115	0.10	38.2	0.03	17	34	<0.5	1
84300-47300	0.042	0.06	81.6	0.05	23	13	1.7	2
84300-47350	0.061	0.07	61.5	0.02	13	10	0.7	<1
84300-47400	0.098	0.13	120	0.03	22	13	4.5	<1
84300-47450	0.057	0.09	47.3	0.01	9	30	0.6	<1
84300-47500	0.065	0.08	62.1	0.04	21	22	1.0	1
84300-47550	0.070	0.10	63.9	0.03	25	19	1.0	1
84300-47600	0.070	0.07	39.5	0.03	13	16	<0.5	<1
84300-47650	0.127	0.08	67.6	0.05	31	24	1.3	2
84300-47700	0.083	0.08	31.2	0.03	21	27	1.0	1
84300-47750	0.118	0.14	101	0.03	21	29	1.5	2
84300-47800	0.101	0.15	151	0.05	65	16	14.0	3
82500-45350	0.049	0.08	75.7	0.02	16	8	4.4	3
82500-45400	0.058	0.09	32.5	0.01	7	13	0.5	<1
82500-45450	0.089	0.08	46.6	0.02	11	23	0.8	1
82500-45500	0.055	0.09	42.0	<0.01	3	10	1.1	1
82500-45550	0.074	0.07	23.8	0.02	12	34	<0.5	1
82500-45600	0.106	0.10	19.8	0.01	11	34	0.5	<1
82500-45800	0.068	0.09	19.2	0.02	12	40	<0.5	<1
82500-45850	0.102	0.16	93.3	0.02	20	26	2.4	2
82500-45950	0.102	0.10	108	0.04	47	29	2.5	2
82500-46000	0.166	0.09	155	0.06	56	81	5.9	2
82500-46050	0.093	0.13	152	0.03	28	28	5.3	1
82500-46100	0.096	0.09	51.8	0.03	14	31	0.9	<1
82500-46150	0.069	0.07	46.2	0.02	9	18	<0.5	<1

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Element Method Det.Lim. Units	@Be	@Bi	@Cd	@Ce	@Co	@Cs	@Ga	@Ge
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.1	0.02	0.01	0.05	0.1	0.05	0.1	0.1
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
81900-45450	0.1	0.09	0.21	4.54	2.4	0.47	2.3	<0.1
81900-45500	<0.1	0.05	0.19	1.47	0.9	0.11	0.7	<0.1
81900-45550	<0.1	0.07	0.19	2.01	1.2	0.25	1.2	<0.1
81900-45600	0.4	0.13	0.18	32.7	5.0	0.61	3.6	<0.1
81900-45650	0.2	0.11	0.20	25.6	4.3	0.38	2.3	<0.1
81900-45700	0.1	0.07	0.14	6.32	2.2	0.36	2.0	<0.1
81900-45750	<0.1	0.07	0.15	3.64	2.0	0.44	2.3	<0.1
81900-45800	0.3	0.10	0.18	20.3	5.6	0.37	2.4	<0.1
81900-45850	0.2	0.10	0.29	8.00	3.4	0.31	1.9	<0.1
81900-45900	0.6	0.12	0.13	29.3	6.2	0.70	5.4	<0.1
81900-45950	<0.1	0.09	0.19	3.09	1.4	0.34	1.4	<0.1
81900-46000	0.8	0.14	0.14	76.5	6.2	0.68	8.1	0.1
81900-46050	<0.1	0.07	1.35	3.86	1.7	0.42	2.5	<0.1
81900-46100	0.1	0.08	0.16	4.00	1.7	0.34	1.5	<0.1
81900-46150	0.3	0.06	0.13	28.6	7.9	0.38	1.8	<0.1
81900-46200	<0.1	0.07	0.15	4.10	1.3	0.24	1.2	<0.1
82200-45400	<0.1	0.08	0.16	1.83	0.8	0.16	0.6	<0.1
82200-45450	0.2	0.06	0.11	5.74	2.1	0.20	1.9	<0.1
82200-45550	0.1	0.09	0.19	3.04	2.3	0.40	1.9	<0.1
82200-45600	<0.1	0.04	0.21	2.81	1.9	0.12	1.2	<0.1
82200-45650	0.8	0.14	0.40	56.3	6.8	0.74	6.9	<0.1
82200-45700	0.5	0.10	0.19	19.6	3.3	0.48	4.4	<0.1
82200-45750	0.1	0.09	0.21	3.13	1.9	0.26	1.6	<0.1
82200-45800	0.1	0.11	0.20	4.75	2.5	0.44	2.3	<0.1
82200-45850	0.1	0.07	0.18	4.29	2.8	0.43	2.6	<0.1
82200-45900	0.4	0.09	0.24	21.1	2.2	0.51	4.8	<0.1
82200-45950	<0.1	0.06	0.09	2.75	1.7	0.31	1.6	<0.1
82200-46000	<0.1	0.06	0.15	3.04	1.5	0.28	1.4	<0.1
82200-46050	0.1	0.10	0.16	4.00	3.3	0.47	2.6	<0.1
82200-46100	0.1	0.14	0.19	5.54	2.2	0.27	1.6	<0.1
82200-46150	<0.1	0.07	0.17	2.92	1.5	0.32	1.3	<0.1
82200-46200	0.2	0.07	0.13	12.4	3.1	0.48	3.1	<0.1
84000-47100	0.1	0.10	0.13	4.15	2.5	0.57	2.2	<0.1
84000-47150	0.5	0.11	0.26	21.0	7.9	0.65	4.4	<0.1
84000-47200	<0.1	0.07	0.16	2.20	1.2	0.20	0.9	<0.1
84000-47250	0.2	0.09	0.15	4.48	2.9	0.44	2.4	<0.1
84000-47300	0.1	0.07	0.25	3.70	2.2	0.38	2.1	<0.1
84000-47350	0.1	0.11	0.21	3.67	2.3	0.62	2.0	<0.1
84000-47400	<0.1	0.09	0.15	2.78	2.1	0.33	1.4	<0.1
84000-47450	0.1	0.08	0.28	2.70	1.8	0.26	1.0	<0.1

