MEMORANDUM

To:	**Casino Copper Corp.**	**Date: July 22, 2014**
From:	**Jennifer Owen, Bruce Mattson**	**Project #: J862-6**
Subject:	**Casino Mine Site Borrow Sites ML/ARD Potential**	

1. Introduction

A review of the available geochemical results for borrow material samples was completed to characterize the Metal Leaching and Acid Rock Drainage (ML/ARD) potential of the borrow material in the Casino Mine area. The relevant borrow material data included acid-base accounting (ABA) results and Metals by Aqua Regia Digestion results for 49 samples. Additionally, shake flask extraction (SFE) tests were completed on the 7 borrow material samples from the Open Pit area. A brief description of the test pit samples and a discussion of the geochemical results for these samples are provided below.

The results indicate that the borrow material from the majority of locations has a very low ML/ARD potential as the majority of samples have total sulphur values < 0.1% and little or no sulphide-sulphur mineralization. However, there is very little carbonate content and portions of the borrow material from the areas underlying the low grade stockpiles, the heap leach facility and the main power plant, may initially have mildly acidic paste pH values (PpH < 5). Organic acidity rather than sulphide acidity appears to be responsible for the depressed pH from these samples as demonstrated by the organic carbon content. These materials will not be a source of ARD.

There is moderate ML/ARD potential for the borrow material from the Open Pit area as some samples had total sulphur values greater than 0.1% and all samples show a lack of carbonate content available to provide neutralization potential. Although sulphide mineralization is lacking in the Open Pit borrow material samples, mildly acidic runoff could be generated from the dissolution of jarosite, similar to what has been documented in CAP waste rock, as some of the samples had mildly acidic paste pH values (PpH < 5). Shake flask extraction results indicate that Cu leaching may occur from borrow material from the Open Pit area.

2. Description of the Samples

The test pit samples are from the following areas at the Casino Property (Figure 1):

- The Open Pit,
- The Low Grade Ore Stockpiles,
- The Gold Ore Stockpile,
- The Heap Leach Facility,

- The Main Power Plant site,
- The Tailings Management Facility (TMF),
- The airstrip borrow area, and
- The barge landing access road borrow areas.

The results and conclusions presented in this memo are associated with borrow materials found above the bedrock layer. The samples were generally collected from test pits at depths ranging from 0.3 m to 4 m below surface, although 3 of the 7 samples collected from the open pit area were collected from between 7.5 m and 20 m below surface (Appendix A). The greater depth of the overburden at the Casino site is due to a lack of glaciation in the area.

The test pit samples generally range from silt to gravel and generally contain a trace of clay. In addition to the test pit samples, weathered granodiorite samples were collected near the TMF, the main power plant site, and the airstrip borrow area and one sample of blasted rock was collected at one of the barge landing access road borrow areas.

608,000 612,000 616,000

6,968,000 6,964,000 6,960,000 6,956,000 6,952,000 6,948,000

TP13-01

N

TP13-84

39-1
TP12-PIT-04
TP12-PIT-06
38-3
38-4
TP12-PIT-01
Open Pit
TP12-PIT-05
Marginal Grade Stockpile
Gold Ore Stockpile
TP11-04
TP13-48
Low Grade Stockpile
TP11-NAG-08
TP11-NAG-02
TP11-11
TP11-10
TP11-20
Main Power Plant
TP11-18
TP11-06
TP11-NAG-07
TP11-NAG-06
TP11-HLF-01
TP11-HLF-05
TP13-04
TP13-03
TP11-HLF-16
TP11-HLF-21
TP11-HLF-13
TP11-HLF-41
Heach Leap Facility
Low Grade Stockpile
Tailings Management Facility (TMF)
TP11-TMF-99
TP11-TMF-94
TP11-TMF-05
TP13-14
TP11-TMF-01
TP11-TMF-10
TP11-TMF-09
TP11-TMF-34
TP11-TMF-12
TP13-33
TP11-TMF-13
TP11-TMF-100
TP13-27
TMF Embankment
TP13-28

Airstrip Borrow Area
TP13-76
TP13-78
TP13-76

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LEGEND

Test Pit Sample

- Paste pH <5.0, Total S > 0.1%
- Paste < 5.0, Total S < 0.1%
- Paste pH > 5.0, Total S > 0.1%
- Paste pH > 5.0, Total S < 0.1%
- Site Facility Maximum Footprint
- 20m Elevation Contour

DATE SAVED:	Jul 07, 2014
DRAWN BY:	AL
REVIEWED:	BM
VERSION:	1

Coordinate System: *NAD 1983 UTM Zone 7N*
Projection: *Transverse Mercator*
Datum: *North American 1983*
Units: *Meter*

1:60,000

0 0.5 1 Km

CLIENT:

western COPPER AND GOLD

LORAX ENVIRONMENTAL

PROJECT:

Casino Project

TITLE:

Test Pit
Sampling Locations

PROJECT #: J862-6

FIGURE: 1

P:\J862 (Casino)\Road\Drafting\MXDs\Figure 2 Casino Test Pit Sampling Locations_2014605_AL.mxd

3. Geochemical Results

The geochemical risk of the borrow materials is determined from the paste pH (PpH) and total sulphur (S_{TOT}) content of the samples rather than from a calculation of the net potential ratio (NPR), which is the standard method for sulphide-bearing waste rock at mining projects. The direct assessment of paste pH and total sulphur is more appropriate for weathered overburden that may contain low amounts of residual acidity associated with metastable oxidation products such as jarosite. The ABA criteria used to identify materials with ML/ARD potential are:

- PpH < 5.0 and
- S_{TOT} > 0.1 %S.

3.1 Open Pit

Four of the 7 test pit samples from the Open Pit area had paste pH values less than 5 (Table 1 and Appendix B.1). This result indicates that this material may produce mildly acidic runoff immediately after excavation. Two of the samples with low paste pH also had relatively high total sulphur content (1.04% and 0.1%), indicating that there is some longer term acid generating potential from borrow material from the Open Pit area. There were two additional samples with total sulphur values greater than 0.1%, although the paste pH was greater than 5. Although the sulphur is in the form of sulphate rather than sulphide in the Open Pit borrow material samples, mildly acidic runoff could be generated from the dissolution of the sulphate-mineral jarosite, similar to what has been documented in CAP waste rock. In addition, due to some enrichment of metals relative to average continental crustal abundance (*e.g.* Cu, Mo), there may be some metal leaching from borrow material from the Open Pit area (Table 2 and Appendix B.2). Based on these results, borrow material from the Open Pit area is considered to have moderate ML/ARD risk.

3.1.1 Shake Flask Extractions

Metal contents measured in SFE provide a measure of the mass of readily soluble metals which will be immediately available for leaching upon exposure to infiltrating water. SFE tests were conducted on the samples from the Open Pit area since 4 of the 7 samples had total sulphur contents greater than or equal to 0.1%. As discussed above, these higher sulphur values indicate a higher potential for ML/ARD.

In order to highlight the significance of various SFE results, the results are compared to Metal Mining Effluent Regulations (MMER, 2002) and Yukon Contaminated Sites Regulation, Schedule 3 (Yukon CSR, 2002) water quality standards for aquatic life (Table 3). Hardness dependent guidelines, including Cd, Cu, Ni and Pb, were calculated based on the mean water hardness of 111.4 mg $CaCO_3$/L measured at the water quality station on lower Casino Creek.

The only parameter to exceed MMER guidelines in the SFE tests is dissolved Cu in one sample (TP12-PIT-05). This sample had a lower solid phase Cu concentration relative to several of the other borrow samples from the open pit, indicating that Cu release is likely due to its relatively low SFE pH. The Yukon CSR standard for Cu (0.05 mg/L) is exceeded in 5 of 7 samples (1.3 to 9.8 times above the guideline), indicating that Cu is the main parameter of concern for metal leaching from the borrow material. Additional parameters which exceed the Yukon CSR standards include Cd (2 samples) and Co (4 samples). These exceedances are generally marginal, the Cd values are 1.2 to 2.1 times the guideline and the Co values are 1.0 to 5.5 times the guideline.

3.2 Ore Stockpiles, Heap Leach Facility and Main Power Plant

The low grade ore stockpiles, gold ore stockpile, heap leach facility and main power plant site are located adjacent to the Open Pit. Seven of 19 samples have paste pH values less than 5, indicating that there may be some mildly acidic runoff following excavation (Table 1 and Appendix B.1). However, the total sulphur values for all of the borrow material samples collected in these areas remain low (range: <0.01 to 0.09%, median: 0.01%). The lower paste pH values are expected to be related to higher organic C values. The samples with paste pH less than 5 have organic C values between 0.46 and 3.16% (median: 1.23%), while the samples with a higher paste pH typically have lower organic C (range: 0.03% to 0.97%, median: 0.17%). These results indicate that the borrow material from these areas has a low ARD risk.

