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**ASSESSMENT REPORT TITLE PAGE AND SUMMARY**

**TITLE OF REPORT: Dump Rock Study, Silver King Mine**

**TOTAL COST: \$4,720.33**

AUTHOR(S): J. Donald Graham, P. Eng.

A handwritten signature in black ink that reads "J. Donald Graham".

SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): N/A

STATEMENT OF WORK EVENT NUMBER(S)/DATE(S):

YEAR OF WORK: 2014 & 2015

PROPERTY NAME: Silver King Mine

CLAIM NAME(S) (on which work was done):

Charter (title on. 394637) and unnamed title 1029505

COMMODITIES SOUGHT: silver, copper, lead, zinc

MINERAL INVENTORY MINFILE NUMBER(S),IF KNOWN: 082FSW176

MINING DIVISION: Nelson

NTS / BCGS: 082F/6

LATITUDE: 49 ° 25' 18" N

LONGITUDE: 117° 18' 04"

UTM Zone: 11 EASTING: 478200  
Northing 5474300

OWNER(S): J. D. Graham & J. D. Graham & Associates Ltd.

MAILING ADDRESS: 8740 Brouwer Place, Chemainus, BC, V0R 1K5

OPERATOR(S) [who paid for the work]: J. D. Graham & Associates Ltd.

MAILING ADDRESS: above

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude. **Do not use abbreviations or codes**)

Dump rock, sorting, concentration, assay of copper, silver, lead, zinc. Value of rock

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:  
EMPR ASS RPT 12611

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
RELATED TECHNICAL			
Sampling / Assaying	15 kg of samples	394637 and 1029505	\$4720.33
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale/area)			

# Dump Rock Study Silver King Mine

NELSON MINING DIVISION  
BRITISH COLUMBIA

NAD 83 UTM 11 478200E, 5474300N  
MAPSHEET: 082F/6

Registered Owner: J. D. Graham

Operator: J. D. Graham & Associates Ltd.

Author J. D. Graham, P. Eng.

Date submitted: January 16, 2015  
Modified and resubmitted September 14, 2015

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## 1. Introduction

The Silver King mine is located 7 kilometres southeast of the town of Nelson in southeastern British Columbia on the north east slope of Toad Mountain. The terrain has moderate slopes in a sub alpine setting. Portions of the property were logged in the late 1980's. Access from the Nelson – Salmo highway is via the Gold Creek logging road.

The property is underlain by the Lower Jurassic Elise Formation. Mineralization occurs in the Silver King shear zone. The Silver King Mine produced from 1889 to 1913, then intermittently up to 1958. Production of 202,049 tonnes of ore returned 138,214,612 grams silver, 8,896 grams gold, 6,789,739 kilograms copper, 15,234 kilograms lead and 4,071 kilograms zinc. Average grade was 684 g/t silver and 3.36% copper.

MINFILE resources include dumps containing 6,186 tonnes, grading Ag 4.13 grams per tonne, Cu 1.16% and Pb 0.09%. (Aylward, Assessment Report 12611, 1983) The work documented in the present report is a preliminary study of the feasibility of identifying ore grade dump mineralization with a view to sorting and shipping for concentration and smelting.

Work was done on the following claim.

<u>Number</u>	<u>Name</u>	<u>Owner</u>	<u>Anniversary</u>	<u>Size (Ha)</u>
394637	Charter	J. D. Graham	February 28	25

Note: This claim is held in trust for J. D. Graham & Associates Ltd.

## 2. Regional and Local Geology

Hoy and Andrew (1989) describe the regional geology of the Nelson area, as follows (Map 2). Most of the Nelson region is underlain by Jurassic-aged mafic to intermediate volcanic rocks of the Rosslund Group, comprised of three formations: Archibald, Elise, and Hall. Volcanic rocks of the Elise Formation host the Silver King mine. Coarse clastic sediments make up the overlying Hall Formation, and finer clastic metasediments comprise the underlying Archibald Formation. These formations are intruded by the mid to late Jurassic Nelson Batholith, mid Eocene Coryell syenite, and Tertiary rhyolite and lamprophyre dykes. The Elise Formation consists of interfingering lenses of massive to brecciated, mostly andesitic to mafic flows, tuffs, subvolcanic porphyries, and minor epiclastics. The Silver King mine is hosted by the upper Elise Formation within predominantly mafic to intermediate volcanic and volcanoclastic rocks. Northwest trending tight folds and associated shear zones dominate the structure of the Toad Mountain area. The Hall Creek syncline, a south-

plunging, west-dipping, overturned fold, is the most prominent feature in the region. The core of this fold comprises a zone of intense shearing called the Silver King Shear. The Silver King Property lies directly over this shear zone, which exceeds 1000 metres in width. The shear is the focus of abundant sericite, chlorite, quartz, carbonate, hematite, and epidote alteration in discrete to pervasive zones throughout the property.