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	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.1	0.02	0.01	0.05	0.1	0.05	0.1	0.1
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
84000-47500	<0.1	0.06	0.14	4.23	1.8	0.21	0.9	<0.1
84000-47550	0.2	0.08	0.16	9.68	2.5	0.34	1.2	<0.1
84000-47600	0.4	0.09	0.15	16.1	3.3	0.29	2.5	<0.1
84000-47650	<0.1	0.07	0.14	2.92	2.0	0.22	1.5	<0.1
84000-47700	0.1	0.10	0.12	3.32	2.0	0.43	2.1	<0.1
84000-47750	<0.1	0.12	0.24	3.26	2.3	0.39	2.0	<0.1
84000-47800	<0.1	0.05	0.10	2.94	1.8	0.23	1.8	<0.1
84000-47850	0.2	0.06	0.14	11.4	5.1	0.17	2.0	<0.1
84300-47000	0.1	0.09	0.19	3.51	2.5	0.39	2.1	<0.1
84300-47050	<0.1	0.11	0.15	2.03	1.0	0.29	0.9	<0.1
84300-47100	0.1	0.12	0.17	2.85	1.9	0.36	1.7	<0.1
84300-47150	0.2	0.12	0.16	12.1	6.8	0.45	4.3	<0.1
84300-47200	0.1	0.12	0.19	3.59	2.9	0.44	2.1	<0.1
84300-47300	0.2	0.05	0.04	8.29	2.3	0.27	2.2	<0.1
84300-47350	0.2	0.07	0.11	8.80	1.9	0.29	1.6	<0.1
84300-47400	0.7	0.07	0.20	45.2	4.8	0.24	4.2	0.1
84300-47450	0.1	0.09	0.16	3.45	1.4	0.25	1.0	<0.1
84300-47500	0.1	0.07	0.12	6.91	3.2	0.28	2.9	<0.1
84300-47550	0.2	0.08	0.12	10.7	3.4	0.32	2.9	<0.1
84300-47600	0.2	0.11	0.12	9.69	2.7	0.28	2.1	<0.1
84300-47650	0.7	0.14	0.16	33.4	13.3	0.57	4.9	<0.1
84300-47700	0.2	0.14	0.16	4.05	2.0	0.38	2.0	<0.1
84300-47750	0.4	0.11	0.27	39.1	2.2	0.39	3.1	<0.1
84300-47800	1.3	0.10	0.29	72.1	8.8	0.38	4.5	0.2
82500-45350	0.3	0.21	0.10	12.5	1.7	0.16	1.6	<0.1
82500-45400	<0.1	0.07	0.16	2.04	0.9	0.22	0.8	<0.1
82500-45450	0.3	0.09	0.25	13.4	1.6	0.24	1.7	<0.1
82500-45500	<0.1	0.06	0.17	1.41	0.8	0.11	0.5	<0.1
82500-45550	<0.1	0.08	0.17	2.87	1.4	0.31	1.4	<0.1
82500-45600	<0.1	0.06	0.17	2.75	2.2	0.22	1.3	<0.1
82500-45800	<0.1	0.07	0.24	1.98	1.2	0.40	1.2	<0.1
82500-45850	0.4	0.09	0.16	34.2	6.9	0.28	2.2	<0.1
82500-45950	0.8	0.12	0.16	60.6	11.6	0.51	6.1	<0.1
82500-46000	0.7	0.12	0.23	51.9	9.2	0.59	6.1	<0.1
82500-46050	0.6	0.11	0.22	46.3	4.0	0.43	4.2	<0.1
82500-46100	0.1	0.06	0.24	2.80	1.8	0.39	1.8	<0.1
82500-46150	0.2	0.09	0.14	7.36	1.4	0.33	1.5	<0.1

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Element Method Det.Lim. Units	@Hf	@Hg	@In	@La	@Lu	@Mo	@Nb	@Pb
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.05	0.01	0.02	0.1	0.01	0.05	0.05	0.2
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
81900-45450	<0.05	0.10	<0.02	2.5	0.02	4.47	0.52	10.8
81900-45500	<0.05	0.23	<0.02	0.8	<0.01	11.5	0.33	7.3
81900-45550	<0.05	0.20	<0.02	1.1	<0.01	6.43	0.27	14.4
81900-45600	<0.05	0.25	<0.02	15.0	0.07	10.3	0.69	12.4
81900-45650	<0.05	0.17	<0.02	11.9	0.06	11.5	0.37	16.6
81900-45700	<0.05	0.15	<0.02	3.0	0.02	5.27	0.40	10.0
81900-45750	<0.05	0.13	<0.02	1.8	0.01	4.82	0.45	7.3
81900-45800	<0.05	0.17	<0.02	8.1	0.07	8.34	0.37	15.4
81900-45850	<0.05	0.21	<0.02	3.9	0.02	6.44	0.29	17.8
81900-45900	<0.05	0.09	<0.02	13.4	0.07	5.72	0.85	8.0
81900-45950	<0.05	0.20	<0.02	1.7	0.01	6.46	0.31	13.2
81900-46000	0.35	0.08	0.03	40.4	0.32	3.79	1.21	8.1
81900-46050	<0.05	0.07	<0.02	1.9	0.02	3.31	0.63	6.1
81900-46100	<0.05	0.13	<0.02	2.2	0.02	7.94	0.27	13.4
81900-46150	0.05	0.15	<0.02	12.7	0.08	2.62	0.49	8.3
81900-46200	<0.05	0.17	<0.02	2.3	0.02	4.29	0.26	10.4
82200-45400	<0.05	0.28	<0.02	1.0	0.01	12.7	0.17	13.4
82200-45450	<0.05	0.07	<0.02	3.2	0.03	2.82	0.39	2.3
82200-45550	<0.05	0.14	<0.02	1.7	0.01	2.40	0.34	10.8
82200-45600	<0.05	0.16	<0.02	1.6	0.02	20.7	0.23	5.3
82200-45650	<0.05	0.18	0.03	17.5	0.08	19.4	0.82	16.6
82200-45700	0.21	0.09	0.02	15.8	0.14	2.79	1.01	7.3
82200-45750	<0.05	0.18	<0.02	1.6	0.01	6.29	0.33	13.3
82200-45800	<0.05	0.13	<0.02	2.3	0.02	7.92	0.41	15.2
82200-45850	<0.05	0.08	<0.02	2.3	0.02	4.20	0.33	6.9
82200-45900	<0.05	0.16	<0.02	10.7	0.05	2.65	0.62	7.9
82200-45950	<0.05	0.13	<0.02	1.3	0.01	4.11	0.32	8.1
82200-46000	<0.05	0.10	<0.02	1.7	0.01	3.28	0.25	9.2
82200-46050	<0.05	0.15	<0.02	2.1	0.01	4.25	0.48	13.9
82200-46100	<0.05	0.14	<0.02	3.0	0.02	7.48	0.28	10.3
82200-46150	<0.05	0.25	<0.02	1.5	0.01	7.52	0.22	11.3
82200-46200	<0.05	0.09	<0.02	6.4	0.04	4.10	0.56	5.3
84000-47100	<0.05	0.14	<0.02	2.1	0.02	7.08	0.39	15.0
84000-47150	0.09	0.10	<0.02	13.8	0.15	19.6	0.77	5.0
84000-47200	<0.05	0.30	<0.02	1.3	0.01	3.17	0.19	12.3
84000-47250	<0.05	0.10	<0.02	2.5	0.02	4.75	0.46	12.4
84000-47300	<0.05	0.19	<0.02	1.8	0.02	4.27	0.43	10.1
84000-47350	<0.05	0.15	<0.02	2.0	0.01	7.93	0.44	16.7
84000-47400	<0.05	0.18	<0.02	1.6	0.01	6.42	0.28	15.6
84000-47450	<0.05	0.18	<0.02	1.4	0.01	5.94	0.20	13.2