3.3 Tailings Management Facility

The samples from the TMF area were collected from the embankment area at the southern end of the TMF. These test pit samples typically have higher paste pH values relative to the samples collected closer to the Open Pit area. Only one of 14 samples had a paste pH value below pH 5 (Table 1 and Appendix B.1). In addition, total sulphur values remain low for all samples (range: <0.01 to 0.07%, median: 0.01%). Based on these results, these samples are classified as non-acid generating.

3.4 Airstrip and Barge Landing Access Road Borrow Areas

Four samples were collected from the airstrip borrow area, located south of the project area and 5 samples were collected from two locations along the proposed barge landing access road, to the north of the project area. The samples indicate that the borrow material in these areas are non-acid generating as the paste pH values are high (> PpH 7) and the total sulphur values are low (0.01% or lower) (Table 1 and Appendix B.1).

4. Recommendations

The geochemical results indicate that there is some potential for ML/ARD from the borrow material from the Open Pit area and low to no ML/ARD potential from the other areas. Based on these findings, it is expected that borrow with a low ML/ARD risk can be derived from all the borrow areas identified except within the proposed open pit limits. However, it is recommended that a ML/ARD Management Plan be developed for each area prior to the excavation of borrow material to confirm these preliminary findings. The ML/ARD Management Plans should include the following:

- An accounting of the quantity of material expected to be excavated from each site subdivided into the quantity of bedrock, weathered bedrock, alluvium and colluvium that would be removed at each site, in addition to the lithologic composition and stratigraphic affiliation if applicable.
- At least three test pit samples should be collected from each borrow site and submitted for geochemical analysis, including ABA and total metals analysis, prior to excavation. Increased sampling and sample planning should be conducted in proposed borrow areas within the open pit extents and immediately adjacent to the open pit where a higher degree of ML/ARD risk was identified.

This approach will ensure that all borrow material used for construction will have a low ML/ARD potential.

5. References

Metal Mining Effluent Regulations (MMER) (2002). Analytical Requirements for Metal Mining Effluent, Schedule 3, Subsections 1(1), 12(2) and 20(5), Fisheries Act, Department of Justice Canada, Registration June 6, 2002. Last amended on March 2, 2012.

Yukon Contaminated Site Regulation, Schedule 3 (Yukon CSR) (2002). Environment Act Contaminated Sites Regulations Schedule 3, O.I.C. 2002/171, September 30, 2002.

Table 1:
Summary of ABA Results

Parameter	Units	Borrow Location											
		Open Pit			Low Grade Stockpiles, Gold Ore Stockpile, Heap Leach Facility and Power Plant Site			Tailings Management Facility			Airstrip Borrow Area and Barge Access Road Borrow Areas		
Number of Samples		7			19			14			9		
		Min	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**
Rinse pH	-	3.57	4.54	5.08	4.14	4.92	6.86	4.19	5.23	6.71	5.32	6.54	7.77
Paste pH	-	3.71	4.85	5.67	4.26	5.34	7.59	4.89	6.02	7.6	7.01	7.9	9.09
TIC	%	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.01	0.17	<0.01	<0.01	0.01
$CaCO_3$ NP	see note	<0.8	<0.8	<0.8	<0.8	<0.8	2.50	<0.8	0.82	14.17	<0.8	<0.8	0.83
C(T)	%	0.04	0.15	0.78	<0.01	0.38	3.17	0.04	0.48	2.37	<0.01	0.05	0.08
S(T)	%	0.04	0.1	1.04	<0.01	0.01	0.09	<0.01	0.01	0.07	<0.01	<0.01	0.01
$S(SO_4)$	%	0.02	0.11	1.13	<0.01	<0.01	0.1	<0.01	0.01	0.08	<0.01	<0.01	<0.01
$S(S^{-2})$	%	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Insoluble S	%	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	0.01	0.01	<0.01	<0.01	0.01
SAP	see note	<0.3	<0.3	<0.3	<0.3	<0.3	0.31	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Non-SO_4 AP	see note	0.08	0.08	0.63	0.08	0.08	0.63	0	0.08	0.31	0.08	0.08	0.08
Sobek NP	see note	5	11	28	12	16	25	13.1	15	39	14	19	22
Net NP	see note	5	11	28	12	16	25	13.1	15	39	14	19	22
Fizz Test		-	-	-	-	-	-	-	-	-	-	-	-

Note:

SAP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. AP is determined from the measured sulphide sulphur content.

Non-SO4 AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. AP calculated from non-sulphate sulphur (total sulphur - sulphate sulphur).

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

NET NP = NP – SAP

Carbonate NP is calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Sulphate Sulphur determined by 25% HCl Leach with S by ICP Finish

Sulphide Sulphur determined by 1:7 Nitric Acid Leach with S by ICP-MS Finish

Insoluble S is acid insoluble S (Total S - (Sulphate S + Sulphide S)).

Table 2:
Summary of Metals by Aqua Regia Disgestion Results

Parameter	Units	Average Continental Crustal Abundance	Borrow Location											
			Open Pit			Low Grade Stockpiles, Gold Ore Stockpile, Heap Leach Facility and Power Plant Site			Tailings Management Facility			Airstrip Borrow Area and Barge Access Road Borrow Areas		
Number of Samples			7			19			14			9		
			Min	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**
Ag	ppm	0.075	***0.33***	***0.73***	***1.6***	0.06	***0.43***	***50.3***	0.02	0.06	***0.6***	<0.01	0.05	***0.32***
Al	%	8.23	1.0	1.4	3.4	0.5	1.7	2.0	0.68	1.6	2.3	0.8	1.0	2.1
As	ppm	1.8	***10***	***18***	***41***	<1	***19***	***694***	1	***8***	***672***	<1	1	***25***
B	ppm	-	40	50	60	<10	50	60	10	55	60	<10	<10	<10
Ba	ppm	425	183	353	***435***	201	311	***1730***	58	181	***2130***	119	254	***647***
Be	ppm	-	0.2	0.4	0.8	0.3	0.5	0.8	0.3	0.5	1.3	0.2	0.3	0.4
Bi	ppm	0.0085	***0.23***	***1.5***	***1.9***	***0.06***	***0.36***	***5.33***	***0.08***	***0.17***	***0.67***	***0.0***	***0.1***	***0.62***
Ca	%	4.15	0.06	0.23	0.68	0.17	0.38	0.48	0.23	0.41	1.49	0.31	0.39	0.58
Cd	ppm	0.15	<0.01	***0.22***	***0.42***	0.14	***1.0***	***10.3***	0.04	0.11	***2.92***	0.03	0.07	***0.44***
Ce	ppm	-	24	50	110	31	43	60	24.8	42	85	23	37	54
Co	ppm	25	2.8	7.9	***177***	6.2	9.8	12.9	5.6	10.15	***29***	4.2	9.2	11.6
Cr	ppm	102	59	66	***116***	80	***115***	***160***	46	***117***	***169***	***104***	***120***	***187***
Cs	ppm	-	1.2	2.0	4.3	1.3	3.0	11.5	0.93	3.1	14.2	0.8	1.3	2.6
Cu	ppm	60	***116***	***1010***	***2510***	7	20	***565***	6.1	27	***97***	4.1	9.6	36.4
Fe	%	5.63	2.5	3.7	***9.2***	1.73	3.4	4.3	1.96	2.9	***5.87***	1.9	2.1	4.0
Ga	ppm	19	3.9	5.5	9.9	1.7	5.2	6.8	2.4	5.4	9.3	2.4	4.4	7.5
Ge	ppm	-	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1
Hf	ppm	-	0.05	0.19	0.58	<0.05	0.06	0.17	<0.05	0.16	0.34	0.08	0.18	0.52
Hg	ppm	0.085	<0.01	<0.01	0.03	<0.01	0.03	***0.2***	<0.01	0.02	***0.58***	<0.01	0.02	0.08
In	ppm	-	0.02	0.03	0.13	<0.02	0.06	2.57	<0.02	0.02	0.06	<0.02	0.02	0.04
K	%	2.085	0.15	0.32	0.73	0.09	0.2	0.73	0.12	0.19	0.52	0.15	0.29	0.78
La	ppm	39	13	28	***57***	12	22	34	13.1	23	***75***	12	21	36
Li	ppm	-	3	6	11	1	9	12	4	11	16	4	14	21
Lu	ppm	-	0.03	0.12	0.51	0.09	0.16	0.25	0.09	0.16	0.31	0.07	0.14	0.29
Mg	%	2.33	0.24	0.41	1.4	0.08	0.48	0.77	0.18	0.55	1.04	0.4	0.80	1.31
Mn	ppm	950	94	275	***3450***	499	***1280***	***5730***	434	550	***2380***	334	553	837