The Elise Formation is the main host rock for mineralization at Silver King, and is mainly comprised of volcanic augite porphyry and chlorite schist. Volcaniclastic rocks are mostly coarse mafic to intermediate pyroclastic or flow breccias. Lenses of more felsic material are common, and have been variously interpreted as either metasedimentary/metavolcanic layers or intrusives. The Silver King Porphyry, a plagioclase porphyry of quartz-dioritic composition, outcrops to the southeast of the Silver King Mine area (Mulligan, 1952 and Hoy and Andrew, 1989), but is not presently a major host to mineralization. The Silver King Shear Zone trends northwest along the Hall Creek Syncline and is bounded by the Silver King Intrusion in the southeast and the Eagle Creek Plutonic Complex in the northwest.

There are several mineralized veins and structures on the Silver King property, including the Main Silver King Vein, King Vein, Iroquois Vein, and Kohinoor Vein. These veins strike southeast, subparallel to the Silver King shear. Other known veins include the K-vein, Cross Fault structure, and Queen Vein which strike approximately north-south or east-west. All mineralized veins occur as siliceous (quartz-chalcedony-chert) breccias within larger iron-manganese carbonate alteration halos. Hematite spotting and dusting is common in the carbonate alteration halo, and often extends into lesser-altered andesite host rocks. The andesite may be chloritized or sericitic, and locally exhibits epidote alteration. Significant zones within the andesitic host rocks comprise quartz  $\pm$  carbonate "spotted" andesites. However, this spotted texture, previously referred to as "amygdaloidal", is actually a feature resulting from tectonic milling in a hydrothermal environment, resulting in shearing and cross-shearing of previously formed quartz and carbonate veins and stockwork. The main sulphide minerals in the veins include pyrite, chalcopyrite, galena, sphalerite, tetrahedrite-tennantite, and bornite. There is also minor argentite, stromeyerite, and other silver-bearing minerals. Alteration associated with mineralized veins is well-zoned, is well-zoned, from distal regional calcite and chlorite to proximal iron manganese carbonate and quartz.

