An Investigation into

METALLURGICAL TESTWORK OF CU/NI/PGE SAMPLES FROM THE WELLGREEN PROPERTY

prepared for

PROPHECY PLATINUM CORPORATION

Project 50149-001 – Final Report
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Executive Summary

A test program was completed by developing a flowsheet suitable for a single master composite and confirming through a high Ni composite sample from the Wellgreen property in Yukon Territory, Canada. The Wellgreen deposit is a part of the Kluane Ultramafic Nickel belt located in the Yukon Territory, Canada.

SGS Vancouver Metallurgy office received multiple shipments; a total of 300 kg to prepare the master composite, and later on a third shipment of 120 kg to prepare the high Ni composite. The samples originated from the Wellgreen deposit and submitted by Prophecy Platinum Corporation. The material shipped was originally three sub-composites (massive sulphide, gabbro, and peridotite) and were used to prepare a Master Composite and a High Ni Composite for metallurgical testing.

The head assays of the sub-composites as well as the Master Composite are shown in Table 1.

Table 1: Head Assay Results for Sub-Composites and Master Composite Samples

Sample	Cu	Ni	Ni(s)	Co	Fe	S	C(t)	MgO	Pt	Pd	Au	Rh
	%	%	%	%	%	%	%	%	g/t	g/t	g/t	g/t
Massive Sulphide	1.57	2.59	2.45	0.150	44.0	28.8	0.06	0.56	1.01	0.69	0.08	0.39
Gabbro	0.43	0.19	0.17	0.015	9.77	2.38	0.08	12.7	0.53	0.27	0.12	<0.02
Peridotite	0.25	0.36	0.30	0.017	11.0	1.47	0.06	25.9	0.25	0.35	0.02	0.03
Master Composite	0.33	0.42	0.37	0.018	11.9	2.53	0.06	22.8	0.41	0.45	0.04	0.04

Later on in the program a High Nickel Composite was prepared. The head assays of the ores as received and the High Nickel Composite are presented in Table 2.

Table 2: Head Assay Results for Sub-Composites and High Nickel Composite Samples

Sample	Cu	Ni	Ni(s)	Co	Fe	S	C(t)	MgO	Pt	Pd	Au	Rh
	%	%	%	%	%	%	%	%	g/t	g/t	g/t	g/t
Massive Sulphide	1.40	3.12	2.70	0.170	47.8	29.7	0.08	0.41	1.29	0.86	0.09	0.17
Gabbro	0.51	0.27	0.24	0.024	12.1	3.02	0.07	14.3	0.64	0.33	0.04	0.03
Peridotite	0.30	0.40	0.33	0.020	11.0	1.79	0.06	25.5	0.41	0.60	0.05	0.03
High Ni Composite	0.52	0.83	0.69	0.044	18.1	6.45	0.04	19.8	0.57	0.61	0.10	0.10

The scope of the program involved sample preparation, mineralogy and flotation testing. The flotation testwork investigated reagent and flowsheet options for the recovery of a bulk Copper-Nickel-PGM concentrate and a Ni concentrate. Scoping copper nickel separation tests were also conducted on the bulk copper-nickel concentrate. Batch rougher kinetics, batch cleaner and locked cycle flotation testing were conducted on each of the two composites.

Mineralogy investigations on feed sample were conducted. Detailed feed mineralogy was completed by QEMSCAN™ (quantitative mineralogy) on the master composite to identify mineral liberations and associations to develop grade recovery relationships for the sample. The mineralogy study provides indications of primary target grind based on mineral liberation information. This information identifies independent primary and regrind target estimations which will allow adequate mineral liberation to achieve target final concentrate grade.

Standard Bond grindability test (BWI) and abrasion index test were conducted. The BWI was determined to be 19.7 kWh/t for the Wellgreen master composite ore. This is considered to be a hard ore in the context of the SGS BWI database. The abrasion index fell in the soft range of abrasiveness with a Bond abrasion index of 0.088.

A preliminary flotation testwork was conducted on the master composite. The key variables tested were the effect of grind, collector, talc pre-float and CMC on rougher kinetics. Open circuit cleaner testing was conducted to test the effect of the regrind and dispersants/depressants on circuit recovery and bulk Cu/Ni concentrate grade. The preliminary cleaner flotation test results showed a 18% Cu+Ni concentrate grade at the average Cu and Ni recoveries of 79% and 50%, respectively would be expected. At the same test conditions the combined Pt, Pd and Au grade of 14 g/t at 22%, 53% and 53% recoveries, respectively is achieved.

Following the preliminary testing, split flowsheet optimization testwork to optimize the flowsheet through a more detailed program was started. The proposed split flowsheet recommends taking advantage of the parallel cleaner lines. The viability of the flowsheet was confirmed by means of locked cycle testing through re-circulation of middling streams. The average locked cycle test results over the last three cycles showed that the master composite produced copper, nickel and final bulk concentrates projections as shown in Table 3.

Table 3: Cu and Ni Metallurgical Predictions for Master Composite

LCT-3	Weight	Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution					
Product	**%**	**Cu**	**Ni**	**S**	**Pt**	**Pd**	**Au**	**Fe**	**MgO**	**Cu**	**Ni**	**S**	**Pt**	**Pd**	**Au**
Bulk Clnr 2 Conc.	2.78	11.0	9.28	27.2	3.39	10.3	0.80	31.6	4.13	83.5	57.6	25.9	22.7	62.9	50.3
Ni 3rd Clnr Conc.	2.36	0.59	1.78	12.8	3.55	1.45	0.11	22.4	17.9	3.8	9.4	10.3	20.2	7.5	6.1
Ni 1st Clnr Tail	15.7	0.10	0.34	4.41	0.66	0.41	0.03	—	—	4.3	12.1	23.8	24.9	14.1	12.1
Ni Scav Tail	69.9	0.04	0.11	1.06	0.14	0.06	0.02	—	—	7.6	16.6	25.4	24.1	9.5	25.4
Magnetic Clnr Conc.	0.21	0.85	1.22	8.93	6.19	5.41	0.52	24.4	18.4	0.5	0.6	0.7	3.2	2.5	2.5
Magnetic Rghr Tail	9.00	0.01	0.19	4.50	0.23	0.18	0.02	—	—	0.2	3.7	13.8	4.9	3.5	3.6
Combined Concentrates	**5.36**	**6.01**	**5.66**	**20.1**	**3.57**	**6.22**	**0.48**	**27.3**	**10.8**	**87.8**	**67.6**	**36.9**	**46.0**	**72.9**	**58.9**
Head (calc.)		0.37	0.45	2.92	0.42	0.46	0.04								

The results for High Ni Composite indicate the production of a combine concentrate with 14.5% Cu+Ni grade at the average Cu and Ni recoveries of 88% and 73%, respectively. At the same test conditions the combined Pt, Pd and Au grade of 9 g/t at 38%, 73% and 62% recoveries, respectively would be expected.

Introduction

A metallurgical test program was initiated by Mr. Danniel Oosterman on behalf of Prophecy Platinum Corporation. Mr. Oosterman requested a mineralogical and metallurgical study of one master composite on material from Wellgreen deposit.

The present scoping study was intended to investigate the flotation conditions and to improve mineral recoveries to advance the understanding of mineral recoveries for Cu, Ni, and PGM by flotation.

The scope of the program included sample preparation, mineralogy, grindability and flotation tests on a Master Composite and a High Ni Composite sample prepared from several areas of the mine which would establish a flowsheet capable of producing copper and nickel concentrates. Copper/nickel separation testwork was conducted on the master composite bulk concentrate.

While it is recognized that the different areas in the mine vary to some degree with regard to Cu-Ni-PGM ratios, the detailed testwork was completed on the Master Composite.

Mr. Danniel Oosterman and Mr. Mike Ounpuu represented the client and the results were forwarded to them as they became available. Mr Gary Johnson from Strategic Metallurgy Pty Ltd, Perth, Australia also provided recommendation to the testwork program. The optimization test program was conducted under the direction of consulting metallurgist Mr. Ounpuu, regular meetings and email communications were held over the duration of the project.

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Testwork Summary

1. Sample Receipt and Preparation

Two shipments containing a total of three sub-composite samples, originated from the Wellgreen deposit in Yukon Territory, Canada were received by SGS Vancouver through Prophecy Platinum Corporation. The three sub-composites (massive sulphide, gabbro, and peridotite) were used to prepare one master composite for metallurgical testing.

Initially the three sub-composites representing different zones in the mine plan were stage crushed to ¾". Splits samples were taken as back-up and stored for future testwork. The remaining three sub-composites were combined based on the instruction from the client. The ratio of the sub-composites used to prepare the master composite were 80%, 15%, and 5% for peridotite, gabbro, and massive sulphide. This master composite sample was then processed further for sample characterization and metallurgical testing.

The master composite was first riffled to prepare material for Bond ball mill work index test and Abrasion index test. All remaining master composite material was crushed to minus 10 mesh and split into 2 kg test charges. A portion of one of the 2 kg test charges was removed for composite characterization.

Later in the program, 120 kg material was received and a High Nickel Composite was prepared. The ratio of the sub-composites used to prepare the High Nickel Composite were 70%, 13%, and 17% for peridotite, gabbro, and massive sulphide. The high nickel composite material was then crushed to minus 10 mesh and split into 2 kg test charges.

The complete sample list and sample preparation plan are provided in Appendix A.

2. Material Characterization

2.1. *Chemical Analysis*

A sub-sample from each composite was submitted for assay of Cu, Ni, NiS, Co, Fe, S, C(t), S, Pt, Pd, Au, Rh and MgO, as well as complete multi-element ICP Scan. The results are summarized in Tables 4 and 5 and presented in Appendix B.

It is important to note from the Ni and NiS assays; the Ni assay represents the total amount of Ni that is present, and the sulphide Ni (NiS) is an analytical indicator for the amount of Ni that can actually be recovered by flotation. Assay results indicate that for the master composite nickel is mainly present as the sulphide form (88%). A portion of the nickel (about 12%), however, is non-sulphide and most likely in solid solution with amphiboles, serpentine & amphiboles (substitution in crystal structure). It has been reported that the nickel content of the silicate minerals is about 0.1 to 0.3% Ni. This portion of nickel cannot be recovered during sulphide flotation. As a result, maximum achievable nickel recovery in flotation is reduced accordingly. In the case of the present ore sample, it is speculated that the maximum nickel recovery during rougher flotation process will be about 85% of total nickel. Platinum and palladium contents of head sample are also fairly significant. Gold assay in this sample seems to be low at 0.04 g/t.

The other compound of note is the high MgO content ranging from 0.6% to 26% in the composites.

Table 4: Head Sample Analysis and ICP-Scan for Master Composite

Sample	Masive Sulphide	Gabbro	Peridotite	Master Composite
Element	Assay			
Cu %	1.57	0.43	0.25	0.33
Ni %	2.59	0.19	0.36	0.42
NiS %	2.45	0.17	0.30	0.37
Co %	0.15	0.015	0.017	0.018
Fe %	44.0	9.77	11.0	11.9
S %	28.8	2.38	1.47	2.53
C(t) %	0.06	0.08	0.06	0.06
Pt g/t	1.01	0.53	0.25	0.41
Pd g/t	0.69	0.27	0.35	0.45
Au g/t	0.08	0.12	0.02	0.04
Rh g/t	0.39	< 0.02	0.03	0.04
MgO %	0.56	12.7	25.9	22.8
Ag g/t	5	3	< 2	< 2
Al g/t	16200	47800	30800	27900
As g/t	< 30	< 30	< 30	< 30
Ba g/t	134	1740	51.4	521
Be g/t	0.30	0.36	0.20	0.22
Bi g/t	< 20	< 20	< 20	< 20
Ca g/t	32100	110000	24800	29800
Cd g/t	< 2	< 2	< 2	< 2
Cr g/t	128	573	2227	1915
K g/t	2860	953	1650	1750
Li g/t	< 20	< 33	< 20	21
Mn g/t	322	1400	1300	1300
Mo g/t	< 5	< 5	< 5	< 5
Na g/t	1590	1670	425	1390
P g/t	< 200	539	310	313
Pb g/t	82	112	< 20	< 20
Sb g/t	< 10	< 10	< 10	< 10
Se g/t	66	< 30	< 30	< 30
Sn g/t	< 20	< 20	< 20	< 20
Sr g/t	45.9	40.0	21.6	19.2
Ti g/t	1110	4960	3460	3650
Tl g/t	< 30	< 30	< 30	< 30
U g/t	79	26	< 20	< 20
V g/t	118	169	114	126
Y g/t	4.8	14	7.6	8.5
Zn g/t	72	106	90	91

Table 5: Head Sample Analysis and ICP-Scan for High Nickel Composite

Sample	Masive Sulphide	Gabbro	Peridotite	High Nickel Composite
Element	Assay			
Cu %	1.40	0.51	0.3	0.52
Ni %	3.12	0.27	0.40	0.83
NiS %	2.70	0.24	0.33	0.69
Co %	0.17	0.024	0.02	0.044
Fe %	47.8	12.1	11.0	18.1
S %	29.7	3.02	1.79	6.45
C(t) %	0.08	0.07	0.06	0.04
Pt g/t	1.29	0.64	0.41	0.57
Pd g/t	0.86	0.33	0.60	0.61
Au g/t	0.09	0.04	0.05	0.10
Rh g/t	0.17	0.03	0.03	0.61
MgO %	0.41	14.3	25.5	19.8
Ag g/t	< 2	2	< 2	< 2
Al g/t	12400	39200	24500	30000
As g/t	< 30	< 30	< 30	< 30
Ba g/t	106	165	61.3	70.7
Be g/t	0.20	0.34	0.18	0.20
Bi g/t	< 20	< 20	< 20	< 20
Ca g/t	25800	28900	23600	33500
Cd g/t	< 2	< 2	< 2	< 2
Cr g/t	130	909	3070	1530
K g/t	1790	882	1560	1280
Li g/t	< 5	29	14	10
Mn g/t	290	1220	1220	1050
Mo g/t	< 5	< 5	< 5	< 5
Na g/t	582	100	533	434
P g/t	< 200	455	266	< 285
Pb g/t	< 200	< 200	< 200	< 60
Sb g/t	< 10	< 10	< 10	< 10
Se g/t	79	< 30	< 30	< 30
Sn g/t	< 20	< 20	< 20	< 20
Sr g/t	27	29.3	13.4	17.7
Ti g/t	744	3910	3200	2760
Tl g/t	< 30	< 30	< 30	< 30
U g/t	< 80	< 80	< 80	< 30
V g/t	92	146	104	107
Y g/t	3	10.7	6.5	6.5
Zn g/t	105	96	90	87

2.2. *Mineralogy Study*

QEMSCAN[TM] analysis used for quantitative mineralogical ore characterization is an acronym for Quantitative Evaluation of Materials by Scanning Electron Microscopy. In order to accurately quantify the mineral constituents of the master composite and generate detailed information on grain sizes and liberation, the master composite was analysed using QEMSCAN. Particle Mineral Analyses (PMA) and

Specific Mineral Search (SMS) analyses were performed on each of the submitted polished sections. Particle Mineral Analysis (PMA) is a two-dimensional mapping analysis aimed at resolving liberation and locking characteristics of a generic set of particles. A pre-defined number of particles are mapped at a point spacing selected in order to spatially resolve and describe mineral textures and associations. Specific Mineral Search is a modified particle mapping routine aimed at resolving liberation and locking characteristics of a set of particles, specifically a phase that reports as a low-grade constituent. The results of the QEMSCAN analyses are presented in Appendix G.

2.2.1. Sample Receipt and Description

A ground sample of the overall master composite with an average K_{80} of 100 µm was submitted for mineralogy. The sample was screened to form three size fractions; +75, -75/+25, and -25 µm. A portion of each fraction was submitted for Cu, Ni, S and WRA analyses for data validation. Polished epoxy grain mounts were prepared for each size fraction and were submitted for analyses using QEMSCAN technology. These results are further discussed in the assay reconciliation portion of this section.

2.2.2. Analytical Quality Control

Analytical quality control is conducted by comparing the chemical analysis determined mineralogically by QEMSCAN with the chemical analyses obtained from standard assaying techniques.

Key QEMSCAN elemental assays, calculated from the mineral composition have been regressed with the chemical assays and this is presented in Figure 1. The overall correlation, as measured by R-squared criteria, was 0.99 and is considered acceptable.

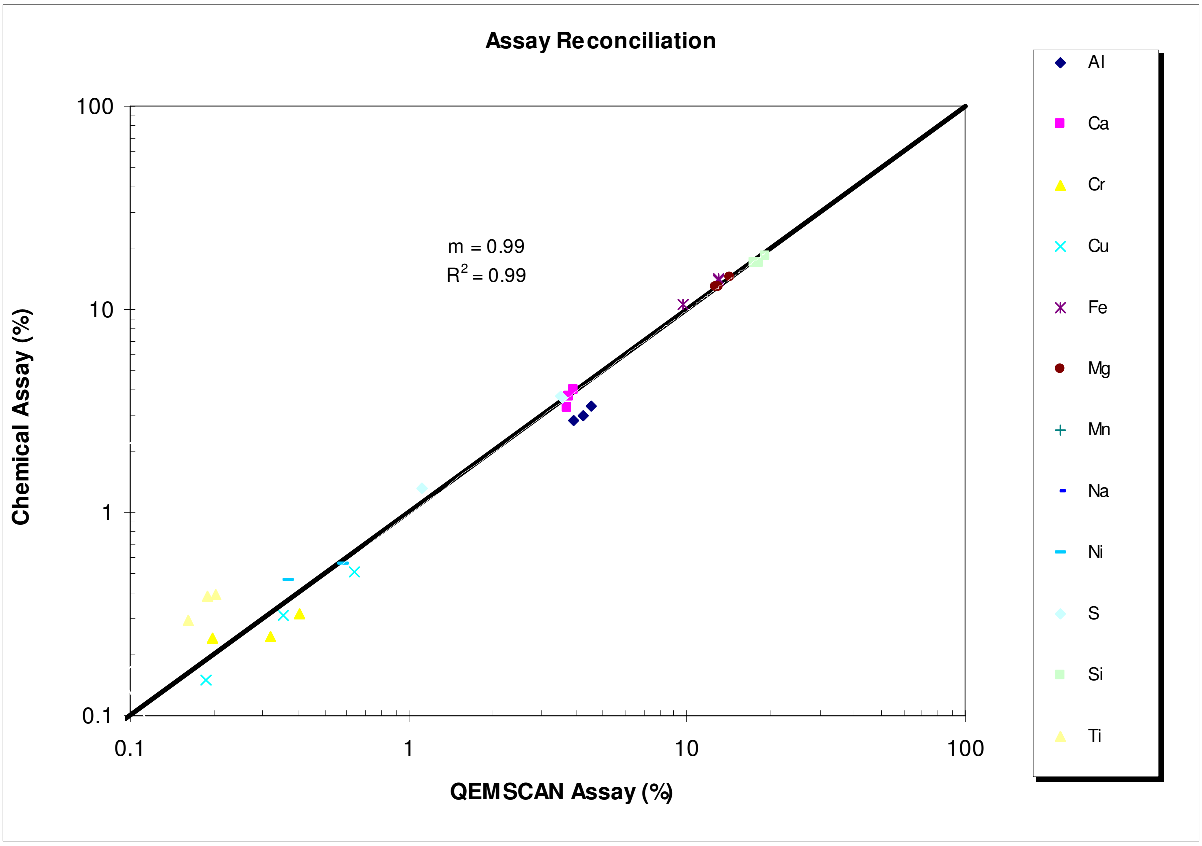


Figure 1: QEMSCAN Calculated Assays Compared to Chemical Assays

2.2.3. Modal Analysis and Grain Size Distribution

Mineral modal analysis of the overall composite, illustrating mineral distributions by both sample and fraction, is presented in Table 6. The major sulphide minerals are chalcopyrite, pentlandite and pyrrhotite, while the major floatable gangue minerals are orthopyroxene, clinopyroxene, chlorite/serpentine and talc.

The value minerals of this ore are chalcopyrite, accounting for 1.2% of the overall mineral mass, and pentlandite accounting for 1.1% of the overall mineral mass. The distributions of chalcopyrite and pentlandite increase in the finer fractions. The main constituent of sulphide gangue is pyrrhotite at 5.8% of the sample. Pyrite is present in only a few grains mainly liberated with a couple of attached grains. Chlorite, serpentine, amphiboles, pyroxene, talc, mica, and iron oxides account for a significant portion of the non-sulphide gangue. A high proportion of the gangue is potentially floatable.

Table 6: Bulk Modal Analysis of the Overall Composite

Sample		Master Comp						
Fraction		Combined	+75 um		-75/+25 um		-25 um	
Mass Size Distribution (%)			23.7		39.0		37.2	
Calculated ESD Particle Size		15	75		32		7	
		Sample	Sample	Fraction	Sample	Fraction	Sample	Fraction
Mineral Mass (%)	Chalcopyrite	1.2	0.1	0.5	0.4	1.0	0.7	1.8
	Pyrrhotite	5.8	0.5	2.2	2.9	7.5	2.3	6.2
	Pentlandite	1.1	0.1	0.3	0.4	1.1	0.6	1.7
	Other Sulphides	0.1	0.0	0.0	0.0	0.0	0.1	0.2
	Feldspar	3.4	0.6	2.4	1.3	3.2	1.5	4.2
	Orthopyroxene	7.7	2.8	11.8	4.1	10.4	0.9	2.3
	Clinopyroxene	12.9	3.4	14.5	5.7	14.7	3.8	10.1
	Amphibole	13.0	2.7	11.5	4.4	11.2	5.9	15.8
	Mica	1.6	0.8	3.6	0.5	1.3	0.3	0.7
	Chlorite/Serpentine	45.7	11.2	47.1	16.5	42.2	18.1	48.5
	Talc	3.0	0.6	2.4	1.1	2.8	1.4	3.7
	Other Silicates	0.5	0.1	0.4	0.2	0.5	0.2	0.5
	Fe Oxides	2.4	0.4	1.8	0.9	2.4	1.0	2.7
	Other Oxides	1.1	0.3	1.1	0.5	1.3	0.3	0.9
	Carbonates	0.3	0.0	0.2	0.1	0.3	0.1	0.4
	Others	0.2	0.0	0.1	0.1	0.2	0.1	0.3
	Total	100	23.7	100	39.0	100	37.2	100

The LCT-1 Ni cleaner concentrate as well as the rougher tails were submitted for the microprobe work. The primary focus of the probe work focused on Ni in major gangue minerals however pentlandite and pyrrhotite were also included to check their contents. The probe results showed there is Ni in the serpentine and chlorite and some Ni in the pyroxene and amphiboles. The mineral chemistry is provided in Appendix G.

The cumulative grain size distributions of the main minerals are presented in Figure 2. Pyrrhotite is the coarsest minerals present. Chalcopyrite and pentlandite are approximately in the same size range. Since the overall size distribution is coarser than the sulphides, the sulphides are preferentially ground finer than the silicates.

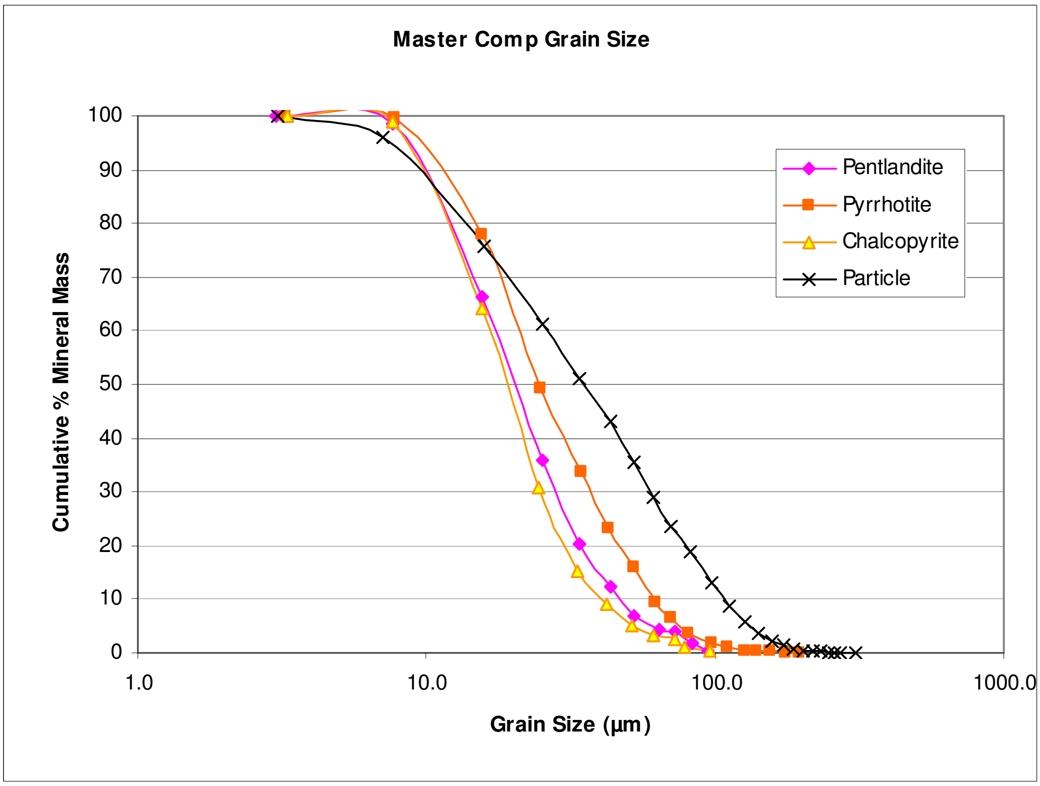
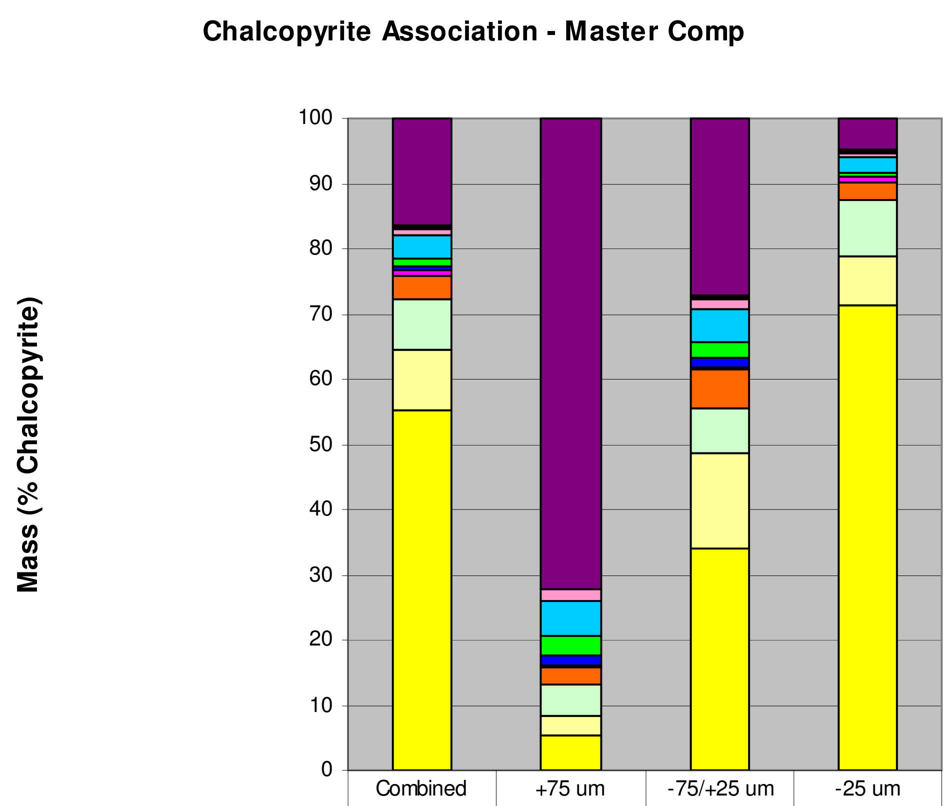


Figure 2: Mineral Cumulative Grain Size Distribution

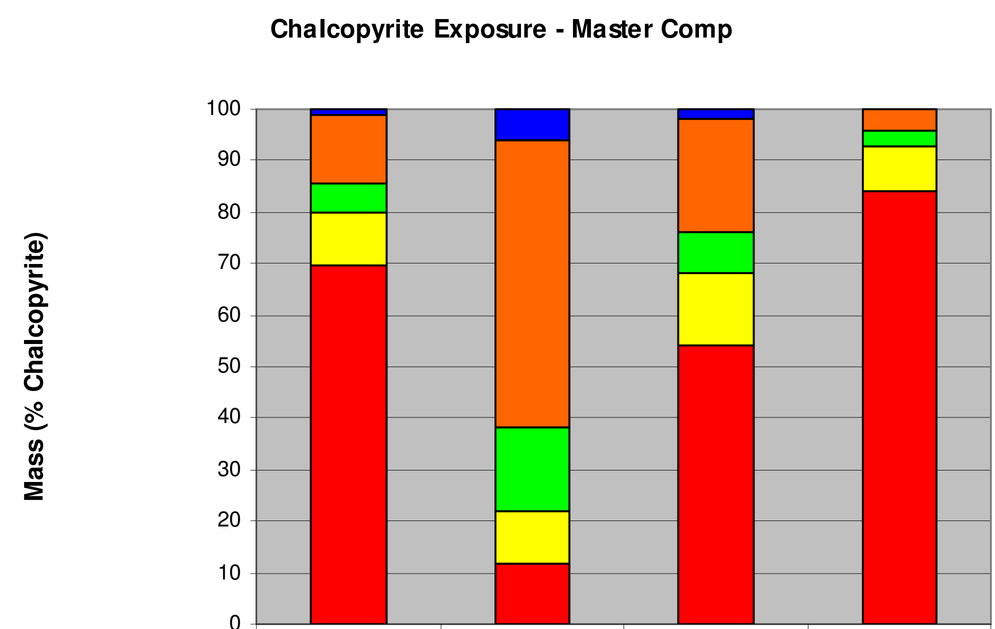
2.2.4. Liberation and Association

Global exposure, associations, and liberations of chalcopyrite, pentlandite, and pyrrhotite in the each fraction and overall composite are shown in Figures 3-8 and presented in Appendix G.