Parameter	Units	Average Continental Crustal Abundance	Borrow Location											
			Open Pit			Low Grade Stockpiles, Gold Ore Stockpile, Heap Leach Facility and Power Plant Site			Tailings Management Facility			Airstrip Borrow Area and Barge Access Road Borrow Areas		
Number of Samples			7			19			14			9		
			Min	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**	**Min**	**Median**	**Max**
Mo	ppm	1.2	***2.8***	***51***	***435***	0.5	***1.4***	***7.2***	0.7	***1.9***	***5.6***	***3***	***3.8***	***11.3***
Na	%	2.355	0.02	0.06	0.07	0.01	0.04	0.06	0.02	0.05	0.08	0.05	0.07	0.15
Nb	ppm	-	0.2	0.44	0.95	0.1	1.08	1.6	0.24	1.3	2.4	0.43	0.52	2.01
Ni	ppm	84	3.1	7.2	16	3	10	20	4.5	11	***85***	2.7	3.4	28.2
P	ppm	1050	0.035	0.050	0.127	0.029	0.057	0.069	0.021	0.042	0.154	0.037	0.047	0.069
Pb	ppm	14	11	***20***	***33.1***	9.7	***68.8***	***10000***	5.8	8.0	***73.4***	3.6	6.5	***45.6***
Rb	ppm	-	12	22	47	12	19	52	10.2	20	59	12	24	46
S	%	0.035	<0.01	***0.1***	***1.05***	<0.01	<0.01	***0.09***	<0.01	<0.01	***0.05***	<0.01	<0.01	<0.01
Sb	ppm	0.2	***1.45***	***1.8***	***7.7***	***0.34***	***1.9***	***137.0***	***0.24***	***0.73***	***17.50***	0.1	0.15	***1.64***
Sc	ppm	22	2.1	4.8	11.5	3.1	5.6	12.5	3.2	6.2	14.2	2.6	3.7	12.1
Se	ppm	0.05	***1***	***1***	***2***	<1	<1	<1	<1	<1	***2***	<1	<1	<1
Sn	ppm	-	0.4	0.6	1.2	<0.3	0.7	2.1	0.5	0.7	1.1	0.5	0.9	1.5
Sr	ppm	370	15	36	61	10	24	32	10.8	23	57	22	25	36
Ta	ppm	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.27
Tb	ppm	-	0.18	0.29	2.19	0.19	0.35	0.57	0.2	0.38	1.19	0.2	0.29	0.67
Te	ppm	-	<0.05	0.18	0.27	<0.05	<0.05	0.31	<0.05	<0.05	0.13	<0.05	<0.05	<0.05
Th	ppm	1.2	***7***	***10***	***18***	***6.4***	***12***	***27***	***3.8***	***9.8***	***22.3***	***8***	***11***	***17***
Ti	%	0.565	0.03	0.07	0.1	<0.01	0.08	0.23	0.01	0.12	0.17	0.05	0.11	0.26
Tl	ppm	0.85	0.18	0.25	0.69	0.17	0.30	0.64	0.12	0.22	***5.11***	0.11	0.2	0.42
U	ppm	2.7	1.7	***3.1***	***8.7***	1.8	***3.5***	***9.1***	0.62	1.8	***6.0***	0.7	0.9	***3.9***
V	ppm	120	27	45	100	15	75	83	35	66	***162***	33	41	104
W	ppm	1.3	0.7	***1.9***	***106***	<0.1	0.3	1.2	0.1	0.7	***7.9***	<0.1	0.2	0.6
Y	ppm	-	3	6.7	56	5	9.7	15.3	5.9	11	27	5.1	8	20
Yb	ppm	-	0.2	0.80	3.70	0.5	1.0	1.7	0.6	1.2	2.1	0.50	0.8	1.8
Zn	ppm	70	18	60	***150***	51	***193***	***1810***	42	60	***629***	36	50	67
Zr	ppm	-	1.8	8.3	23.8	1.0	2.9	7.1	3.4	8.0	13.0	1.7	5.4	10.0

Notes:
Bold italics indicate a value greater than the average continental crustal abundance
Light grey shading indicates a value greater than 5x the average continental crustal abundance
Dark grey shading indicates a value greater than 10x the average continental crustal abundance

Table 3:
Shake Flask Extraction Results for Open Pit Samples

Parameter	Units	MMER			Yukon CSR	38-3	38-4	39-1	TP-PIT-01	TP-PIT-04	TP-PIT-05	TP-PIT-06
		MMM	MCS	MGS								
Volume Nanopure Water	mL	*NP*	*NP*	*NP*	*NP*	690	630	750	750	750	750	750
Sample Weight	g	*NP*	*NP*	*NP*	*NP*	230	210	250	250	250	250	250
pH		*NP*	*NP*	*NP*	*NP*	6.50	6.20	6.39	5.46	6.72	5.12	7.18
Redox	mV	*NP*	*NP*	*NP*	*NP*	394	378	341	290	296	396	349
Conductivity	µS/cm	*NP*	*NP*	*NP*	*NP*	231	241	756	23	15	37	16
Acidity (to pH 4.5)	mg $CaCO_3$/L	*NP*	*NP*	*NP*	*NP*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total Acidity (to pH 8.3)	mg $CaCO_3$/L	*NP*	*NP*	*NP*	*NP*	4.0	4.3	8.2	6.9	2.4	4.8	2.8
Alkalinity	mg $CaCO_3$/L	*NP*	*NP*	*NP*	*NP*	2.4	1.6	4.4	1.2	2.3	0.3	3.9
Sulphate	mg/L	*NP*	*NP*	*NP*	1000	89	95	276	4	3	10	6
Ion Balance												
Major Anions	meq/L	*NP*	*NP*	*NP*	*NP*	1.90	2.01	5.84	0.11	0.11	0.21	0.20
Major Cations	meq/L	*NP*	*NP*	*NP*	*NP*	2.05	2.15	6.82	0.21	0.18	0.27	0.18
Difference	meq/L	*NP*	*NP*	*NP*	*NP*	-0.15	-0.14	-0.98	-0.10	-0.07	-0.06	0.02
Balance (%)	%	*NP*	*NP*	*NP*	*NP*	-3.8%	-3.4%	-7.7%	-31.3%	-24.7%	-12.2%	5.2%
Dissolved Metals												
Hardness CaCO3	mg/L	*NP*	*NP*	*NP*	*NP*	26.2	37.3	216	3.45	3.26	6.84	4.69
Aluminum Al	mg/L	*NP*	*NP*	*NP*	*NP*	0.0266	0.0051	0.0967	0.502	0.407	0.0908	0.167
Antimony Sb	mg/L	*NP*	*NP*	*NP*	0.2	< 0.0002	< 0.0002	0.0029	0.0003	< 0.0002	< 0.0002	0.0011
Arsenic As	mg/L	0.5	0.75	1	0.05	< 0.0002	< 0.0002	0.0180	0.0002	< 0.0002	0.0002	0.0011
Barium Ba	mg/L	*NP*	*NP*	*NP*	10	0.0104	0.0139	0.116	0.0293	0.00870	0.142	0.0300
Beryllium Be	mg/L	*NP*	*NP*	*NP*	0.053	0.00003	0.00005	< 0.00002	0.00004	< 0.00002	0.00012	< 0.00002
Bismuth Bi	mg/L	*NP*	*NP*	*NP*	*NP*	< 0.00001	< 0.00001	0.00028	0.00017	0.00018	< 0.00001	0.00001
Boron B	mg/L	*NP*	*NP*	*NP*	*NP*	0.0054	0.0157	0.0105	0.0032	0.0051	0.0099	0.0097
Cadmium Cd*	mg/L	*NP*	*NP*	*NP*	0.0005	0.000592	0.000244	0.00106	0.000126	0.000066	0.000483	0.000087
Calcium Ca	mg/L	*NP*	*NP*	*NP*	*NP*	8.55	12.4	67.6	0.94	0.80	2.00	1.17
Chromium Cr (Cr^{+6})	mg/L	*NP*	*NP*	*NP*	0.01	< 0.0005	< 0.0005	0.0009	0.0005	< 0.0005	< 0.0005	< 0.0005
Cobalt Co	mg/L	*NP*	*NP*	*NP*	0.009	0.0499	0.0117	0.00940	0.00175	0.000119	0.0115	0.000136
Copper Cu*	mg/L	0.3	0.45	0.6	0.05	0.130	0.0968	0.113	0.0154	0.0268	***0.492***	0.0652
Iron Fe	mg/L	*NP*	*NP*	*NP*	*NP*	0.034	0.004	0.095	0.379	0.834	0.007	0.132
Lead Pb*	mg/L	0.2	0.3	0.4	0.06	0.00006	< 0.00002	0.00057	0.00023	0.00098	0.00004	0.00017