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Element Method Det.Lim. Units	@Hf	@Hg	@In	@La	@Lu	@Mo	@Nb	@Pb
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.05	0.01	0.02	0.1	0.01	0.05	0.05	0.2
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
84000-47500	<0.05	0.21	<0.02	2.7	0.02	8.28	0.22	10.7
84000-47550	<0.05	0.19	<0.02	5.1	0.03	2.47	0.18	10.0
84000-47600	<0.05	0.20	<0.02	8.6	0.06	4.01	0.42	12.6
84000-47650	<0.05	0.21	<0.02	1.5	0.01	4.94	0.25	12.1
84000-47700	<0.05	0.18	<0.02	1.8	0.01	5.23	0.48	14.3
84000-47750	<0.05	0.25	<0.02	1.8	0.01	6.78	0.34	17.8
84000-47800	<0.05	0.14	<0.02	1.6	0.02	4.84	0.39	5.8
84000-47850	0.08	0.13	<0.02	6.3	0.08	3.38	0.41	5.4
84300-47000	<0.05	0.28	<0.02	1.7	0.01	7.68	0.42	15.7
84300-47050	<0.05	0.25	<0.02	1.0	<0.01	5.28	0.32	18.0
84300-47100	<0.05	0.23	<0.02	1.4	0.01	7.22	0.33	18.1
84300-47150	<0.05	0.21	<0.02	5.3	0.05	5.41	0.52	13.6
84300-47200	<0.05	0.26	<0.02	1.7	0.01	5.65	0.40	18.8
84300-47300	<0.05	0.12	<0.02	4.0	0.04	3.17	0.46	3.2
84300-47350	<0.05	0.15	<0.02	5.2	0.03	5.59	0.29	8.9
84300-47400	0.10	0.21	<0.02	23.9	0.20	4.63	0.53	3.0
84300-47450	<0.05	0.20	<0.02	1.7	0.02	9.20	0.19	11.6
84300-47500	<0.05	0.14	<0.02	3.4	0.02	8.42	0.46	6.5
84300-47550	<0.05	0.18	<0.02	5.3	0.04	4.33	0.45	9.5
84300-47600	<0.05	0.17	<0.02	4.8	0.03	5.47	0.37	13.8
84300-47650	<0.05	0.17	0.02	17.4	0.09	6.15	0.67	15.1
84300-47700	<0.05	0.19	<0.02	2.0	0.02	6.34	0.39	14.0
84300-47750	<0.05	0.26	<0.02	23.8	0.16	10.0	0.45	12.7
84300-47800	0.35	0.19	<0.02	46.6	0.59	7.41	1.02	5.3
82500-45350	0.08	0.11	<0.02	8.7	0.09	14.0	0.43	4.4
82500-45400	<0.05	0.16	<0.02	1.1	<0.01	9.89	0.15	11.9
82500-45450	<0.05	0.17	<0.02	6.3	0.05	6.37	0.24	12.0
82500-45500	<0.05	0.22	<0.02	0.7	<0.01	8.64	0.14	9.0
82500-45550	<0.05	0.16	<0.02	1.6	<0.01	6.00	0.21	13.9
82500-45600	<0.05	0.19	<0.02	1.2	<0.01	7.61	0.17	11.9
82500-45800	<0.05	0.22	<0.02	1.0	<0.01	3.60	0.18	10.4
82500-45850	<0.05	0.88	<0.02	17.7	0.11	5.68	0.31	7.6
82500-45950	<0.05	0.21	0.03	28.6	0.17	6.50	0.70	14.7
82500-46000	0.18	0.15	0.02	20.7	0.18	8.50	1.04	8.7
82500-46050	0.16	0.20	<0.02	24.4	0.22	6.12	0.65	8.7
82500-46100	<0.05	0.14	<0.02	1.4	0.01	7.71	0.39	8.8
82500-46150	<0.05	0.15	<0.02	4.1	0.02	6.38	0.23	11.3

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Element Method Det.Lim. Units	@Rb	@Sb	@Sc	@Se	@Sn	@Ta	@Tb	@Te
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.2 ppm	0.05 ppm	0.1 ppm	1 ppm	0.3 ppm	0.05 ppm	0.02 ppm	0.05 ppm
81900-45450	7.4	0.17	0.6	<1	<0.3	<0.05	0.04	<0.05
81900-45500	1.1	0.27	0.5	2	<0.3	<0.05	<0.02	<0.05
81900-45550	2.6	0.28	0.4	1	<0.3	<0.05	0.02	<0.05
81900-45600	6.5	0.43	1.0	<1	0.3	<0.05	0.29	<0.05
81900-45650	5.4	0.39	0.6	1	<0.3	<0.05	0.23	<0.05
81900-45700	4.7	0.36	0.7	<1	<0.3	<0.05	0.06	<0.05
81900-45750	6.3	0.15	0.7	2	<0.3	<0.05	0.03	<0.05
81900-45800	5.3	0.29	0.8	2	<0.3	<0.05	0.16	<0.05
81900-45850	4.9	0.25	0.7	<1	<0.3	<0.05	0.07	<0.05
81900-45900	8.2	0.22	1.8	1	0.4	<0.05	0.27	<0.05
81900-45950	4.0	0.25	0.6	3	<0.3	<0.05	0.04	<0.05
81900-46000	8.0	0.27	5.4	<1	0.5	<0.05	0.99	<0.05
81900-46050	4.3	0.18	0.8	2	<0.3	<0.05	0.04	<0.05
81900-46100	3.5	0.25	0.6	1	<0.3	<0.05	0.04	<0.05
81900-46150	3.0	0.25	0.9	<1	<0.3	<0.05	0.25	<0.05
81900-46200	2.4	0.26	0.6	1	<0.3	<0.05	0.05	<0.05
82200-45400	1.3	0.38	0.8	4	<0.3	<0.05	0.02	<0.05
82200-45450	2.1	0.42	0.9	<1	<0.3	<0.05	0.07	<0.05
82200-45550	6.4	0.27	0.8	5	<0.3	<0.05	0.03	<0.05
82200-45600	1.9	0.26	0.7	2	<0.3	<0.05	0.05	<0.05
82200-45650	7.4	0.31	1.4	<1	0.5	<0.05	0.31	<0.05
82200-45700	4.2	0.25	2.4	<1	0.4	<0.05	0.38	<0.05
82200-45750	2.3	0.26	0.8	2	<0.3	<0.05	0.03	<0.05
82200-45800	6.9	0.26	0.5	<1	0.3	<0.05	0.05	<0.05
82200-45850	5.9	0.17	0.5	<1	<0.3	<0.05	0.04	<0.05
82200-45900	5.1	0.22	0.6	<1	0.4	<0.05	0.20	<0.05
82200-45950	3.7	0.19	0.6	<1	<0.3	<0.05	0.03	<0.05
82200-46000	3.2	0.15	0.5	2	<0.3	<0.05	0.03	<0.05
82200-46050	7.7	0.24	0.7	<1	0.3	<0.05	0.04	<0.05
82200-46100	4.0	0.23	0.5	1	<0.3	<0.05	0.05	<0.05
82200-46150	2.9	0.24	0.7	3	<0.3	<0.05	0.03	<0.05
82200-46200	6.3	0.13	1.1	1	<0.3	<0.05	0.13	<0.05
84000-47100	8.4	0.22	0.7	<1	<0.3	<0.05	0.04	<0.05
84000-47150	7.6	0.23	3.1	<1	<0.3	<0.05	0.38	<0.05
84000-47200	3.2	0.23	0.5	2	<0.3	<0.05	0.03	<0.05
84000-47250	8.1	0.15	0.6	<1	<0.3	<0.05	0.05	<0.05
84000-47300	6.2	0.23	0.8	2	<0.3	<0.05	0.04	<0.05
84000-47350	7.2	0.28	0.5	2	0.4	<0.05	0.03	<0.05
84000-47400	6.3	0.29	0.7	2	<0.3	<0.05	0.03	<0.05
84000-47450	3.4	0.22	0.8	2	<0.3	<0.05	0.03	<0.05