	Combined	+75 um	-75/+25 um	-25 um
Complex	16.5	72.2	27.1	4.9
Chalcopyrite:Other	0.2	0.0	0.0	0.2
Chalcopyrite:Oxides	0.3	0.1	0.7	0.2
Chalcopyrite:Other Silicates	1.1	1.7	1.4	0.8
Chalcopyrite:Serp/Chlorite	3.4	5.2	5.0	2.3
Chalcopyrite:Pyx/Amph	1.3	3.2	2.4	0.5
Chalcopyrite:Po:Pn	0.7	1.5	1.6	0.1
Chalcopyrite:Pentlandite	0.7	0.1	0.4	0.9
Chalcopyrite:Pyrrhotite	3.6	2.7	5.9	2.5
Lib Chalcopyrite	7.8	5.0	6.8	8.6
Free Chalcopyrite	9.4	2.8	14.7	7.6
Pure Chalcopyrite	55.2	5.4	34.1	71.3

Figure 3: Chalcopyrite Mineral Association



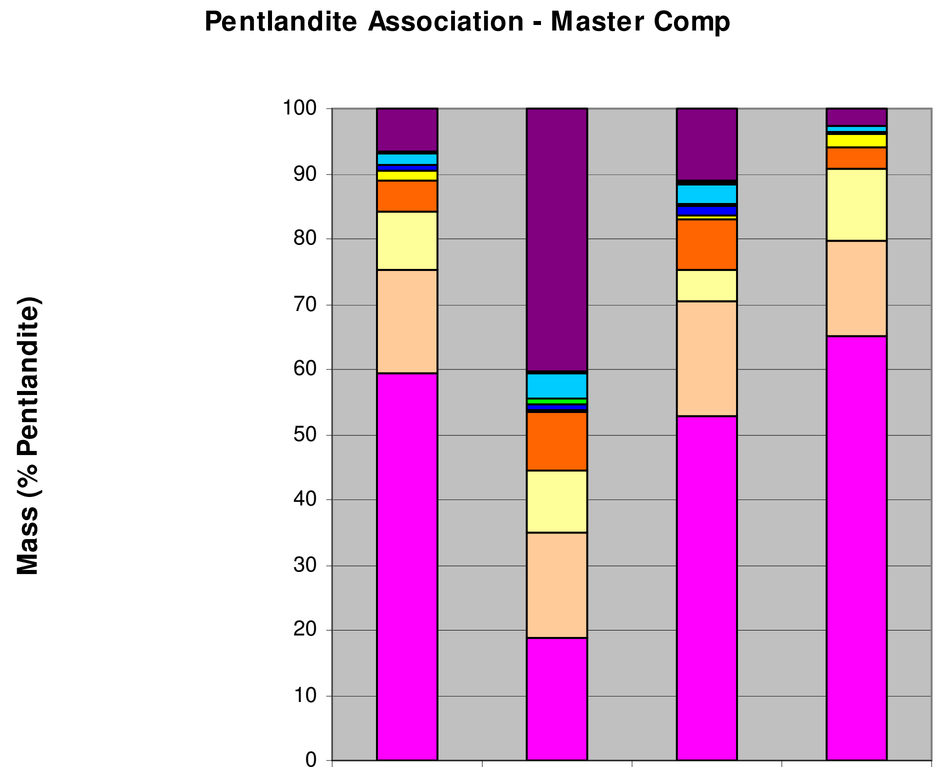
	Combined	+75 um	-75/+25 um	-25 um
Locked	1.1	6.1	1.8	0.2
0-30% Exposed	13.3	55.5	21.9	4.2
30-50% Exposed	5.5	16.3	8.1	3.0
50-80% Exposed	10.3	10.2	14.1	8.4
Exposed	69.8	11.8	54.0	84.3

Figure 4: Chalcopyrite Exposure

Chalcopyrite liberation in the sample is reasonably good at a grind size of ~80 µm. The pure, free, and liberated chalcopyrite accounts for 72% of the mineral mass overall. In the coarsest size fraction, this decreases to 13% of the Cu being liberated, with the expected increase in liberation in the finer fractions. Visual representations of these particles grouped by liberation class are shown in Appendix G.

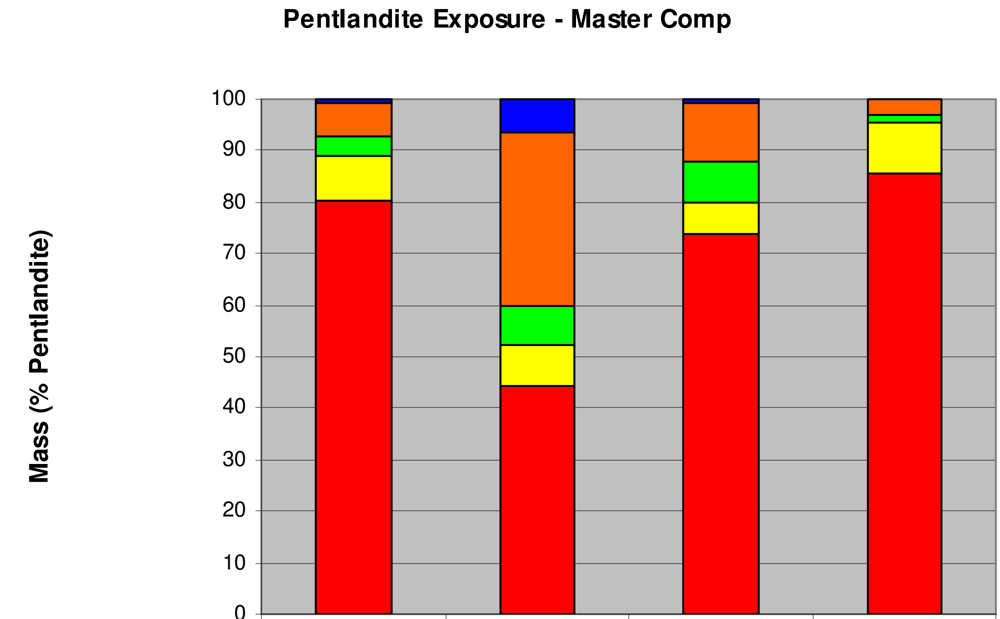
Most of the chalcopyrite exists as liberated minerals but there are associations with other sulphides and complex gangue particles in all size fractions. A regrind will be necessary in order to fully liberate the copper minerals. Minor amounts of chalcopyrite are associated with nickel sulphides.

Examining the exposure data, 70% of the chalcopyrite in the sample is totally exposed; the best exposure is seen in the -25 microns fraction. Locked chalcopyrite is 6% in the +75 microns fraction dropping to less than 1% in the -25 microns. Less than 1.1% of the overall chalcopyrite was locked.



	Combined	+75 um	-75/+25 um	-25 um
Complex	6.6	40.4	11.2	2.5
Pentlandite:Other	0.0	0.0	0.0	0.0
Pentlandite:Oxides	0.1	0.2	0.2	0.1
Pentlandite:Other Silicates	0.1	0.0	0.3	0.1
Pentlandite:Serp/Chlorite	1.7	3.9	3.1	1.0
Pentlandite:Pyx/Amph	0.1	0.9	0.2	0.0
Pentlandite:Cpy:Pn	0.7	0.7	1.7	0.2
Pentlandite:Chalcopyrite	1.5	0.3	0.3	2.1
Pentlandite:Pyrrhotite	4.9	8.8	8.0	3.2
Lib Pentlandite	9.0	9.8	4.6	11.1
Free Pentlandite	15.6	16.1	17.7	14.6
Pure Pentlandite	59.5	18.8	52.8	65.1

Figure 5: Pentlandite Mineral Association

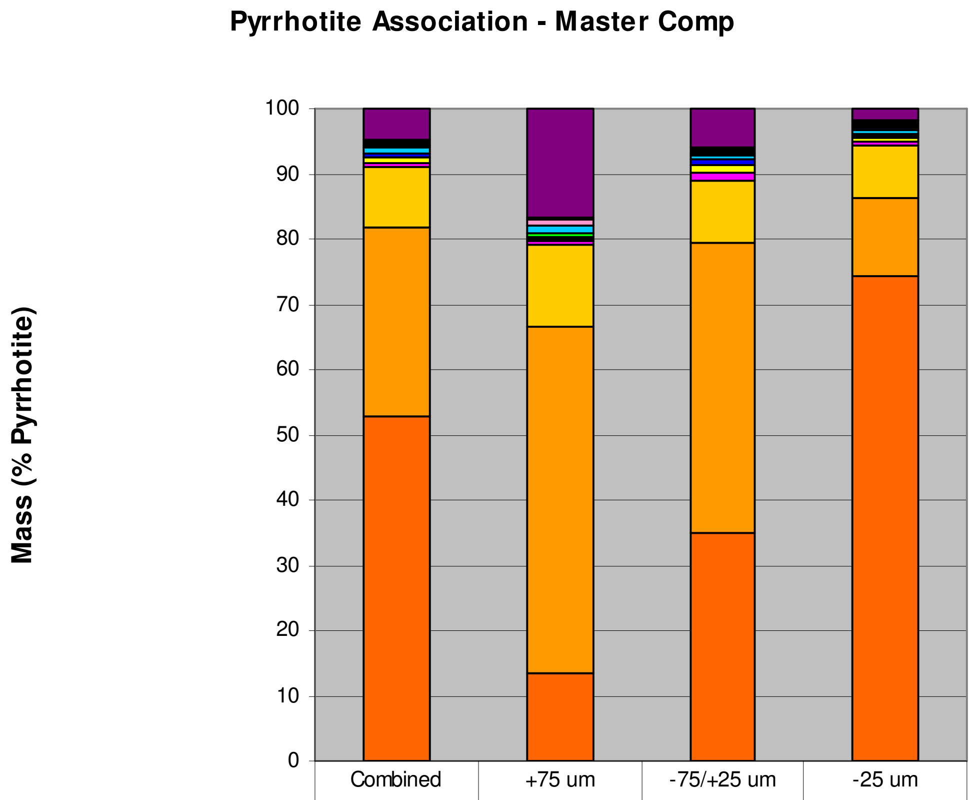


	Combined	+75 um	-75/+25 um	-25 um
Locked	0.6	6.6	0.8	0.2
0-30% Exposed	6.6	33.7	11.4	2.7
30-50% Exposed	3.8	7.3	7.7	1.7
50-80% Exposed	8.6	8.2	6.1	9.9
Exposed	80.4	44.2	73.9	85.5

Figure 6: Pentlandite Exposure

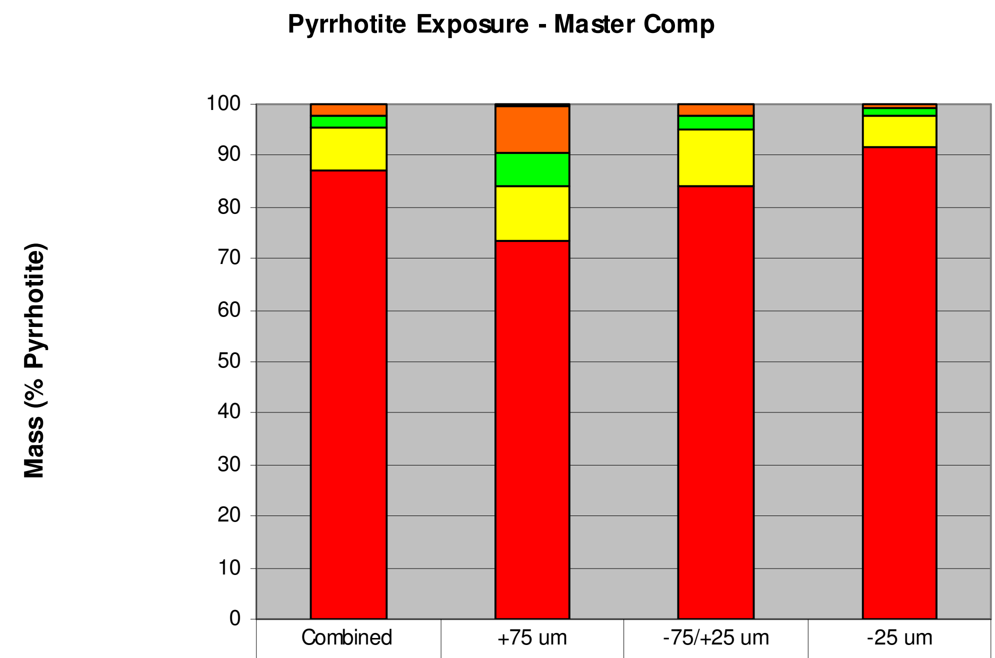
Pentlandite is reasonably well liberated at this grind (K_{80} ~80 µm). Overall, 84% of the pentlandite is pure, free, or liberated, with the best liberation observed in the -25 microns fraction at 91%. This is identified by the pentlandite exposure data where 80% of the pentlandite is exposed and the best exposure is in the -25 microns fraction to 86%. Locked pentlandite is present in trace amounts in all size fractions. The amount of locked sulphide Ni decreased with the successively finer size fractions to 0.2% locked in the -25 µm fraction. In the coarsest size fraction, 44% of the Ni-S was exposed. A visual representation of these particles grouped by liberation class is also presented in Appendix G.

As with the chalcopyrite, much of the pentlandite is liberated and is chiefly associated with pyrrhotite or other complex particles. Regrinding will likely be necessary in order to fully liberate the nickel. In the coarser fractions, there is also some association with sulphide complexes and serpentine and chlorite gangue.



	Combined	+75 um	-75/+25 um	-25 um
Complex	4.8	16.7	6.0	1.9
Pyrrhotite:Other	0.1	0.1	0.2	0.0
Pyrrhotite:Oxides	1.0	0.3	0.8	1.2
Pyrrhotite:Other Silicates	0.2	0.6	0.3	0.1
Pyrrhotite:Serp/Chlorite	0.7	1.4	0.6	0.7
Pyrrhotite:Pyx/Amph	0.3	0.4	0.1	0.3
Pyrrhotite:Cpy:Pn	0.4	0.3	0.8	0.1
Pyrrhotite:Chalcopyrite	0.9	0.5	1.3	0.6
Pyrrhotite:Pentlandite	0.7	0.5	0.9	0.6
Lib Pyrrhotite	9.3	12.7	9.8	8.3
Free Pyrrhotite	28.8	53.1	44.3	11.9
Pure Pyrrhotite	52.9	13.4	35.0	74.3

Figure 7: Pyrhotite Mineral Association



	Combined	+75 um	-75/+25 um	-25 um
Locked	0.1	0.3	0.1	0.0
0-30% Exposed	2.0	9.1	2.2	0.8
30-50% Exposed	2.3	6.3	2.8	1.3
50-80% Exposed	8.6	10.7	10.9	6.2
Exposed	87.0	73.6	84.0	91.6

Figure 8: Pyrrhotite Exposure

Pyrrhotite liberation (pure, free and liberated combined) in the sample is very good and accounts for 91% of the mineral mass overall with the best liberation seen in the -25 micron fraction at 94%. This is also noted in pyrrhotite exposure data where 87% of the pyrrhotite is exposed. In the coarsest size fraction this decreases to 74% with the expected increase in exposure in the finer fractions to 92%. Less than 0.1% of the overall pyrrhotite was locked.

Pyrrhotite associations exist with other sulphides and chiefly with complex gangue particles in all size fractions.

2.2.5. Process Mineralogy

Figure 9 illustrates the mineralogically limiting copper grade-recovery curves for the master composite by sample and by size fraction. This analysis provides an indication of the maximum achievable Cu grade and recovery based on individual particle liberation and grade. These curves do not reflect gangue activation and entrainment or other factors that could occur in the actual metallurgical process. Full grade-recovery data for each sample can be found in Appendix G.

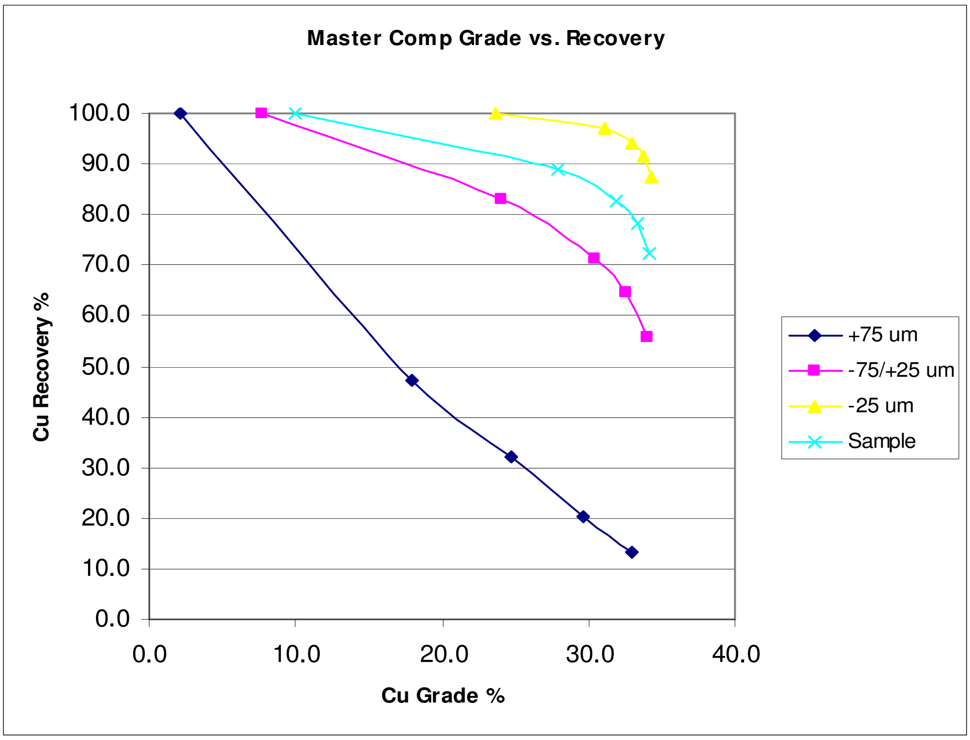


Figure 9: Mineralogically Limiting Copper Grade-Recovery Curves

It can be seen that there is a significant improvement in Cu recovery when particles are reduced to sizes finer than 75 µm. Grade recovery for Cu shows that for the sample, Cu grades of 34% and 28% can be achieved at recoveries of 72% and 89%, respectively.

Figure 10 illustrates the mineralogically limiting nickel grade-recovery curves for the master composite on each size fraction.

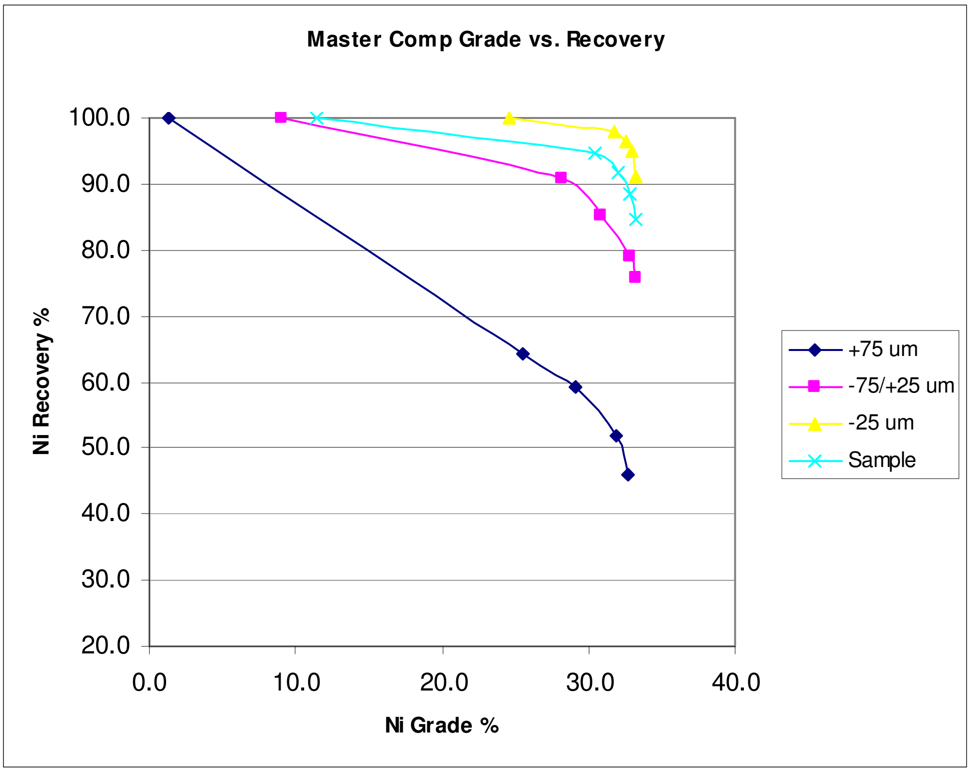


Figure 10: Mineralogically Limiting Nickel Grade-Recovery Curves

Grade recovery for Ni shows that for the sample, Ni grades of 33% and 30% can be achieved at Ni recoveries of 85% and 95% respectively.

Grade recovery for pyrrhotite shows that grades of 98% and 91% can be achieved at recoveries of 91% and 99%, respectively as shown in Figure 11.

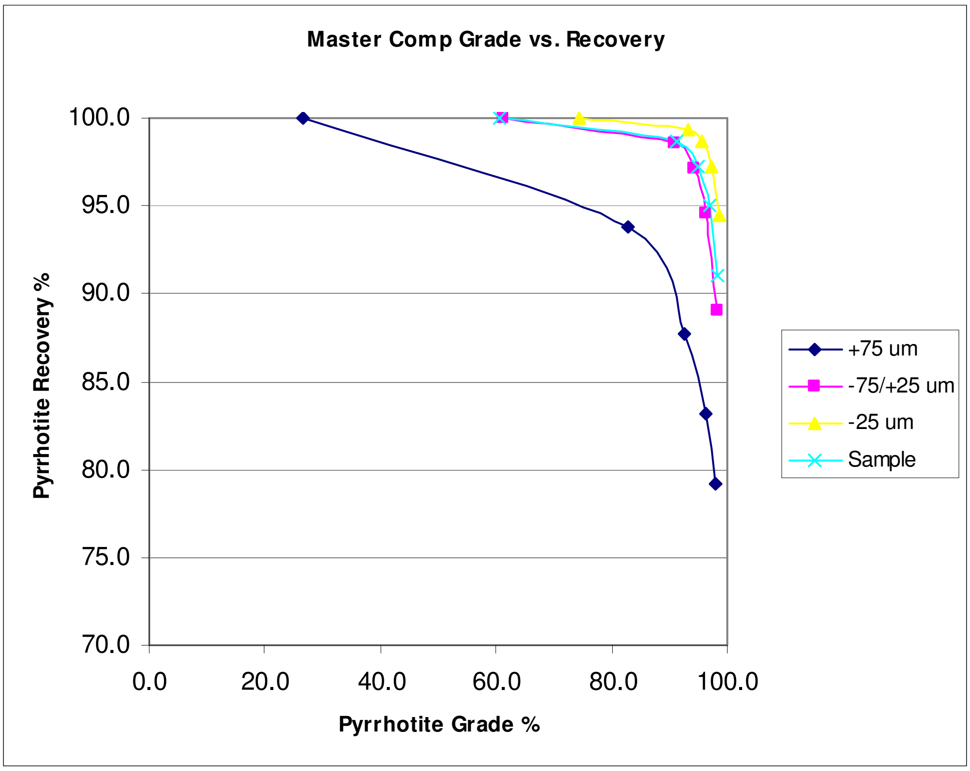


Figure 11: Mineralogically Limiting Pyrrhotite Grade -Recovery Curves

Care should be taken in the interpretation of these grade-recovery curves. They are better indicators of how the liberation changes with particle size than they are predictors of actual flotation grade-recovery potential. The mineralogical limiting grade-recovery curves do not take into account that most sulphides will float at the same time and that some of the floatable gangue is very difficult to depress, unless some of the Cu and Ni is sacrificed as well.

The mineral release curves for chalcopyrite, pentlandite and pyrrhotite are presented in Figure 12. The mineral release curve is used to predict the amount of liberated mineral of interest at varying size distributions. This can be an indicator of optimum grind targets for metallurgical processes to achieve the most liberation for the least amount of grind energy. The variation between value and gangue mineral release curves may sometimes be used to enhance separation.

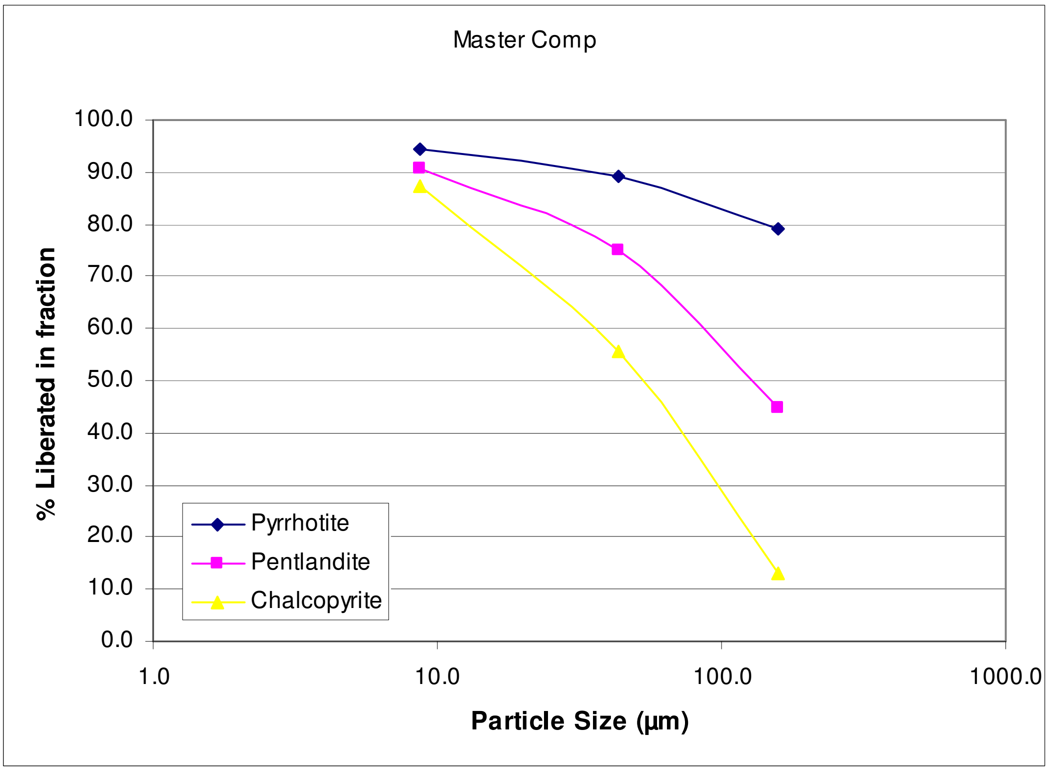


Figure 12: Mineral Release Curves

In the master composite, a significant increase in chalcopyrite liberation occurs between 75 and 10 µm. Both pyrrhotite and pentlandite show a more gradual increase between these two sizes. The mineral release curves indicate that the Cu circuit will require a regrind to 20 µm in order to liberate 80% of the chalcopyrite.