### **3. Detailed Technical Data and Interpretation**

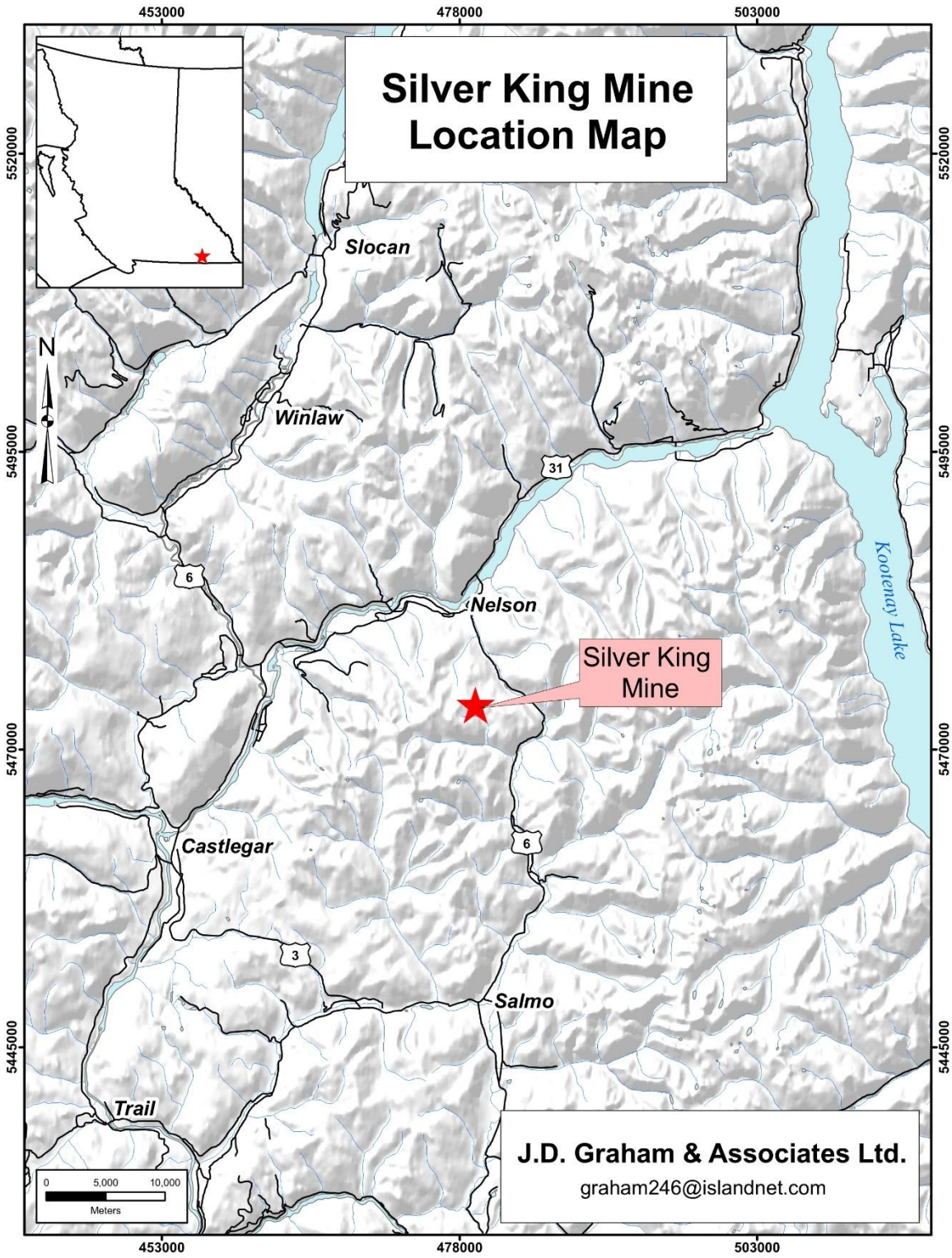
#### **3.1 Objective and Scope**

The potential exists for recovering ore from the Silver King dumps. On-site preliminary concentration is indicated to reduce the cost of transport to a final concentration site. Various approaches for on-site preliminary concentration are possible including sink-float technology and hand sorting. Visual grade estimation would be required to guide the on-site preliminary concentration.

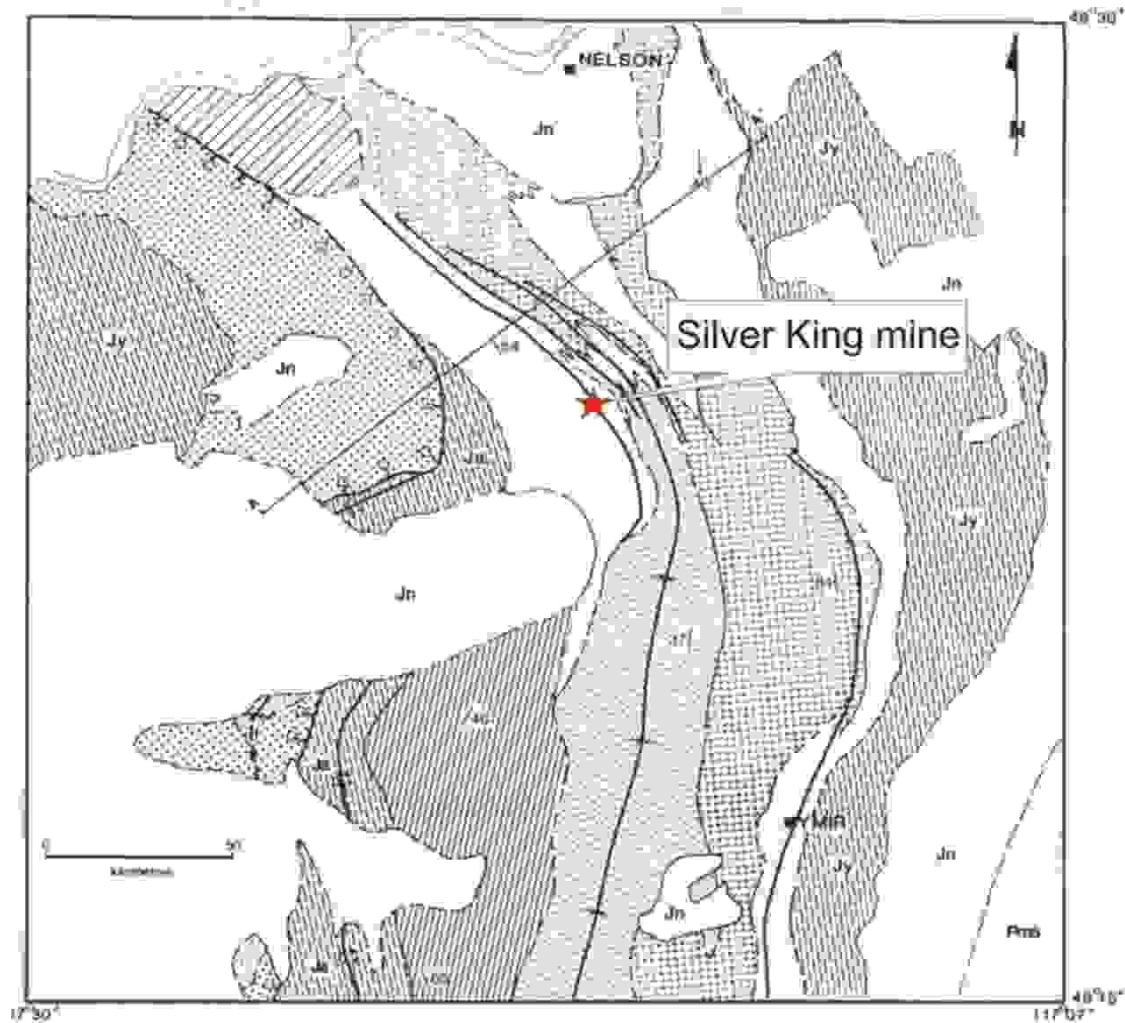
The primary objective of this study is to obtain a preliminary measure of the grade of mineralized rock in the dump. The secondary objective is to establish a guide for visual grade estimation and to provide experience in identifying stromeyerite, the primary silver bearing mineral. The scope of this work is the study and analysis of a limited number of hand specimens collected from dumps to achieve the stated objectives.