Parameter	Units	MMER			Yukon CSR	38-3	38-4	39-1	TP-PIT-01	TP-PIT-04	TP-PIT-05	TP-PIT-06
		MMM	MCS	MGS								
Lithium Li	mg/L	*NP*	*NP*	*NP*	*NP*	0.004	0.002	0.002	< 0.001	< 0.001	0.001	< 0.001
Magnesium Mg	mg/L	*NP*	*NP*	*NP*	*NP*	1.18	1.56	11.4	0.267	0.306	0.449	0.431
Manganese Mn	mg/L	*NP*	*NP*	*NP*	*NP*	1.84	0.470	5.14	0.0532	0.0087	0.538	0.0101
Mercury Hg	ug/L	*NP*	*NP*	*NP*	1	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
Molybdenum Mo	mg/L	*NP*	*NP*	*NP*	10	0.00311	0.00075	0.00169	0.00255	0.00939	0.00007	0.166
Nickel Ni*	mg/L	0.5	0.75	1	0.65	0.0011	0.0006	0.0052	0.0012	0.0003	0.0024	0.0004
Phosphorus P	mg/L	*NP*	*NP*	*NP*	*NP*	0.014	0.025	0.079	0.022	0.027	0.012	0.068
Potassium K	mg/L	*NP*	*NP*	*NP*	*NP*	1.75	3.13	23.0	2.22	0.854	1.85	1.12
Selenium Se	mg/L	*NP*	*NP*	*NP*	0.01	0.00017	0.00022	0.00636	0.00034	0.00058	0.00026	0.00053
Silicon Si	mg/L	*NP*	*NP*	*NP*	*NP*	8.94	7.69	3.89	2.90	5.73	3.46	3.21
Silver Ag*	mg/L	*NP*	*NP*	*NP*	0.015	0.00005	0.00005	0.00004	< 0.00001	0.00001	0.00005	0.00005
Sodium Na	mg/L	*NP*	*NP*	*NP*	*NP*	32.5	30.0	39.3	0.55	1.11	0.96	0.78
Strontium Sr	mg/L	*NP*	*NP*	*NP*	*NP*	0.0710	0.0454	0.223	0.0088	0.0663	0.0199	0.0071
Sulphur (S)	mg/L	*NP*	*NP*	*NP*	*NP*	29.4	32.7	106	1.77	0.86	4.02	0.55
Thallium Tl	mg/L	*NP*	*NP*	*NP*	0.003	0.00002	0.00003	0.00017	0.00005	< 0.00002	0.00005	< 0.00002
Tin Sn	mg/L	*NP*	*NP*	*NP*	*NP*	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Titanium Ti	mg/L	*NP*	*NP*	*NP*	1	0.0016	0.0004	0.0025	0.0017	0.0043	0.0002	0.0035
Uranium U	mg/L	*NP*	*NP*	*NP*	3	0.000183	0.000084	0.000424	0.000154	0.000226	0.000144	0.000130
Vanadium V	mg/L	*NP*	*NP*	*NP*	*NP*	0.00015	0.00012	0.00048	0.00015	0.00064	0.00004	0.00087
Zinc Zn*	mg/L	0.5	0.75	1	0.9	0.020	0.011	0.033	0.016	0.003	0.015	0.002
Zirconium Zr	mg/L	*NP*	*NP*	*NP*	*NP*	0.00002	< 0.00001	0.00141	0.00241	0.00049	0.00014	0.00049

Notes:
NP = none proposed
MMER = Metal Mining Effluent Regulations (MMER, 2002);
MMM = Maximum authorized monthly mean;
MCS = Maximum authorized concentration in a composite sample; and
MGS = Maximum authorized concentration in a grab sample.
Yukon CSR = Yukon Contaminated Sites Regulation, Schedule 3 - Generic Numerical Water Standards, Aquatic Life (Yukon CSR, 2002)
*Hardness dependent guidelines were calculated based on a mean water hardness of 111.4 mg $CaCO_3$/L for the water quality station on Lower Casino Creek
Light grey shading indicates an exceedance of the MMER MMM guideline
Medium grey shading indicates an exceedance of the MMER MCS guideline
Dark grey shading indicates an exceedance of the MMER MGS guideline
Blue shading indicates an exceedance of the maximum Yukon CSR standard

Appendix A: Overburden Sample Description

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Sample ID	Depth (m)	Description	Soil Type	Comments
Open Pit				
38-3	15.24-16.76	Silty sand, trace gravel, trace cla	Colluvium	
38-4	18.29-19.81	Sand and silt, trace clay, trace grave	Residual soil	
39-1	7.62-7.80	Silty sand, fine to coarse	Colluvium	
TP12-PIT-01	0.80-1.00	Sand and gravel, some cobble	Residual soil to highly weathered bedroc	Collected above permafros
TP12-PIT-04	3.00-3.20	Silty sand, some grave	Residual soil to highly weathered bedroc	Collected above bedrock
TP12-PIT-05	3.80-4.00	Gravelly sand, some cobbles, trace silt, coarse graine	Residual soil to highly weathered bedroc	Collected above bedrock
TP12-PIT-06	1.60-1.80	Silty sand, some grave	Residual soil to highly weathered bedroc	Collected above permafros
Low Grade Stockpiles				
TP11-04	0.77-0.97	Silt and sand, trace clay, trace grave	Colluvium	Collected above permafros
TP11-NAG-02	1.20-1.40	Silty sand, some gravel, trace cla	Colluvium	Boulders left out of sample
TP11-NAG-06	3.20-3.40	Gravelly sand, some silt, trace cla	Granodiorite, completely weathered	Collected above bedrock
TP11-NAG-07	0.70-0.90	Sand and silt, some gravel, trace cla	Colluvium	Collected above permafros
TP11-NAG-08	0.60-0.80	Silty, gravelly sand, trace cla	Colluvium	
Gold Ore Stockpile				
TP13-48 BU-1	2.5-2.7	Gravelly sand, trace to some silt, some cobble	Residual soil	
Heap Leach Facility				
TP11-HLF-01	2.00-2.10	Silty sand, some gravel, trace cla	Colluvium	Collected above permafros
TP11-HLF-05	1.50-1.90	Gravelly sand, some sil	Colluvium	Collected above permafros
TP11-HLF-13	1.80-2.00	Gravelly sand, some silt, trace cla	Colluvium	Collected from a road cu
TP11-HLF-16	2.80-3.00	Gravel and sand, some silt, trace cla	Highly weathered bedrock	Collected above permafros
TP11-HLF-21	0.80-1.00	Silty sand, some gravel, trace cla	Colluvium	Collected above boulders
TP11-HLF-41	1.50-1.70	Gravelly sand, some silt, trace cla	Colluvium	
Main Power Plant				
TP11-06	0.84-1.04	Sandy silt, some gravel, trace cla	Colluvium	Collected above permafros
TP11-10	0.30-0.65	Sandy silt, some gravel, trace cla	Colluvium	Collected above large boulder
TP11-11	1.10-1.30	Sand and gravel, some silt, trace cla	Colluvium	Collected above permafros
TP11-18	1.20-1.40	Silty sand, trace clay, trace grave	Residual soil	Collected above permafros
TP11-20	1.25-1.45	Sandy silt, some gravel, trace cla	Residual soil	Collected above bedrock
TP13-03 BU-1	2.0-2.2	Sand, some gravel, trace silt and cla	Residual soil	Collected from an existing exposur
TP13-04 BU-1	2.8-3.0	Weathered granodiorite, coarse graine	Granodiorite, completely weathered	Collected from an existing exposur
Tailings Management Facility				
TP11-TMF-01	1.22-1.42	Gravel, some sand, some silt, trace cla	Colluvium	Collected above bedrock
TP11-TMF-05	2.10-2.30	Sand, some silt, trace gravel, trace cla	Residual Soil	Collected above bedrock/permafros
TP11-TMF-09	0.85-1.05	Silt, trace clay, trace sand	Alluvium - Floodplain Deposi	Collected above permafros
TP11-TMF-10	1.00-1.20	Gravel, some sand, some silt, trace cla	Colluvium	Collected above bedrock
TP11-TMF-12	0.90-1.10	Gravelly sand, some silt, trace cla	Residual Soil	Collected above permafros
TP11-TMF-13	1.35-1.55	Sandy gravel, trace silt, trace cla	Colluvium	Collected above weathered bedrock
TP11-TMF-34	0.80-1.00	Silt and sand, some gravel, trace cla	Colluvium	Collected above permafros
TP11-TMF-94	1.30-1.50	Sandy, silty gravel, trace cla	Colluvium	Collected above bedrock
TP11-TMF-99	0.50-0.70	Silty sand and gravel, trace cla	Colluvium	Collected above bedrock
TP11-TMF-100	1.00-1.20	Sand and gravel, some silt, trace cla	May be weathered bedrock	Collected above bedrock
TP13-14 BU-1	3.0-4.0	Gravelly sands and cobble	Alluvium - riverbed deposi	Collected from frozen ground
TP13-27 BU-1	2.6-2.8	Weathered granodiorite, sand to grave	Granodiorite, completely weathered	Collected above bedrock
TP13-28 BU-1	1.4-1.6	Gravel and sand, some silt, few cobble	Residual soil	Collected above weathered bedrock
TP13-33 BU-1	2.0-2.3	Gravelly sand, some cobbles, trace sil	Residual soil	Collected above permafros
Airstrip Borrow Area				
TP13-76 BU-1	1.0-1.2	Sand and gravel, trace sil	Residual soil	
TP13-76 BU-2	1.7-2.0	Weathered granodiorite, coarse graine	Granodiorite, completely weathered	
TP13-77 BU-1	2.0-2.2	Granodiorite, coarse grained	Dawson Range Batholith granodiorit	Collected bedrock
TP13-78 BU-1	1.0-1.2	Gravelly sand, trace sil	Residual soil	Collected above weathered granodiorit
Barge Landing Access Road				
TP13-01 BU-0	0.6-0.8	Sand, trace to some gravel, trace sil	Alluvium - creek deposi	Collected from an existing exposur
TP13-01 BU-1	1.2-1.4	Sand and gravel, many cobbles, no to trace si	Colluvium	Collected from an existing exposur
TP13-01 BU-2	2.5-2.7	Sand and gravel, many cobbles, no to trace si	Colluvium	Collected from an existing exposur
TP13-01 BU-3	1.0-1.2	Sand and gravel, many cobbles, no to trace si	Colluvium	Collected from an existing exposur
TP13-84 BU-1	n/a	Granodiorite, medium grained (blasted rock	Dawson Range Batholith granodiorit	Collected from existing blasting sit