In order to liberate the sulphide nickel, regrind sizes will need to target sizes of 30 µm or finer.

Pyrrhotite liberated at a coarser size than the value minerals. However, reagent schemes aimed at gangue depression are more likely to target talc, chlorites, and serpentine as potential diluents.

2.2.6. Conclusions

The QEMSCAN mineralogical study of the master composite sample identified the following sample characteristics:

- Copper and nickel are the major value metals in this ore and occur almost exclusively as chalcopyrite, and pentlandite, respectively. The non-sulphide minerals are mainly chlorites, amphiboles, pyroxene, talc, and feldspar.
- There are a high proportion of chlorites/serpentine, pyroxene and talc in the ore which may require depressants to avoid recovery in the concentrate.

- In the ground sample, an average of 72% of the chalcopyrite occurs as liberated or free particles. Based on these analyses, a regrind to ~20 µm should be sufficient. The nickel sulphide is slightly coarser, but will require regrinding to ~30 µm to achieve greater liberation. This will also be sufficient to liberate any pyrrhotite reporting to the Cu circuit
- Of the non-liberated chalcopyrite-bearing particles, there is an association between pyrrhotite and chalcopyrite, and also association with complex gangue particles. Sulphide nickel also occurs as binary particles with pyrrhotite, as well as with non-sulphide gangue and complex particles.

3. Comminution Testwork

Standard Bond grindability test (BWI) for ball mill grinding and abrasion index test were conducted. Figures 13 and 14 place the values on histogram plots of the SGS grindability test database. The Bond ball mill grindability test is performed according to the original Bond procedure. It requires 8 kg of minus 6 mesh material that is preferably prepared at the testing facility. The Bond ball mill work index (BWI) has been widely used for mill sizing, but is also utilized in computer simulation and variability testing. The BWI was determined to be 19.7 kWh/t (metric) for the Wellgreen master composite ore. This is considered to be a hard ore in the context of the SGS BWI database.

The abrasion index fell in the soft range of abrasiveness with a Bond abrasion index of 0.088. Abrasion Index can be used to determine steel media and liner wear in crushers, rod mills, and ball mills.

Details on grindability testing data and calculations can be found in Appendix C.

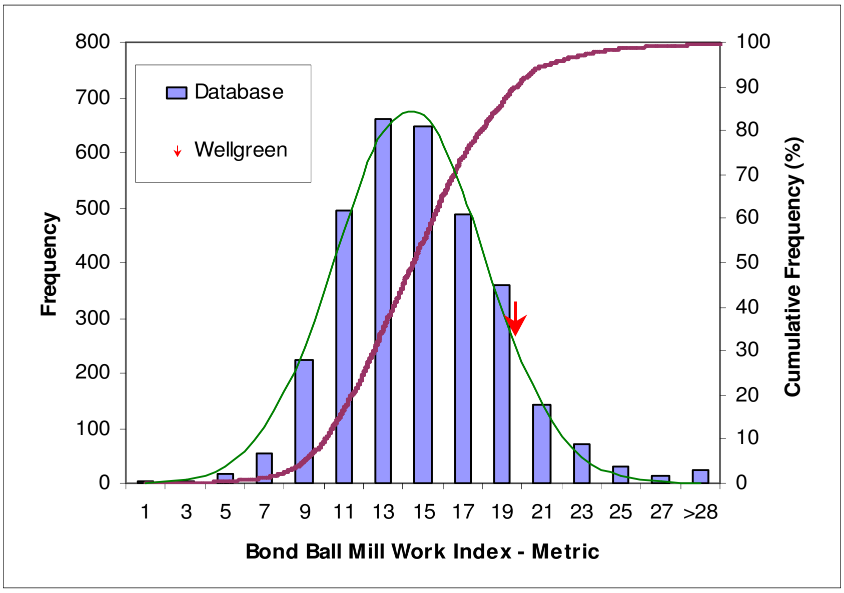


Figure 13: Histogram of Bond Ball Mill Work Index Distribution

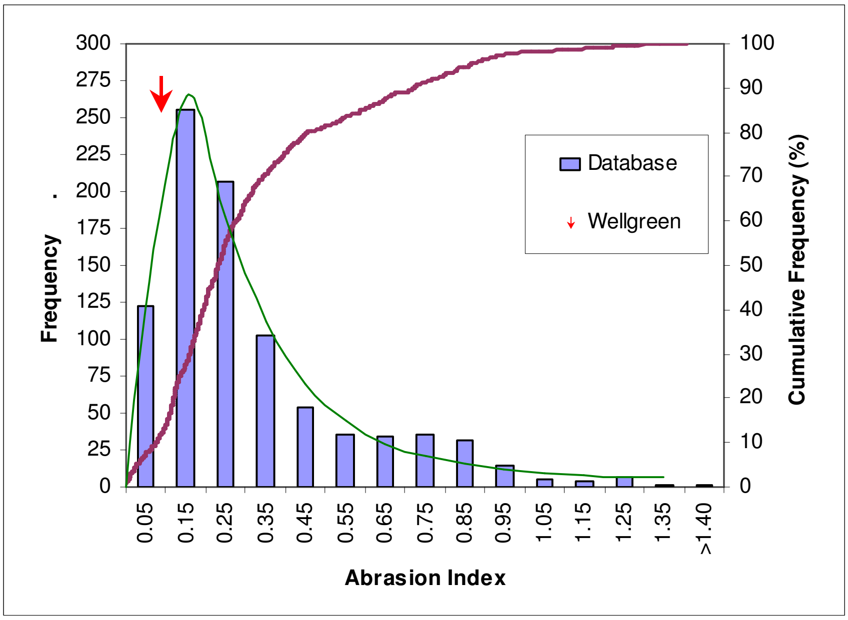


Figure 14: Master Composite Abrasion Index Relative to SGS Database

4. Master Composite Flotation Testwork

Development of a flotation flowsheet was undertaken through a series of rougher kinetics and cleaner flotation tests using 2 kg master composite test charges. The objective of these tests was to maximize recovery of valuable minerals into saleable concentrates whilst also limiting the amount of MgO recovered to the concentrates. The Ni and PGM values in the ore are deemed to be crucial for the profitability and project economics. The complete results are located in Appendix D.

4.1. Preliminary Flotation Testwork

Preliminary flotation testwork was conducted on the master composite. The key variables tested were the effect of grind, collector, talc pre-float and CMC on rougher kinetics. Open circuit cleaner testing was conducted to test the effect of the regrind and dispersants/depressants on circuit recovery and bulk Cu/Ni concentrate grade. A copper/nickel separation test and a split flotation test were also conducted in the preliminary testwork. One locked cycle test was conducted to assess the effect of re-circulating products on metallurgical performance.

In each test, pyrrhotite (Po), chalcopyrite (Cp), pentlandite (Pn) and non-sulphide gangue (NSG) grades were calculated from stoichiometric relationship assumptions based on actual assays of copper, nickel, and sulphur. It was assumed the major copper bearing mineral as chalcopyrite, nickel bearing mineral as pentlandite and the remaining S content is associated with pyrrhotite.

Determining the non-sulphide nickel of tails was also undertaken for the selected tests.

The following sections capture the bench-scale flotation testing component of the master composite in the preliminary testwork.

4.1.1. Rougher Flotation Tests

A series of 12 rougher kinetics tests were conducted. Rougher kinetics tests can establish preliminary grade and recovery relationships as well as flotation kinetics. This was accomplished by collecting concentrates over incremental time periods. The effects of operational variables (primary grind, collector, pH, talc pre-float and carboxy methyl cellulose (CMC)) on recovery were studied.

The initial test was conducted as a sighter test. Subsequent tests modified test conditions in attempts to improve metallurgy. Further tests avoided too much collector to collapse the copper froth, but added sufficient to recover the slower floating PGE minerals.

The final three rougher tests included additional collectors added at different points, dosages and a selective collector versus SIPX. In test F-24 enough dosage of SIPX was added in the grind to get a good copper recovery however the Ni recovery was low. Test F-26 replaced the SIPX in the grind with Cytec Aero 4037 promoter to float copper more selectively than SIPX. Test F-27 was conducted with 20 g/t SIPX in the first rougher instead of the grind to see if the pentlandite is more floatable at the start of the rougher. Finally, test F-28 was conducted with 5 minutes aeration between grinding and the first rougher to investigate if the pentlandite needs some aeration to get floating better. The results show aeration is not required. Adding collector into the grind really only floats copper. Using a selective collector shows more selective at floating copper from nickel and pyrrhotite however needs more investigation.

Table 7 summarizes the results of the rougher flotation testwork and Table 8 shows the rougher flotation test results. Complete test details can be found in Appendix E.

Table 7: Summary of the Rougher Flotation Test Condition and Results

	Grade, %	Rec. %	Grade %	Rec. %	Grade g/t	Rec. %	Grade g/t	Rec. %	Grade g/t	Rec. %	Mass Rec	Prim. Grind	Float	SIPX	PAX	pH	CMC	Option
Test	Cu		Ni		Pt		Pd		Au		%	Microns	min	g/t	g/t		g/t	
F1	1.20	92.2	1.40	84.7	1.20	77.1	1.58	88.7	0.17	87.9	28.3	90	18	100	–	Nat	–	
F2	1.29	89.5	1.50	80.6	1.11	68.4	1.33	81.2	0.10	69.8	24.9	90	18	–	80	Nat	–	
F3	1.82	92.8	2.03	78.8	1.65	66.8	2.04	81.7	0.15	62.8	18.0	90	20	70	–	Nat	–	
F4	1.63	93.1	1.82	82.4	1.58	78.7	1.93	89.2	0.16	67.5	20.4	90	20	70	–	9.5	–	
F5	1.54	95.7	1.74	81.9	1.49	70.3	1.79	82.3	0.10	59.2	22.2	50	20	70	–	Nat	–	
F6	1.49	90.6	1.68	81.3	1.36	73.4	1.60	85.0	0.11	61.8	22.1	144	20	70	–	Nat	–	
F7	1.37	82.2	1.68	79.3	1.37	67.6	1.64	73.7	0.11	57.5	21.5	90	20	70	–	Nat	–	Talc Pre-float
F8	1.70	91.7	1.86	80.5	1.53	67.6	2.00	83.0	0.16	65.7	19.7	90	20	70	–	Nat	60	CMC
F24	1.74	90.3	1.92	75.1	1.52	63.0	2.50	82.0	0.17	62.7	16.9	90	20	60	–	Nat	–	
F26	2.30	87.8	2.36	73.6	1.66	51.0	2.50	73.0	0.18	60.0	14.2	90	20	40	–	Nat	–	4037 20 g/t
F27	1.79	85.8	1.93	71.9	1.40	49.0	2.30	74.0	0.14	55.5	15.6	90	20	60	–	Nat	–	
F28	2.08	86.1	2.30	71.3	1.63	47.0	2.70	74.0	0.18	57.4	13.3	90	20	60	–	Nat	–	Aeration

Table 8: Rougher Flotation Test Results

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
		%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
	Ro Conc 1	11.1	2.81	3.00	11.3	1.78	3.33	0.35	84.7	70.8	39.7	44.8	73.1	72.5
F1	Ro Conc 1-2	19.6	1.68	1.91	9.84	1.49	2.15	0.23	90.1	79.9	61.2	66.5	83.7	82.8
SIPX 100 g/t	**Ro Conc 1-3**	**28.3**	**1.20**	**1.40**	**8.60**	**1.20**	**1.58**	**0.17**	**92.2**	**84.7**	**77.0**	**77.1**	**88.7**	**87.9**
K80 90 um	Ro Tail	71.7	0.04	0.10	1.01	0.14	0.08	0.01	7.8	15.3	23.0	22.9	11.3	12.1
	Head (calc.)		0.37	0.47	3.15	0.44	0.50	0.05						
	Ro Conc 1	9.1	3.10	2.73	8.92	1.16	2.56	0.19	79.0	53.7	26.3	26.2	57.2	47.3
F2	Ro Conc 1-2	18.4	1.69	1.89	8.50	1.23	1.65	0.13	86.8	75.0	50.6	55.9	74.3	63.0
PAX 80 g/t	**Ro Conc 1-3**	**24.9**	**1.29**	**1.50**	**8.00**	**1.11**	**1.33**	**0.10**	**89.5**	**80.6**	**64.3**	**68.4**	**81.2**	**69.8**
K80 90 um	Ro Tail	75.1	0.05	0.12	1.47	0.17	0.10	0.02	10.5	19.4	35.7	31.6	18.8	30.2
	Head (calc.)		0.36	0.46	3.10	0.40	0.41	0.04						
	Ro Conc 1	3.5	2.26	0.38	3.81	0.50	2.55	0.14	22.1	2.8	4.4	3.9	19.7	11.0
	Ro Conc 1-2	8.2	3.57	2.89	8.81	1.39	3.34	0.25	82.3	51.0	24.0	25.4	60.7	46.2
F3	Ro Conc 1-3	12.5	2.54	2.67	9.04	1.67	2.67	0.20	89.8	72.2	37.7	47.0	74.4	56.1
SIPX 70 g/t	Ro Conc 1-4	14.6	2.22	2.39	9.08	1.70	2.39	0.18	91.4	75.2	44.1	55.8	77.7	58.9
K80 90 um	**Ro Conc 1-5**	**18.0**	**1.82**	**2.03**	**9.52**	**1.65**	**2.04**	**0.15**	**92.8**	**78.8**	**57.2**	**66.8**	**81.7**	**62.8**
	Ro Tail	82.0	0.03	0.12	1.57	0.18	0.10	0.02	7.2	21.2	42.8	33.2	18.3	37.2
	Head (calc.)		0.35	0.46	3.00	0.44	0.45	0.04						
	Ro Conc 1	3.0	1.86	0.38	3.55	0.61	3.73	0.14	15.7	2.5	3.4	4.5	25.4	8.6
	Ro Conc 1-2	7.7	3.77	3.35	10.6	1.60	3.80	0.32	81.8	57.4	25.7	30.2	66.4	50.2
F4	Ro Conc 1-3	14.0	2.30	2.46	10.3	1.76	2.59	0.22	90.2	76.2	45.2	60.1	81.8	61.7
Higher pH	Ro Conc 1-4	16.4	1.99	2.16	9.92	1.71	2.29	0.19	91.7	78.7	51.1	68.6	85.1	64.2
K80 90 um	**Ro Conc 1-5**	**20.4**	**1.63**	**1.82**	**10.4**	**1.58**	**1.93**	**0.16**	**93.1**	**82.4**	**66.8**	**78.7**	**89.2**	**67.5**
	Ro Tail	79.6	0.03	0.10	1.33	0.11	0.06	0.02	6.9	17.6	33.2	21.3	10.8	32.5
	Head (calc.)		0.36	0.45	3.19	0.41	0.44	0.05						
	Ro Conc 1	3.6	0.32	0.37	1.94	1.70	5.38	0.28	3.2	2.8	2.4	13.1	40.4	26.7
	Ro Conc 1-2	8.0	3.38	1.06	5.58	1.84	3.70	0.19	75.3	18.0	15.1	31.2	61.0	39.3
F5	Ro Conc 1-3	13.5	2.43	2.56	7.06	1.79	2.64	0.14	91.5	73.3	32.3	51.4	73.8	49.5
Repeat F3	Ro Conc 1-4	17.1	1.97	2.16	7.23	1.69	2.22	0.12	94.0	78.3	41.8	61.4	78.3	55.1
K80 50 um	**Ro Conc 1-5**	**22.2**	**1.54**	**1.74**	**7.15**	**1.49**	**1.79**	**0.10**	**95.7**	**81.9**	**53.7**	**70.3**	**82.3**	**59.2**
	Ro Tail	77.8	0.02	0.11	1.76	0.18	0.11	0.02	4.3	18.1	46.3	29.7	17.7	40.8
	Head (calc.)		0.36	0.47	2.96	0.47	0.48	0.04						
	Ro Conc 1	4.4	5.59	2.75	10.7	0.33	1.01	0.09	67.1	26.2	15.5	3.5	10.6	9.6
	Ro Conc 1-2	7.8	3.71	3.57	11.1	0.81	2.67	0.19	79.4	60.7	28.8	15.5	49.9	35.6
F6	Ro Conc 1-3	12.7	2.47	2.62	10.0	1.24	2.45	0.16	86.6	72.9	42.3	38.7	74.7	50.2
Repeat F3	Ro Conc 1-4	16.5	1.96	2.14	9.61	1.41	2.02	0.14	89.0	77.2	52.8	56.9	80.2	54.9
K80 144 um	**Ro Conc 1-5**	**22.1**	**1.49**	**1.68**	**9.01**	**1.36**	**1.60**	**0.11**	**90.6**	**81.3**	**66.3**	**73.4**	**85.0**	**61.8**
	Ro Tail	77.9	0.04	0.11	1.30	0.14	0.08	0.02	9.4	18.7	33.7	26.6	15.0	38.2
	Head (calc.)		0.36	0.46	3.01	0.41	0.42	0.04						
	Talc Conc 1-2	**5.3**	**1.73**	**0.55**	**3.20**	**0.66**	**2.36**	**0.10**	**11.7**	**3.1**	**2.5**	**3.7**	**12.6**	**6.5**
	Ro Conc 1	3.4	7.82	4.05	14.8	2.27	6.41	0.46	73.0	29.9	16.2	17.5	44.9	38.0
F7	Ro Conc 1-2	5.8	4.84	4.95	13.3	2.09	4.83	0.31	77.5	62.7	24.9	27.7	58.0	44.6
Repeat F3	Ro Conc 1-3	9.1	3.18	3.54	11.4	2.09	3.48	0.22	80.2	70.8	33.7	43.7	65.9	49.5
Talc Pre-float	Ro Conc 1-4	13.0	2.26	2.63	11.8	1.88	2.59	0.17	81.3	74.7	49.9	56.0	69.9	53.3
K80 90 um	**Ro Conc 1-5**	**21.5**	**1.37**	**1.68**	**9.93**	**1.37**	**1.64**	**0.11**	**82.2**	**79.3**	**69.8**	**67.6**	**73.7**	**57.5**
	Ro Tail	73.2	0.03	0.11	1.16	0.17	0.09	0.02	6.1	17.7	27.7	28.6	13.7	36.0
	Head (calc.)		0.36	0.46	3.07	0.43	0.48	0.04						
	Ro Conc 1	4.5	5.93	0.90	8.92	1.44	4.80	0.43	72.9	8.9	13.0	14.5	45.6	41.3
	Ro Conc 1-2	8.4	3.71	3.55	11.2	1.78	3.84	0.30	85.2	65.7	30.6	33.5	68.1	52.9
F8	Ro Conc 1-3	12.3	2.66	2.76	10.2	1.84	2.97	0.23	89.5	74.8	40.6	50.7	77.0	60.4
Repeat F3	Ro Conc 1-4	15.3	2.17	2.31	10.0	1.74	2.49	0.19	90.8	77.9	49.9	59.7	80.4	62.9
CMC 60 g/t	**Ro Conc 1-5**	**19.7**	**1.70**	**1.86**	**9.38**	**1.53**	**2.00**	**0.16**	**91.7**	**80.5**	**60.1**	**67.6**	**83.0**	**65.7**
K80 90 um	Ro Tail	80.3	0.04	0.11	1.53	0.18	0.10	0.02	8.3	19.5	39.9	32.4	17.0	34.3
	Head (calc.)		0.37	0.45	3.08	0.45	0.47	0.05						
	Ro Conc 1	6.5	3.93	0.97	6.64	1.54	4.40	0.25	77.7	14.4	18.1	24.4	56.0	36.3
	Ro Conc 1-2	10.3	2.75	2.78	8.31	1.69	3.63	0.24	86.8	66.2	36.1	42.8	73.9	54.5
F24	Ro Conc 1-3	13.1	2.21	2.37	7.95	1.67	3.04	0.20	89.0	71.7	44.0	53.8	78.8	58.9
SIPX 60 g/t	Ro Conc 1-4	15.3	1.91	2.08	7.55	1.58	2.67	0.18	89.9	73.8	48.8	59.4	80.8	60.9
(20 in grind)	**Ro Conc 1-5**	**16.9**	**1.74**	**1.92**	**7.34**	**1.52**	**2.45**	**0.16**	**90.3**	**75.1**	**52.4**	**63.3**	**82.0**	**62.7**
K80 90 um	Ro Tail	83.1	0.04	0.13	1.36	0.18	0.11	0.02	9.7	24.9	47.6	36.7	18.0	37.3
	Head (calc.)		0.33	0.43	2.37	0.41	0.51	0.04						
	Ro Conc 1	4.1	6.32	0.53	8.21	1.65	4.89	0.40	71.4	4.8	11.7	14.9	41.9	38.7
	Ro Conc 1-2	7.3	4.11	2.94	9.24	1.80	3.93	0.28	81.5	47.0	23.0	28.5	59.1	48.1
F26	Ro Conc 1-3	10.1	3.09	2.95	8.98	1.77	3.22	0.23	85.0	65.6	31.1	39.0	67.3	54.1
SIPX 60 g/t	Ro Conc 1-4	12.5	2.55	2.58	8.55	1.71	2.75	0.20	86.9	71.0	36.7	46.6	71.0	58.0
4037 20 g/t	**Ro Conc 1-5**	**14.2**	**2.27**	**2.36**	**8.33**	**1.66**	**2.50**	**0.18**	**87.8**	**73.6**	**40.5**	**51.4**	**73.4**	**60.0**
K80 90 um	Ro Tail	85.8	0.05	0.14	2.02	0.26	0.15	0.02	12.2	26.4	59.5	48.6	26.6	40.0
	Head (calc.)		0.37	0.45	2.91	0.46	0.48	0.04						
	Ro Conc 1	5.6	4.32	2.63	8.99	1.50	4.42	0.27	74.3	35.3	21.2	18.9	50.7	40.1
	Ro Conc 1-2	9.7	2.72	2.52	7.60	1.45	3.24	0.19	80.8	58.5	31.0	31.6	64.1	47.6
F27	Ro Conc 1-3	12.2	2.24	2.27	7.12	1.44	2.78	0.16	83.4	66.0	36.5	39.2	69.2	50.9
Repeat F24	Ro Conc 1-4	14.2	1.96	2.07	6.85	1.42	2.51	0.14	84.9	69.9	40.7	45.0	72.3	54.0
(20 in first rghr)	**Ro Conc 1-5**	**15.6**	**1.80**	**1.93**	**6.68**	**1.40**	**2.34**	**0.13**	**85.8**	**71.9**	**43.8**	**49.0**	**74.3**	**55.5**
K80 90 um	Ro Tail	84.4	0.06	0.14	1.59	0.27	0.15	0.02	14.2	28.1	56.2	51.0	25.7	44.5
	Head (calc.)		0.33	0.42	2.39	0.45	0.49	0.04						
	Ro Conc 1	4.5	5.29	2.76	9.97	1.63	5.24	0.38	73.6	29.3	19.1	15.9	47.8	42.0
	Ro Conc 1-2	6.8	3.74	3.16	9.07	1.72	4.31	0.29	79.3	51.1	26.5	25.5	59.8	48.3
F28	Ro Conc 1-3	9.6	2.80	2.81	8.02	1.67	3.45	0.22	82.9	63.7	32.8	34.9	67.1	52.4
Repeat F27	Ro Conc 1-4	11.5	2.38	2.51	7.44	1.66	3.03	0.19	84.8	68.5	36.6	41.5	70.8	54.8
Aeration	**Ro Conc 1-5**	**13.3**	**2.08**	**2.26**	**7.04**	**1.63**	**2.72**	**0.18**	**86.1**	**71.3**	**40.1**	**47.2**	**73.6**	**57.4**
K80 90 um	Ro Tail	86.7	0.05	0.14	1.62	0.28	0.15	0.02	13.9	28.7	59.9	52.8	26.4	42.6
	Head (calc.)		0.32	0.42	2.34	0.46	0.49	0.04						

Figures 15 and 16 provide a general overview of the kinetic responses and the influence of mass recovery in each test for Cu, Ni, and PGM. The results show that after 8 minutes the Cu and Ni, and Pd recoveries do not appreciably improve; whereas the Pt and Au recoveries improves beyond 8 minutes. Pd is usually associated with copper, while Pt and Au will be at least partially associated with pyrrhotite and gangue minerals.

Figure 15 shows copper, nickel, and palladium rougher flotation has a fast flotation rate at the start. In the first 4 minutes close to 80% of the copper and 60% of the nickel and palladium can be recovered. The slower floating minerals, Pt and Au, will take another 10-15 minutes of laboratory flotation time to be recovered.

Figure 16 shows that copper and nickel recoveries are least influenced by mass recovery above 15%, while for Pt a 10% additional mass recovery will increase rougher recovery by 20%, from 50% to 70%. The same was observed for Pd and Au; thus, higher than 15% mass recovery is recommended.

Overall, the rougher flotation test results show the rougher flotation performance looks to be fairly robust with good recovery of the metal values to the rougher concentrate.