The Dandy dump is one of the most accessible of the Silver King dumps. Inspection of the dump surface rock indicates that this may be one of the largest and highest grade dump on the property. It is not known why this dump was not sampled nor mentioned by Aylward. Stromeyerite is believed to be present in the smaller Bonanza dump, another dump not sampled by Aylward.





**Map 1**



LEGEND

MIDDLE JURASSIC

Jn NELSON intrusions

LOWER OR MIDDLE JURASSIC (?)

diorite (?)

LOWER JURASSIC

ROSSLAND GROUP

SILVER KING intrusions

HALL FORMATION

ELISE FORMATION

Upper Elise

intermediate to mafic lapilli, crystal and fine tuff

intermediate lapilli and crystal tuff

Lower Elise

mafic flow tuff, flows

mafic pyroclastic breccia, crystal tuff

ARCHIBALD FORMATION

YMIR GROUP

PALEOZOIC

Pms metasedimentary rocks

How and Andrew (1988)

Regional Geology  
Map 2

### **3.2 Ore Minerals**

Ore minerals are primarily chalcopyrite, bornite, stromeyerite, galena and sphalerite. In the Kootenay mines silver is usually associated with galena. However at the Silver King the presence of stromeyerite suggests a closer silver – copper association.

### **3.3 Selection and treatment of samples**

The Dandy dump was chosen for study because of the abundance of higher grade rock. Approximately 15 kilograms of well mineralized dump rock was collected. Lab work commenced by selecting the more heavily mineralized samples for study (samples #1SK to #9SK). Sample sizes varied from 400 to 700 grams. A 200 gram sample, identified as “Strom”. containing a mineral thought to be stromeyerite was collected during examination of the Bonanza dump.

The author examined, photographed, described and estimated the Cu, Ag and Pb grade of each sample. A one centimetre slice was cut from the middle of each sample using a diamond blade. Orientation of the cut was such that the slice was representative of the grade of the sample.

Assay results are required to evaluate the visual grade estimates. Slices from what appeared to be the higher grade sample were submitted for assay. The sample Strom, was submitted for assay to determine if the mineral stromeyerite was present in the sample.

### **3.4 Description of the Samples**

#### **Sample #1SK**

Dark rock, not an impressive amount of mineralization seen on un-cut surface. Qtz stringers up to 5 mm wide, and blebs of qtz up to 5 mm wide making up 10 to 15% of cut surface. Blebs of chalcopyrite and galena in qtz and in ground mass.

Estimated Grade: Cu 2%, Pb 1%

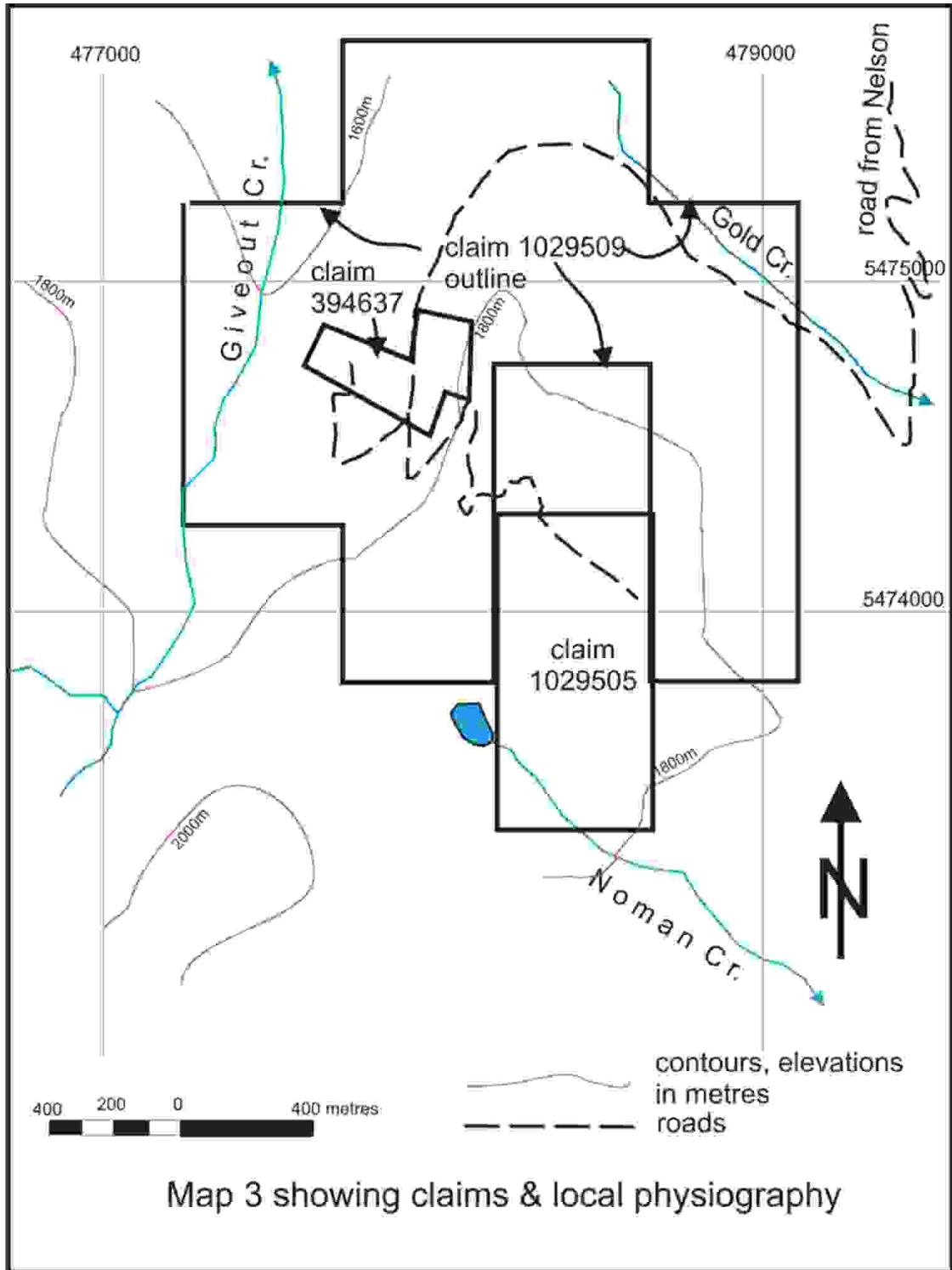
Not assayed because the grade was estimated to be too low.