Appendix B: ABA and Metals Results

Appendix B.1: Static Test Results for Overburden Samples - Static Test ABA Results

Appendix B.2: Static Test Results for Overburden Samples - Static Test Aqua Regia Metals Results

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APPENDIX B.1: STATIC TEST RESULTS FOR OVERBURDEN SAMPLES - STATIC TEST ABA RESULTS

Sample ID	Rinse pH	Paste pH	TIC %	$CaCO_3$ NP	C(T) %	S(T) %	$S(SO_4)$ %	$S(S^{-2})$ %	Insoluble S %	SAP $mgCaCO_3/kg$	Non-SO_4 AP $mgCaCO_3/kg$	NP $mgCaCO_3/kg$	Net NP	NPR (NP/SAP)	Fizz Test
Open Pit															
38-3	4.54	5.00	<0.01	<0.8	0.05	0.05	0.05	<0.01	<0.01	<0.3	0.08	12.8	12.8	42.7	None
38-4	4.38	4.85	<0.01	<0.8	0.04	0.04	0.02	<0.01	0.02	<0.3	0.63	28.1	28.1	93.7	None
39-1	5.06	5.37	<0.01	<0.8	0.4	0.11	0.13	<0.01	<0.01	<0.3	0.08	11.2	11.2	37.3	None
TP12-PIT-01	3.57	3.71	<0.01	<0.8	0.78	1.04	1.13	<0.01	<0.01	<0.3	0.08	4.8	4.8	16.0	None
TP12-PIT-04	4.58	4.76	<0.01	<0.8	0.27	0.08	0.1	<0.01	<0.01	<0.3	0.08	9.4	9.4	31.3	None
TP12-PIT-05	3.72	4.06	<0.01	<0.8	0.12	0.1	0.11	<0.01	<0.01	<0.3	0.08	10.1	10.1	33.7	None
TP12-PIT-06	5.08	5.67	<0.01	<0.8	0.15	0.12	0.12	<0.01	<0.01	<0.3	0.08	13.2	13.2	44.0	None
Low Grade Stockpiles															
TP11-04	4.31	4.45	<0.01	<0.8	1.24	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	11.6	11.6	38.7	None
TP11-NAG-02	4.69	5.12	<0.01	<0.8	0.98	0.03	0.01	<0.01	0.02	<0.3	0.63	16.4	16.4	54.7	None
TP11-NAG-06	5.10	5.90	<0.01	<0.8	0.08	<0.01	<0.01	0.01	<0.01	0.3	0.08	25.2	24.9	80.6	Slight
TP11-NAG-07	4.54	4.88	<0.01	<0.8	1.13	0.02	0.01	<0.01	0.01	<0.3	0.31	15.5	15.5	51.7	None
TP11-NAG-08	4.43	4.92	<0.01	<0.8	0.91	0.02	0.01	0.01	<0.01	0.3	0.31	15.4	15.1	49.3	None
Gold Ore Stockpile															
TP13-48 BU-1	6.12	7.29	<0.01	<0.8	0.04	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	17.0	17.0	56.7	None
Heap Leach Facility															
TP11-HLF-01	4.74	4.89	<0.01	<0.8	1.27	0.01	0.01	<0.01	<0.01	<0.3	0.08	16.0	16.0	53.3	None
TP11-HLF-05	4.53	5.34	<0.01	<0.8	0.38	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	13.4	13.4	44.7	None
TP11-HLF-13	5.34	5.86	0.01	0.8	0.18	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	12.1	12.1	40.3	None
TP11-HLF-16	4.92	6.00	0.01	0.8	0.18	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	13.2	13.2	44.0	None
TP11-HLF-21	5.90	5.81	0.02	1.7	0.97	0.01	<0.01	<0.01	0.01	<0.3	0.16	18.6	18.6	62.0	None
TP11-HLF-41	6.86	6.22	0.01	0.8	0.1	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	12.6	12.6	42.0	None
Main Power Plant															
TP11-06	4.48	4.37	0.01	0.8	3.17	0.03	0.02	<0.01	0.01	<0.3	0.31	11.7	11.7	39.0	None
TP11-10	4.14	4.26	<0.01	<0.8	1.35	0.02	0.01	<0.01	0.01	<0.3	0.31	13.4	13.4	44.7	None
TP11-11	4.98	5.47	<0.01	<0.8	0.2	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	17.0	17.0	56.7	None
TP11-18	5.47	5.34	0.01	0.8	0.36	0.09	0.1	0.01	<0.01	0.3	0.08	14.8	14.5	47.4	None
TP11-20	4.50	4.95	<0.01	<0.8	0.47	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	17.1	17.1	57.0	None
TP13-03 BU-1	5.23	6.15	0.03	2.5	0.2	0.06	0.04	<0.01	0.02	<0.3	0.63	18.1	18.1	60.3	None
TP13-04 BU-1	6.18	7.59	<0.01	<0.8	<0.01	0.01	<0.01	<0.01	0.01	<0.3	0.08	16.7	16.7	55.7	None
Tailings Management Facility															
TP11-TMF-01	4.99	5.35	0.02	1.7	0.58	0.07	0.06	<0.01	0.01	<0.3	0.31	14.8	14.8	49.3	None
TP11-TMF-05	5.64	6.67	<0.01	<0.8	0.06	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	15.1	15.1	50.3	None
TP11-TMF-09	6.66	6.59	0.17	14.2	2.24	0.02	0.02	<0.01	<0.01	<0.3	0.08	38.8	38.8	129.3	Slight
TP11-TMF-10	4.97	5.38	0.01	0.8	0.58	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	17.4	17.4	58.0	None
TP11-TMF-12	4.19	4.89	<0.01	<0.8	0.75	0.01	<0.01	<0.01	0.01	<0.3	0.08	13.1	13.1	43.7	None
TP11-TMF-13	6.71	6.73	0.05	4.2	0.17	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	14.2	14.2	47.3	None
TP11-TMF-34	5.09	5.30	0.01	0.8	2.37	0.02	0.01	<0.01	0.01	<0.3	0.31	19.1	19.1	63.7	None
TP11-TMF-94	5.14	5.45	0.03	2.5	0.69	0.07	0.08	<0.01	<0.01	<0.3	0.08	22.2	22.2	74.0	None
TP11-TMF-99	4.25	5.11	<0.01	<0.8	0.37	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	15.3	15.3	51.0	None
TP11-TMF-100	5.15	5.23	0.01	0.8	2.32	0.02	0.01	<0.01	0.01	<0.3	0.31	18.5	18.5	61.7	None

Sample ID	Rinse pH	Paste pH	TIC %	$CaCO_3$ NP	C(T) %	S(T) %	$S(SO_4)$ %	$S(S^{-2})$ %	Insoluble S %	SAP $mgCaCO_3/kg$	Non-SO_4 AP $mgCaCO_3/kg$	NP $mgCaCO_3/kg$	Net NP	NPR (NP/SAP)	Fizz Test
TP13-14 BU-1	6.15	7.08	<0.01	<0.8	0.24	0.02	0.01	<0.01	0.01	<0.3	0.31	14.9	14.9	49.7	None
TP13-27 BU-1	6.31	7.60	<0.01	<0.8	0.04	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	14.3	14.3	47.7	None
TP13-28 BU-1	5.40	6.78	<0.01	<0.8	0.08	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	13.9	13.9	46.3	None
TP13-33 BU-1	5.31	6.87	<0.01	<0.8	0.09	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	16.7	16.7	55.7	None
Airstrip Borrow Area															
TP13-76 BU-1	5.63	7.11	<0.01	<0.8	0.06	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	18.9	18.9	63.0	None
TP13-76 BU-2	6.21	7.82	<0.01	<0.8	0.02	0.01	<0.01	<0.01	0.01	<0.3	0.08	21.7	21.7	72.3	None
TP13-77 BU-1	6.54	8.49	<0.01	<0.8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	20.5	20.5	68.3	None
TP13-78 BU-1	5.90	7.16	<0.01	<0.8	0.06	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	20.0	20.0	66.7	None
Barge Landing Access Road Borrow Areas															
TP13-01 BU-0	7.43	7.90	<0.01	<0.8	0.08	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	14.4	14.4	48.0	None
TP13-01 BU-1	6.80	8.23	0.01	0.8	0.05	0.01	<0.01	<0.01	0.01	<0.3	0.08	21.5	21.5	71.7	None
TP13-01 BU-2	7.10	8.19	<0.01	<0.8	0.04	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	18.4	18.4	61.3	None
TP13-01 BU-3	5.32	7.01	<0.01	<0.8	0.07	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	13.8	13.8	46.0	None
TP13-84 BU-1	7.77	9.09	0.01	0.8	0.02	<0.01	<0.01	<0.01	<0.01	<0.3	0.08	17.4	17.4	58.0	None

Note:

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material. SAP is determined from the measured sulphide sulphur content, Non-SO4 AP is determined from the non-SO_4 sulphur content.