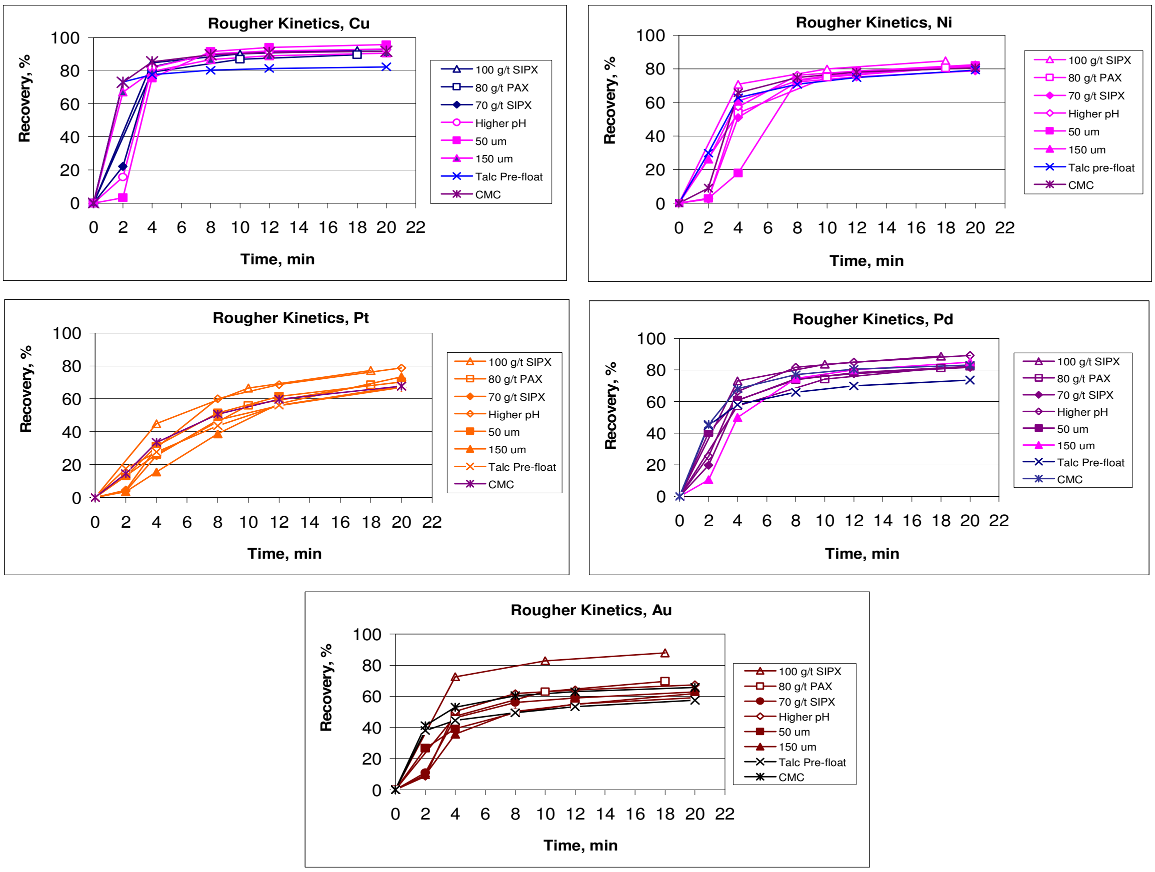


Figure 15: Rougher flotation Kinetics Results

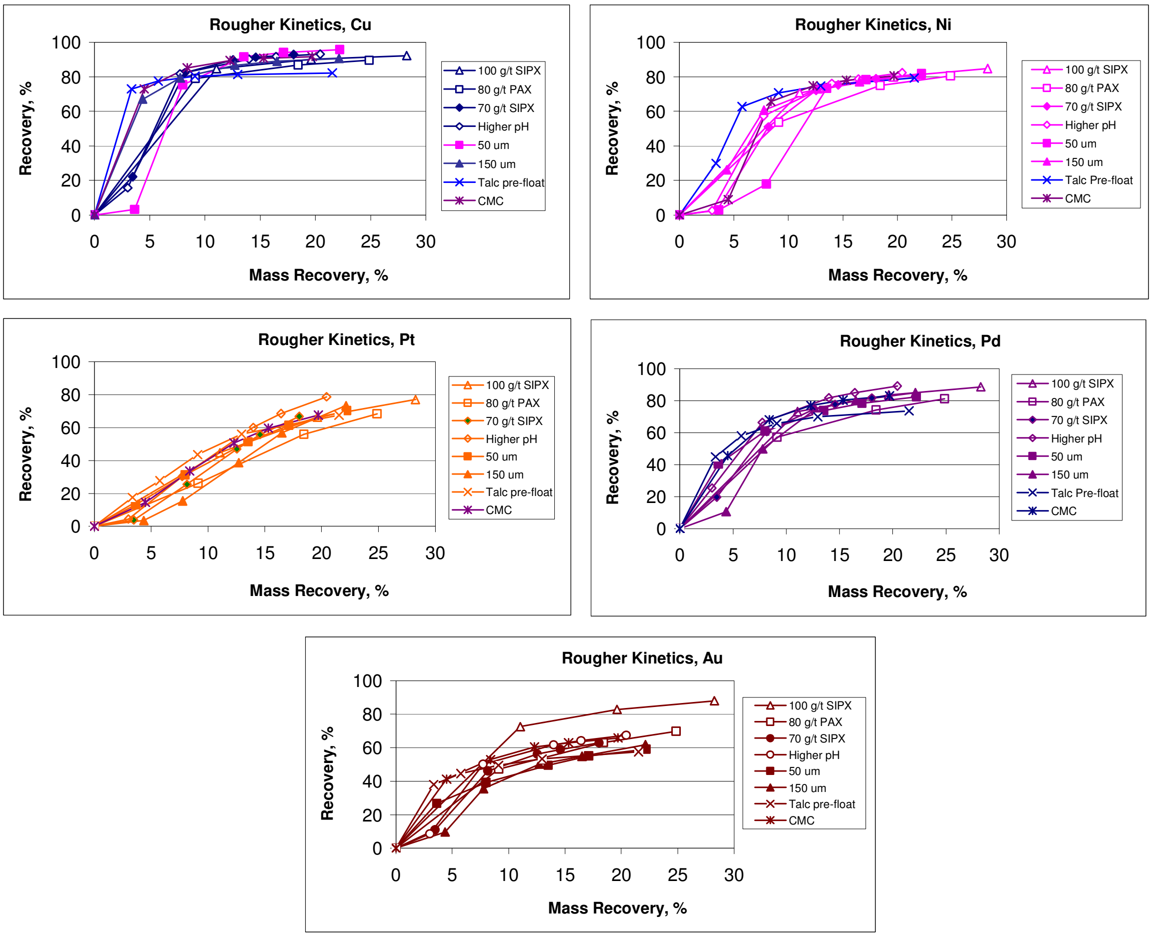


Figure 16: Effect of Mass Recovery on Cu, Ni and PGE Recovery

4.1.1.1. Effect of Primary Grinding

Preliminary rougher kinetics tests were conducted on the composite sample to determine the effects of grind size. Tests F3, F5, and F6 varied the primary grind, at 90, 50, and 144 microns respectively, while the SIPX dosage remained constant at 70 g/t at natural pH. In test F8 CMC was used as talc depressant. The results are shown in Figures 17 and 18.

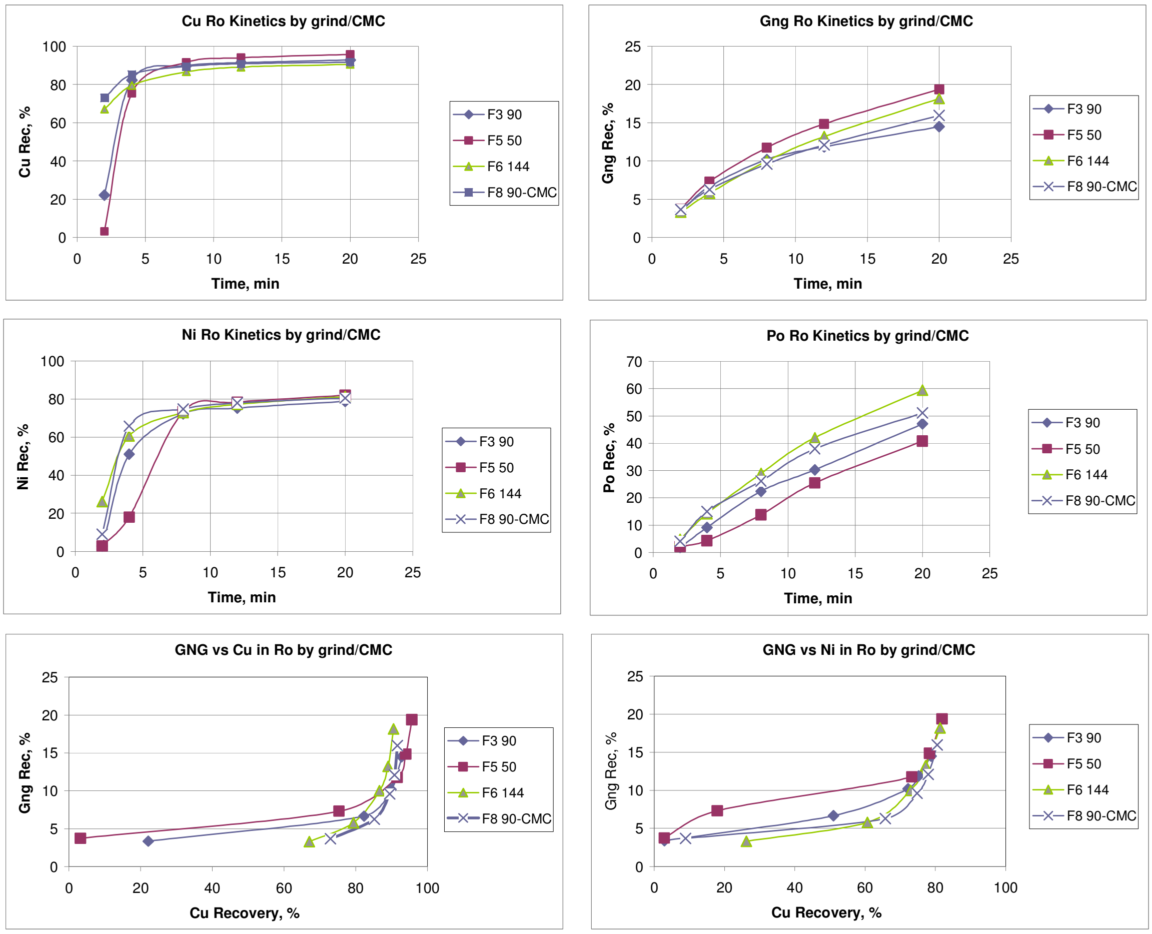


Figure 17: Effect of Primary Grinding on Rougher Recovery

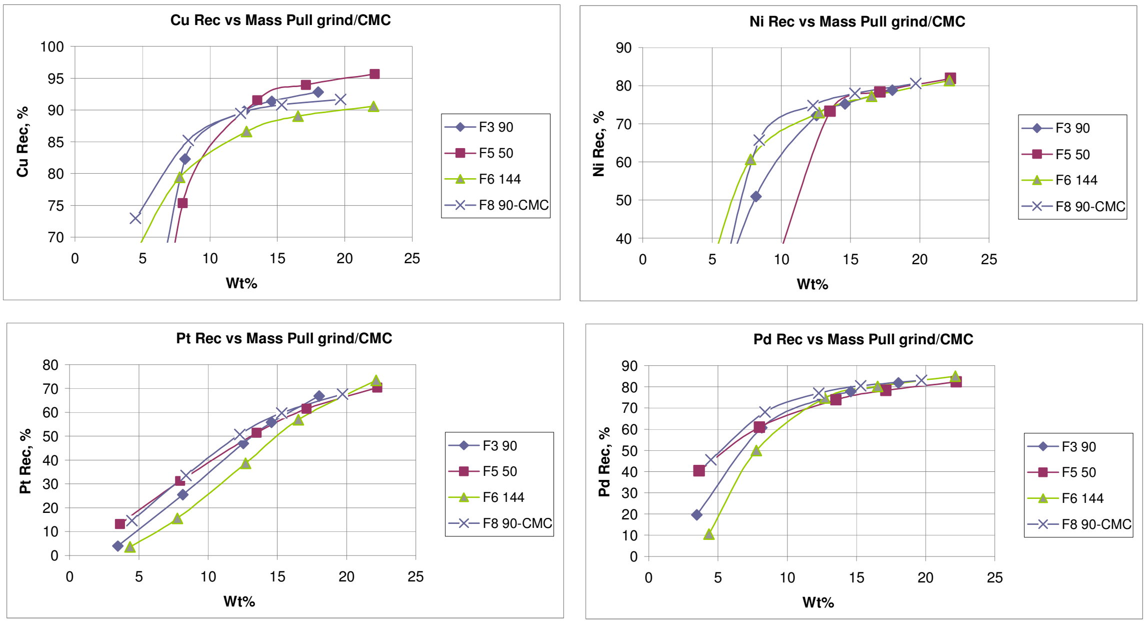


Figure 18: Recovery Grind Relationship

The following conclusions can be made from the test results:

- Copper recovery slightly increased with finer grind size over the range tested. The response was as expected with respect to copper metallurgy in Figure 2, with the grade/recovery relationship generally improving with finer grind. A maximum rougher recovery of 96% was reached with K_{80} of 50 µm. A plausible explanation is that at the finer grind, the chalcopyrite is better liberated, resulting in faster kinetics at the finer grind.
- Effect of grinding on nickel recovery is not similar to copper and finer grinding does not appear to improve recovery or selectivity, but may even be detrimental to Ni recovery over the range tested. Nickel metallurgy is shown in Figure 17 where the finer grind resulted in almost the same recovery as the coarser grind.
- Referring to Table 8 a common trend is noticed, which is not limited to the effect of grind test series but to all rougher kinetics tests completed, that a final rougher tailings Ni assay value of ~0.11% Ni is often reached. This is because there is some Ni in the silicates as well as some pentlandite texture/associations which can not be recovered. It also shows that the Pt losses tend to be highest. The mineralogy by Terra shows that Pt is primarily associated with pyrrhotite.
- Nickel rougher recovery barely reached more than 82%. This is expected since as it was stated previously, about some of the nickel is expected to be associated with silicate minerals and is not expected to float. The copper and nickel rougher concentrate grade ranged from 1.5%-1.8% and

1.7%-2%, respectively. Thus, the rougher flotation upgrading index for copper is between 4.5 and 5.5 and that of nickel is between 4 and 4.8, this is a reflection of the high mass pull used.

- The distribution of pyrrhotite, which is the main iron sulphide mineral in the ore, appears to have a close correlation with nickel recovery. The pyrrhotite content of the bulk concentrate reached a maximum level at 18.8%. Contrary to both copper and nickel, pyrrhotite grade continuously increased as the flotation time increased.
- The pulp pH was at a natural level of about 9 in the primary flotation tests. This pH is not high enough to depress pyrrhotite. Pentlandite flotation is also expected not to be negatively affected at this pH. Sodium Isopropyl Xanthate was used as the main collector and it was stage added to the flotation cell with the total addition of 70 g/t. Details are shown in Appendix E.
- Pt and Pd recoveries were slightly higher at coarser primary grind size of 144 microns.
- While Cu and Ni kinetics were seen to be quicker in the test F6, the final recoveries were ultimately the same.

4.1.1.2. Effect of Pulp Chemistry

In addition to SIPX, collector PAX was tested. PAX is particularly effective for a stronger collector and it is non-selective collector which also renders Mg minerals to float. SIPX has the potential to improve the selectivity of nickel sulphide flotation therefore increase the nickel recovery.

The effects of this collector on copper, nickel, and PGM recoveries are shown in Figure 19.

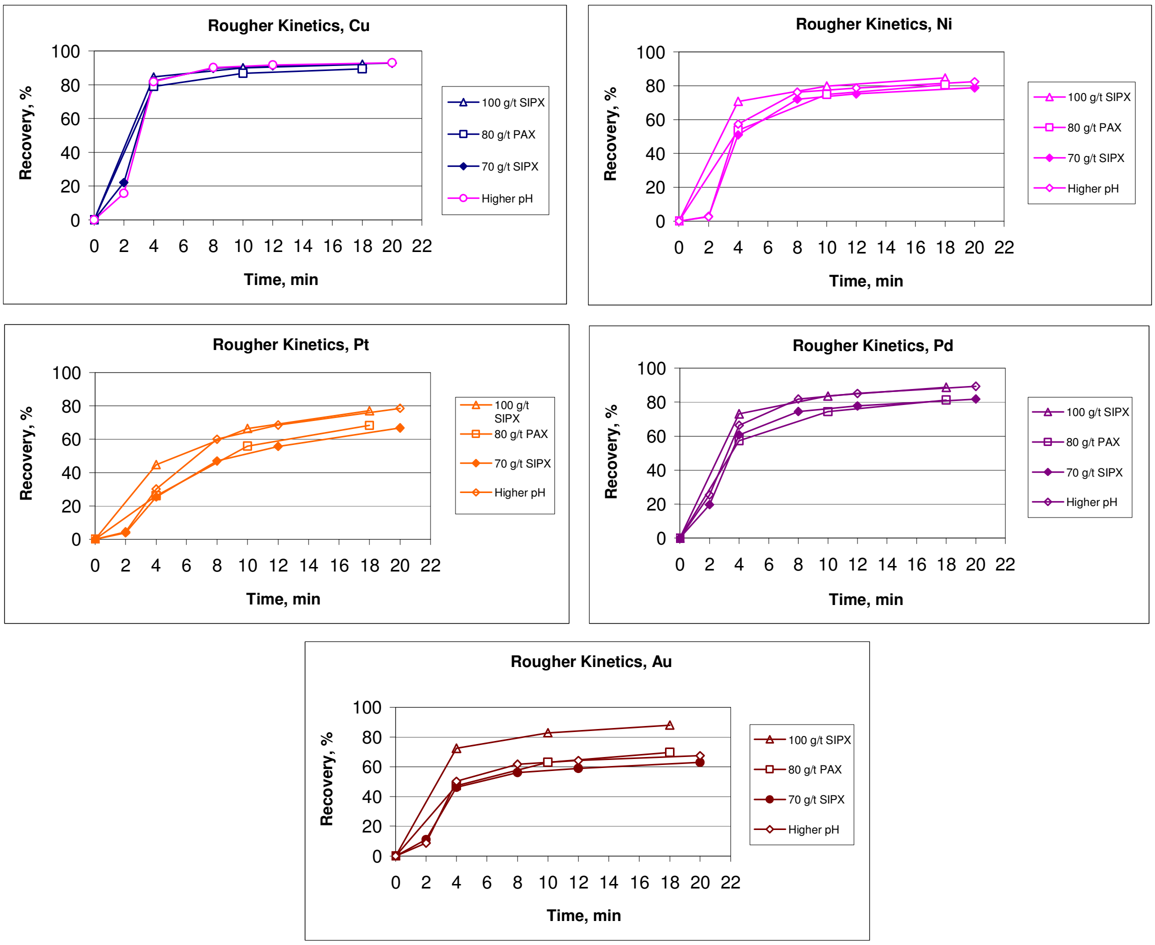


Figure 19: Effect of Pulp Chemistry on Rougher Flotation

The following results can be extracted from the test results:

- SIPX provided the same copper recovery as PAX.
- With SIPX, nickel recovery was higher within the first 10 minutes of the flotation; however the final recoveries were ultimately the same.
- Pyrrhotite distribution in the bulk concentrate decreased to 57% when PAX was used in comparison with SIPX which pyrrhotite recovery was 73%.
- Higher pH did not show any better results than the natural pH.
- SIPX provided better overall recoveries of sulphides and was used in further tests.

4.1.1.3. Effect of Talc Pre-float and CMC as Silicate Depressant

As the flotation testwork continued it was noticed that talc and floatable silicate material in the ore was causing problems during flotation and the dilution of concentrate was possible. In order to improve copper and nickel recoveries and enhance concentrate grade in the bulk concentrate, the effect of talc pre-flotation and CMC as silicate depressant were examined. In one test talc was floated ahead of the bulk copper and nickel flotation with frother. The results are shown in Figure 20.

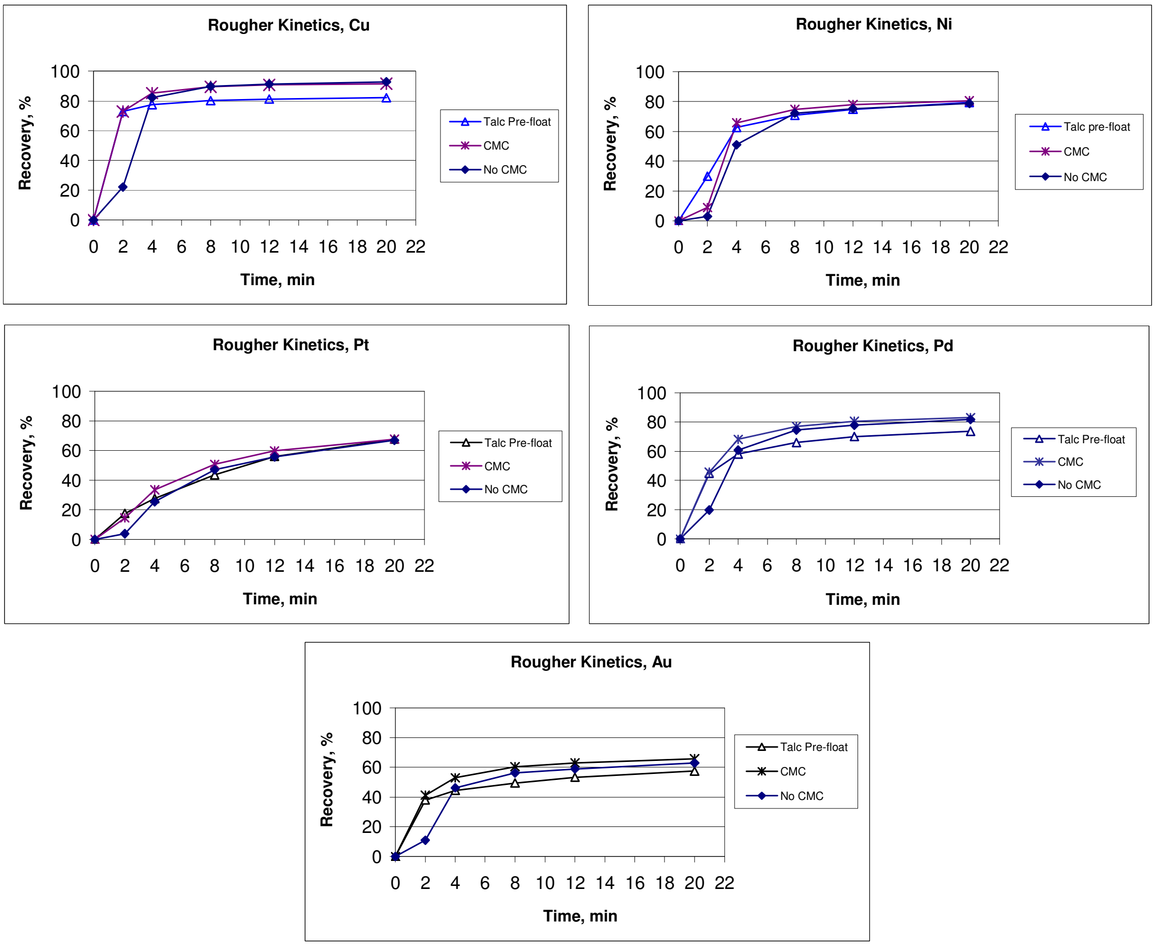


Figure 20: Effect of Talc Pre-flotation and CMC on Rougher Flotation

It can be concluded that:

- Effect of CMC: CMC was applied to depress silicates. It was stage added to the first three rougher stages at 60 g/t. CMC had minimal overall impact on Cu, Ni and PGM recoveries. The slight increase in Au recovery is likely due to inherent process variation.
- Effect of talc pre-float: Before collection of a first rougher concentrate, talc was floated using the addition of frother. It can be clearly observed in Table 8 that there was significant loss of Cu, Ni and PGM in the talc pre-float concentrate.

Due to the lack of any positive effect of talc pre-float and CMC addition, the base case (Test F3) was shown to be the preferred one. Thus, further cleaner flotation tests were followed based on the rougher flotation conditions of the base case.

4.1.2. Cleaner Flotation Tests

To further assess grades and recoveries of minerals into a final saleable concentrate a series of 15 batch cleaner flotation tests was conducted, allowing grade-recovery relationships to be developed. Grade-recovery relationships assist in understanding the extent of cleaning stages required to reach target concentrate grade and identify stage recovery losses within the circuit. In each test, mineral assays were estimated using the metal and sulphur assays of the products and the nominal contents of the preceding elements in each mineral, i.e. chalcopyrite, pentlandite and pyrrhotite. As MgO is critical to concentrate quality, tracking its deportment through particularly the cleaners, is crucial. The target is less than 5% MgO. The ratio of Fe:MgO greater than 4.5:1 in the final concentrate would be another critical parameter.

The key flotation circuit conditions and the main results are summarized in Table 9 and Table 10 for the batch cleaner tests and details are provided in Appendix E.

A bulk rougher concentrate was floated under conditions similar to those utilized in the rougher kinetics testwork. The bulk rougher concentrate was then subjected to a bulk cleaner flotation, with further additions of collector and/or depressants as required.

Tests F9-F25 attempted to establish a grade-recovery relationship for the master composite in a three stage cleaner test. A typical flowsheet for a conventional cleaner circuit is displayed in Figure 21. The rougher flotation scheme and reagent suite used followed that of F3. While maximum copper recovery of 88.6% was achieved in test F14, the Ni recovery was 64%. A low quality concentrate with Cu+Ni grade of 8% and 17.5% MgO was achieved in this test. Test F10 recovered the maximum Ni recovery of 65.5%, again the grade was low and MgO high. The results are shown in Table 10.

Many of the PGM ores have a floatable silicate gangue component which is rich in MgO. The MgO is a deleterious component in the smelting of concentrates and must be removed in the mineral processing stage. Not all silicates that float into the concentrate are naturally floatable. Non-floatable silicates are also recovered when they are still locked with sulphides. The distinction between the floatable silicates and the middling-silicates is an important one and is an important issue during flotation.

The main focus of the cleaner tests was on silicates depressant effects in the cleaner circuit. Both CMC depressant and guar gum were examined. The effect of Calgon, which has been a proven effective dispersant on low-grade Cu/Ni ores, was also investigated. The purpose of using dispersant is to eliminate the heterocoagulation between two different mineral particles via increasing the repulsive interactions between them. The most commonly used dispersants are sodium hexametaphosphate (Calgon), carboxymethyl cellulose (CMC), and gums. When added to the slurry, the dispersant adsorbs onto the particles surfaces and leads to a very high repulsive potential energy barrier to prevent the particles attaching to each other, making the ore slurry a well dispersed suspension of individual particles. At the same time, the dispersant also plays the role as a depressant, which is supposed to make gangue minerals more hydrophilic and difficult to attach to the air bubbles.

An analysis of the Cu, Ni, and S values in the Cu/Ni cleaner concentrate suggests that the primary diluents are non-sulphide gangue (NSG) minerals. It was unknown if these NSG minerals reported to the concentrate is in the form of middlings or by direct flotation. A mineralogical analysis of selected concentrates helped to answer this question and form the basis of the optimization program to improve the concentrate grade.

Table 9: Summary of Cleaner Flotation Tests Conditions and Results

	Grade, %	Rec. %	Grade %	Rec. %	Grade g/t	Rec. %	Grade g/t	Rec. %	Grade g/t	Rec. %	Mass Rec	Re-grind	Float	SIPX	pH	Fe	MgO	Option
Test	Cu		Ni		Pt		Pd		Au		%	Microns	min	g/t		%	%	
F9	5.88	82.0	4.40	46.8	2.17	24.2	6.45	62.7	0.56	51.2	4.9	No	22	15	Nat	–	14.7	
F10	4.49	86.9	4.36	65.5	2.52	37.9	5.23	72.4	0.31	47.0	7.0	No	22	15	Nat	–	15.7	CMC=35 g/t
F11	11.3	83.6	2.84	15.8	2.88	16.1	13.7	60.3	0.98	48.6	2.3	25	22	15	Nat	–	14.2	CMC=35 g/t
F12	10.2	79.2	8.02	48.5	3.62	22.1	9.14	52.8	0.99	52.7	3.1	No	22	15	Nat	–	4.1	CMC=200 g/t
F13	20.7	50.9	4.23	7.7	2.78	4.9	10.0	15.0	1.60	26.1	0.8	No	22	15	Nat	–	3.5	CMC=150, Guar gum=375 g/t
F14	3.88	88.6	4.16	63.9	2.51	39.2	5.00	68.1	0.26	42.1	6.9	No	22	15	Nat	–	17.5	Calgon=300g/t
F15	15.4	76.9	3.68	13.6	3.29	12.9	11.4	37.9	0.89	31.7	1.6	No	22	15	Nat	–	6.2	CMC=75, Guar gum=113 g/t
F16	11.9	79.7	6.58	33.0	2.69	15.0	8.55	45.1	0.85	43.4	2.4	No	22	15	Nat	–	5.1	CMC=65 Guar gum=85 g/t
F17	11.2	74.1	7.85	40.7	3.21	18.2	8.70	46.0	0.59	31.5	2.4	No	22	15	Nat	30.0	3.7	CMC=120 g/t
F19	23.6	68.5	3.51	8.0	3.26	7.6	15.0	32.0	1.51	34.7	1.0	23	22	15	Nat	30.1	2.5	CMC=200 g/t, Pri-grind 150 um
F20	15.8	77.2	8.47	32.6	3.47	12.9	12.4	46.0	0.90	36.8	1.7	34	22	15	Nat	33.0	2.3	CMC=200 g/t, Pri-grind 150 um
F21	8.99	69.5	8.78	47.0	3.60	19.3	11.2	52.0	0.59	29.2	2.3	72	22	15	Nat	31.7	6.6	CMC=200 g/t, Pri-grind 150 um
F22	10.1	76.9	7.82	42.6	3.90	21.2	11.2	52.0	0.78	35.5	2.4	51	22	15	Nat	30.0	5.9	CMC=200 g/t, Regrind 1st clnr conc
F23	5.60	79.2	6.50	64.0	4.00	46.8	6.78	66.0	0.43	45.4	4.7	No	22	15	Nat	39.5	5.2	CMC=200 g/t, CuSO4=245 g/t
F25	16.0	65.6	7.98	24.6	4.57	18.0	12.9	38.4	1.00	28.0	1.4	No	19	15	Nat	33.9	2.6	CMC=160 g/t