#### **Sample #2SK**

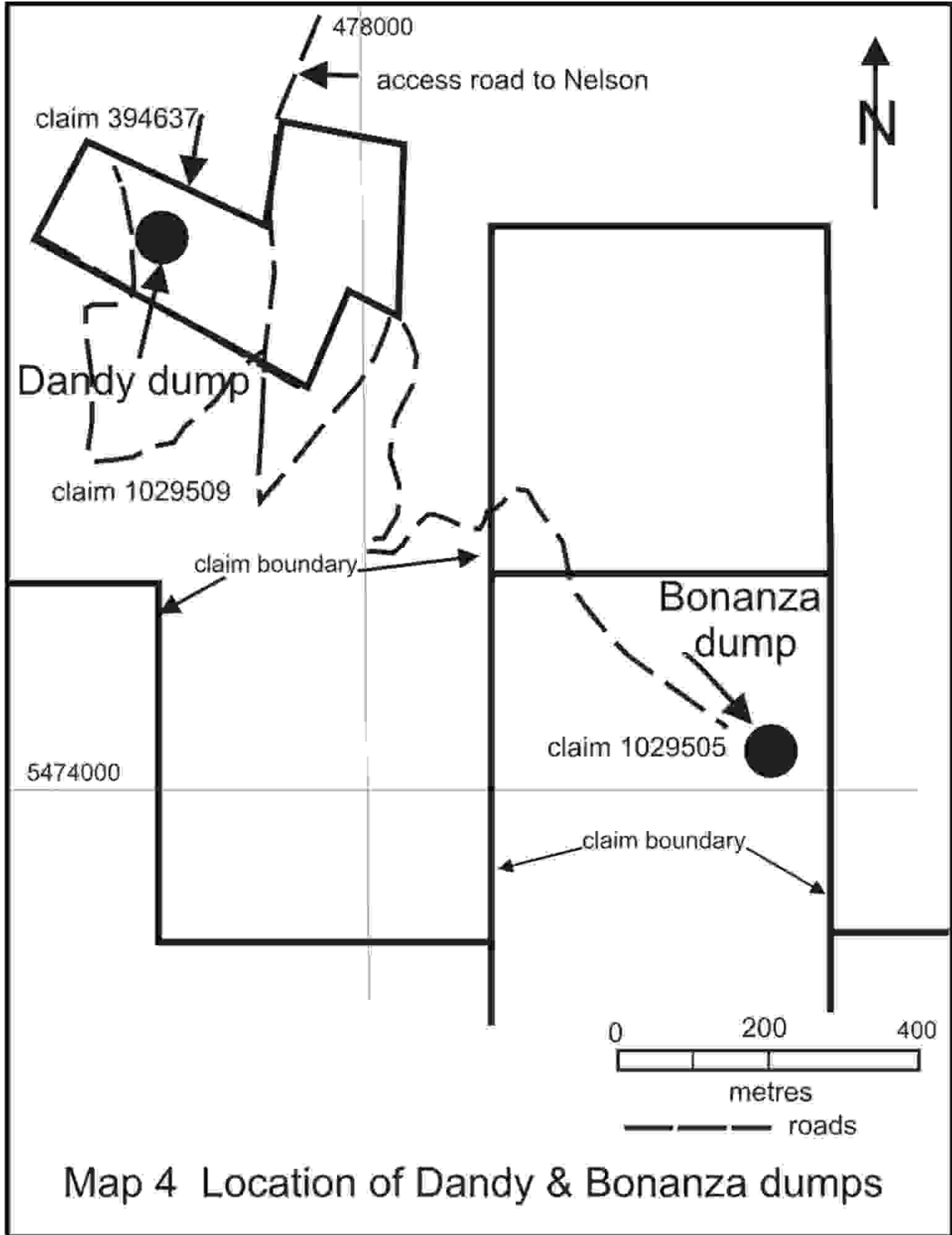
Dark grey rock, siliceous. Surface of specimen shows some sulphides (10%) but cut face shows up to 15 to 20% mineralization. Crenulated qtz stringers up to 5 mm wide on cut surface. 30% of cut surface is sparsely mineralized and contains no qtz stringers.