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

NET NP = NP - SAP

Carbonate NP is calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Sulphate Sulphur determined by 25% HCL with Gravimetric Finish

Sulphide Sulphur determined by Sobek 1:7 Nitric Acid with S by ICP-MS Finish

Insoluble S is acid insoluble S (Total S - (Sulphate S + Sulphide S)).

For the 1994 samples, total S and sulphate S results were switched from the original result sheet because S(SO_4) was greater than S(T) for all samples.

APPENDIX B.2: STATIC TEST RESULTS FOR OVERBURDEN SAMPLES - STATIC TEST AQUA REGIA METALS RESULTS

Sample ID	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cs ppm	Cu ppm	Fe %	Ga ppm	Ge ppm	Hf ppm	Hg ppm	In ppm	K %	La ppm	Li ppm	Lu ppm	Mg %	Mn ppm	Mo ppm	Na %	Nb ppm	Ni ppm	P ppm	Pb ppm	Rb ppm	S %	Sb ppm	Sc ppm	Se ppm	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Te ppm	Th ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Y ppm	Yb ppm	Zn ppm	Zr ppm
Open Pit																																																				
38-3	0.33	2.93	10	60	383	0.7	0.43	0.24	0.33	110	92.9	65	2.37	2510	2.5	6.4	0.2	0.19	<0.01	0.02	0.15	50.5	8	0.35	0.49	1630	29.2	0.06	0.42	7.2	0.035	15	17.1	0.03	1.45	4.8	1	0.7	35.5	<0.05	1.82	0.07	9.1	0.09	0.24	7.76	45	1	33.8	2.8	85	5.7
38-4	0.96	3.36	12	50	435	0.8	0.23	0.68	0.42	80.7	177	59	4.3	1540	3.75	9.9	0.2	0.1	<0.01	0.02	0.58	56.5	11	0.51	1.4	3450	50.8	0.05	0.22	3.9	0.05	17.1	47.3	<0.01	1.58	11.5	1	1.2	36.6	<0.05	2.19	<0.05	6.9	0.07	0.69	5.87	100	0.7	56	3.7	150	1.8
39-1	0.73	1.23	41	50	335	0.3	1.72	0.23	0.22	34.8	5.7	116	1.82	116	2.85	3.9	<0.1	0.18	0.01	0.03	0.19	18.8	4	0.08	0.3	275	2.83	0.07	0.5	8.5	0.044	33.1	11.9	0.12	3.76	2.9	1	0.5	50.3	<0.05	0.27	0.27	12.4	0.03	0.18	1.91	29	0.7	5.48	0.5	60	9.5
TP12-PIT-01	0.64	0.95	14	50	404	0.2	1.3	0.06	<0.01	50.3	2.8	66	1.22	129	4.75	3.9	<0.1	<0.05	<0.01	0.02	0.73	28.4	4	0.03	0.24	94	208	0.06	0.41	3.1	0.095	10.7	37	1.05	1.81	2.1	2	0.4	60.8	<0.05	0.18	0.14	7.1	0.03	0.4	1.67	27	106	2.65	0.2	18	3.7
TP12-PIT-04	1.04	1.66	18	40	183	0.7	1.48	0.09	0.13	23.6	4.9	64	1.99	1110	9.18	7.1	<0.1	0.58	0.03	0.04	0.32	12.5	3	0.15	0.35	168	435	0.02	0.44	5.6	0.127	20	22.2	0.09	1.69	6.5	2	0.5	15.3	<0.05	0.29	0.18	18.1	0.04	0.25	8.74	46	2.3	6.7	0.9	33	23.8
TP12-PIT-05	0.58	1.36	22	60	353	0.3	1.53	0.23	0.21	35.5	15.2	89	1.39	353	2.92	4.5	<0.1	0.2	<0.01	0.05	0.23	19.2	6	0.09	0.41	434	47.2	0.06	0.71	9.4	0.048	21.1	18	0.1	2.38	3.8	<1	0.6	29.7	<0.05	0.27	0.25	10.1	0.07	0.22	1.88	41	2.3	6.14	0.6	55	8.3
TP12-PIT-06	1.6	1.36	24	60	230	0.4	1.94	0.25	0.41	57.8	7.9	110	2.5	1010	3.65	5.5	<0.1	0.23	<0.01	0.13	0.49	30.8	7	0.12	0.72	220	303	0.04	0.95	16	0.07	30.2	42.7	0.1	7.69	6.3	1	1	26.1	<0.05	0.39	0.24	11.7	0.1	0.42	3.12	64	1.9	9.39	0.8	99	9.7
Low Grade Stockpiles																																																				
TP11-04	0.17	1.82	80	50	214	0.4	0.2	0.38	0.48	31.4	11.5	118	2.14	16.8	3.4	5.9	<0.1	<0.05	0.01	0.11	0.13	15.7	12	0.09	0.55	945	1.09	0.04	1.6	16.3	0.057	32.3	16	<0.01	0.61	5.2	<1	0.7	22.5	<0.05	0.26	<0.05	8.2	0.12	0.21	1.76	75	0.2	6.55	0.6	150	2.3
TP11-NAG-02	0.8	1.43	14	60	221	0.4	1.01	0.43	0.64	31.8	11.1	143	1.43	27.2	3.38	5	<0.1	<0.05	0.02	0.06	0.13	15.2	9	0.12	0.52	1010	1.43	0.06	1.46	14.4	0.063	53.2	15.3	<0.01	1.03	5.6	<1	0.8	24.4	<0.05	0.28	<0.05	8.2	0.11	0.21	2.14	75	0.2	7.67	0.7	140	2.3
TP11-NAG-06	0.4	1.87	27	50	437	0.6	0.11	0.41	2.71	48	9.4	105	4.98	11.6	3.67	6.5	<0.1	0.1	0.01	0.09	0.43	22.6	9	0.18	0.72	2070	0.76	0.03	0.51	4.8	0.056	282	31.5	<0.01	1.88	8.2	<1	0.8	19.6	<0.05	0.37	<0.05	18.6	0.07	0.39	3.92	75	0.2	10.5	1.2	452	2.2
TP11-NAG-07	2.66	1.69	31	60	308	0.6	1.37	0.39	2.02	46.2	12.9	121	2.39	54.8	3.91	5.7	<0.1	<0.05	0.03	0.11	0.17	23.4	10	0.19	0.53	1990	1.15	0.04	1.46	18	0.062	178	21	<0.01	3.57	7.1	<1	0.9	23.9	<0.05	0.44	<0.05	10.1	0.11	0.3	4.62	77	0.3	12.7	1.2	253	3.7
TP11-NAG-08	1.76	1.76	14	60	264	0.4	1.95	0.43	1.16	41.7	11.9	127	1.98	50.8	3.55	5.9	<0.1	<0.05	0.02	0.08	0.15	20.7	11	0.14	0.59	1280	1.22	0.05	1.42	17.3	0.062	87	18.9	<0.01	1.18	6.9	<1	0.8	25.1	<0.05	0.36	<0.05	9.9	0.12	0.26	3.19	81	0.3	9.88	0.9	245	2.7
Gold Ore Stockpile																																																				
TP13-48 BU-1	0.07	0.95	27	<10	335	0.4	0.09	0.28	0.59	41.1	9.1	105	2.89	10.7	3.02	3.4	<0.1	0.08	0.03	0.02	0.2	25.4	4	0.18	0.36	743	3.18	0.03	0.08	4.5	0.069	13.5	11.9	<0.01	2.16	4.9	<1	<0.3	16.7	<0.05	0.42	<0.05	14.1	0.01	0.17	1.89	40	<0.1	11.2	1.2	73	2.9
Heap Leach Facility																																																				