Table 10: Cleaner Flotation Test Results

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
		%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
	3rd Clnr Conc	4.9	5.88	4.40	15.5	2.17	6.45	0.56	82.0	46.8	25.3	24.2	62.7	51.2
F9	2nd Clnr Conc	8.0	3.81	3.73	12.9	2.03	4.59	0.39	87.0	64.9	34.4	37.0	73.1	58.8
No Regrind	1st Clnr Conc	11.4	2.75	2.94	12.1	1.92	3.51	0.30	89.9	73.4	46.1	50.1	80.1	65.2
No CMC	1st Cl & ClScv Conc	13.0	2.43	2.66	12.0	1.88	3.17	0.28	90.7	75.6	52.3	55.9	82.5	67.3
	Rghr Conc	20.3	1.58	1.78	9.00	1.41	2.11	0.18	92.0	79.1	61.3	65.4	85.7	70.1
	1st Clnr Scv Tls	7.3	0.06	0.22	3.66	0.57	0.22	0.02	1.3	3.5	9.0	9.5	3.2	2.7
	Rougher Tails	79.7	0.04	0.12	1.45	0.19	0.09	0.02	8.0	20.9	38.7	34.6	14.3	29.9
	Head (calc.)		0.35	0.46	2.99	0.44	0.50	0.05						
	3rd Clnr Conc	7.0	4.49	4.36	14.3	2.52	5.23	0.31	86.9	65.5	34.9	37.9	72.4	47.0
F10	2nd Clnr Conc	9.8	3.30	3.41	12.0	2.22	3.99	0.24	89.1	71.3	40.8	46.6	77.1	50.6
No Regrind	1st Clnr Conc	13.8	2.40	2.59	10.5	1.91	3.00	0.18	90.7	76.0	50.3	56.3	81.3	54.8
CMC=35 g/t	1st Cl & ClScv Conc	15.3	2.16	2.37	10.3	1.83	2.74	0.19	91.1	77.4	55.0	59.8	82.6	63.6
	Rghr Conc	22.8	1.47	1.65	7.89	1.35	1.90	0.14	92.1	80.2	62.2	65.4	84.8	66.7
	1st Clnr Scv Tls	7.4	0.05	0.18	2.82	0.35	0.15	0.02	1.0	2.8	7.3	5.5	2.2	3.2
	Rougher Tails	77.2	0.04	0.12	1.41	0.21	0.10	0.02	7.9	19.8	37.8	34.6	15.2	33.3
	Head (calc.)		0.36	0.47	2.88	0.47	0.51	0.05						
	3rd Clnr Conc	2.3	11.3	2.84	16.5	2.88	13.7	0.98	83.6	15.8	16.4	16.1	60.3	48.6
F11	2nd Clnr Conc	5.1	5.16	2.29	9.23	1.98	6.73	0.47	86.6	29.0	20.8	25.2	67.3	53.0
Regrind	1st Clnr Conc	8.3	3.23	2.63	8.15	1.80	4.58	0.31	88.6	54.3	30.0	37.3	74.7	57.3
K80 = 25 um	1st Cl & ClScv Conc	9.9	2.75	2.65	8.18	1.67	3.97	0.27	89.4	64.8	35.7	40.9	76.7	58.3
CMC=35 g/t	Rghr Conc	18.9	1.46	1.62	6.91	1.27	2.23	0.15	90.7	75.9	57.7	59.7	82.6	64.3
	1st Clnr Scv Tls	9.0	0.04	0.50	5.52	0.84	0.33	0.03	1.3	11.2	22.0	18.8	5.8	6.0
	Rougher Tails	81.1	0.04	0.12	1.18	0.20	0.11	0.02	9.3	24.1	42.3	40.3	17.4	35.7
	Head (calc.)		0.30	0.40	2.26	0.40	0.51	0.05						
	3rd Clnr Conc	3.1	10.2	8.02	26.2	3.62	9.14	0.99	79.2	48.5	23.0	22.1	52.8	52.7
F12	2nd Clnr Conc	8.2	4.31	4.55	18.8	2.83	4.76	0.46	89.0	73.2	43.8	46.1	73.3	65.1
No Regrind	1st Clnr Conc	15.3	2.39	2.66	12.8	1.95	2.81	0.26	92.4	80.2	55.9	59.3	80.9	70.1
CMC=200 g/t	1st Cl & ClScv Conc	17.0	2.16	2.43	12.3	1.84	2.57	0.24	92.9	81.5	59.5	62.4	82.3	71.2
	Rghr Conc	22.6	1.64	1.87	9.85	1.47	1.97	0.19	93.6	83.3	63.6	66.2	84.0	73.2
	1st Clnr Scv Tls	5.6	0.04	0.16	2.54	0.34	0.16	0.02	0.6	1.8	4.1	3.8	1.7	1.9
	Rougher Tails	77.4	0.03	0.11	1.65	0.22	0.11	0.02	6.4	16.7	36.4	33.8	16.0	26.8
	Head (calc.)		0.40	0.51	3.51	0.50	0.53	0.06						
	3rd Clnr Conc	0.7	20.7	4.23	27.9	2.78	10.0	1.60	50.9	7.7	9.1	4.9	15.0	26.1
F13	2nd Clnr Conc	2.1	10.4	4.19	18.8	3.47	8.86	0.90	70.6	21.0	17.0	17.0	36.8	40.8
No Regrind	1st Clnr Conc	9.1	2.90	3.30	12.4	2.54	4.27	0.30	86.7	72.9	49.3	54.9	77.9	59.1
CMC=150 g/t	1st Cl & ClScv Conc	11.7	2.28	2.63	10.9	2.14	3.42	0.24	87.7	74.9	55.7	59.6	80.3	61.4
Guar=375 g/t	Rghr Conc	21.5	1.26	1.51	7.02	1.33	1.95	0.14	89.1	79.0	66.3	68.2	84.2	65.7
	1st Clnr Scv Tls	9.8	0.05	0.17	2.45	0.37	0.20	0.02	1.5	4.1	10.6	8.7	4.0	4.3
	Rougher Tails	78.5	0.04	0.11	0.98	0.17	0.10	0.02	10.9	21.0	33.7	31.8	15.8	34.3
	Head (calc.)		0.30	0.41	2.28	0.42	0.50	0.05						
	3rd Clnr Conc	6.9	3.88	4.16	13.4	2.51	4.96	0.26	88.6	63.9	39.6	39.2	68.1	42.1
F14	2nd Clnr Conc	9.0	3.07	3.43	11.5	2.29	4.08	0.25	91.2	68.5	44.4	46.5	72.7	52.3
No Regrind	1st Clnr Conc	11.1	2.51	2.89	10.2	2.08	3.41	0.21	92.7	71.6	48.9	52.5	75.5	55.3
Calgon=300g/t	1st Cl & ClScv Conc	12.9	2.19	2.56	9.87	1.96	3.03	0.19	94.0	73.9	54.9	57.6	78.1	57.5
	Rghr Conc	19.8	1.45	1.74	7.31	1.42	2.05	0.13	94.9	76.7	62.1	63.6	80.8	62.3
	1st Clnr Scv Tls	6.8	0.04	0.19	2.44	0.39	0.20	0.03	1.0	2.9	7.1	6.0	2.7	4.8
	Rougher Tails	80.2	0.02	0.13	1.10	0.20	0.12	0.02	5.1	23.3	37.9	36.4	19.2	37.7
	Head (calc.)		0.30	0.45	2.33	0.44	0.50	0.04						
	3rd Clnr Conc	1.6	15.4	3.68	23.3	3.29	11.4	0.89	76.9	13.6	16.2	12.9	37.9	31.7
F15	2nd Clnr Conc	3.1	8.67	5.90	19.4	3.15	8.83	0.75	83.2	42.1	25.9	23.7	56.5	51.5
No Regrind	1st Clnr Conc	7.2	3.86	4.03	13.4	2.41	4.95	0.36	86.8	67.4	41.9	42.5	74.1	57.9
CMC=75 g/t	1st Cl & ClScv Conc	10.2	2.75	3.00	11.4	1.97	3.63	0.26	88.1	71.2	50.8	49.5	77.3	59.9
Guar=113 g/t	Rghr Conc	17.5	1.64	1.85	7.79	1.39	2.23	0.16	89.7	75.1	59.3	59.5	81.1	63.1
	1st Clnr Scv Tls	7.2	0.07	0.23	2.70	0.56	0.25	0.02	1.6	3.9	8.5	9.9	3.8	3.2
	Rougher Tails	82.5	0.04	0.13	1.13	0.20	0.11	0.02	10.3	24.9	40.7	40.5	18.9	36.9
	Head (calc.)		0.32	0.43	2.29	0.41	0.48	0.04						
	3rd Clnr Conc	2.4	11.9	6.58	24.0	2.69	8.55	0.85	79.7	33.0	18.3	15.0	45.1	43.4
F16	2nd Clnr Conc	4.3	7.26	6.40	19.8	2.53	6.34	0.56	86.0	56.7	26.8	24.9	59.0	50.8
No Regrind	1st Clnr Conc	8.0	4.03	4.26	14.9	2.17	4.13	0.35	89.4	70.6	37.6	40.1	72.0	58.7
CMC=65	1st Cl & ClScv Conc	11.2	2.95	3.27	14.1	1.93	3.18	0.27	90.7	75.3	49.6	49.5	76.9	62.7
Guar=85 g/t	Rghr Conc	20.7	1.62	1.88	9.28	1.26	1.80	0.15	92.3	80.4	60.4	59.8	81.1	66.7
	1st Clnr Scv Tls	9.5	0.06	0.26	3.58	0.47	0.20	0.02	1.7	5.1	10.7	10.3	4.1	4.0
	Rougher Tails	79.3	0.04	0.12	1.59	0.22	0.11	0.02	7.7	19.6	39.6	40.2	18.9	33.3
	Head (calc.)		0.36	0.49	3.18	0.43	0.46	0.05						

Table 11: Cleaner Flotation Test Results (Continued)

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
		%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
	3rd Clnr Conc	**2.4**	**11.2**	**7.85**	**26.3**	**3.21**	**8.70**	**0.59**	**30.0**	**3.70**	**74.1**	**40.7**	**20.0**	**18.2**	**46.0**	**31.5**	**5.8**	**0.4**
F17	2nd Clnr Conc	4.8	6.37	6.06	21.1	2.96	6.03	0.43	27.3	7.86	83.6	62.4	31.8	33.3	63.3	45.7	10.4	1.8
No Regrind	1st Clnr Conc	11.0	3.00	3.18	13.0	1.98	3.16	0.24	20.9	15.0	89.2	74.1	44.3	50.4	75.1	57.7	18.1	7.7
CMC=120 g/t	1st Cl & ClScv Conc	12.9	2.58	2.78	12.8	1.85	2.78	0.21	21.3	15.3	90.1	76.3	51.2	55.5	77.8	60.3	21.6	9.2
	Rghr Conc	**20.4**	**1.65**	**1.84**	**9.51**	**1.33**	**1.83**	**0.15**	**18.5**	**17.5**	**91.2**	**79.7**	**60.4**	**63.0**	**81.0**	**65.2**	**29.7**	**16.6**
	1st Clnr Scv Tls	7.5	0.05	0.21	3.94	0.43	0.20	0.03	13.7	21.2	1.0	3.4	9.2	7.5	3.3	4.9	8.1	7.4
	Rougher Tails	79.6	0.04	0.12	1.60	0.20	0.11	0.02	11.2	22.5	8.8	20.3	39.6	37.0	19.0	34.8	70.3	83.4
	Head (calc.)		0.37	0.47	3.22	0.43	0.46	0.05	12.7	21.5								
	3rd Clnr Conc	**1.0**	**23.6**	**3.51**	**31.6**	**3.26**	**15.0**	**1.51**	**30.7**	**2.52**	**68.5**	**8.0**	**10.4**	**7.6**	**31.9**	**34.7**	**2.5**	**0.1**
F19	2nd Clnr Conc	2.0	13.6	5.96	23.9	3.62	12.0	1.02	27.4	7.17	74.4	25.6	14.9	15.9	48.1	44.2	4.3	0.6
CMC=200 g/t	1st Clnr Conc	5.7	4.93	4.31	13.4	2.43	5.30	0.42	20.0	15.8	78.5	53.8	24.4	31.0	61.9	53.3	9.1	3.9
Grind 150 um	1st Cl & ClScv Conc	6.9	4.10	4.00	12.9	2.37	4.56	0.36	20.2	16.2	79.2	60.5	28.3	36.6	64.5	55.2	11.1	4.8
Regrind 23 um	**Rghr Conc**	**15.5**	**1.87**	**2.14**	**9.56**	**1.47**	**2.23**	**0.18**	**19.4**	**18.2**	**80.7**	**72.3**	**46.9**	**51.0**	**70.6**	**62.7**	**23.9**	**12.2**
	1st Clnr Scv Tls	8.6	0.06	0.63	6.85	0.75	0.35	0.04	18.7	19.8	1.5	11.8	18.6	14.3	6.1	7.5	12.8	7.3
	Rougher Tails	84.5	0.08	0.15	1.98	0.26	0.17	0.02	11.3	24.1	19.3	27.7	53.1	49.0	29.4	37.3	76.1	87.8
	Head (calc.)		0.36	0.46	3.15	0.45	0.49	0.05	12.5	23.2								
	3rd Clnr Conc	**1.7**	**15.8**	**8.47**	**27.8**	**3.47**	**12.4**	**0.90**	**33.0**	**2.32**	**77.2**	**32.6**	**17.3**	**12.9**	**46.2**	**36.8**	**4.7**	**0.2**
F20	2nd Clnr Conc	2.9	9.70	7.90	22.6	3.53	9.00	0.61	29.9	6.81	80.1	51.4	23.8	22.2	56.7	42.5	7.2	0.9
CMC=200 g/t	1st Clnr Conc	6.0	4.72	4.61	13.5	2.58	4.82	0.33	22.7	14.8	82.3	63.3	29.9	34.2	64.1	47.8	11.6	4.0
Grind 150 um	1st Cl & ClScv Conc	6.6	4.31	4.32	13.0	2.55	4.46	0.31	22.6	15.1	82.6	65.4	31.7	37.1	65.2	49.3	12.7	4.5
Regrind 34 um	**Rghr Conc**	**14.0**	**2.09**	**2.33**	**9.65**	**1.65**	**2.32**	**0.17**	**19.9**	**17.5**	**84.5**	**74.5**	**49.8**	**50.7**	**71.5**	**58.2**	**23.5**	**11.0**
	1st Clnr Scv Tls	7.4	0.09	0.54	6.66	0.84	0.39	0.05	17.4	19.6	1.9	9.1	18.1	13.6	6.3	8.9	10.8	6.5
	Rougher Tails	86.0	0.06	0.13	1.58	0.26	0.15	0.02	10.5	22.9	15.5	25.5	50.2	49.3	28.5	41.8	76.5	89.0
	Head (calc.)		0.35	0.44	2.71	0.45	0.45	0.04	11.8	22.1								
	3rd Clnr Conc	**2.3**	**8.99**	**8.78**	**23.6**	**3.60**	**11.2**	**0.59**	**31.7**	**6.57**	**69.5**	**47.0**	**23.9**	**19.3**	**52.0**	**29.2**	**6.1**	**0.6**
F21	2nd Clnr Conc	4.4	4.99	5.61	15.7	2.94	6.95	0.37	24.5	14.0	72.7	56.5	29.9	29.6	60.8	34.4	8.9	2.5
CMC=200 g/t	1st Clnr Conc	8.9	2.52	3.05	9.42	1.90	3.69	0.20	18.5	20.4	74.6	62.4	36.5	38.9	65.6	38.3	13.7	7.3
Grind 150 um	1st Cl & ClScv Conc	10.6	2.15	2.70	9.06	1.78	3.21	0.18	18.7	20.5	75.4	65.5	41.7	43.4	67.8	40.4	16.3	8.7
Regrind 72 um	**Rghr Conc**	**17.4**	**1.35**	**1.79**	**7.35**	**1.37**	**2.13**	**0.13**	**17.9**	**21.6**	**78.2**	**71.6**	**55.6**	**54.6**	**73.8**	**47.6**	**25.8**	**15.0**
	1st Clnr Scv Tls	6.8	0.12	0.39	4.7	0.72	0.44	0.05	16.8	23.2	2.7	6.1	13.9	11.3	6.0	7.2	9.5	6.3
	Rougher Tails	82.6	0.08	0.15	1.24	0.24	0.16	0.03	10.9	25.8	21.8	28.4	44.4	45.4	26.2	52.4	74.2	85.0
	Head (calc.)		0.30	0.44	2.31	0.44	0.50	0.05	12.1	25.1								
	3rd Clnr Conc	**2.4**	**10.1**	**7.82**	**25.7**	**3.90**	**11.2**	**0.78**	**30.0**	**5.86**	**76.9**	**42.6**	**25.5**	**21.2**	**52.3**	**35.5**	**5.3**	**0.7**
F22	2nd Clnr Conc	4.9	5.28	5.32	18.0	3.21	6.83	0.47	25.7	11.9	81.2	58.6	36.1	35.3	64.5	43.0	9.1	2.7
CMC=200 g/t	1st Clnr Conc	11.0	2.45	2.88	11.5	2.10	3.47	0.25	20.6	17.2	84.3	70.6	51.8	51.5	73.1	52.1	16.3	8.7
Regrind	1st Cl & ClScv Conc	12.3	2.20	2.61	11.0	1.98	3.14	0.23	20.3	17.6	84.6	71.8	55.4	54.5	74.2	53.3	18.0	10.0
1st Clnr 51um	**Rghr Conc**	**17.5**	**1.55**	**1.89**	**8.48**	**1.51**	**2.26**	**0.21**	**18.1**	**19.1**	**85.3**	**74.1**	**60.9**	**59.4**	**76.2**	**69.1**	**23.0**	**15.5**
	1st Clnr Scv Tls	5.2	0.04	0.20	2.53	0.42	0.20	0.16	13.1	22.8	0.6	2.4	5.4	4.9	2.0	15.7	5.0	5.5
	Rougher Tails	82.5	0.06	0.14	1.16	0.22	0.15	0.02	12.9	22.1	14.7	25.9	39.1	40.6	23.8	30.9	77.0	84.5
	Head (calc.)		0.32	0.45	2.44	0.45	0.52	0.05	13.8	21.6								
	3rd Clnr Conc	**4.7**	**5.61**	**6.50**	**18.8**	**4.00**	**6.78**	**0.43**	**39.5**	**5.17**	**79.2**	**64.0**	**40.4**	**46.8**	**66.0**	**45.4**	**15.5**	**1.0**
F23	2nd Clnr Conc	7.3	3.76	4.52	14.5	2.98	4.73	0.30	31.1	11.4	82.6	69.3	48.6	54.2	71.5	50.1	18.9	3.3
No Regrind	1st Clnr Conc	12.9	2.22	2.76	9.60	1.94	2.87	0.19	22.8	17.8	85.8	74.4	56.5	62.0	76.4	56.3	24.5	9.2
CMC=200 g/t	1st Cl & ClScv Conc	15.8	1.84	2.33	8.57	1.69	2.42	0.17	21.2	19.1	87.2	76.7	61.7	66.1	78.7	60.8	27.8	12.0
CuSO4	**Rghr Conc**	**22.2**	**1.33**	**1.70**	**6.41**	**1.26**	**1.76**	**0.13**	**18.2**	**21.2**	**88.3**	**78.9**	**64.8**	**69.1**	**80.7**	**65.1**	**33.5**	**18.8**
	1st Clnr Scv Tls	6.4	0.06	0.16	1.07	0.19	0.15	0.03	10.7	26.6	1.1	2.1	3.1	3.0	2.0	4.3	5.7	6.8
	Rougher Tails	77.8	0.05	0.13	0.99	0.16	0.12	0.02	10.3	26.2	11.7	21.1	35.2	30.9	19.3	34.9	66.5	81.2
	Head (calc.)		0.33	0.48	2.19	0.40	0.48	0.04	12.0	25.1								
	3rd Clnr Conc	**1.4**	**16.0**	**7.98**	**28.0**	**4.57**	**12.9**	**0.97**	**33.9**	**2.63**	**65.6**	**24.6**	**16.0**	**18.0**	**38.4**	**28.3**	**3.6**	**0.2**
F25	2nd Clnr Conc	2.8	9.12	7.54	22.6	4.22	10.0	0.77	30.9	6.05	77.4	48.1	26.7	34.4	61.6	46.4	6.8	0.8
Repeat F12	1st Clnr Conc	7.3	3.89	4.08	13.1	2.63	5.01	0.38	22.4	13.6	85.5	67.5	40.2	55.5	80.0	59.0	12.7	4.5
Optimize CMC	1st Cl & ClScv Conc	8.9	3.24	3.48	11.9	2.43	4.28	0.32	21.3	15.4	86.5	70.0	44.1	62.2	82.9	61.0	14.8	6.2
	Rghr Conc	**14.5**	**2.00**	**2.22**	**8.18**	**1.62**	**2.69**	**0.20**	**17.7**	**18.7**	**87.4**	**72.9**	**49.6**	**67.9**	**85.1**	**63.4**	**20.1**	**12.3**
	1st Clnr Scv Tls	5.6	0.05	0.23	2.34	0.35	0.18	0.02	12.1	23.9	0.9	2.9	5.5	5.7	2.2	2.4	5.3	6.1
	Rougher Tails	85.5	0.05	0.14	1.41	0.13	0.08	0.02	12.0	22.7	12.6	27.1	50.4	32.1	14.9	36.6	79.9	87.7
	Head (calc.)		0.33	0.44	2.39	0.35	0.46	0.05	12.8	22.1								

Test F9 was conducted as a baseline cleaner flotation test without using any depressants or regrind. To improve Cu and Ni metallurgy, test F10 investigated the effect of 35 g/t silicate depressant CMC. Copper and nickel recoveries improved to 87% and 65.5%, respectively. PGE recoveries were also higher. Due to high recovery of non-sulphide gangue (60%) copper grade in this test decreased to 4.5%.

Test F11 explored the effect of regrinding. Regrinding is an avenue to liberate the sulphides from the silicates, but the re-grind needs to grind fine. Fine sulphides (and PGM) will exhibit a slower flotation rate and losses can increase as a result. In addition, the re-grind can re-grind talc component as well, which will then become more difficult to depress. The results show that regrinding the rougher concentrate to 30 microns decreased the recovery of Ni and Pt dramatically. Cu recovery was less affected and copper grade increased to 11%.

Regrinding of already liberated particles is not ideal and particularly in Ni ores with floatable gangue. Typically, the grind is applied on streams with abundant middling particles, not on well liberated streams. Furthermore, the benefit of a re-grind mill cannot be tested in a batch test, as the effect of re-grinding the floatable silicates cannot be assessed without recycling these particles. It is especially the build-up of floatable gangue in the cleaning circuit that plague the ability to control floatation and attain an acceptable concentrate grade and recovery

Test F12 examined the effect of higher CMC and no regrind which resulted in better selectivity. Ni grade and recovery increased to 8% and 48%, however copper recovery decreased to 79%.

The effect of guar gum as a possible floatable silicate depressant was tested in test F13. While the copper grade increased to 21%, Ni recovery was the worst at 8%. PGE recoveries were also very low in this test.

Calgon was tried in test F14. Very low copper grade was achieved in this test. A combined 8% Cu/Ni, 8 g/t PGE, and 17.5% MgO were achieved in this test

To reduce Ni and PGE losses, CMC and guar gum dosages in the 2^{nd} and 3^{rd} cleaners were decreased in tests F15 and F16. The results show the improvement of the recovery of Ni and PGE.

Tests F10 to F17 were conducted to investigate the effect of silicate depressants and optimize their dosages by balancing these depressant to obtain good flotation performance. Mineralogy data indicated the presence of free floating silicates which was countered with CMC as a depressant. The addition of high dosage of CMC proved detrimental to both copper, and especially nickel recoveries.

Flotation tests F19-F21 tested the effect of a coarse primary grind at different re-grind sizes. Loss of Cu, Ni and PGE in the rougher tailings resulted in lower recoveries.

The position of the regrind mill after the first cleaner was investigated based on the results obtained with this configuration and with rougher concentrate re-grind. First cleaner concentrate was re-ground in test F22 which resulted loss of Ni in the second cleaner tails.

In order to improve Ni recovery and enhance pyrrhotite distribution in the bulk concentrate, the effect of $CuSO_4$ was examined in flotation test F23. It was added after the collection of two rougher concentrates at 175 g/t in the rougher and 70 g/t in the cleaner stages. Copper sulphate had no positive effect on Ni and pyrrhotite recovery in this test.

Test F25 was conducted to adjust CMC dosages in the cleaner stages with no success due to high dosages. The CMC dosages worked out to be ~600, 600, 800 g/t stage which were too high. Ni recovery was very low in this test. At the start of the cleaners in this test a heavy froth was noticed which is a sign of too much collector. In the roughers gangue is floated with the sulphides and the gangue helps support the froth, however when CMC is added it depresses the gangue and the gangue no longer helps support the froth. The heavy froth is likely from the Cu which suggests floating the Cu ahead of most of the Ni and deal with Ni in separate cleaners, a split-stream flowsheet circuit.

Finally test F40 was conducted to repeat test F17. Rougher tailing from this test was directed to a magnetic separation stage. No improvement in the Ni recovery was observed in this test.

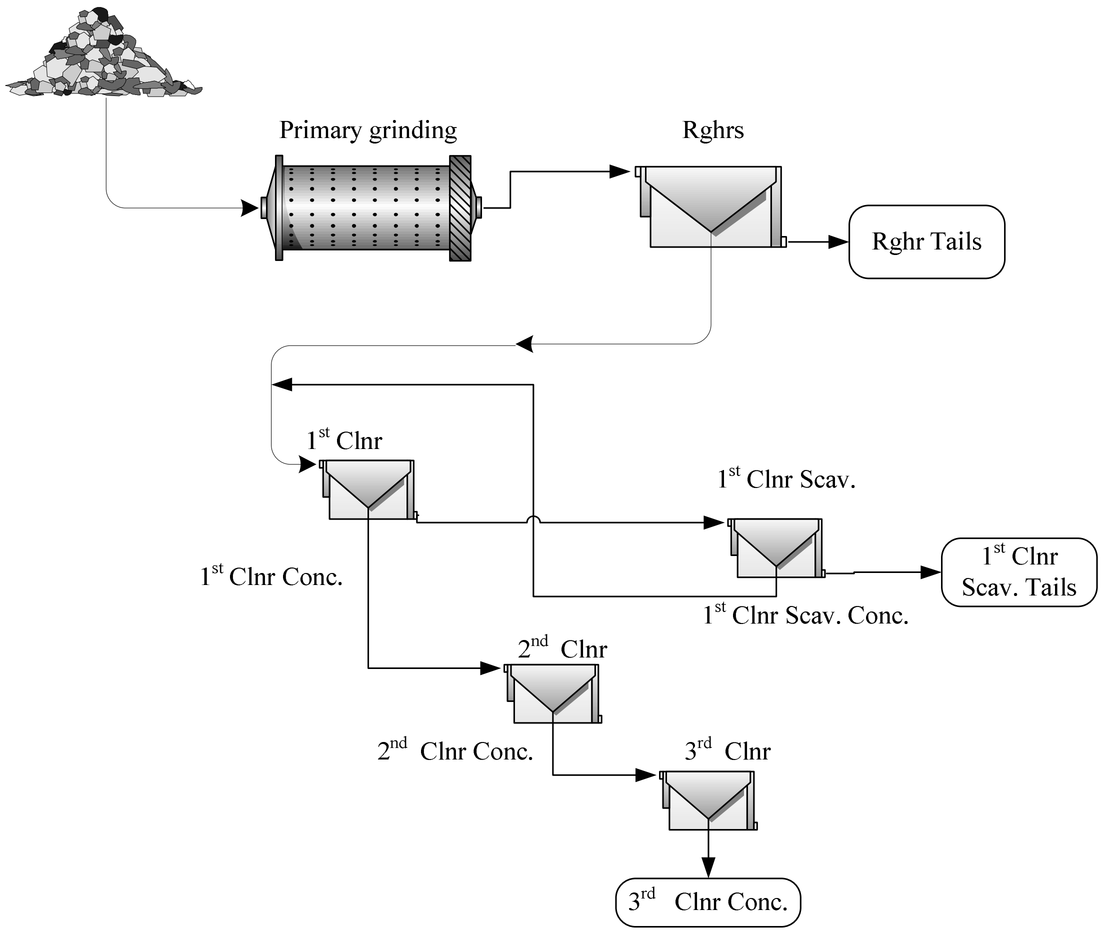


Figure 21: Cleaner Flotation Tests Flowsheet

Figure 22 shows the copper grade-recovery relationships for the cleaner tests and Figure 23 compares the recovery of each of the pay-metals; Cu and Ni as well as Pt, Pd, and Au as a function of combined Cu+Ni and PGE grades, respectively.