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	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.2 ppm	0.05 ppm	0.1 ppm	1 ppm	0.3 ppm	0.05 ppm	0.02 ppm	0.05 ppm
84000-47500	2.2	0.21	0.8	2	<0.3	<0.05	0.06	<0.05
84000-47550	5.8	0.22	0.9	2	<0.3	<0.05	0.10	<0.05
84000-47600	7.0	0.24	1.3	8	<0.3	<0.05	0.18	<0.05
84000-47650	6.2	0.26	0.9	2	<0.3	<0.05	0.03	<0.05
84000-47700	6.3	0.20	0.5	<1	0.3	<0.05	0.03	<0.05
84000-47750	5.8	0.34	0.6	2	0.3	<0.05	0.03	<0.05
84000-47800	3.0	0.17	1.2	<1	<0.3	<0.05	0.04	<0.05
84000-47850	2.3	0.29	1.3	3	<0.3	<0.05	0.17	<0.05
84300-47000	5.5	0.22	0.6	1	<0.3	<0.05	0.04	<0.05
84300-47050	3.4	0.41	0.7	5	<0.3	<0.05	0.02	<0.05
84300-47100	3.9	0.28	0.6	2	<0.3	<0.05	0.03	<0.05
84300-47150	6.3	0.28	2.0	3	0.4	<0.05	0.14	<0.05
84300-47200	7.5	0.28	0.7	3	<0.3	<0.05	0.04	<0.05
84300-47300	7.3	0.19	1.3	4	<0.3	<0.05	0.10	<0.05
84300-47350	4.3	0.21	1.0	6	<0.3	<0.05	0.10	<0.05
84300-47400	2.6	0.46	3.6	4	<0.3	<0.05	0.60	<0.05
84300-47450	3.0	0.28	0.8	4	<0.3	<0.05	0.04	<0.05
84300-47500	5.3	0.24	1.3	2	<0.3	<0.05	0.08	<0.05
84300-47550	4.5	0.21	1.1	2	<0.3	<0.05	0.12	<0.05
84300-47600	5.4	0.27	0.8	2	0.3	<0.05	0.10	<0.05
84300-47650	7.5	0.30	1.5	2	0.4	<0.05	0.36	<0.05
84300-47700	4.1	0.24	0.9	4	<0.3	<0.05	0.04	<0.05
84300-47750	4.8	0.36	1.5	4	0.3	<0.05	0.54	<0.05
84300-47800	3.0	0.54	2.9	5	0.3	<0.05	1.49	<0.05
82500-45350	1.9	3.19	1.7	5	<0.3	<0.05	0.22	<0.05
82500-45400	1.5	0.30	0.7	3	<0.3	<0.05	0.02	<0.05
82500-45450	1.8	0.29	1.6	3	<0.3	<0.05	0.14	<0.05
82500-45500	1.4	0.28	0.6	3	<0.3	<0.05	<0.02	<0.05
82500-45550	3.0	0.23	0.6	3	<0.3	<0.05	0.03	<0.05
82500-45600	2.2	0.21	0.6	2	<0.3	<0.05	0.03	<0.05
82500-45800	2.6	0.29	0.5	2	<0.3	<0.05	<0.02	<0.05
82500-45850	2.6	0.27	1.9	4	<0.3	<0.05	0.37	<0.05
82500-45950	5.6	0.37	2.6	3	0.5	<0.05	0.61	<0.05
82500-46000	9.3	0.32	3.3	6	0.5	<0.05	0.50	<0.05
82500-46050	4.4	0.48	2.5	3	0.3	<0.05	0.62	<0.05
82500-46100	4.0	0.16	0.6	2	<0.3	<0.05	0.03	<0.05
82500-46150	4.0	0.22	0.7	3	<0.3	<0.05	0.07	<0.05