Estimated Grade: Cu 5%

Not assayed because the total metal content was estimated to be too low.



Map 3 showing claims & local physiography



Map 4 Location of Dandy & Bonanza dumps

**Sample #3SK**

Dark grey rock, visible qtz banding. Heavy, indicating high metallic mineral content. Visible mineralization on surface, both massive band of sulphides 2 cm thick, in qtz veinlet and disseminated. Chalcopyrite and galena.

Estimated Grade: Cu 10% Pb 3%

Assay: Cu 2.2%, Pb 4.7%, Ag 241g/tonne or 7.8 oz/tonne, Zn 1%

**Sample #4SK**

Dark surface, primarily due to oxidized sulfides. Qtz veinlet on one surface but only occasional qtz bleb present on cut surface. Cut surface 30% disseminated sulphides, of which 90% is chalcopyrite with minor galena.

Estimated Grade: Cu 6%, Pb 1%

Assay: Cu 3.3%, Pb 1.6%, Ag 622g/tonne >20 oz/tonne, Zn 0.2

**Sample #5SK**

Well mineralized surface, 10 to 15% qtz blebs. Heavy. Cut surface 10 to 15% disseminated mineral, chalcopyrite-galena 50-50.

Estimated Grade: Cu 4% Pb 10%

Assay: Cu 3.2%, Pb 14%, Ag 543g/tonne or 17.5 oz/tonne, Zn 0.1

**Sample #6SK**

Dark surface, primarily due to oxidized sulfides. Broken surfaces well mineralized Silicified. Heavy. Cut surface 10 to 15% disseminated mineral, chalcopyrite-galena 90-10.

Estimated Grade: Cu 3%, Pb 1%

Not assayed because the grade was estimated to be too low.

**Sample #7SK**

Dark surface with sulfides, including minor "peacock" bornite oxidation, and minor qtz showing on broken surfaces. Very heavy. Cut surface 70% sulfides in a siliceous matrix. Chalcopyrite-galena 50-50

Estimated Grade: Cu 8%, Pb 25%

Assay: Cu 2.9%, Pb >20%, Ag 325g/tonne or 10.5 oz/tonne, Zn 3.9

**Sample #8SK**

Dark surface with sulfides showing through the oxidation. Some cleavage-like faces. Heavy. Cut face shows 40% sulfides in oriented, poorly banded orientation. Chalcopyrite-galena 80-20

Estimated Grade: Cu 8%, Pb 7%

Assay: Cu 4.4%, Pb 3.3%, Ag 333g/tonne or 10.7 oz/tonne, Zn 2.6

**Sample #9SK**

Irregular 10 mm to 2 mm qtz vein in a grey to black banded siliceous rock. Sulfides associated with the qtz and in the ground mass. Cut face shows 10% sulfides disseminated and in 2 mm or narrower veinlets and blebs set in a siliceous ground mass. Chalcopyrite-galena 80-20

Estimated Grade: Cu 2%, Pb 1%

Not assayed because the grade was estimated to be too low.