TP11-HLF-01	0.5	1.75	33	50	310	0.4	0.47	0.48	3.25	43.2	11.3	116	3.32	22.3	3.64	5.8	<0.1	0.06	0.03	0.08	0.19	22.3	11	0.16	0.62	1160	1.16	0.04	1.46	12.8	0.062	114	21.9	<0.01	2.02	7.1	<1	0.7	29.2	<0.05	0.4	<0.05	10.5	0.1	0.31	3.94	75	0.5	11.3	1.1	566	4
TP11-HLF-05	0.26	1.1	43	60	201	0.3	0.36	0.31	2.22	32.8	9.4	160	1.25	9.6	2.67	3.8	<0.1	<0.05	<0.01	0.04	0.14	12.4	7	0.09	0.4	1410	0.96	0.05	0.98	9.6	0.043	42.5	15.3	<0.01	0.96	3.7	<1	0.5	19.1	<0.05	0.19	<0.05	9.6	0.07	0.18	1.8	52	0.4	5.09	0.5	188	1.5
TP11-HLF-13	0.37	0.62	16	50	353	0.8	0.58	0.19	3.63	46.1	6.2	136	11.5	9.9	2.42	2.1	<0.1	0.08	0.05	0.14	0.28	25	2	0.16	0.11	1940	2.96	0.02	0.2	5.8	0.041	157	18	<0.01	1.86	3.6	<1	0.4	13.5	<0.05	0.34	<0.05	18.8	<0.01	0.42	4.31	16	0.3	9.31	1.1	481	4.2
TP11-HLF-16	0.47	0.57	8	50	367	0.7	1.1	0.21	2.3	51.7	7.4	84	8.64	16.2	2.5	2.1	<0.1	0.1	0.05	<0.02	0.26	26.2	1	0.14	0.1	2180	7.17	0.02	0.15	7.9	0.042	33.4	20.7	<0.01	2.32	3.7	<1	<0.3	11.3	<0.05	0.31	<0.05	23.3	<0.01	0.49	5.53	20	0.2	8.13	1	280	5.3
TP11-HLF-21	0.43	1.2	19	60	311	0.5	5.01	0.48	1.04	45.1	10.4	107	5.1	30.1	3.22	4.5	<0.1	0.06	0.04	0.04	0.2	21.8	8	0.14	0.45	1580	4.07	0.04	1.1	12.6	0.052	63.5	21.6	<0.01	1.88	5.7	<1	0.5	32.3	<0.05	0.34	<0.05	11.9	0.08	0.41	2.34	60	0.7	8.94	0.9	193	3.7
TP11-HLF-41	0.65	0.53	10	50	418	0.7	0.36	0.17	0.69	51.2	7.1	115	5.15	12.3	1.73	1.7	<0.1	0.17	0.08	<0.02	0.2	24.6	2	0.16	0.08	1790	3.48	0.01	0.21	6.7	0.029	111	14.6	<0.01	1.88	3.1	<1	0.4	10	<0.05	0.31	<0.05	27.1	<0.01	0.28	5.78	15	0.5	7.84	1	259	7.1
Main Power Plant																																																				
TP11-06	0.39	1.7	31	50	216	0.4	0.27	0.38	0.69	30.7	10.3	80	2.07	23.2	2.95	5.2	<0.1	<0.05	0.05	0.07	0.09	14.8	10	0.13	0.42	805	1.94	0.03	1.48	16.7	0.057	43.5	12.1	0.02	0.71	5.1	<1	0.6	24.9	<0.05	0.33	0.06	7.4	0.08	0.21	3.45	64	0.2	8.96	0.9	143	1.9
TP11-10	0.36	1.9	17	50	234	0.5	0.24	0.35	0.63	34	10.9	115	2.61	19.5	3.45	6.2	<0.1	<0.05	0.03	0.06	0.13	17.4	9	0.13	0.48	767	1.02	0.03	1.21	17.4	0.061	87	16.6	<0.01	0.94	6.7	<1	0.7	24.5	<0.05	0.35	<0.05	6.4	0.09	0.28	2.36	76	0.2	9.5	0.9	181	1
TP11-11	0.12	1.76	5	60	538	0.4	0.09	0.38	0.14	60.3	9.8	106	9.09	8.5	3.53	6.8	<0.1	0.16	0.02	0.04	0.43	34.2	12	0.25	0.63	846	0.52	0.04	1.08	6.5	0.054	13.7	41.2	<0.01	0.59	12.5	<1	1.2	20.2	<0.05	0.57	<0.05	22.8	0.13	0.46	4.28	83	0.2	15.3	1.7	82	6.3
TP11-18	0.94	1	694	40	233	0.7	0.49	0.25	9.45	45	8.9	132	3.62	21.7	3.55	3.1	<0.1	<0.05	0.1	0.79	0.24	24.7	4	0.22	0.2	1900	2.01	0.02	0.43	7.3	0.052	68.8	16	0.09	3.61	5.1	<1	0.5	26	<0.05	0.4	<0.05	16.7	0.02	0.64	5.28	34	0.3	12.2	1.4	1100	1.3
TP11-20	0.48	1.97	12	60	333	0.5	0.21	0.44	0.77	43.6	11.9	97	2.83	26.8	3.53	6.4	<0.1	0.06	0.03	0.04	0.18	22.9	11	0.19	0.6	1060	0.84	0.04	1.13	20.1	0.058	88.3	22.1	<0.01	1.29	8.3	<1	0.8	31.3	<0.05	0.46	<0.05	10.7	0.14	0.28	2.57	83	1	12.9	1.3	145	4.8
TP13-03 BU-1	50.3	1.13	73	<10	1730	0.7	5.33	0.18	10.3	37.8	9.7	105	6.09	565	4.3	3.5	<0.1	<0.05	0.2	2.57	0.29	21.4	4	0.19	0.29	5730	3.52	0.01	0.37	3.7	0.058	>10000	21.6	0.04	137	6.4	<1	2.1	26.4	<0.05	0.42	0.31	14.1	0.03	0.6	9.08	42	0.6	12.2	1.3	1810	2.3
TP13-04 BU-1	0.06	1.71	<1	<10	450	0.3	0.06	0.37	0.56	34.5	8.1	119	3.04	7.4	3.01	5.8	<0.1	0.16	0.02	0.02	0.73	19.3	12	0.15	0.77	499	2.97	0.06	0.9	2.6	0.062	9.7	52.1	<0.01	0.34	5.5	<1	1	20.4	<0.05	0.31	<0.05	15.8	0.23	0.48	1.81	78	1.2	9.7	0.9	51	3
Tailings Management Facility																																																				
TP11-TMF-01	0.31	1.54	672	50	1050	1.1	0.67	0.25	2.92	50.2	22.7	122	4.07	65.2	5	5.7	<0.1	0.06	0.58	0.04	0.26	23.5	13	0.22	0.38	2380	2.1	0.02	0.79	58.8	0.07	73.4	22.3	0.05	17.5	8.7	<1	0.9	23	<0.05	0.65	0.13	7.9	0.07	3.85	1.75	67	1	18.6	1.5	629	4.1
TP11-TMF-05	0.05	1.16	3	60	125	0.5	0.17	0.28	0.04	48.3	5.6	116	4.35	16.2	1.96	5	<0.1	0.34	0.01	<0.02	0.35	30.5	10	0.17	0.43	508	1.02	0.05	0.99	4.9	0.021	6.3	46.5	<0.01	0.28	5.2	<1	1.1	13.9	<0.05	0.3	<0.05	22.3	0.07	0.33	1.17	43	0.2	9.34	2	42	9.9
TP11-TMF-09	0.1	1.74	10	60	187	0.5	0.14	1.49	0.25	29.7	13	46	0.93	39.4	3.41	5.4	<0.1	0.17	0.02	0.03	0.12	14.6	13	0.13	0.76	580	0.84	0.06	1.89	29.8	0.087	7.9	10.2	0.01	0.46	6	<1	0.5	56.6	<0.05	0.41	<0.05	3.8	0.16	0.12	0.62	89	0.2	11.1	1	76	8.7
TP11-TMF-10	0.27	2.32	10	60	120	0.5	0.2	0.89	0.1	41.2	10.9	81	1.65	17	3.02	7.3	<0.1	0.27	0.03	0.02	0.19	23.1	13	0.14	0.64	468	1.9	0.08	1.56	12.3	0.04	8.7	22.5	<0.01	0.65	6.8	<1	0.7	43.8	<0.05	0.34	<0.05	10.7	0.17	0.21	1.45	85	1.6	9.6	0.9	58	13
TP11-TMF-12	0.04	1.6	3	60	177	0.3	0.08	0.39	0.08	24.8	8.9	97	1.89	23	2.46	5.4	<0.1	0.08	<0.01	<0.02	0.29	13.1	10	0.09	0.52	434	1.52	0.07	1.6	5.9	0.032	5.8	28	<0.01	0.31	4.6	<1	0.7	19.2	<0.05	0.2	<0.05	9.6	0.11	0.2	1.14	65	7.9	5.9	0.6	44	4.6