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Element Method Det.Lim. Units	@Th	@Ti	@U	@W	@Y	@Yb	LOI
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	G_PHY01K
	0.1 ppm	0.02 ppm	0.05 ppm	0.1 ppm	0.05 ppm	0.1 ppm	-10.000 %
81900-45450	<0.1	0.03	0.17	0.3	1.19	<0.1	32.0
81900-45500	<0.1	<0.02	0.25	<0.1	0.51	<0.1	81.5
81900-45550	<0.1	0.02	0.09	<0.1	0.57	<0.1	66.2
81900-45600	0.2	0.06	0.41	18.8	7.12	0.5	53.8
81900-45650	<0.1	0.04	0.31	0.3	6.00	0.4	64.2
81900-45700	0.5	0.03	0.27	0.1	1.58	0.1	44.6
81900-45750	0.2	0.03	0.14	0.2	0.88	<0.1	37.0
81900-45800	0.1	0.06	0.27	0.2	3.96	0.3	60.3
81900-45850	0.1	0.05	0.22	0.1	1.67	0.1	57.8
81900-45900	0.4	0.05	0.72	0.4	6.49	0.4	42.9
81900-45950	0.1	0.02	0.13	0.1	0.93	<0.1	63.2
81900-46000	2.3	0.06	3.64	0.2	25.6	2.0	40.1
81900-46050	0.4	0.02	0.19	0.2	1.02	<0.1	41.4
81900-46100	0.1	0.03	0.17	0.1	1.42	0.1	61.6
81900-46150	0.2	0.03	0.87	0.2	8.63	0.5	64.2
81900-46200	0.1	0.02	0.14	<0.1	1.27	<0.1	57.6
82200-45400	0.1	0.04	0.16	<0.1	0.65	<0.1	79.0
82200-45450	0.4	<0.02	3.42	0.2	2.36	0.2	27.9
82200-45550	0.2	0.06	0.11	0.2	0.84	<0.1	43.3
82200-45600	0.2	<0.02	1.26	<0.1	1.63	0.1	62.0
82200-45650	0.2	0.13	0.86	0.3	7.35	0.5	59.7
82200-45700	0.9	0.04	0.93	0.2	11.6	0.9	50.6
82200-45750	0.1	0.02	0.13	0.1	0.99	<0.1	61.9
82200-45800	<0.1	0.03	0.16	0.2	1.29	0.1	47.1
82200-45850	<0.1	0.05	0.18	0.1	1.16	<0.1	32.4
82200-45900	<0.1	0.04	0.71	0.8	4.49	0.3	50.1
82200-45950	0.2	0.02	0.13	<0.1	0.74	<0.1	56.1
82200-46000	<0.1	0.02	0.12	<0.1	0.97	<0.1	41.9
82200-46050	0.1	0.05	0.14	0.1	0.98	<0.1	39.4
82200-46100	0.1	0.03	0.15	<0.1	1.57	0.1	68.1
82200-46150	<0.1	0.03	0.14	<0.1	0.82	<0.1	53.9
82200-46200	0.2	0.03	0.43	0.1	3.39	0.2	33.1
84000-47100	0.1	0.06	0.13	<0.1	1.11	<0.1	39.6
84000-47150	1.0	0.07	3.35	0.3	11.4	0.9	46.1
84000-47200	<0.1	0.02	0.11	<0.1	0.86	<0.1	77.0
84000-47250	<0.1	0.03	0.18	<0.1	1.39	0.1	42.1
84000-47300	0.4	0.03	0.20	0.1	1.07	<0.1	52.8
84000-47350	<0.1	0.05	0.15	<0.1	0.90	<0.1	59.5
84000-47400	0.1	0.03	0.14	<0.1	0.94	<0.1	57.0
84000-47450	0.1	0.03	0.16	<0.1	0.75	<0.1	55.1

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Element Method Det.Lim. Units	@Th	@TI	@U	@W	@Y	@Yb	LOI
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	G_PHY01K
	0.1 ppm	0.02 ppm	0.05 ppm	0.1 ppm	0.05 ppm	0.1 ppm	-10.000 %
84000-47500	0.2	0.03	0.58	<0.1	1.72	0.1	67.3
84000-47550	0.2	0.03	0.33	<0.1	3.01	0.2	62.0
84000-47600	0.4	0.04	0.72	0.2	5.12	0.3	65.1
84000-47650	0.2	0.03	0.16	<0.1	0.97	<0.1	58.9
84000-47700	<0.1	0.04	0.17	<0.1	0.88	<0.1	56.4
84000-47750	<0.1	0.06	0.17	<0.1	0.89	<0.1	55.8
84000-47800	0.4	0.03	0.46	<0.1	1.09	<0.1	38.9
84000-47850	0.5	0.04	3.39	<0.1	5.95	0.4	77.8
84300-47000	<0.1	0.06	0.18	<0.1	1.03	<0.1	58.7
84300-47050	<0.1	0.03	0.10	<0.1	0.62	<0.1	78.5
84300-47100	<0.1	0.04	0.11	<0.1	0.79	<0.1	61.2
84300-47150	0.3	0.06	0.77	0.1	4.03	0.3	62.6
84300-47200	<0.1	0.06	0.17	<0.1	0.96	<0.1	60.2
84300-47300	0.3	0.02	0.48	9.6	2.92	0.3	53.3
84300-47350	0.2	0.02	0.54	0.1	2.94	0.2	60.2
84300-47400	1.2	0.04	6.09	<0.1	16.4	1.2	80.5
84300-47450	0.1	0.03	0.32	<0.1	1.15	<0.1	67.2
84300-47500	0.2	0.05	0.72	<0.1	2.08	0.2	59.4
84300-47550	0.2	0.03	0.61	<0.1	3.05	0.2	51.9
84300-47600	<0.1	0.05	0.45	<0.1	2.64	0.2	45.9
84300-47650	0.4	0.06	2.03	0.1	9.13	0.6	58.0
84300-47700	0.1	0.03	0.28	<0.1	1.12	<0.1	53.8
84300-47750	0.2	0.07	2.65	0.1	16.0	1.0	77.0
84300-47800	1.3	0.10	48.4	0.2	44.5	3.5	67.1
82500-45350	0.6	0.02	2.81	0.2	6.66	0.5	39.7
82500-45400	0.5	0.02	0.19	<0.1	0.58	<0.1	64.5
82500-45450	0.5	0.02	0.80	0.1	3.99	0.3	66.6
82500-45500	0.1	<0.02	0.09	<0.1	0.42	<0.1	78.9
82500-45550	0.1	0.02	0.11	0.1	0.77	<0.1	43.9
82500-45600	0.1	0.02	0.13	0.2	0.69	<0.1	68.4
82500-45800	<0.1	0.03	0.13	<0.1	0.52	<0.1	44.6
82500-45850	0.6	0.03	0.96	0.1	9.43	0.7	75.5
82500-45950	0.5	0.06	2.24	0.3	15.4	1.1	63.4
82500-46000	1.1	0.06	4.13	0.4	13.5	1.2	54.8
82500-46050	0.6	0.05	6.07	0.2	17.0	1.4	71.0
82500-46100	0.2	0.04	0.20	0.1	0.76	<0.1	42.2
82500-46150	<0.1	0.03	0.22	<0.1	1.94	0.1	53.1

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Certificate of Analysis
Work Order : VC162443
[Report File No.: 0000020736]

Date: February 02, 2017

To: DAVID BLANN
HAPPY CREEK MINERALS LTD
789 PENDER STREET W SUITE 460
VANCOUVER BC V6C 1H2

P.O. No.: Rateria 28 samples
Project No.: -
Samples: 28
Received: Aug 8, 2016
Pages: Page 1 to 8
(Inclusive of Cover Sheet)

Methods Summary

<u>No. Of Samples</u>	<u>Method Code</u>	<u>Description</u>
28	G_LOG02	Pre-preparation processing, sorting, logging, boxing
28	G_WGH79	Weighing of samples and reporting of weights
28	G_DRY16	Dry and macerate vegetation
28	GE_ARM133_VA	Aqua Regia Digest 25g-300ml, ICPMS (Vancouver)
28	GE_IC14A	Aqua Regia digestion/ICP-AES finish
28	GE_IC14M	Aqua Regia digestion/ICP-MS finish
28	G_PHY01K	Gravimetric determination at 1000C

Comments:

Boron values are informational only.