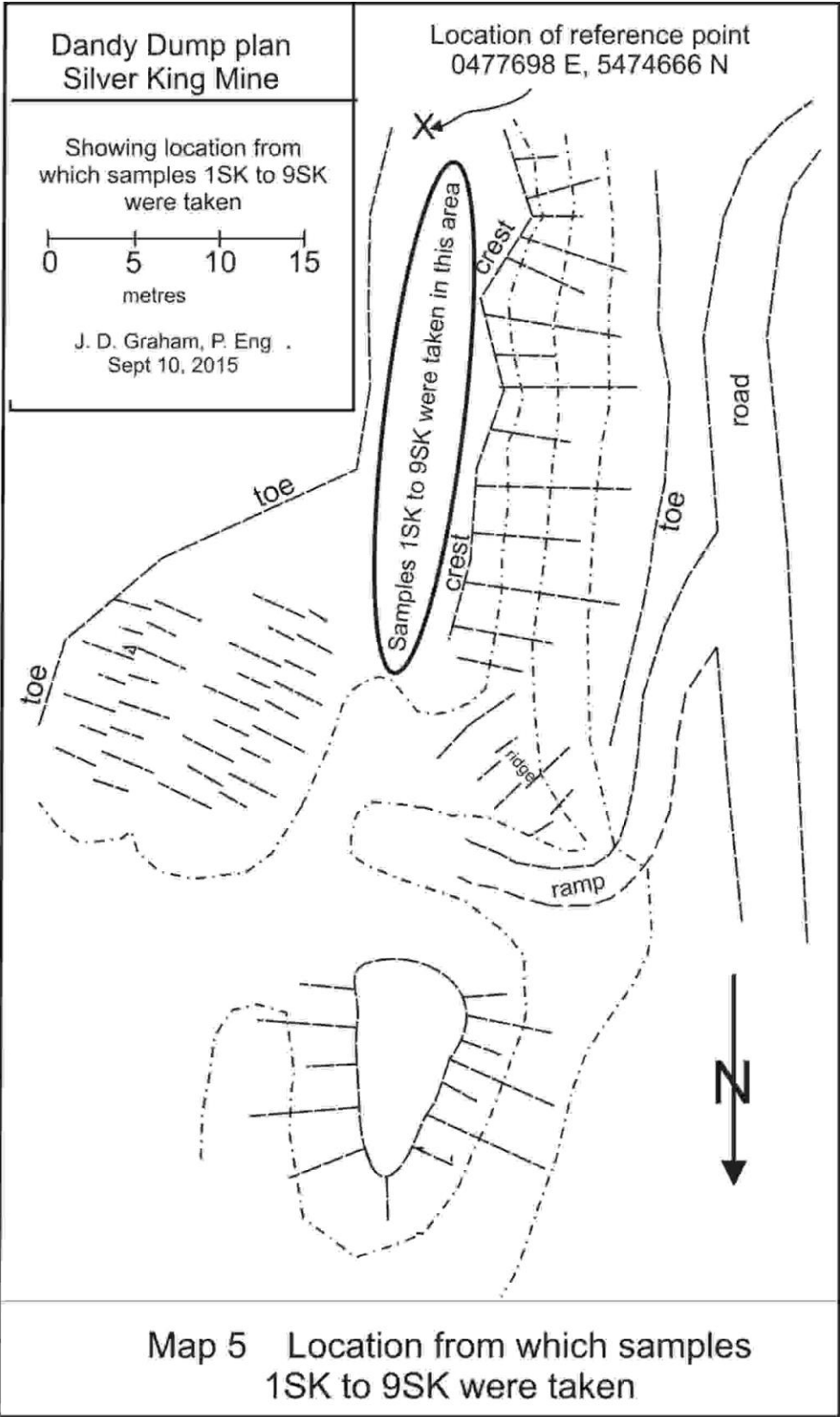
### **Sample Strom**

Tan coloured rock, yellow tones, 2 to 5% chalcopyrite, malachite staining. Black mineral, showing some cleavage?, hardness 3 or 4, shiny purple cast, brown streak occurring in poorly formed bands or blebs. Has the appearance of an oxidation product. This black mineral makes up approximately 25% of the specimen.

No estimated grade

Assay: Cu 2.2%, Pb 0.5%, Ag 52g/tonne 1.7 oz/tonne, Zn 0.1







### 3.5 Discussion/Interpretation of Results

Study of the visual grade estimates compared to assay results listed above leads to the following observations.

For samples #4SK and #8SK the Cu assay value was one half the visual estimate; in #5SK the visual Cu was close to the assay (4% vs 3.2% for the assay). In two of the samples the actual Cu assay value was lower by factors of 5 (#3SK) and 3(#7SK). The conclusion is that estimation Cu content is difficult. Estimation requires more practise and can benefit from the assay results.

Pb content was more accurately estimated than that of Cu. Pb estimates tended to be lower than the assay.

Ag content clearly correlated with Cu content rather than Pb assay.

The low Ag assay of the Strom sample indicated that the mineral thought to be stromeyerite was incorrectly identified.

A Canadian dollar value was calculated for the five Dandy dump samples assayed. The value is given for a tonne of rock having a metal content equal to the sample assay.

Assaying was by ALS Canada Ltd. The assay certificate is located in the Appendix.

#### Table A – Factors Used in calculating values

Can \$/US\$ exchange rate: 0.88  
 Recovery of all metals: 85%  
 Pounds per tonne for each percent: 22  
 Cu US\$/lb: \$2.90, Pb US\$/lb:\$0.93, Ag US\$/oz \$16, Zn  
 US\$/lb: \$1

#### Table B – Sample Assay Values

Sample	Ag ppm or gm/tonne	Cu %	Pb %	Zn %
3	241	2.2	4.8	1.0
4	622	3.3	1.6	0.2
5	543	3.2	14	0.1
7	325	2.87	20	3.9
8	333	4.4	3.3	2.6

**Table C – Sample Dollar Values**

Sample	Ag	Cu	Pb	Zn	Recovered value/tonne
3	\$120.15	\$135.58	\$94.86	\$21.25	\$371.83
4	\$ 310.09	\$203.36	\$31.62		\$545.07
5	\$270.70	\$197.20	\$ 276.68		\$744.58
7	\$162.02	\$176.86	\$395.25	\$82.88	\$817.01
8	\$166.01	\$271.15	\$65.22	\$55.25	\$557.63

It is interesting to note that in two of the samples (#5 & #7) the Pb value exceeds the value of both Ag and Cu. This is a surprise considering that the historic Pb production value was eclipsed by Ag and Cu. In only two samples (#4 & #5) did Ag value exceed the Cu value.

Drilling on the lower elevation of the property in the area of the Dandy adit portal has returned higher ratios of Pb. The higher Pb dump values therefore suggest that a significant proportion of the Dandy dump material came from the lower levels of the mine. Considering that the Dandy adit is the lowest in the mine, this is a reasonable assumption.