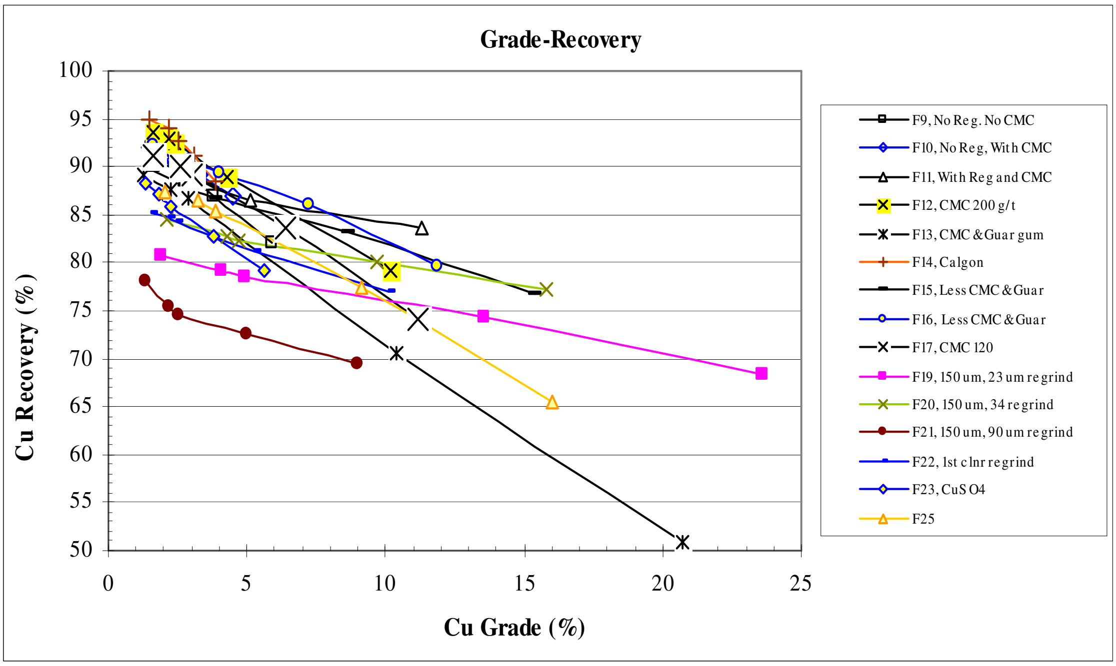


Figure 22: Copper Grade-Recovery Relationship

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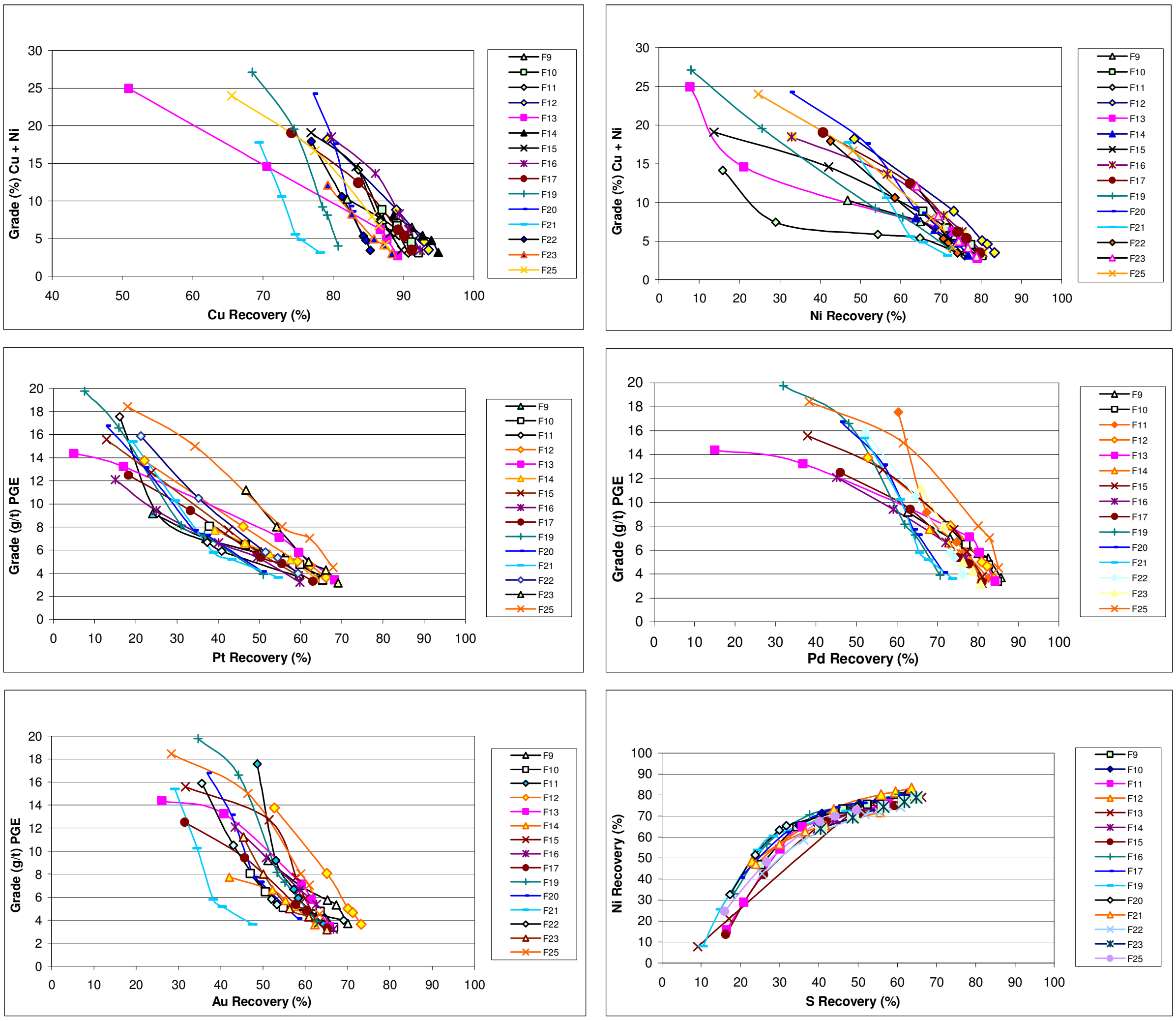

Figure 23: Recovery vs. Cu+Ni and PGE grade

Based on the results of test F12, if an 18% Cu+Ni concentrate grade is acceptable, the average Cu and Ni recovery is expected to be approximately 79% and 50%, respectively. At higher Cu+Ni concentrate grades, Cu and Ni recoveries are expected to decrease. The recoveries quoted are for open-circuit batch tests and are expected to be slightly higher in a closed circuit.

The combined Au, Pt, and Pd grade of the test F12 is 14 g/t. The Pt, Pd and Au recoveries are 22%, 53% and 53%, respectively.

4.1.3. Copper Nickel Separation

In addition to standard cleaning, one test (Sep-F1) investigated the feasibility of copper nickel separation. The intention was to draw attention to a possible method for producing separate copper and nickel concentrates while minimizing nickel losses into the copper concentrate. The flowsheet for this separation testwork is outlined in Figure 24.

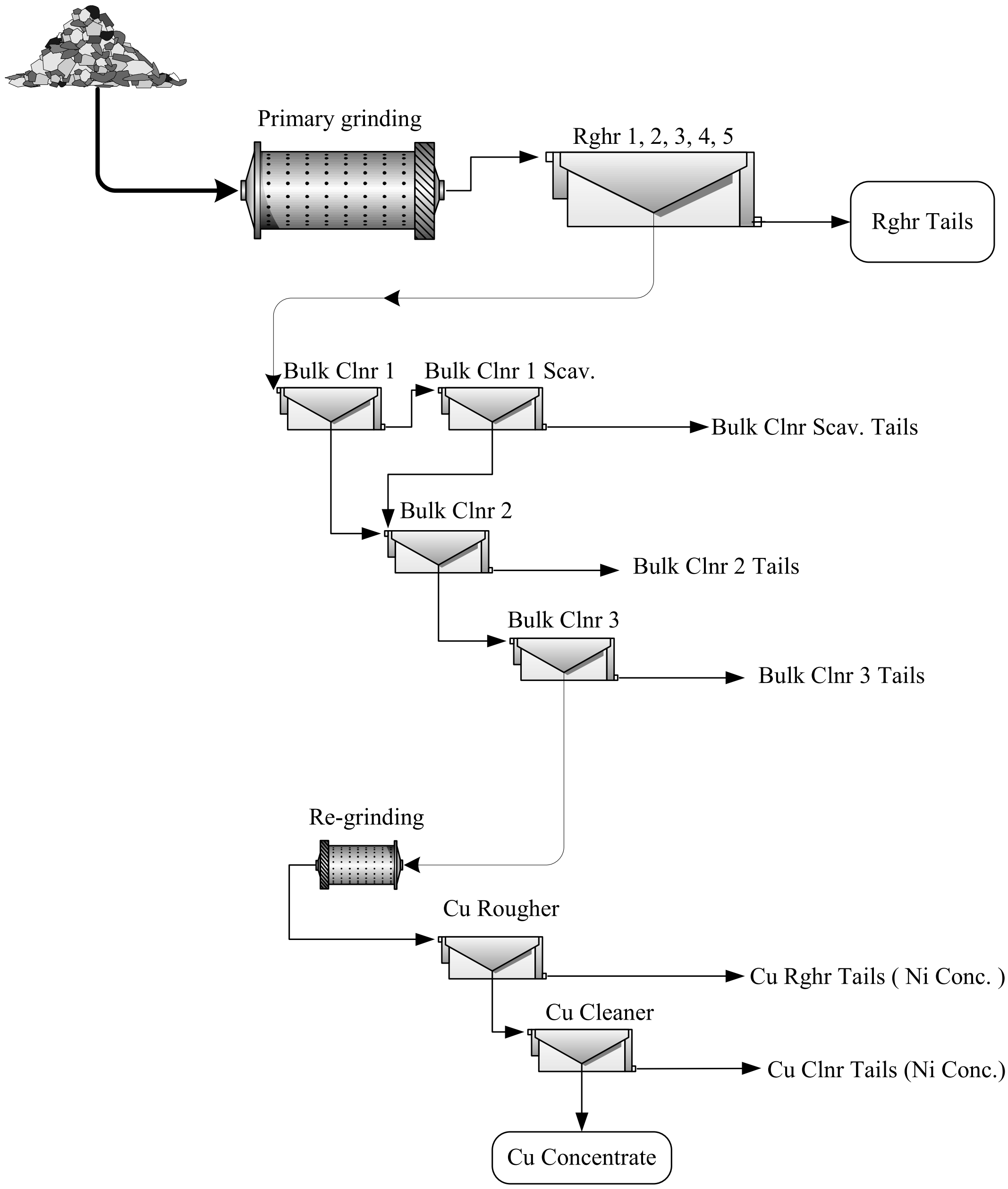

Figure 24: Cu/Ni Separation Flowsheet used in Test Sep-F1

The most notable results observed in test Sep-F1 show the rougher stage produced a copper concentrate assaying 18% Cu at 60% recovery. This test featured a copper rougher tail producing a final Ni concentrate of 7.5% Ni at 51.5% recovery. Bulk cleaner in this test observed recoveries of 76% and 52% for copper and nickel respectively into the final 3rd cleaner concentrate at a grade of 15% Cu+Ni. Cu/Ni separation test results are presented in Table 12. Detailed test results are attached in the Appendix E.

Table 12: Cu/Ni Separation Test (Sep-F1) Results

Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, fe, MgO %)								% Distribution							
	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Cu Cleaner 1 Conc.	**0.2**	**31.3**	**0.38**	**1.50**	**6.04**	**0.83**	**31.4**	**30.4**	**0.70**	**19.1**	**0.2**	**0.8**	**2.4**	**3.8**	**2.6**	**0.5**	**0.0**
Cu Rghr Conc.	1.1	17.9	**1.72**	2.22	9.14	0.73	22.5	21.3	1.68	60.2	**4.4**	**6.2**	**20.1**	**18.4**	**10.4**	**1.9**	**0.1**
Cu Cleaner 1 Tails (Ni Conc.)	0.9	14.9	**2.01**	2.38	9.83	0.71	0.71	19.3	1.90	41.1	**4.2**	**5.4**	**17.7**	**14.6**	**7.8**	**1.4**	**0.1**
(Cu Rghr Tails (Ni Conc.)	**2.0**	**2.51**	**9.75**	**4.52**	**9.47**	**0.33**	**22.3**	**31.9**	**5.70**	**16.2**	**47.4**	**24.0**	**39.7**	**15.9**	**19.8**	**5.3**	**0.5**
Total Ni Conc.	**2.9**	**6.23**	**7.43**	**3.88**	**9.58**	**0.44**	**21.8**	**28.1**	**4.56**	**57.3**	**51.6**	**29.4**	**57.4**	**30.5**	**27.6**	**6.7**	**0.6**
Bulk 3rd Clnr Conc	3.1	7.79	6.99	3.73	9.36	0.47	22.4	28.3	4.32	76.4	51.8	30.2	59.8	34.3	30.2	7.2	0.6
Bulk 2nd Clnr Conc	5.0	5.06	5.19	3.29	6.67	0.36	18.1	26.6	9.20	81.9	63.4	43.9	70.3	43.8	40.4	11.2	2.0
Bulk 1st Clnr + Clnr Scav Conc	11.5	2.36	2.63	1.99	3.33	0.21	11.1	20.4	16.9	86.9	73.1	60.5	80.0	57.7	56.3	19.5	8.3
Bulk Rghr Conc	**19.4**	**1.42**	**1.63**	**1.33**	**2.06**	**0.13**	**7.49**	**17.1**	**19.7**	**88.1**	**76.6**	**68.0**	**83.2**	**61.4**	**64.0**	**27.5**	**16.2**
Bulk Rghr Tail	80.6	0.05	0.12	0.15	0.10	0.02	1.01	10.8	24.5	11.9	23.4	32.0	16.8	38.6	36.0	72.5	83.8

4.1.4. Split-Stream Flowsheet

A split-stream flow sheet was also tested and initial fast-floating copper minerals were cleaned separately from slower floating nickel minerals. Test F18 was performed with the objective of producing a copper concentrate that could be marketed to a smelter and a bulk copper-nickel concentrate to be processed in a hydrometallurgy process. Since the first and second timed rougher concentrates were high grade in copper, combined and was cleaned separately to produce a copper concentrate. The remainder of the rougher concentrate (rougher concentrates 3-5) was cleaned separately in three stages. The results are shown in Table 13. Detailed test results are presented in the Appendix E. It can be concluded that the copper grade in the final Cu concentrate reached 28% Cu with a low recovery of about 27%. While the grade of copper into the Cu concentrate was high, the nickel content in the copper concentrate was 0.5%. With two cleaning stages a lower copper grade of 20% Cu concentrate with 65% recovery was achieved.

Nickel did not upgrade to any significant level in the bulk concentrate. In this concentrate, nickel grade and recovery were 4% Ni and 7%, respectively. The other main portions of nickel were in the copper cleaner tails and bulk rougher tails. Pyrrhotite deports mainly to the low-nickel grade concentrate.

Table 13: The Split-Stream Test (F18) Results

Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk Clnr 3 Conc	**0.8**	**1.34**	**4.02**	**7.10**	**2.68**	**0.33**	**19.7**	**29.2**	**2.74**	**2.9**	**6.8**	**13.5**	**4.7**	**5.2**	**5.1**	**1.7**	**0.1**
Bulk Clnr 2 Conc	1.6	0.95	3.07	5.34	2.24	0.23	20.2	34.2	5.98	4.4	11.0	21.5	8.3	7.7	11.0	4.2	0.4
Bulk Clnr 1 + Clnr 1 Scav Conc	6.0	0.44	1.39	2.51	1.18	0.11	12.9	25.8	14.5	7.5	18.2	36.8	16.0	14.0	25.6	11.6	4.0
Bulk Rghr 3-5 Conc	**12.2**	**0.26**	**0.80**	**1.45**	**0.70**	**0.07**	**8.46**	**19.9**	**18.6**	**8.9**	**21.3**	**43.4**	**19.3**	**16.5**	**34.3**	**18.3**	**10.3**
Bulk Rghr Tail	78.4	0.04	0.11	0.14	0.07	0.02	1.51	12.0	22.7	8.0	18.9	27.0	12.5	32.3	39.5	70.8	81.2
Ro1-2 Cu Clnr 3 Conc.(High Cu Conc	**0.3**	**28.4**	**0.46**	**1.82**	**13.2**	**1.72**	**29.5**	**28.4**	**2.79**	**26.9**	**0.3**	**1.5**	**10.0**	**11.8**	**3.3**	**0.7**	**0.0**
Ro1-2 Cu Clnr 2 Conc.	1.1	19.7	1.32	2.31	11.4	1.51	22.5	25.1	7.27	64.5	3.3	6.5	29.7	35.9	8.6	2.2	0.4
Ro1-2 Cu Clnr 1 Conc.	3.0	8.94	3.61	1.87	7.40	0.70	14.3	19.3	14.2	76.5	23.8	13.8	50.7	43.2	14.3	4.4	2.0
Rghr 1-2 Conc	**9.5**	**3.09**	**2.88**	**1.27**	**3.16**	**0.26**	**8.29**	**15.3**	**19.6**	**83.1**	**59.8**	**29.6**	**68.2**	**51.2**	**26.2**	**10.9**	**8.5**
Rghr 1-5 Conc	**21.6**	**1.50**	**1.71**	**1.37**	**1.78**	**0.15**	**8.38**	**17.9**	**19.0**	**92.0**	**81.1**	**73.0**	**87.5**	**67.7**	**60.5**	**29.2**	**18.8**

4.1.5. Locked Cycle Testing

Based on the metallurgical performance and expectation from the mineralogical information, one locked cycle test was conducted to provide more definitive performance information by re-circulation of middling streams and the projection of concentrate grades and recoveries that would be realized from a continuous process. The conditions for the locked cycle test were kept the same as the batch test F12. Aero 3477 was added to the grind and guar gum and CMC were used in the cleaner stages. The 1st cleaner scavenger stage was dropped in this test since not enough gangue material is rejected to ever make concentrate by keeping the cleaner scavenger. Table 14 presents the locked cycle test (LCT-2) results, and detailed results are attached in the Appendix F.

The calculated mass balances and LCT stability are presented in Appendix F. It should be noted that the mass balance is calculated from the locked cycle test end cycle products (last three cycles) along with the projected concentrate grades and recoveries. Cycle test stability is measured by comparing the mass and metal units into and out of the circuit from each cycle. Figure 25 shows LCT-2 circuit stability.

Table 14: Locked Cycle Test 2 Results

Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution					
	%	Cu	Ni	S	Pt	Pd	Au	Fe	Mgo	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Concentrate	4.36	6.99	7.13	19.4	2.44	6.80	0.54	25.4	9.82	84.9	63.4	29.2	26.4	64.4	62.9
Cleaner Tail	12.8	0.11	0.44	3.59	0.70	0.41	0.03	–	–	3.9	11.3	15.8	22.2	11.5	9.3
Rougher Tail	82.9	0.05	0.15	1.93	0.25	0.13	0.01	–	–	11.2	25.3	55.0	51.4	24.1	27.8
1st Cleaner Regrind Conc F	0.23	0.51	1.40	4.55	2.17	1.73	0.20	–	–	0.3	0.7	0.4	1.2	0.9	1.2
Magnetic Conc F	0.32	0.28	0.45	3.33	1.40	1.38	0.21	–	–	0.2	0.3	0.4	1.1	1.0	1.8
Head (calc.)	100.0	0.36	0.49	2.90	0.40	0.46	0.04	–	–	100.0	100.0	100.0	100.0	100.0	100.0
(direct)		0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8						

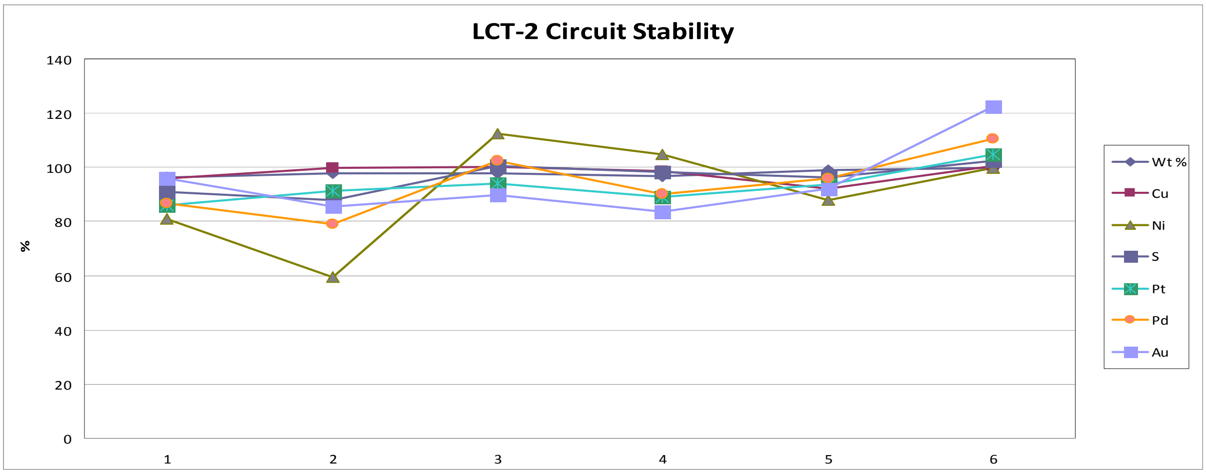

Figure 25: Locked Cycle Test 2 Circuit Stability

Test F-40 to some extent suggested a lot of the PGE is with pyrrhotite and/ or magnetite. A small test was added to the LCT-2 by conducting a magnetic separation on the cycle F rougher tail. The magnetic concentrate was reground for 20 minutes with 20 g/t Aero 4037 and then floated for recovery of Cu, Ni, and PGE.

Also in this the 1st cleaner tail F was reground for 20 minutes with Aero 4037 and floated for recovery of Cu, Ni, and PGE. The added reground and magnetic separations were promising in this test. The results are presented in Appendix F.

Based on the test LCT-2, a 14% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 85% and 63%, respectively. The combined Au, Pt, and Pd grade of this test was 10 g/t. The Pt, Pd and

Au recoveries were 26%, 64% and 33%, respectively. The Fe/MgO ratio and MgO content of the final concentrate were above the accepted limits in this test.

4.2. Optimization Flotation Testwork

4.2.1. Split-Stream Flowsheet

Following the preliminary testing, the next step of the flotation testwork to optimize the split flowsheet through a more detailed program was started. The proposed split flowsheet recommends taking advantage of the parallel cleaner lines presently used by most Cu/Ni commercial operations. The strategy would be to direct a rougher concentrate, rich in copper and nickel minerals to one of the lines and to direct a scavenger concentrate, rich in pyrrhotite to the other line. The advantages of decoupling the cleaners would be that the collector and CMC conditions could be customized to the floatability of each mineral class. Specifically, the copper and nickel minerals are known to be responsive to very low collector conditions. This low amount of collector is anticipated to result in significant improvements to the flotation separation of copper from nickel. Also the rougher circuit can be focused on recovery of the liberated minerals and avoid regrind here. The pyrrhotite rich products would likely have most of the middling particles and this is where r regrind is applied. On the other hand, the pyrrhotite is known to require high amounts of collector to recover acceptable levels of sulphides. It is predicted that the proposed flowsheet will result in the production of better quality copper concentrates and better process control in the commercial operation.

The proposed flowsheet is presented in Figure 26 and the tests results are presented in Tables 15 and 16. As the testwork progressed modifications to the flowsheet were applied for each individual test as presented in the Appendix E.

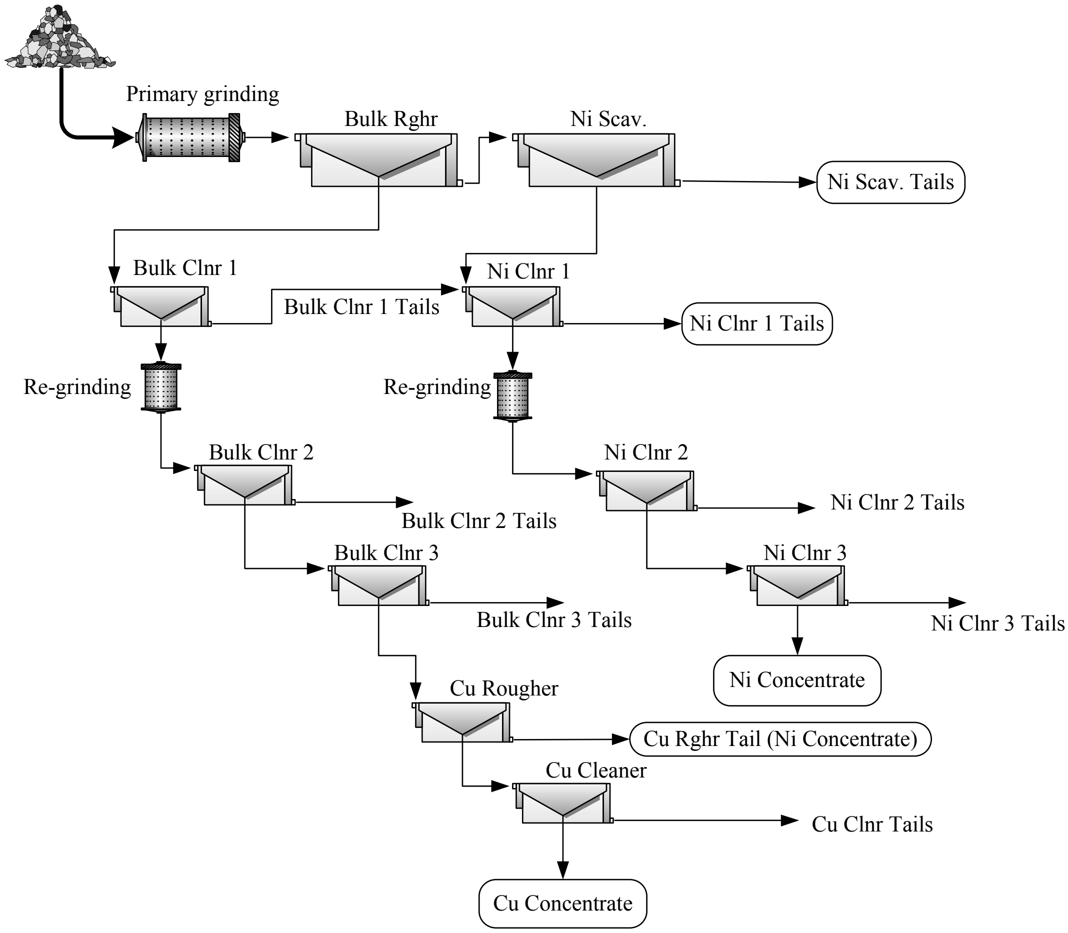

Figure 26: Split Flowsheet

Ten flotation tests were conducted to optimize the split-stream test conditions. Test F29 was intended to scope appropriate bulk cleaner conditions for the bulk cleaner circuits (rougher and scavenger) as well as attempted a preliminary Cu-Ni separation of the bulk cleaner concentrate. The objective of the bulk circuit was to recover most of the copper and most of the liberated pentlandite. The Ni scavenger used a high dosage of SIPX to get a high recovery of PGE. The bulk 2^{nd} cleaner concentrate contained in excess of 37% non-sulphide gangue (NSG), which was considered very high. A high content of NSG was present in the scavenger cleaner as well and pyrrhotite was noted to have poor kinetics. Cu-Ni separation showed promise with a Cu concentrate grade of 29% Cu and 0.4% Ni at a copper recovery of 40%.

Test F30 was conducted with no re-grind in the bulk circuit and coarser regrind for Ni circuit. CMC was used in the rougher and scavenger stages. In Test F31 Ni scavenger time was extended and CuSo4 was added in the third scavenger stage.

Test F32 used copper sulphate in the Ni scavenger and Aero 5100 was used in the copper circuit. This test gave the best Ni cleaner performance and this is notable for the addition of CuSO4 with no apparent impact on making concentrate grade. Test F34 used Aero 5100 and 3477 in the final stage of the Ni cleaner circuit.

Test F35 used CMC and guar with a 50:50 mix. The results were encouraging and gave the best 1st bulk cleaner performance. This test is notable for blended CMC/guar and higher SIPX in the bulk rougher. CMC is very good at depressing talc but also tends to collapse the froth when the dosage is high. Guar is often used to depress chlorite which was identified by mineralogy as the primary gangue mineral in the high grade concentrates. Guar also has the benefit of not collapsing the froth.

Test F36 was a repeat of F35 but more aggressive for recovery with more time in bulk rougher and Ni scavenger as well as CuSo4 in Ni scavenger. No bulk reground was conducted in this test with only two stages of cleaning. Copper sulphate was added after Ni regrind in this test to keep the Ni and PGE floating. Test F37 was a repeat of F36 with no CMC/guar in the roughers. This had no effect on the mass recovery in rougher/scavenger. CMC/guar was eliminated in this test and yet had no effect on the mass recovery in rougher/scavenger.

Test F36 was repeated as the test F38 with no CMC/guar in the rougher stages with a re-grind before 1st Ni cleaner stage. And finally F41 was conducted at a finer primary grind of 70 microns.