This Report cancels and supersedes the Report No. 018646 dated Aug 22, 2016 issued by SGS Canada (Production Way).
The locked version is the official copy that SGS retains on file for authentication.

Certified By : _____

John Chiang
QC Chemist

SGS Minerals Services Geochemistry Vancouver conforms to the requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation which can be found at <http://www.scc.ca/en/search/palcan/sgs>

Report Footer: L.N.R. = Listed not received I.S. = Insufficient Sample
n.a. = Not applicable -- = No result
*INF = Composition of this sample makes detection impossible by this method
M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion
Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

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Element Method Det.Lim. Units	WtKg G_WGH79	Au GE_ARM133	@Ag_ GE_ICM14B	@Al GE_ICM14B	@B GE_ICM14B	@Ba GE_ICM14B	@Ca GE_ICM14B	@Cr GE_ICM14B
	0.01 kg	1 ppb	0.01 ppm	0.01 %	10 ppm	5 ppm	0.01 %	1 ppm
84600-46900	0.110	2	0.25	0.25	<10	175	0.49	4
84600-47000	0.085	2	0.13	0.50	<10	99	0.64	5
86400-47050	0.095	<1	0.11	0.59	<10	130	0.50	8
86400-47150	0.175	1	0.03	0.22	<10	124	1.02	3
86400-47250	0.105	3	0.36	0.95	60	846	2.77	12
86400-47300	0.085	<1	0.38	1.74	<10	237	2.40	16
86400-47350	0.170	<1	0.36	0.56	20	282	1.65	6
86400-47400	0.150	<1	0.41	0.57	<10	206	1.48	5
86400-47450	0.085	<1	0.19	0.36	20	225	1.33	3
86400-47500	0.100	<1	0.41	3.34	<10	459	2.21	22
86400-47600	0.075	<1	0.13	0.60	<10	130	0.48	7
86400-47650	0.165	<1	0.18	0.15	10	139	1.10	2
86400-47700	0.125	<1	0.09	0.32	<10	126	1.14	4
78500-46350	0.080	1	0.11	0.69	<10	328	1.07	6
78500-46450	0.075	<1	0.16	0.29	10	156	0.83	3
78500-46550	0.125	1	0.08	0.26	10	227	2.26	4
78500-46700	0.075	<1	0.15	0.35	20	123	0.76	4
78500-46750	0.075	1	0.14	0.29	10	174	0.55	6
78500-46850	0.080	1	0.11	0.27	<10	83	0.50	5
78500-46950	0.060	<1	0.13	0.32	<10	121	0.79	4
77500-46550	0.065	<1	0.13	0.44	10	322	0.76	8
77500-46650	0.060	1	0.09	0.71	10	143	0.49	7
77500-46750	0.030	<1	0.26	0.66	<10	409	1.07	5
77500-46850	0.070	<1	0.11	0.48	<10	227	0.58	4
77500-46950	0.090	<1	0.12	0.36	<10	232	0.85	4
77500-47050	0.070	1	0.20	0.27	<10	133	0.59	3
77500-47150	0.070	2	0.17	0.47	10	178	0.80	4
77500-47250	0.070	<1	0.19	0.32	<10	201	0.76	4

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Element Method Det.Lim. Units	@Cu	@Fe	@K	@Li	@Mg	@Mn	@Na	@Ni
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.5 ppm	0.01 %	0.01 %	1 ppm	0.01 %	2 ppm	0.01 %	0.5 ppm
84600-46900	57.1	0.51	0.07	1	0.09	418	0.02	3.8
84600-47000	102	0.50	0.09	2	0.12	1350	0.02	4.5
86400-47050	91.3	0.92	0.06	2	0.13	1910	0.02	5.6
86400-47150	20.1	0.32	0.08	1	0.12	53	0.02	2.9
86400-47250	180	1.42	0.34	4	0.24	3760	0.04	9.3
86400-47300	133	1.84	0.08	8	0.27	740	0.02	10.5
86400-47350	63.1	0.74	0.04	3	0.15	395	0.02	4.2
86400-47400	98.5	0.64	0.07	2	0.11	102	0.02	4.0
86400-47450	73.9	0.38	0.10	2	0.18	653	0.02	3.6
86400-47500	379	2.64	0.13	12	0.32	4400	0.02	19.3
86400-47600	82.8	0.80	0.07	3	0.11	474	0.02	5.7
86400-47650	78.0	0.18	0.07	1	0.08	1110	0.02	2.3
86400-47700	26.8	0.44	0.06	2	0.11	133	0.01	3.5
78500-46350	48.6	0.93	0.10	5	0.17	1290	0.02	5.3
78500-46450	40.3	0.36	0.07	2	0.08	1900	0.02	3.2
78500-46550	36.0	0.40	0.07	2	0.17	231	0.03	3.8
78500-46700	46.5	0.52	0.09	2	0.12	2310	0.01	4.1
78500-46750	40.3	0.53	0.08	2	0.09	1410	0.01	4.5
78500-46850	34.7	0.58	0.06	1	0.08	819	0.02	3.6
78500-46950	49.6	0.54	0.07	2	0.11	1350	0.01	3.4
77500-46550	35.3	0.68	0.08	3	0.14	4490	0.02	6.8
77500-46650	38.1	1.09	0.06	4	0.16	1760	0.02	6.8
77500-46750	43.9	0.53	0.09	2	0.11	5390	0.02	5.3
77500-46850	33.3	0.55	0.07	2	0.10	3870	0.01	4.4
77500-46950	37.1	0.60	0.11	2	0.15	1360	0.01	3.9
77500-47050	43.9	0.38	0.07	1	0.09	1120	0.01	3.2
77500-47150	44.7	0.51	0.09	1	0.09	1060	0.02	3.6
77500-47250	39.5	0.53	0.09	2	0.11	2190	0.02	3.8