#### **4 Conclusions and Recommendations**

This preliminary investigation of the Dandy dump indicates that, even at the lower metal prices prevailing at the end of 2014 / beginning of 2015, the dump shows the potential for a profitable onsite sorting operation.

This potential warrants the following program:

1. Collection of a larger dump rock sample for examination and assay;
2. Dump mapping, including estimation of dump tonnage;
3. Evaluation of preliminary on-site sorting methods and costs; and
4. Estimation of haulage, concentration and smelting costs.

## 5 References

1. EMPR ASS RPT 12611
2. "Material Properties Affecting the Stability of a 50-Year-Old Rock Dump in an Active Mine" D.R. Tesarik and R.W. McKibbin U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
3. **HOY, T. and ANDREW, K.** 1989a; Geology of the Nelson Map Area, Southeastern BC: BC Ministry of Mines. Geological Survey Branch, Open File 1989-11.
4. **HOY, T. and ANDREW, K.** 1989b; The Rossland Group, Nelson Map Area, Southeastern BC: Ministry of Energy and Mines, Fieldwork 1988.
5. **MUMIN, H., 2009**; Technical Report on the Fall 2009 Drilling, Silver King Mine Property: Unpublished Report for Excalibur Resources Ltd.

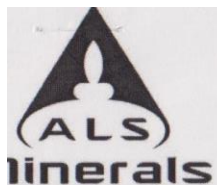
### Itemized Cost Statement

1. J. D. Graham, P. Eng.: July 10 & 11, 2014 Field work at Silver King, and return travel time 16 hours @ an avg. rate of \$62.5/hr,	\$1,000.
2. J. D. Graham, P. Eng.: lab work, map preparation and report writing including preparation of cost statement and submission 30.2 hours @ an average rate of \$95.29/hr.	\$2,877.76.
3. Transportation, accommodation and meals plus Use of 4x4 vehicle, Ferry charges, vehicle, return to Vancouver Island	\$1,204.35
4. Expenses: rental of diamond saw and tool \$50, Assays <span style="float: right;"><u>\$188.48</u></span> <span style="float: right;">\$238.38</span>	 \$238.48
Total	<hr/> \$5,320.59

## Author's Qualifications

I, John Donald Graham, P. Eng., certify that:

1. I am a graduate of the University of British Columbia, holding the following degrees granted by UBC: B. Appl. Sc., Geological Engineering, and M. Appl. Sc., Mining Engineering, and
2. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia, and
3. I have practiced my profession in the areas of mineral exploration and mine operations continuously since 1964. My qualifications include the technical and managerial aspects of the profession.



ALS Canada Ltd.  
 2103 Dollarton Hwy  
 North Vancouver BC V7H 0A7  
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: J.D. GRAHAM & ASSOCIATES LTD.  
 8740 BROUWER PLACE  
 CHEMAINUS BC V0R 1K5

Page  
 Total # Pages: 2  
 Plus Appendix Pa  
 Finalized Date: 29- NOV- 20  
 This copy reported  
 1- DEC- 2  
 Account: JGRA

**CERTIFICATE VA14181383**

This report is for 6 Rock samples submitted to our lab in Vancouver, BC, Canada on 1- NOV- 2014.

The following have access to data associated with this certificate:

DON GRAHAM

**SAMPLE PREPARATION**

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
PUL- 31	Pulverize split to 85% < 75 um

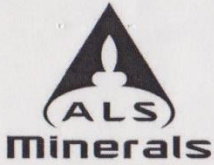
**ANALYTICAL PROCEDURES**

ALS CODE	DESCRIPTION	INSTRUMENT
ME- OG46	Ore Grade Elements - AquaRegia	ICP- AES

To: J.D. GRAHAM & ASSOCIATES LTD.  
 ATTN: DON GRAHAM  
 8740 BROUWER PLACE  
 CHEMAINUS BC V0R 1K5

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: \_\_\_\_\_



ALS Canada Ltd.  
 2103 Dollarton Hwy  
 North Vancouver BC V7H 0A7  
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: J.D. GRAHAM & ASSOCIATES LTD.  
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 CHEMAINUS BC V0R 1K5

Page: 2 - A  
 Total # Pages: 2 (A)  
 Plus Appendix Pages  
 Finalized Date: 29- NOV- 2014  
 Account: JGRATE

CERTIFICATE OF ANALYSIS VA14181383

Sample Description	Method Analyte Units LOR	WEI- 21	ME- OG46	ME- OG46	ME- OG46	ME- OG46
		Recvd Wt. kg	Ag ppm	Cu %	Pb %	Zn %
		0.02	1	0.001	0.001	0.001
#3SK		0.08	241	2.19	4.75	1.020
#4SK		0.08	622	3.30	1.600	0.166
#5SK		0.14	543	3.16	14.00	0.083
#7SK		0.16	325	2.87	>20.0	3.87
#8SK		0.10	333	4.39	3.35	2.60
DOM		0.06	52	2.17	0.458	0.106

\*\*\*\*\* See Appendix Page for comments regarding this certificate \*\*\*\*\*

APPENDIX  
 ASSAY CERTIFICATE