Overall, the results for these tests show there is no need for CMC/guar in the rougher. The results for bulk cleaners are good however more CMC/guar might be needed in the bulk cleaners. Ni scavenger results are good and use of copper sulphate is recommended for master composite. As for the Ni cleaner, it is needed to drop copper sulphate after regrind. Also SIPX additions need to stay high for recovery presumably to float the middling Cu/Ni material and for pyrrhotite recovery which has been shown to have abundant PGE minerals associated with it.

Table 15: Split Flowsheet Cleaner Flotation Test Results

Test	Product	Weight	Assays, %			% Distribution		
		%	Cu	Ni	S	Cu	Ni	S
F29	Cu 1st Clnr Conc	0.40	29.3	0.40	30.7	40.3	0.4	5.1
	Cu Rougher Conc	0.62	24.3	1.20	28.2	51.6	1.82	7.29
	Bulk 3rd Clnr Conc	1.40	13.6	6.61	23.8	65.6	22.7	14.0
	Bulk Rougher Conc	5.49	3.86	3.45	10.0	72.9	46.5	23.1
	Ni 4th Clnr Conc	0.20	7.29	9.33	28.7	5.08	4.63	2.44
	Ni Scav Conc	8.68	0.36	1.23	7.69	10.8	26.1	28.0
	Ni Scav Tail	85.8	0.06	0.13	1.36	16.3	27.4	48.9
	Head (calc.)		0.29	0.41	2.39			
F30	Bulk 3rd Clnr Conc	1.62	14.2	4.79	22.4	75.3	19.7	14.9
	Bulk Rougher Conc	5.65	4.41	3.57	10.9	81.6	51.3	25.4
	Ni 3rd Clnr Conc	0.44	2.64	6.08	13.2	3.80	6.79	2.40
	Ni Scav Conc	7.68	0.39	1.14	9.22	9.90	22.3	29.2
	Ni Scav Tail	86.7	0.03	0.12	1.27	8.52	26.5	45.4
	Head (calc.)		0.31	0.39	2.43			
F31	Bulk 3rd Clnr Conc	1.19	16.4	3.70	24.4	63.8	10.8	12.3
	Bulk Rougher Conc	6.03	3.85	3.74	11.2	75.9	55.5	28.7
	Ni 3rd Clnr Conc	0.14	4.65	6.76	30.3	2.09	2.28	1.80
	Ni Scav Conc	6.32	0.34	1.00	9.70	7.12	15.51	26.0
	Ni Scav Tail	86.2	0.06	0.13	1.07	16.4	27.6	39.1
	Head (calc.)		0.31	0.41	2.36			
F38	Bulk 2nd Clnr Conc	3.18	9.34	7.20	24.2	79.4	47.5	23.3
	Bulk Rougher Conc	9.17	3.45	3.60	13.0	84.7	68.5	36.0
	Ni 3rd Clnr Conc	1.36	0.69	1.50	30.0	2.50	4.2	12.3
	Ni Scav Conc	11.7	0.22	0.62	13.5	6.86	15.05	47.7
	Ni Scav Tail	79.2	0.04	0.10	0.68	8.48	16.45	16.3
	Head (calc.)		0.37	0.48	3.30			
F41	Bulk 2nd Clnr Conc	3.20	11.2	8.26	25.8	86.6	52.0	24.1
	Bulk Rougher Conc	10.6	3.55	3.49	12.3	90.8	72.7	38.1
	Ni 2nd Clnr Conc	0.61	0.91	1.66	25.9	1.35	2.00	4.64
	Ni Scav Conc	7.03	0.19	0.57	11.2	3.26	7.87	22.9
	Ni Scav Tail	82.4	0.03	0.12	1.62	5.98	19.44	39.0
	Head (calc.)		0.41	0.51	3.43			

Table 16; Split Flowsheet Cleaner Test Results (Continued)

Test	Product	Weight	Assays, %								% Distribution							
		%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
F32	Cu 1st Clnr Conc	0.4	30.3	0.47	1.71	6.17	1.27	30.1	31.5	1.15	37.6	0.4	1.6	5.0	11.5	4.6	0.9	0.02
4Kg	Cu Rougher Conc	0.4	28.3	0.93	2.06	8.69	1.353	29.5	31.6	1.60	43.7	1.0	2.4	8.71	15.2	5.7	1.2	0.03
	Bulk 2nd Clnr Conc	0.8	20.1	6.68	2.52	14.2	1.127	28.3	31.0	2.82	55.5	12.8	5.3	25.3	22.7	9.67	2.0	0.09
	Bulk Rougher Conc	3.1	6.08	3.53	1.44	5.87	0.365	11.7	18.1	17.7	64.8	26.2	11.7	40.6	28.4	15.4	4.5	2.22
	Ni 3rd Clnr Conc	1.2	3.14	9.32	7.10	7.80	0.44	30.5	44.1	2.24	13.0	26.8	22.3	20.9	13.2	15.6	4.3	0.11
	Ni Scav Conc	8.8	0.64	2.20	2.14	1.82	0.125	11.4	22.5	18.3	19.5	46.4	49.2	35.8	27.5	42.9	16.1	6.54
	Ni Scav Tail	88.1	0.05	0.13	0.17	0.12	0.02	1.11	11.1	25.6	15.7	27.4	39.1	23.6	44.1	41.7	79.4	91.2
	Head (calc.)		0.29	0.42	0.38	0.45	0.04	2.35	12.3	24.7								
F34	Bulk 3rd Clnr Conc	0.82	23.2	3.65	2.51	12.0	1.41	29.2	30.2	2.3	60.4	6.8	4.7	20.3	25.2	8.9	1.9	0.08
4Kg	Bulk Rougher Conc	5.42	4.60	4.44	1.96	5.25	0.36	12.5	19.7	16.1	79.6	55.2	24.5	58.9	42.4	25.3	8.4	3.87
	Ni 2nd Clnr Conc	0.41	3.11	7.05	9.33	7.69	1.12	29.6	42.3	3.7	4.0	6.6	8.8	6.5	10.0	4.5	1.36	0.07
	Ni Scav Conc	5.85	0.42	1.22	1.95	1.27	0.15	9.86	21.0	18.4	7.9	16.3	26.4	15.3	18.7	21.5	9.7	4.78
	Ni Scav Tail	88.7	0.04	0.14	0.24	0.14	0.02	1.61	11.7	23.2	12.5	28.5	49.1	25.7	38.9	53.2	81.9	91.4
	Head (calc.)		0.31	0.44	0.43	0.48	0.05	2.68	12.7	22.5								
F35	Bulk 3rd Clnr Conc	1.26	18.5	7.53	3.10	15.5	1.57	30.3	31.3	2.11	70.2	21.6	8.8	34.9	37.7	13.2	3.0	0.1
4Kg	Bulk Rougher Conc	5.93	4.66	4.49	2.17	5.41	0.43	14.0	20.9	15.9	82.9	60.5	28.8	57.2	48.6	28.5	9.5	4.0
	Ni 3rd Clnr Conc	0.31	3.00	4.13	5.51	6.00	1.60	32.9	48.0	2.32	2.8	2.9	3.8	3.3	9.4	3.5	1.1	0.0
	Ni Scav Conc	5.49	0.42	1.07	1.91	1.15	0.17	11.5	23.8	17.7	7.0	13.3	23.5	11.3	17.8	21.8	10.1	4.2
	Ni Scav Tail	88.6	0.04	0.13	0.24	0.20	0.02	1.6	11.8	24.2	10.1	26.2	47.7	31.5	33.6	49.7	80.4	91.8
	Head (calc.)		0.33	0.44	0.45	0.56	0.05	2.9	13.0	23.3								
F36	Bulk 2nd Clnr Conc	3.22	8.85	8.94	2.22	6.79	0.72	26.6	32.1	4.8	80.1	59.3	20.9	55.3	29.6	28.7	8.4	0.7
4Kg	Bulk Rougher Conc	7.60	3.88	4.29	1.54	3.40	0.36	13.9	20.7	14.9	83.0	67.2	34.3	65.2	34.8	35.3	12.7	5.2
	Ni 3rd Clnr Conc	2.83	0.41	1.32	1.30	0.78	0.17	30.8	47.3	5.2	3.3	7.7	10.8	5.6	6.1	29.2	10.8	0.7
	Ni Scav Conc	10.2	0.27	0.67	0.99	0.56	0.11	14.2	27.2	15.4	7.8	14.1	29.6	14.4	14.8	48.4	22.4	7.2
	Ni Scav Tail	82.2	0.04	0.11	0.15	0.10	0.05	0.6	9.8	23.2	9.2	18.6	36.1	20.4	50.4	16.2	64.9	87.6
	Head (calc.)		0.36	0.49	0.34	0.40	0.08	3.0	12.4	21.8								
F37	Bulk 2nd Clnr Conc	3.01	10.8	8.56	1.88	6.27	0.94	29.2	30.9	4.3	81.5	53.3	13.9	51.7	11.9	24.2	7.3	0.6
4Kg	Bulk Rougher Conc	7.97	4.22	3.85	1.35	2.98	0.45	14.3	19.3	15.3	84.2	63.3	26.5	65.1	15.2	31.3	12.0	5.8
	Ni 3rd Clnr Conc	3.46	0.44	1.69	3.02	0.31	0.37	32.1	46.7	5.4	3.8	12.1	25.7	2.9	5.3	30.5	12.6	0.9
	Ni Scav Conc	9.35	0.32	0.92	1.61	0.40	0.23	18.4	30.6	13.2	7.5	17.9	37.0	10.3	9.1	47.3	22.3	5.9
	Ni Scav Tail	82.7	0.04	0.11	0.18	0.11	0.02	0.9	10.2	22.4	8.3	18.8	36.5	24.7	19.5	21.4	65.7	88.3
	Head (calc.)		0.40	0.48	0.41	0.37	0.07	3.6	12.8	21.0								

4.2.2. MF2 Flowsheet

Tests F-33 and F-39 were conducted using grind-float-grind-float philosophy (An MF2 style flowsheet). This type of flowsheet has been successfully used in the South African platinum industry to deal with bimodal distributions of PGM. Coarse minerals were recovered before regrinding the tails to liberate very fine material. MF2 flowsheet is shown in Figure 27 and the results are presented in Tables 17 and 18. Detailed test results are presented in the Appendix F

Based on the test F-33, a 16.5% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 67% and 25%, respectively. The combined Au, Pt, and Pd grade of this test was 14.5 g/t. The Pt, Pd and Au recoveries were 16%, 36% and 37%, respectively.

As for the test F-39, a 13% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 79% and 38%, respectively. The MF2 tests did not show much promise but there are merits to including flash flotation as this will recover easy to float liberated Cu/Ni from a de-slimed feed. It is difficult to test the lash flotation in the lab.

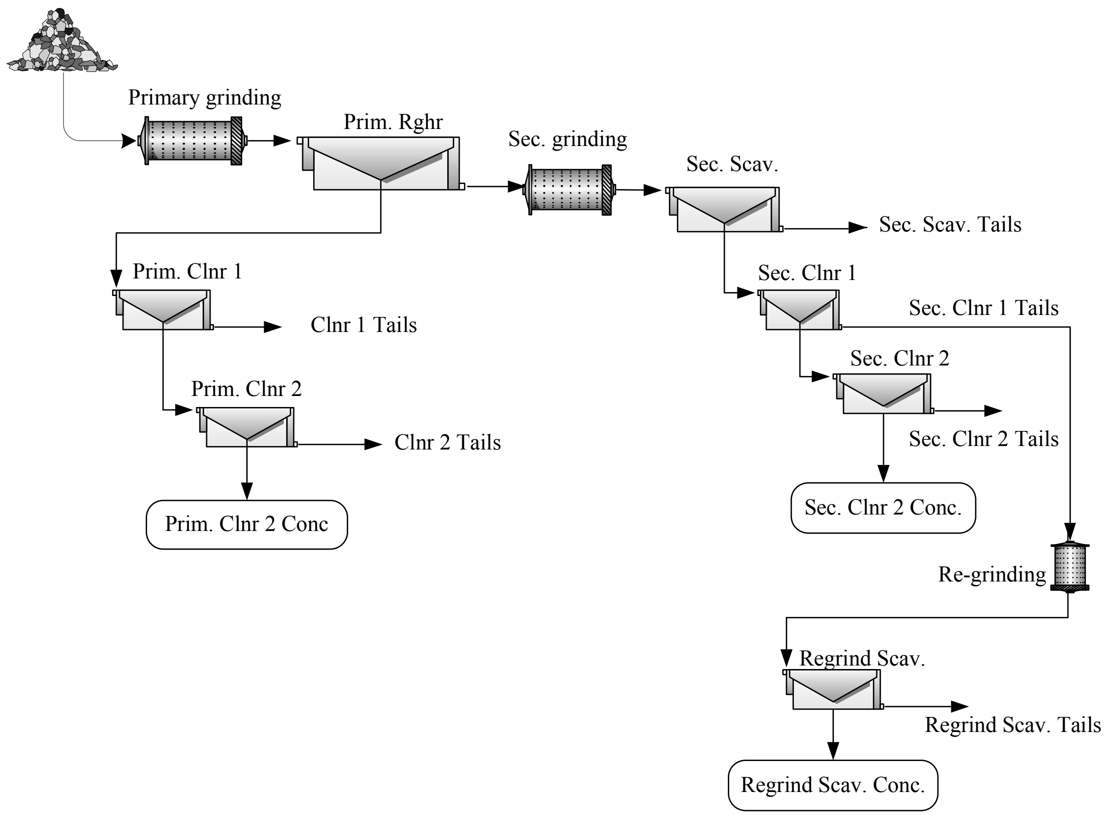

Figure 27: MF2 Flowsheet

Table 17: Test F-33 Results Using MF2 Flowsheet

Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Prim 2nd Clnr Conc	0.4	22.4	2.64	2.47	10.1	1.60	29.2	31.8	2.9	29.4	2.4	2.3	8.0	13.7	4.8	1.0	0.05
Prim 1st Clnr Conc	1.0	11.1	8.99	2.57	10.8	0.90	26.0	30.9	4.5	36.5	20.6	5.9	21.4	19.4	10.6	2.5	0.2
Prim Rougher Conc	2.7	4.32	4.64	1.42	4.73	0.37	12.5	19.3	13.0	38.6	28.8	8.9	25.4	21.6	13.8	4.2	1.5
Sec 3rd Clnr Conc	1.5	7.53	6.61	3.82	9.44	0.72	23.7	29.9	4.75	37.2	22.7	13.2	28.1	23.2	14.5	3.6	0.3
Sec 2nd Clnr Conc	4.2	3.29	3.92	3.57	5.49	0.38	14.3	23.0	14.2	44.9	37.3	34.1	45.1	34.0	24.2	7.6	2.5
Sec 1st Clnr Conc	4.7	2.94	3.63	3.39	5.00	0.35	13.6	22.5	14.9	45.6	39.2	36.7	46.7	35.1	26.1	8.4	3.0
Sec Scav Conc	9.7	1.50	1.97	2.04	2.65	0.20	8.51	17.8	18.4	47.4	43.3	45.0	50.4	41.0	33.3	13.6	7.4
Regrind Scav Conc	0.2	0.70	1.23	2.92	2.03	0.37	6.88	15.9	20.5	0.5	0.7	1.6	0.9	1.8	0.7	0.3	0.2
Regrind Scav Feed	4.9	0.11	0.36	0.74	0.38	0.06	3.60	13.2	21.7	1.7	4.1	8.3	3.7	5.8	7.2	5.1	4.5
Regrind Scav Tail	4.7	0.08	0.32	0.63	0.30	0.04	3.44	13.1	21.8	1.2	3.4	6.7	2.8	4.0	6.5	4.8	4.3
Sec Scav Tail	87.6	0.05	0.14	0.23	0.14	0.02	1.49	11.9	24.8	14.0	27.9	46.1	24.2	37.4	52.9	82.3	91.1
Comb Clnr Conc	1.9	10.7	5.78	3.54	9.58	0.90	24.9	30.3	4.36	66.7	25.1	15.5	36.1	37.0	19.3	4.6	0.3
Comb Ro & Scav Conc	12.4	2.12	2.56	1.90	3.11	0.24	9.39	18.1	17.2	86.0	72.1	54	76	63	47.1	17.7	8.9

Table 18: Test F-39 Results Using MF2 Flowsheet

Product	Weight	Assays, %			% Distribution		
	%	Cu	Ni	S	Cu	Ni	S
Prim Clnr 2 Conc	1.0	15.5	7.28	29.7	40.9	14.9	8.57
Prim Clnr 1 Conc	1.3	11.6	7.95	28.1	42.9	22.8	11.4
Prim Rougher Conc	4.8	3.75	4.56	16.1	49.1	46.4	23.1
Sec Clnr 2 Conc	2.6	5.31	4.20	20.7	37.6	23.1	16.1
Sec Clnr 1 Conc	4.5	3.19	2.82	16.4	39.8	27.3	22.5
Sec Scav Conc	9.9	1.53	1.51	11.1	41.5	31.8	33.0
Regrind Scav Conc	0.2	0.65	0.98	7.80	0.38	0.45	0.50
Regrind Scav Feed	5.3	0.11	0.39	6.55	1.65	4.50	10.5
Regrind Scav Tail	5.1	0.09	0.37	6.50	1.27	4.05	10.0
Sec Scav Tail	85.3	0.04	0.12	1.71	9.38	21.8	43.9
Comb Clnr Conc	3.5	8.07	5.04	23.1	78.5	38.0	24.6
Comb Ro & Scav Conc	14.7	2.25	2.50	12.7	90.6	78.2	56.1

4.2.3. Locked Cycle Tests – Split Stream

Locked cycle testing helps to establish plant predicted grade-recovery relationships since it includes circulating loads in a simulated continuous environment. Based on the results and analysis of metallurgical performance from the split flowsheet batch tests three locked cycle tests, LCT-1, LCT-3, and LCT-5 were conducted using this flowsheet (Figure 26) by re-circulating the intermediate products.

LCT-1 was conducted with Cu-Ni separation on the last three cycles. In this test 4-kg charges were used for each cycle. A copper concentrate with a grade of 23% Cu at a recovery of 68% was achieved in this test. The Fe/MgO ratio and MgO content of the final concentrate were within the accepted limits in this test. Separately, a nickel concentrate with a grade of 12.9% at a recovery of 60.9% was achieved. Total copper recovery in concentrates was 86.2% and nickel recovery in concentrates was 62.8%.

Table 19 presents the locked cycle test (LCT-1) results, and detailed results are presented in Appendix F.

Table 19: LCT-1 Test Results

LCT-1 Product	Weight %	Assays Cu	Ni	S	Pt	Pd	Au	Rh	Ru	Ir	Os	Co	Fe	MgO
		%	%	%	g/t	g/t	g/t	ppb	ppb	ppb	ppb	%	%	%
Cu Conc	1.00	23.2	0.88	28.3	2.16	4.83	1.44	177	192	150	140	0.045	28.5	2.83
Cu Rougher Tail (Ni Conc.)	1.78	2.55	14.4	26.7	3.34	10.9	0.32	323	455	329	270	0.870	32.5	4.55
Ni 3rd Clnr Conc	0.48	3.24	7.03	27.2	5.72	5.9	0.43	311	430	338	290	0.360	41.8	5.04
Ni 1st Clnr Tail	15.0	0.13	0.48	7.48	1.02	0.61	0.05	90	112	106	72	0.023	18.5	20.4
Ni Scav Tail	81.7	0.03	0.13	1.15	0.22	0.09	0.02	<20	<50	23	19	<0.01	10.4	23.8
Total Ni Conc.	2.26	2.69	12.9	26.8	3.84	9.84	0.34	320	450	331	274	0.762	34.5	4.66
Head (calc.)		0.34	0.48	2.95	0.44	0.44	0.05	39	70	44	33.9	0.029	12.3	22.7

LCT-1 Product	% Distribution Cu	Ni	S	Pt	Pd	Au	Rh	Ru	Ir	Os	Co	Fe	MgO
Cu Conc	68.2	1.8	9.5	4.9	11.0	31.2	4.5	2.7	3.4	4.1	1.5	2.3	0.1
Cu Rougher Tail (Ni Conc.)	13.4	53.9	16.1	13.5	44.6	12.4	14.8	11.6	13.4	14.2	52.9	4.7	0.4
Ni 3rd Clnr Conc	4.6	7.0	4.4	6.2	6.5	4.5	3.8	2.9	3.7	4.1	5.9	1.6	0.1
Ni 1st Clnr Tail	5.8	15.0	38.0	34.7	21.0	16.3	34.8	24.1	36.4	31.9	11.8	22.5	13.5
Ni Scav Tail	8.0	22.2	31.9	40.7	16.9	35.6	42.0	58.6	43.0	45.7	27.9	68.9	85.9
Total Ni Conc.	18.0	60.9	20.5	19.7	51.1	16.9	18.6	14.6	17.1	18.3	58.8	6.3	0.5
Head (calc.)													

LCT-3 was conducted to repeat LCT-1 with magnetic separation stage and Aero 4037 was added into the regrind. No Cu-Ni separation was tried in this test. Based on the results of test LCT-3, a 12% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 88% and 68%, respectively. The combined Au, Pt, and Pd grade of this test was 10.5 g/t. The Pt, Pd and Au recoveries were 46%, 73% and 59%, respectively. The Fe/MgO ratio and MgO content of the combined concentrate were above the accepted limits in this test.

Table 20 shows the locked cycle test (LCT-3) results. Detailed results are presented in Appendix F.

Table 20: LCT-3 Test Results

LCT-3	Weight	Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution					
Product	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au
Bulk Clnr 2 Conc.	2.78	11.0	9.28	27.2	3.39	10.3	0.80	31.6	4.13	83.5	57.6	25.9	22.7	62.9	50.3
Ni 3rd Clnr Conc.	2.36	0.59	1.78	12.8	3.55	1.45	0.11	22.4	17.9	3.8	9.4	10.3	20.2	7.5	6.1
Ni 1st Clnr Tail	15.7	0.10	0.34	4.41	0.66	0.41	0.03	—	—	4.3	12.1	23.8	24.9	14.1	12.1
Ni Scav Tail	69.9	0.04	0.11	1.06	0.14	0.06	0.02	—	—	7.6	16.6	25.4	24.1	9.5	25.4
Magnetic Clnr Conc.	0.21	0.85	1.22	8.93	6.19	5.41	0.52	24.4	18.4	0.5	0.6	0.7	3.2	2.5	2.5
Magnetic Rghr Tail	9.00	0.01	0.19	4.50	0.23	0.18	0.02	—	—	0.2	3.7	13.8	4.9	3.5	3.6
Combined Concentrates	**5.36**	**6.01**	**5.66**	**20.1**	**3.57**	**6.22**	**0.48**	**27.3**	**10.8**	**87.8**	**67.6**	**36.9**	**46.0**	**72.9**	**58.9**
Head (calc.)		0.37	0.45	2.92	0.42	0.46	0.04								

Finally, LCT-5 was conducted using the same bulk circuit conditions as the LCT-3. Lime was added for copper separation and SIPX was added to copper rougher. Aero 4037 was added into the regrind as this worked good in the magnetic separation circuit and was okay in LCT-2 on the first cleaner tails. CuSo4 was added in the Ni cleaners. Ni scavenger concentrate was reground in this test. A copper concentrate with a grade of 19% Cu at a recovery of 74% was achieved. A total Ni concentrate of 8.75% Ni at 61.5% recovery was produced in this test. The Fe/MgO ratio and MgO content of the final concentrate were within the accepted limits however, the copper concentrate contained 1.37% Ni which is just slightly above the 1% threshold required to meet saleable copper concentrate quality. This will be addressed in the next phase of program. Total copper recovery in concentrates was 85.9% and total nickel recovery in concentrates was 65.7%.

Table 21 presents the locked cycle test (LCT-5) results. The metallurgical results of LCT-5 are shown in Appendix F.

Table 21: LCT-5 Test Results

LCT-5	Weight	Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								Distribution, %					
Product	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au
Cu Clnr 1 Conc	1.36	19.1	1.37	25.5	2.51	6.06	1.41	28.8	4.75	74.1	4.2	12.2	8.3	17.8	31.5
Cu Rougher Tail (Ni Conc.)	1.66	1.66	14.3	25.0	3.63	12.0	0.45	30.8	5.58	7.9	53.7	14.6	14.6	42.8	12.3
Ni 3rd Clnr Conc	1.29	0.88	2.44	17.2	5.76	2.32	0.19	28.2	14.4	3.2	7.1	7.8	18.0	6.4	3.9
Ni 1st Clnr Tail	14.5	0.12	0.36	4.21	0.59	0.43	0.03	—	—	4.8	11.7	21.5	20.7	13.4	7.7
Ni Scav Tail	70.9	0.04	0.11	1.11	0.15	0.07	0.01	—	—	8.1	17.6	27.6	25.7	10.4	11.7
Magnetic Cleaner Con	0.2	1.68	1.88	11.6	8.04	8.58	7.46	26.5	15.9	0.7	0.6	0.6	3.0	2.8	18.6
Magnetic Cleaner Tail	3.3	0.06	0.25	4.82	0.68	0.45	0.16	—	—	0.6	1.9	5.6	5.4	3.2	8.7
Magnetic Rougher Tail	6.9	0.03	0.20	4.20	0.26	0.22	0.05	—	—	0.6	3.1	10.1	4.3	3.2	5.5
Total Ni Conc.	3.10	1.34	8.75	21.1	4.73	7.81	0.68	29.5	9.77	11.8	61.5	23.0	35.6	52.1	34.8
Head (calc.)		0.35	0.44	2.85	0.41	0.47	0.06	—	—						

5. High Nickel Composite Flotation Testwork

As mentioned earlier a High Ni Composite was prepared from the third shipment of the samples to SGS Vancouver Metallurgy. The grades for this composite were higher but contained lower MgO (19.8%) as compared with the master composite. Flotation tests HNI-F1 to HNI-F5 were conducted using the high nickel composite.

Rougher flotation test HNI-F1 was conducted using the same conditions as the rougher flotation test F3 for the Master Composite. Mass recovery and Cu and Ni recoveries were higher for high Ni composite.

The results for HNI-F1 are shown in Table 22. Detailed test conditions and results and are presented in Appendix E.

Table 22: Rougher Flotation Test HNI-F1 Results

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
		%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
	Ro Conc 1	2.3	1.10	0.44	3.00	0.58	4.02	0.23	4.8	1.2	1.0	2.3	16.9	8.5
HNI-F1	Ro Conc 1-2	6.4	6.32	1.77	11.2	1.46	4.14	0.50	75.8	13.6	10.8	16.2	48.0	51.4
SIPX 70 g/t	Ro Conc 1-3	13.2	3.59	4.69	15.0	1.60	3.02	0.32	88.7	74.3	29.8	36.7	72.1	66.6
K80 90 um	Ro Conc 1-4	18.4	2.67	3.69	15.9	1.67	2.37	0.24	91.9	81.3	43.9	53.0	78.6	71.5
	Ro Conc 1-5	**26.2**	**1.92**	**2.77**	**17.1**	**1.50**	**1.77**	**0.18**	**94.1**	**86.7**	**67.4**	**68.1**	**84.0**	**76.5**
	Ro Tail	73.8	0.04	0.15	2.94	0.25	0.12	0.02	5.9	13.3	32.6	31.9	16.0	23.5
	Head (calc.)		0.53	0.83	6.66	0.58	0.55	0.06						

Cleaner flotation test HNI-F2 was conducted using the same test conditions as the master composite cleaner flotation test F12. High Ni composite has a higher sulphide content which would result in a proportionally higher mass flow to the cleaning circuit. Ni recovery was high at 66.5% for this composite as compared to 48.5% for Master Composite. Based on the test HNI-F2, a 15% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 85% and 66.5%, respectively. The combined Au, Pt, and Pd grade of this test was 9 g/t. The Pt, Pd and Au recoveries were 29%, 66% and 61%, respectively. The Fe/MgO ratio and MgO content of the final concentrate were within the accepted limits in this test.

The results for test HNI-F2 are shown in Table 23. Detailed test conditions and results and are presented in Appendix E.