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Element Method Det.Lim. Units	@P	@S	@Sr	@Ti	@V	@Zn	@Zr	@As
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.005 %	0.01 %	0.5 ppm	0.01 %	1 ppm	1 ppm	0.5 ppm	1 ppm
84600-46900	0.068	0.08	46.8	0.02	16	31	0.9	3
84600-47000	0.114	0.10	43.2	0.02	10	41	0.8	2
86400-47050	0.101	0.09	30.5	0.03	26	33	0.6	3
86400-47150	0.062	0.11	76.4	0.01	8	8	2.0	2
86400-47250	0.460	0.07	236	0.04	48	275	1.1	2
86400-47300	0.080	0.10	145	0.04	36	17	5.4	2
86400-47350	0.077	0.12	100.0	0.02	17	42	2.0	2
86400-47400	0.080	0.11	99.1	0.02	13	20	2.1	2
86400-47450	0.087	0.11	87.6	0.02	9	17	0.5	2
86400-47500	0.162	0.08	129	0.07	82	65	4.3	4
86400-47600	0.096	0.08	29.1	0.04	21	28	0.7	2
86400-47650	0.081	0.13	64.0	<0.01	4	34	0.6	2
86400-47700	0.054	0.10	69.0	0.02	10	26	1.6	2
78500-46350	0.077	0.06	69.8	0.04	26	24	1.1	2
78500-46450	0.061	0.09	49.8	0.02	10	65	1.2	2
78500-46550	0.062	0.11	147	0.02	15	12	2.0	3
78500-46700	0.066	0.09	33.9	0.02	14	49	0.8	2
78500-46750	0.060	0.07	27.3	0.02	15	58	0.8	2
78500-46850	0.071	0.08	24.2	0.02	18	27	0.5	1
78500-46950	0.075	0.11	37.7	0.02	16	48	0.8	2
77500-46550	0.073	0.07	49.9	0.02	20	115	1.1	2
77500-46650	0.063	0.05	24.1	0.05	33	77	0.8	2
77500-46750	0.076	0.10	60.8	0.03	12	83	2.2	2
77500-46850	0.082	0.07	28.7	0.02	15	79	0.6	2
77500-46950	0.065	0.09	38.6	0.03	18	40	1.0	2
77500-47050	0.080	0.10	32.9	0.02	10	41	0.7	2
77500-47150	0.092	0.10	34.2	0.02	13	31	1.3	2
77500-47250	0.065	0.09	36.2	0.02	15	90	0.9	2

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Element Method Det.Lim. Units	@Be	@Bi	@Cd	@Ce	@Co	@Cs	@Ga	@Ge
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.1	0.02	0.01	0.05	0.1	0.05	0.1	0.1
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
84600-46900	<0.1	0.09	0.14	2.27	1.6	0.37	1.3	<0.1
84600-47000	<0.1	0.15	0.19	2.77	2.0	0.44	1.7	<0.1
86400-47050	0.1	0.12	0.11	3.53	3.2	0.47	2.1	<0.1
86400-47150	<0.1	0.04	0.10	2.48	1.0	0.19	0.8	<0.1
86400-47250	0.2	0.07	0.30	10.3	4.1	0.51	3.1	<0.1
86400-47300	0.5	0.11	0.23	40.3	4.3	0.43	5.1	0.1
86400-47350	<0.1	0.08	0.14	4.94	2.1	0.32	2.2	<0.1
86400-47400	0.2	0.10	0.12	12.0	1.5	0.18	2.1	<0.1
86400-47450	0.1	0.11	0.09	3.25	1.4	0.40	1.3	<0.1
86400-47500	0.8	0.22	0.26	64.9	10.8	0.88	8.3	0.1
86400-47600	0.1	0.12	0.13	3.60	2.1	0.46	2.5	<0.1
86400-47650	<0.1	0.07	0.17	1.53	0.9	0.23	0.6	<0.1
86400-47700	<0.1	0.05	0.15	4.96	1.4	0.32	1.3	<0.1
78500-46350	0.2	0.06	0.07	11.2	3.0	0.28	2.2	<0.1
78500-46450	<0.1	0.08	0.12	2.11	1.4	0.28	1.1	<0.1
78500-46550	<0.1	0.09	0.13	2.72	1.6	0.20	1.0	<0.1
78500-46700	<0.1	0.07	0.12	2.38	1.7	0.22	1.1	<0.1
78500-46750	<0.1	0.08	0.20	2.69	1.7	0.27	1.2	<0.1
78500-46850	<0.1	0.07	0.11	1.89	1.3	0.29	1.1	<0.1
78500-46950	<0.1	0.11	0.14	2.33	1.5	0.29	1.1	<0.1
77500-46550	<0.1	0.07	0.23	3.43	2.5	0.32	1.7	<0.1
77500-46650	0.1	0.09	0.14	5.69	3.1	0.60	2.7	<0.1
77500-46750	0.1	0.10	0.31	3.82	2.7	0.40	2.0	<0.1
77500-46850	<0.1	0.09	0.25	2.66	2.4	0.35	1.7	<0.1
77500-46950	<0.1	0.10	0.20	2.69	2.1	0.32	1.5	<0.1
77500-47050	<0.1	0.10	0.15	2.72	1.4	0.31	1.1	<0.1
77500-47150	<0.1	0.10	0.11	2.44	1.7	0.31	1.6	<0.1
77500-47250	<0.1	0.09	0.16	2.48	1.8	0.38	1.3	<0.1

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Element Method Det.Lim. Units	@Hf	@Hg	@In	@La	@Lu	@Mo	@Nb	@Pb
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.05	0.01	0.02	0.1	0.01	0.05	0.05	0.2
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
84600-46900	<0.05	0.16	<0.02	1.1	<0.01	23.5	0.33	13.9
84600-47000	<0.05	0.29	<0.02	1.4	<0.01	8.52	0.31	24.6
86400-47050	<0.05	0.23	<0.02	1.7	0.01	7.87	0.32	18.6
86400-47150	<0.05	0.15	<0.02	1.2	0.02	5.53	0.20	5.9
86400-47250	<0.05	0.07	<0.02	4.3	0.06	4.14	0.36	9.1
86400-47300	0.15	0.19	0.02	21.4	0.21	3.28	0.65	7.8
86400-47350	<0.05	0.34	<0.02	2.6	0.02	5.51	0.25	8.9
86400-47400	<0.05	0.26	<0.02	6.6	0.04	4.11	0.25	10.4
86400-47450	<0.05	0.27	<0.02	1.9	0.01	7.53	0.14	17.4
86400-47500	0.11	0.18	0.03	31.8	0.26	7.40	0.99	21.7
86400-47600	<0.05	0.20	<0.02	1.9	0.01	6.67	0.39	15.3
86400-47650	<0.05	0.36	<0.02	0.8	<0.01	10.4	0.06	9.5
86400-47700	<0.05	0.26	<0.02	2.5	0.02	5.99	0.18	5.1
78500-46350	<0.05	0.08	<0.02	5.6	0.05	7.89	0.42	6.2
78500-46450	<0.05	0.20	<0.02	1.1	<0.01	9.91	0.16	13.1
78500-46550	<0.05	0.15	<0.02	1.4	0.02	12.5	0.20	10.3
78500-46700	<0.05	0.21	<0.02	1.1	0.01	4.36	0.17	16.5
78500-46750	<0.05	0.14	<0.02	1.3	<0.01	7.93	0.17	14.2
78500-46850	<0.05	0.20	<0.02	0.9	<0.01	5.32	0.13	11.2
78500-46950	<0.05	0.25	<0.02	1.2	<0.01	6.68	0.16	16.2
77500-46550	<0.05	0.13	<0.02	1.8	0.02	3.28	0.22	12.7
77500-46650	<0.05	0.12	<0.02	2.5	0.03	2.98	0.49	12.3
77500-46750	<0.05	0.26	<0.02	1.8	0.02	4.47	0.43	18.1
77500-46850	<0.05	0.16	<0.02	1.2	0.01	4.16	0.25	16.9
77500-46950	<0.05	0.23	<0.02	1.3	0.01	3.55	0.26	20.9
77500-47050	<0.05	0.21	<0.02	1.3	<0.01	3.35	0.14	19.8
77500-47150	<0.05	0.27	<0.02	1.2	0.01	4.03	0.25	17.6
77500-47250	<0.05	0.23	<0.02	1.1	<0.01	5.49	0.20	15.3