TP11-TMF-13	0.25	0.85	5	50	58	0.7	0.2	0.31	0.09	65.4	6.8	73	5.66	6.1	2.9	4.1	<0.1	0.27	0.02	<0.02	0.16	38.7	4	0.24	0.19	440	0.87	0.03	0.24	4.6	0.023	15.4	15.7	<0.01	1.09	6.8	<1	0.7	12	<0.05	0.49	<0.05	20	0.01	0.13	2.37	59	1.4	14	1.6	42	12.3
TP11-TMF-34	0.05	1.85	12	60	153	0.4	0.13	0.73	0.13	32.2	10.3	87	1.7	28.3	2.95	5.7	<0.1	0.15	0.03	0.02	0.16	17.2	12	0.14	0.58	519	0.78	0.07	1.86	15.3	0.038	6.8	20.3	<0.01	0.56	6.2	<1	0.7	35.5	<0.05	0.34	<0.05	8.2	0.12	0.19	1.83	72	0.3	10.1	0.9	61	8.1
TP11-TMF-94	0.6	2.15	366	50	2130	0.9	0.25	0.51	1.05	53.8	29	169	8.99	97.4	5.87	8.9	0.1	<0.05	0.42	0.06	0.49	25.3	16	0.23	1.04	1420	4.05	0.03	2.39	84.9	0.154	16.5	36	0.04	12.2	14.2	2	0.9	32.1	<0.05	0.73	0.1	5.8	0.14	5.11	2.66	162	1.2	19.9	1.6	203	4.1
TP11-TMF-99	0.07	2.03	35	60	335	1.3	0.44	0.37	0.1	84.7	12.4	143	5.03	29.4	3.87	9.3	0.2	0.15	0.02	0.05	0.52	74.8	13	0.31	0.66	658	1.99	0.05	2.28	32.3	0.053	11.3	59.4	<0.01	0.8	12.1	1	0.9	22.6	<0.05	1.19	0.06	13.1	0.15	0.57	2.66	78	0.3	26.7	2.1	93	7.1
TP11-TMF-100	0.05	1.84	5	60	150	0.4	0.14	0.74	0.11	32.4	10	95	1.71	78.7	2.9	5.7	<0.1	0.14	0.02	0.02	0.15	17.3	12	0.13	0.57	491	0.7	0.08	2.03	14.7	0.038	6.5	20	<0.01	0.41	6.2	<1	0.7	36.4	<0.05	0.33	<0.05	8.2	0.13	0.17	1.81	73	0.2	9.78	0.9	67	7.8
TP13-14 BU-1	0.28	0.99	27	<10	302	0.4	0.27	0.42	0.69	27.7	10.3	132	2.16	58.6	2.49	3.3	<0.1	<0.05	0.02	0.02	0.15	15.1	7	0.13	0.28	611	5.59	0.05	0.76	9.5	0.041	42.7	14.3	0.01	1.46	3.2	<1	0.5	34.1	<0.05	0.3	<0.05	9.9	0.04	0.22	6.04	42	1.7	8.52	0.8	88	3.4
TP13-27 BU-1	0.03	0.77	<1	<10	177	0.5	0.08	0.25	0.06	41.8	6	121	4.24	7.6	2.25	3.3	<0.1	0.3	0.04	0.02	0.19	23.4	7	0.21	0.33	618	3.89	0.03	0.41	4.5	0.065	6.9	17.5	<0.01	1.45	4.1	<1	0.5	12.1	<0.05	0.44	<0.05	17.7	0.03	0.23	2.98	35	0.4	12.3	1.3	43	9.2
TP13-28 BU-1	0.02	0.68	6	<10	191	0.7	0.11	0.23	0.06	44.1	6.5	117	14.2	11.9	2.48	2.4	<0.1	0.31	0.33	0.03	0.15	24.4	4	0.23	0.18	627	3.3	0.03	0.36	5.8	0.067	8	17.1	<0.01	1.78	6.5	<1	0.5	10.8	<0.05	0.53	<0.05	16.9	0.03	1.03	2.42	40	0.1	14.3	1.5	49	11.2
TP13-33 BU-1	0.02	1.61	<1	<10	184	0.3	0.16	0.44	0.11	33.5	9.3	119	1.57	25.1	2.45	5.2	<0.1	0.25	0.01	<0.02	0.25	19.2	9	0.13	0.58	458	3.14	0.06	0.86	9	0.042	6.6	19.5	<0.01	0.24	4.5	<1	0.6	19.8	<0.05	0.28	<0.05	9.5	0.15	0.15	0.8	65	1.2	7.08	0.7	43	7.4
Airstrip Borrow Area																																																				
TP13-76 BU-1	0.05	1.82	1	<10	353	0.3	0.06	0.41	0.05	32.9	10.3	112	1.61	9.5	3.56	6.5	<0.1	0.1	0.01	0.03	0.36	21.4	14	0.14	0.91	760	3	0.1	0.5	3.4	0.062	3.6	25.5	<0.01	0.14	9	<1	1	32.1	<0.05	0.35	<0.05	8.3	0.11	0.2	0.87	81	0.2	8.38	0.9	53	2.7
TP13-76 BU-2	0.02	2.1	1	<10	488	0.3	0.06	0.48	0.07	48.7	11.6	129	1.77	9.3	4.02	7.5	<0.1	0.15	0.02	0.04	0.75	28.6	20	0.29	1.31	837	3.27	0.13	0.43	3.1	0.069	3.8	42.8	<0.01	0.12	12.1	<1	1.3	35.8	<0.05	0.67	<0.05	13.6	0.21	0.33	0.73	104	0.1	20.2	1.8	67	2.6
TP13-77 BU-1	<0.01	1.7	<1	<10	521	0.2	0.04	0.58	0.03	37.1	9.2	111	2.2	4.6	3.3	6.2	0.1	0.11	0.02	<0.02	0.78	21.9	18	0.12	0.93	547	2.86	0.15	0.87	2.8	0.063	3.6	46.1	<0.01	0.15	5.2	<1	0.9	34.6	<0.05	0.29	<0.05	11.2	0.26	0.34	1.2	89	<0.1	8.29	0.8	51	2.1
TP13-78 BU-1	0.02	1.92	<1	<10	240	0.4	0.07	0.39	0.05	54	10.2	104	1.29	9.6	3.68	6.9	<0.1	0.08	0.02	0.03	0.29	35.5	15	0.24	0.96	766	2.71	0.07	0.53	2.7	0.05	5.1	24.2	<0.01	0.12	8.4	<1	1	28.9	<0.05	0.57	<0.05	16	0.11	0.21	1.25	81	<0.1	15.5	1.5	53	1.7
Barge Landing Access Road Borrow Areas																																																				
TP13-01 BU-0	0.09	0.83	25	<10	165	0.3	0.43	0.34	0.21	22.9	7.8	130	1.02	18.5	1.96	2.6	<0.1	0.33	0.08	<0.02	0.15	11.6	4	0.17	0.4	334	5.19	0.05	1.01	16.3	0.043	11	12.3	<0.01	1.57	2.6	<1	0.5	22.5	0.27	0.25	<0.05	7.6	0.05	0.13	0.69	36	0.6	5.2	0.6	46	6.3
TP13-01 BU-1	0.06	0.87	11	<10	119	0.3	0.18	0.39	0.2	23.5	8.9	116	0.79	22.4	2.02	2.9	<0.1	0.23	0.04	<0.02	0.16	12.7	4	0.09	0.8	408	3.81	0.05	0.49	24.4	0.037	7.7	13.8	<0.01	0.63	3	<1	0.5	22	<0.05	0.22	<0.05	11.9	0.06	0.11	0.81	33	0.4	5.59	0.6	36	5.4
TP13-01 BU-2	0.32	0.75	15	<10	186	0.3	0.45	0.4	0.44	24	9.5	187	0.86	25.5	1.89	2.4	<0.1	0.18	0.04	0.03	0.15	12.1	4	0.07	0.63	553	4.81	0.06	0.43	28.2	0.04	45.6	11.7	<0.01	1.64	3.2	<1	0.6	23	<0.05	0.2	<0.05	8.3	0.05	0.12	0.78	37	0.5	5.1	0.5	50	6.8
TP13-01 BU-3	0.13	1.03	15	<10	254	0.3	0.62	0.31	0.34	38.9	7.4	120	1.13	36.4	2.08	3	<0.1	0.21	0.04	0.02	0.2	18.1	4	0.08	0.42	554	11.3	0.05	0.52	17.5	0.045	11.5	16.5	<0.01	0.96	3.3	<1	0.5	24.7	<0.05	0.28	<0.05	11.4	0.06	0.18	1.05	41	0.6	6.25	0.6	42	8.6
TP13-84 BU-1	0.03	0.93	1	<10	647	0.3	0.1	0.37	0.04	53.1	4.2	156	2.58	4.1	2.06	4.4	<0.1	0.52	<0.01	<0.02	0.49	31	21	0.21	0.45	456	4.74	0.08	2.01	3.1	0.047	6.5	37.7	<0.01	0.15	3.7	<1	1.5	22.8	<0.05	0.49	<0.05	16.8	0.16	0.42	3.93	35	0.2	13.9	1.4	45	10