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Element Method Det.Lim. Units	@Rb	@Sb	@Sc	@Se	@Sn	@Ta	@Tb	@Te
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B
	0.2	0.05	0.1	1	0.3	0.05	0.02	0.05
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
84600-46900	3.2	0.21	0.6	4	<0.3	<0.05	0.02	<0.05
84600-47000	6.5	0.34	0.6	5	0.3	<0.05	0.03	<0.05
86400-47050	6.3	0.24	0.6	4	<0.3	<0.05	0.04	<0.05
86400-47150	2.3	0.17	0.6	3	<0.3	<0.05	0.03	<0.05
86400-47250	11.3	0.12	1.3	4	0.4	<0.05	0.12	<0.05
86400-47300	4.2	0.46	3.3	4	0.4	<0.05	0.58	<0.05
86400-47350	3.0	0.31	1.1	5	<0.3	<0.05	0.07	<0.05
86400-47400	2.0	0.29	1.2	6	<0.3	<0.05	0.14	<0.05
86400-47450	6.4	0.25	0.6	4	<0.3	<0.05	0.03	<0.05
86400-47500	9.5	0.33	3.6	3	0.6	<0.05	0.86	<0.05
86400-47600	5.2	0.23	0.7	4	0.3	<0.05	0.04	<0.05
86400-47650	1.7	0.18	0.5	4	<0.3	<0.05	<0.02	<0.05
86400-47700	3.4	0.17	0.8	4	<0.3	<0.05	0.05	<0.05
78500-46350	3.9	0.11	1.1	1	<0.3	<0.05	0.13	<0.05
78500-46450	2.8	0.23	0.6	4	<0.3	<0.05	0.03	<0.05
78500-46550	1.9	0.19	0.5	4	<0.3	<0.05	0.04	<0.05
78500-46700	3.1	0.17	0.5	4	<0.3	<0.05	0.03	<0.05
78500-46750	3.0	0.16	0.6	3	<0.3	<0.05	0.02	<0.05
78500-46850	2.2	0.21	0.5	2	<0.3	<0.05	<0.02	<0.05
78500-46950	3.6	0.25	0.5	2	<0.3	<0.05	0.02	<0.05
77500-46550	3.6	0.16	0.7	4	<0.3	<0.05	0.04	<0.05
77500-46650	7.3	0.18	0.8	2	<0.3	<0.05	0.07	<0.05
77500-46750	5.8	0.27	0.9	5	<0.3	<0.05	0.04	<0.05
77500-46850	3.7	0.19	0.5	2	<0.3	<0.05	0.03	<0.05
77500-46950	5.8	0.30	0.7	3	<0.3	<0.05	0.03	<0.05
77500-47050	2.9	0.35	0.6	4	<0.3	<0.05	0.02	<0.05
77500-47150	3.2	0.24	0.6	4	<0.3	<0.05	0.03	<0.05
77500-47250	4.0	0.20	0.6	3	<0.3	<0.05	0.02	<0.05

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Element Method Det.Lim. Units	@Th	@Ti	@U	@W	@Y	@Yb	LOI
	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	GE_ICM14B	G_PHY01K
	0.1	0.02	0.05	0.1	0.05	0.1	-10.000
	ppm	ppm	ppm	ppm	ppm	ppm	%
84600-46900	0.2	0.03	0.14	<0.1	0.61	<0.1	62.6
84600-47000	<0.1	0.06	0.15	<0.1	0.76	<0.1	66.4
86400-47050	0.1	0.05	0.19	<0.1	0.89	<0.1	60.7
86400-47150	0.2	0.03	0.27	<0.1	0.94	<0.1	81.3
86400-47250	0.3	0.05	0.59	0.1	3.23	0.3	39.1
86400-47300	1.4	0.08	7.69	<0.1	16.2	1.2	70.5
86400-47350	0.3	0.06	0.47	<0.1	1.80	0.1	79.4
86400-47400	0.5	0.03	0.89	<0.1	3.90	0.3	83.1
86400-47450	<0.1	0.04	0.16	<0.1	0.91	<0.1	69.4
86400-47500	1.7	0.12	5.09	0.2	23.4	1.6	50.0
86400-47600	0.1	0.04	0.23	0.1	1.00	<0.1	45.5
86400-47650	<0.1	0.05	0.12	<0.1	0.51	<0.1	82.2
86400-47700	0.3	0.02	0.68	<0.1	1.36	0.1	75.8
78500-46350	0.3	0.03	0.80	0.1	4.10	0.3	39.5
78500-46450	0.1	0.04	0.10	<0.1	0.70	<0.1	74.7
78500-46550	0.1	<0.02	2.01	<0.1	1.13	<0.1	64.8
78500-46700	0.1	0.04	0.10	<0.1	0.68	<0.1	61.3
78500-46750	0.2	0.03	0.17	0.1	0.63	<0.1	47.6
78500-46850	<0.1	0.03	0.09	0.2	0.47	<0.1	55.5
78500-46950	0.2	0.05	0.10	<0.1	0.65	<0.1	67.7
77500-46550	0.2	0.04	0.15	<0.1	0.91	<0.1	55.5
77500-46650	0.3	0.06	0.28	<0.1	1.82	0.2	38.4
77500-46750	0.2	0.11	0.13	0.1	1.14	<0.1	69.4
77500-46850	<0.1	0.06	0.09	<0.1	0.67	<0.1	61.6
77500-46950	0.6	0.05	0.33	<0.1	0.71	<0.1	68.8
77500-47050	0.1	0.05	0.22	<0.1	0.58	<0.1	77.3
77500-47150	<0.1	0.04	0.13	<0.1	0.74	<0.1	69.9
77500-47250	0.1	0.04	0.10	0.1	0.62	<0.1	60.1

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