Table 23; Cleaner Flotation Test HNI-F2 results

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
		%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
	3rd Clnr Conc	**6.8**	**6.53**	**8.21**	**25.0**	**2.53**	**5.54**	**0.68**	**36.0**	**3.02**	**85.2**	**66.5**	**27.1**	**29.1**	**65.6**	**61.5**	**13.4**	**1.0**
HNI-F2	2nd Clnr Conc	10.2	4.54	6.24	23.7	2.36	4.18	0.51	36.6	5.18	88.9	75.7	38.5	40.7	74.2	69.2	20.4	2.5
No Regrind	1st Clnr Conc	15.7	3.01	4.30	19.7	1.89	2.87	0.36	32.9	9.84	90.6	80.2	49.1	50.0	78.2	75.8	28.2	7.4
CMC=200 g/t	1st Cl & ClScv Conc	17.0	2.79	4.02	19.3	1.84	2.68	0.34	32.9	10.2	91.0	81.3	52.2	52.8	79.2	77.2	30.5	8.3
	Rghr Conc	**22.2**	**2.15**	**3.15**	**16.1**	**1.54**	**2.10**	**0.27**	**29.4**	**12.8**	**91.6**	**83.3**	**57.1**	**57.9**	**81.0**	**79.3**	**35.7**	**13.6**
	1st Clnr Scv Tls	5.2	0.07	0.33	5.88	0.58	0.20	0.03	18.3	21	0.7	2.1	4.9	5.1	1.8	2.1	5.2	5.3
	Rougher Tails	77.8	0.06	0.18	3.46	0.32	0.14	0.02	15.1	23.2	8.4	16.7	42.9	42.1	19.0	20.7	64.3	86.4
	Head (calc.)		0.52	0.84	6.27	0.59	0.57	0.08	18.3	20.9								

Flotation tests HNI-F3 to HNI-F5 tested the split flowsheet for this composite.

Test HNI-F3 was conducted as per the master composite flotation test F-35. Higher Ni grade and recovery at 11% and 42% respectively, were achieved in this test.

HNI-F4 was conducted with longer rougher and scavenger flotation time with no bulk cleaner re-grind. Almost the same Cu and Ni grade-recovery relationships were achieved in this test. The Fe/MgO ratio and MgO content of the final concentrates were within the accepted limits in both tests.

The results for HNI-F3 and HNI-F4 are shown in Table 24. Detailed test conditions and results and are presented in Appendix E.

Table 24: High Ni Composite Split Flowsheet Flotation Tests HNI-F3 & F4 Results

Test	Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)								% Distribution							
		%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
	Bulk 3rd Clnr Conc	3.1	10.3	11.0	2.32	8.11	0.94	28.8	33.9	1.82	67.6	41.8	12.6	44.9	40.2	13.9	5.9	0.3
	Bulk 2nd Clnr Conc	4.2	7.95	10.3	2.18	6.68	0.74	27.6	34.1	3.32	70.1	52.6	15.9	49.7	42.5	17.9	7.9	0.7
	Bulk 1st Clnr Conc	6.2	5.95	8.32	2.23	5.38	0.54	24.9	33.2	5.39	77.3	62.6	23.9	58.9	45.8	23.8	11.4	1.7
HNI-F3	Bulk Rougher Conc	10.6	3.64	5.65	1.93	3.58	0.36	21.0	31.4	9.06	81.0	72.8	35.5	67.1	51.8	34.4	18.4	5.0
4 kg	Ni 3rd Clnr Conc	1.1	1.50	1.80	2.64	1.54	0.31	34.1	53.8	0.98	3.4	2.4	4.9	2.9	4.6	5.7	3.2	0.1
	Ni 2nd Clnr Conc	1.9	1.06	1.63	2.36	1.24	0.23	32.1	52.1	2.17	4.3	3.8	7.8	4.2	6.0	9.4	5.5	0.2
	Ni 1st Clnr Conc	4.2	0.67	1.26	1.91	0.92	0.16	28.7	46.9	4.08	6.0	6.5	14.1	6.9	9.6	18.8	11.0	0.9
	Ni Scav Conc	9.5	0.46	0.92	1.55	0.77	0.12	18.7	34.2	11.1	9.2	10.6	25.6	13.0	15.3	27.5	18.1	5.5
	Ni Scav Tail	79.9	0.06	0.17	0.28	0.14	0.03	3.08	14.3	21.4	9.8	16.6	38.9	19.9	32.9	38.1	63.5	89.5
	Head (calc.)		0.47	0.82	0.58	0.56	0.07	6.46	18.0	19.1								
	Bulk 2nd Clnr Conc	4.0	9.68	9.07	2.35	7.46	0.81	28.0	35.3	2.51	77.0	43.3	17.3	52.1	32.9	16.6	7.7	0.5
HNI-F4	Bulk Rougher Conc	10.2	4.08	5.61	1.75	3.78	0.37	18.7	27.8	10.9	82.6	68.1	32.7	67.2	38.5	28.2	15.5	5.8
	Ni 3rd Clnr Conc	1.6	1.62	2.80	3.15	2.00	1.46	30.2	47.2	4.31	5.1	5.2	9.1	5.5	23.3	7.0	4.1	0.4
	Ni 2nd Clnr Conc	2.4	1.21	2.48	2.77	1.66	1.04	29.1	46.2	5.06	5.8	7.2	12.4	7.0	25.5	10.4	6.1	0.6
	Ni 1st Clnr Conc	4.6	0.79	1.94	2.30	1.26	0.64	25.3	41.7	7.63	7.2	10.6	19.5	10.1	30.0	17.2	10.5	1.8
	Ni Scav Conc	12.4	0.38	1.04	1.38	0.70	0.30	17.8	31.8	11.8	9.3	15.3	31.6	15.2	37.9	32.6	21.6	7.6
	Ni Scav Tail	77.4	0.05	0.18	0.25	0.13	0.03	3.42	14.8	21.4	8.2	16.6	35.7	17.6	23.6	39.2	62.9	86.6
	Head (calc.)		0.50	0.84	0.54	0.57	0.10	6.76	18.2	19.1								

Test HNI-F5 was conducted with less SIPX in the scavenger and longer scavenger re-grind. While Ni recovery improved in this test, Ni grade was lower.

Overall, the results for high Ni composite show the bulk circuit is pretty good without CMC/guar in rougher. It seems more SIPX is needed in the bulk rougher 2 in order to get higher recovery. It is needed to make better concentrate on Ni side. The issue is pyrrhotite flotation here. Copper sulphate was not used for this composite. It is suggested to use less SIPX in scavenger and cleaner stages.

The results for this test are shown in Table 25 and are presented in detail in Appendix E.

Table 25: High Ni Composite Split Flotation Test HNI-F5 Results

Test	Product	Weight	Assays, (Cu, Ni, S %)			% Distribution		
		%	Cu	Ni	S	Cu	Ni	S
	Bulk 2nd Clnr Conc	5.2	7.91	8.75	28.5	79.2	55.3	21.3
	Bulk 1st Clnr Conc	7.6	5.44	6.28	24.7	80.3	58.5	27.3
HNI-F5	Bulk Rougher Conc	15.9	2.67	3.26	18.7	81.8	63.1	42.8
	Ni 3rd Clnr Conc	0.8	4.04	3.73	24.0	5.9	3.4	2.6
	Ni 2nd Clnr Conc	1.5	2.25	2.81	22.0	6.5	5.2	4.8
	Ni 1st Clnr Conc	3.1	1.37	2.54	15.8	8.3	9.7	7.1
	Ni Scav Conc	8.2	0.69	2.12	14.4	10.9	21.2	17.1
	Ni Scav Tail	75.9	0.05	0.17	3.67	7.3	15.7	40.1
	Head (calc.)		0.52	0.82	6.94			

Finally, one locked cycle test (LCT-4) was conducted on High Ni Composite sample using the same test conditions as master composite LCT-3. Reagents were adjusted accordingly and no $CuSO_4$ was used in this test.

The results for this test are shown in Table 26 and detailed test conditions and results are presented in Appendix F.

Table 26: LCT-4 Test Results

LCT-4 Product	Weight %	Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution					
		Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au
Bulk Clnr 2 Conc.	6.0	7.57	9.27	30.2	2.51	6.15	0.71	36.6	2.03	82.8	66.9	26.9	26.3	64.4	55.6
Ni 3rd Clnr Conc.	1.2	2.07	3.83	18.8	4.10	2.77	0.32	28.1	12.6	4.7	5.7	3.4	8.9	6.0	5.2
Ni 1st Clnr Tail	16.5	0.18	0.64	12.7	1.06	0.45	0.05	–	–	5.3	12.7	31.3	30.8	13.1	9.9
Ni Scav Tail	68.0	0.05	0.15	3.06	0.22	0.08	0.03	–	–	6.2	12.3	31.0	26.3	10.0	25.2
Magnetic Clnr Conc.	0.2	1.26	1.22	10.9	6.94	6.39	0.55	26.5	16.4	0.5	0.3	0.3	2.5	2.3	1.5
Magnetic Rghr Tail	8.0	0.03	0.22	5.96	0.37	0.30	0.03	–	–	0.5	2.1	7.1	5.2	4.2	2.8
Combined Conc.	**7.4**	**6.48**	**8.15**	**27.8**	**2.89**	**5.59**	**0.64**	**34.9**	**4.18**	**88.0**	**72.9**	**30.7**	**37.7**	**72.6**	**62.2**
Head (calc.)		0.55	0.83	6.73	0.57	0.57	0.08	–	–						

Based on the test LCT-4, a bulk 14.5% Cu+Ni concentrate grade was achieved; the Cu and Ni recoveries were 88% and 73%, respectively. The combined Au, Pt, and Pd grade of this test was 9 g/t. The Pt, Pd and Au recoveries were 38%, 73% and 62%, respectively. The Fe/MgO ratio and MgO content of the final concentrate were within the accepted limits in this test.

6. Mineralogy of Flotation Products

In order to quantify the degree of liberation of Cu and Ni minerals and describe mineral textures and associations, the bulk Cu/Ni 1st cleaner concentrate and the final products of test LCT-1 were submitted to the mineralogy department for QEMSCAN analysis.

The first study focused on the mineralogy of the first cleaning stage for test F12 to investigate the loss of Ni in the cleaner tails. The second mineralogy study evaluated the closed circuit by assessing the LCT-1 products. The objective for these studies was to better understand and identify nickel losses to improve overall nickel recovery and define a recovery limit for nickel.

The results of the QEMSCAN^{TM} analyses for flotation products are presented in Appendix G.

F12 1st Cleaner Concentrate and Tails

The results of the F12 1st cleaner concentrate analysis show only ~25% of the gangue is “free” and 75% is with notable association with other minerals, notably sulphides. Pentlandite is only 71% free and pyrrhotite is 46% free. The QEMSCAN data suggests it is not possible to reject ~70% of the gangue minerals without losses of the sulphides. This was confirmed by metallurgical tests. The analysis of metallurgical results had assumed low upgrading of Ni was related to pyrrhotite, however QEMSCAN data shows there is also issues with gangue middlings as well. As the flotation test results show, there is no difference in Ni-pyrrhotite selectivity between roughing and cleaning. It is not possible to get good Ni recovery without floating pyrrhotite. The concentrate can likely tolerate a maximum of 20% pyrrhotite recovery to meet the quality objectives. Although there is not a great degree of liberation at 90 microns primary grind, but the degree of liberation is high enough for a reasonable rougher recovery and there would be needed to add a re-grind stage to the circuit. The rougher tails results provide an examination into the main reason for losses in test F12. There were minimal losses to the 1st cleaner tails.

Mineral modal analysis of the F12 1st cleaner concentrate and tails, illustrating the mineral distributions, unsized, are presented in Table 27. Modal analysis and pentlandite, pyrrhotite, chalcopyrite, chlorite/serpentine, and talc associations as well as grain size results are presented in Appendix G.

Table 27: Bulk Modal Analysis of F12 1st Cleaner Concentrate and Tails

Sample		F12R Clnl Conc	Ro Tails
Mass Size Distribution (%)		100.0	100.0
Calculated ESD Particle Size		10.8	20
		Sample	Sample
Mineral Mass (%)	Chalcopyrite	8.4	0.1
	Pyrrhotite	8.5	4.8
	Pentlandite	10.7	0.1
	Other Sulphides	0.1	0.0
	Feldspar	0.7	3.0
	Orthopyroxene	2.2	9.3
	Clinopyroxene	2.6	14.0
	Amphibole	6.0	12.5
	Mica	0.2	2.5
	Chlorite/Serpentine	32.0	46.9
	Talc	25.7	2.1
	Other Silicates	0.2	0.3
	Fe Oxides	2.2	2.4
	Other Oxides	0.3	1.2
	Carbonates	0.1	0.5
	Others	0.1	0.3
	Total	100	100

The QEMSCAN results supports split type of flowsheet in which primary roughing is to focus on recovery of the reasonably liberated material, ~85% Cu and ~70% Ni. This does not require a high collector addition or high pyrrhotite recovery. This will need a short re-grind and three aggressive cleaners to reject gangue and have high recovery of sulphides. Cleaner collector will have to be added part way through the cleaner stages to keep the pentlandite and associated pyrrhotite floating. The concentrate from this circuit will/may go to Cu-Ni separation to produce a saleable copper concentrate. The copper separation tail would be Ni concentrate.

There will be a scavenger circuit where the collector dosage would be high to get a good recovery of the remaining valuable, Ni, PGE and some Cu. There would be more notable re-grind here to get some liberation and finally, likely three stages of cleaning to reject gangue and pyrrhotite.

The other choice is a finer primary grind, but the ore is hard and the tonnage is high, so there would be no economical justification for this.

LCT-1 Products

Six products from LCT-1, namely; copper cleaner 1 concentrate, copper rougher tail, bulk cleaner 1 tail, Ni cleaner 3 concentrate, Ni cleaner 1 tail and Ni scavenger tail products were submitted for QEMSCAN analysis. Mineral modal analysis of the LCT-1 products illustrating the mineral distributions is presented in Table 28. Modal analysis and pentlandite, pyrrhotite, chalcopyrite, chlorite/serpentine, talc and Fe Ox associations results are presented in Appendix G.

Table 28: Bulk Modal Analysis of LCT-1 Products

Sample		Cu Cl 1 Con G	Cu Ro. Tail G	Bulk Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Cl. 1 Tail G	Ni Scav Tail G
Fraction		-106um	-106um	-106um	-106um	-106um	-106um
Mass Size Distribution (%)		100.0	100.0	100.0	100.0	100.0	100.0
Calculated ESD Particle Size		16	16	11	15	11	10
Mineral Mass (%)	Chalcopyrite	75.7	9.7	1.0	13.5	0.5	0.1
	Pyrrhotite	8.4	26.6	13.7	38.8	24.1	3.8
	Pentlandite	1.7	41.8	4.8	26.5	1.8	0.1
	Other Sulphides	0.2	0.2	0.04	0.2	0.04	0.004
	Feldspar	3.0	2.9	1.0	2.7	1.9	3.5
	Orthopyroxene	1.6	2.2	2.9	2.0	3.4	6.3
	Clinopyroxene	0.5	0.8	2.3	0.6	4.8	9.1
	Amphibole	1.9	3.1	8.4	3.5	10.1	14.2
	Mica	0.1	0.2	0.2	0.2	0.4	1.7
	Chlorite/Serpentine	4.0	7.8	42.8	7.8	40.2	56.8
	Talc	0.5	1.7	20.0	2.0	9.1	1.5
	Other Silicates	0.4	0.4	0.4	0.3	0.2	0.1
	Fe Oxides	1.7	2.3	1.4	1.8	2.6	1.3
	Other Oxides	0.1	0.2	0.7	0.1	0.5	0.6
	Carbonates	0.1	0.1	0.2	0.0	0.3	0.5
	Others	0.1	0.1	0.1	0.1	0.2	0.2
	Total	100	100	100	100	100	100

The scavenger tail and 1st cleaner tail of the LCT-1 were submitted to Terra mineralogical services Inc. for PGE mineralogy. PGE minerals predominately occur as liberated particles in the Ni 1st cleaner tail. In contrast, only minor amounts of liberated grains (all of them sperrylite) are deported to the Ni scavenger tail, whereas the bulk of PGE minerals reports to this sample as inclusions or intergrown with gangue minerals. Most of the non-liberated PGE minerals occurring in the Ni 1st Cleaner Tail are intergrown with pyrrhotite and only minor amounts are associated with magnetite or silicate gangue. In the Nickel scavenger tail, two-thirds of the PGE minerals are also intergrown with sulphide (chiefly pyrrhotite), yet approximately 21% are also associated with silicate gangue. It is note worthy that almost half of the Pt losses (mineral sperrylite) is as small liberated particles. PGE mineralogy results are presented in Appendix G.

7. Concentrate Analysis

The potential for the deposit is known to contain various impurity elements which may result in penalties or bonus payments at the smelter. In order to complete the study, full multi-element analysis was conducted on concentrates produced from each locked cycle test. 7e and Co ICP-Scan for the LCT-1 products were also conducted. Tables 29-32 list the results. The concentration of various elements in locked cycle test concentrates from master composite feed material are presented, mainly as ICP results, in Appendix B.

Generally, there were no significant differences in the grades of minor elements in the concentrates. Deleterious elements do not appear to be present in sufficient quantities to create marketing issues with these concentrates.

Table 29: Multi-element Analysis Results for LCT-2

ANALYTE	**As**	**Se**	**Te**	**Hg**	**F**	**Cl**	**Al**	**As**	**Ba**	**Be**
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
LCT 2 CLNR 3 CON D/E/F	16	61	12.6	0.77	60	<50	1.25	<30	30	<5
ANALYTE	**Ca**	**Cd**	**Cr**	**Co**	**Cu**	**Fe**	**K**	**La**	**Li**	**Mg**
UNITS	%	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%
LCT 2 CLNR 3 CON D/E/F	1.5	10	900	3660	67800	24.8	<0.1	<10	10	6.53
ANALYTE	**Mn**	**Mo**	**Ni**	**P**	**Pb**	**Sb**	**Sc**	**Sn**	**Sr**	**Ti**
UNITS	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
LCT 2 CLNR 3 CON D/E/F	560	<10	62400	<0.01	310	<50	5	<50	20	0.12
ANALYTE	**V**	**W**	**Y**	**Zn**	**Si**	**SiO2**	–	–	–	–
UNITS	ppm	ppm	ppm	ppm	%	%	–	–	–	–
LCT 2 CLNR 3 CON D/E/F	70	320	<5	470	10	21.4	–	–	–	–

Table 30: Multi-element Analysis Results for LCT-3

ANALYTE	**As**	**Se**	**Te**	**Hg**	**F**	**Cl**	**Al**	**As**	**Ba**	**Be**
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
LCT 3 BULK CLNR 2 CON D/E/F Combined	18	75	16.6	1.15	40	<50	0.84	40	20	<5
LCT 3 NI CLNR CON D/E/F Combined	16	40	3.42	0.30	70	<50	1.14	40	<10	<5
LCT 3 MAG CLNR CON D/E/F Combined	24	27	6.42	0.28	80	<50	1.51	30	<10	<5
Combined Conc.	17	58	10.4	0.74	55		1.00	39.6		
ANALYTE	**Ba**	**Be**	**Ca**	**Cd**	**Cr**	**Co**	**Cu**	**Fe**	**K**	**La**
UNITS	ppm	ppm	%	ppm	ppm	ppm	ppm	%	%	ppm
LCT 3 BULK CLNR 2 CON D/E/F Combined	20	<5	1.2	10	360	5230	1E+05	31.1	<0.1	<10
LCT 3 NI CLNR CON D/E/F Combined	<10	<5	0.6	10	1020	980	6660	22.0	<0.1	<10
LCT 3 MAG CLNR CON D/E/F Combined	<10	<5	1.1	<10	5370	620	9030	24.9	<0.1	<10
Combined Conc.			0.9		850	3174	58367	26.8		
ANALYTE	**Li**	**Mg**	**Mn**	**Mo**	**Ni**	**P**	**Pb**	**Sb**	**Sc**	**Sn**
UNITS	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
LCT 3 BULK CLNR 2 CON D/E/F Combined	<10	2.54	300	<10	89300	<0.01	490	<50	<5	<50
LCT 3 NI CLNR CON D/E/F Combined	<10	11	600	<10	18200	<0.01	40	<50	6	<50
LCT 3 MAG CLNR CON D/E/F Combined	<10	11.1	1170	<10	12400	<0.01	20	<50	10	<50
Combined Conc.		6.6	467		54912		273			
ANALYTE	**Sr**	**Ti**	**V**	**W**	**Y**	**Zn**	**Si**	**SiO2**	–	–
UNITS	ppm	%	ppm	ppm	ppm	ppm	%	%	–	–
LCT 3 BULK CLNR 2 CON D/E/F Combined	10	0.07	50	410	<5	560	4.65	9.95	–	–
LCT 3 NI CLNR CON D/E/F Combined	<10	0.12	50	300	<5	260	15.5	33.1	–	–
LCT 3 MAG CLNR CON D/E/F Combined	<10	0.28	180	340	<5	420	13.4	28.6	–	–
Combined Conc.		0.1	55	359		422	9.78	20.9		

Table 31: Multi-element Analysis Results for LCT-4

ANALYTE	Au	Pt	Pd	As	Se	Te	F	Al	As	Ba
UNITS	ppb	ppb	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm
LCT-4 Bulk Cln 2 Con D, E, F Combined	65	1480	637	22	74	9.54	70	0.7	<30	10
LCT-4 Ni Cln 3 Con D, E, F Combined	151	1790	1580	33	60	14.9	80	0.84	40	<10
LCT-4Mag Cln Con D, E, F Combined	390	5650	4550	21	35	9.42	90	1.43	40	10
Combined Conc.	88	1647	902	24	71	10.4	72	0.74		
ANALYTE	**Be**	**Ca**	**Cd**	**Cr**	**Co**	**Cu**	**Fe**	**K**	**La**	**Li**
UNITS	ppm	%	ppm	ppm	ppm	ppm	%	%	ppm	ppm
LCT-4 Bulk Cln 2 Con D, E, F Combined	<5	1.3	<10	180	5690	78400	>30	<0.1	<10	<10
LCT-4 Ni Cln 3 Con D, E, F Combined	<5	0.7	<10	560	2330	18300	28.1	<0.1	<10	<10
LCT-4 Mag Cln Con D, E, F Combined	<5	1.3	<10	5590	560	9840	26.2	<0.1	<10	<10
Combined Conc.		1.2		393	4990	66522				
ANALYTE	**Mg**	**Mn**	**Mo**	**Ni**	**P**	**Pb**	**Sb**	**Sc**	**Sn**	**Sr**
UNITS	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
LCT-4 Bulk Cln 2 Con D, E, F Combined	1.24	220	<10	90800	<0.01	70	<50	<5	<50	20
LCT-4 Ni Cln 3 Con D, E, F Combined	7.64	400	<10	39400	<0.01	<20	<50	<5	<50	<10
LCT-4 Mag Cln Con D, E, F Combined	9.89	1120	<10	12000	<0.01	<20	<50	9	<50	10
Combined Conc.	2.5	275		80085						
ANALYTE	**Ti**	**V**	**W**	**Y**	**Zn**	**Si**	**SiO2**	–	–	–
UNITS	%	ppm	ppm	ppm	ppm	%	%	–	–	–
LCT-4 Bulk Cln 2 Con D, E, F Combined	0.05	50	410	<5	320	3.35	7.16	–	–	–
LCT-4 Ni Cln 3 Con D, E, F Combined	0.07	40	340	<5	190	11.0	23.6	–	–	–
LCT-4 Mag Cln Con D, E, F Combined	0.26	180	320	<5	270	11.9	25.4	–	–	–
Combined Conc.	0.06	52	396		297	4.86	10.4			

Table 32: Co and 7e ICP-Scan Results for Locked Cycle Test 1 Products

Sample ID	Rh ppb	Ru ppb	Ir ppb	Os ppb	Co %	Au g/t	Pt g/t	Pd g/t
LCT 1 Cu Clnr 1 Con E,F,G combined	177	192	150	140	0.045	1.44	2.16	4.83
LCT 1 Cu Ro Tail E,F,G Combined	323	455	329	270	0.87	0.32	3.34	10.9
LCT 1 Ni 3rd Clnr Con E,F,G Combined	311	430	338	290	0.36	0.43	5.72	5.90
LCT 1 Ni 1st Clnr Tail E,F,G Combined	90	112	106	72	0.023	0.05	1.02	0.61
LCT 1 Ni Scav Tail E,F,G Combined	< 20	< 50	23	19	< 0.01	0.02	0.22	0.09

Conclusions and Recommendations

A test program was completed on a master composite and a high Ni composite sample from the Wellgreen property in Yukon Territory, Canada. SGS Vancouver Metallurgy received multiple shipments, a total of 300 kg to prepare the master composite, and later on a third shipment of 120 kg to prepare the high Ni composite. The material shipped was originally three sub-composites (massive sulphide, gabbro, and peridotite) and was used to prepare a Master Composite and a High Ni Composite for metallurgical testing.

A mineralogy investigation on feed sample was completed by QEMSCAN (quantitative mineralogy) on the master composite to identify mineral liberations and associations and develop grade limiting/recovery relationships for the sample. The results showed that the sulphide minerals dominated by chalcopyrite, pentlandite, and pyrrhotite. Copper and nickel contents combined approximately 2% of the sample mass. Chalcopyrite and pentlandite accounted for most of the Cu and Ni in the sample, respectively. The master composite is non pyritic and contains high levels of chlorite/serpentine. It also contains pyroxene, amphibole, mica and talc. Main copper sulphide (chalcopyrite) mineral association for the overall sample exist with complex gangue minerals (16.5%), pentlandrite (0.7%), and pyrrhotite (3.6%). Nickel sulphide association for the overall sample shows complex gangue minerals (6.6%), chalcopyrite (1.5%) and pyrrhotite (5%). Pyrhotite association for the overall sample shows complex gangue minerals (4.8%), chalcopyrite (0.9%) and pentlandite (0.7%). Overall, the liberations of chalcopyrite, pentlandite, and pyrrhotite were adequate to produce good metallurgical performance in a bulk rougher circuit. Regrinding of rougher concentrates is recommended to improve liberation of chalcopyrite and pentlandite in order to produce optimum cleaner circuit performance.

Standard Bond grindability test (BWI) for ball mill grinding and abrasion index test were conducted. The BWI was determined to be 19.7 kWh/t for the Wellgreen master composite ore. This is considered to be a hard ore in the context of the SGS BWI database. The abrasion index fell in the soft range of abrasiveness with a Bond abrasion index of 0.088.

A preliminary flotation testwork was conducted on the master composite. The key variables tested were the effect of grind, collector, talc pre-float and CMC on rougher kinetics. Due to the lack of any positive effect of talc pre-float and CMC addition, the base case (70 g/t SIPX) was shown to be the preferred one. A primary grind size of 90 microns was identified as optimum.

Further cleaner flotation tests were followed based on the rougher flotation conditions of the base case. Open circuit cleaner testing was conducted to test the effect of the regrind and dispersants/depressants on circuit recovery and bulk Cu/Ni concentrate grade. Overall, the preliminary cleaner flotation test results showed a 18% Cu+Ni concentrate grade at the average Cu and Ni recoveries of 79% and 50%, respectively would be expected. At the same test conditions the combined Pt, Pd and Au grade of 14 g/t at 22%, 53% and 53% recoveries respectively, is achieved.

In order to quantify the degree of liberation of Cu and Ni minerals and describe mineral textures and associations, the bulk cleaner concentrate and the final products of locked cycle test were also submitted for QEMSCAN analysis. The QEMSCAN results supports split type of flowsheet in which primary roughing is to focus on recovery of the reasonably liberated material.

Following the preliminary testing, split flowsheet optimization testwork to optimize the flowsheet through a more detailed program was started. The proposed split flowsheet recommends taking advantage of the parallel cleaner lines presently used in the commercial operations. The strategy would be to direct a rougher concentrate, rich in copper and nickel minerals to one of the lines and to direct a scavenger concentrate, rich in pyrrhotite to the other line. The advantages of decoupling the cleaners would be that collector and CMC conditions could be customized to the floatability of each mineral class. Specifically, the copper and nickel minerals are known to be responsive to very low collector conditions. This low amount of collector is anticipated to result in significant improvements to the flotation separation of copper from nickel. On the other hand, the pyrrhotite is known to require high amounts of collector to recover acceptable levels of sulphides. It is predicted that the proposed flowsheet will result in the production of better quality copper concentrates and better process control in the commercial operation.

The viability of the split flowsheet was confirmed by means of locked cycle testing through re-circulation of middling streams. The results indicate production of a bulk concentrate with 12% Cu+Ni grade at the average Cu and Ni recoveries of 88% and 67%, respectively. At the same test conditions the combined Pt, Pd and Au grade of 10.5 g/t at 46%, 73% and 59% recoveries, respectively would be expected.

In summary, within the limits imposed by its mineralogy, the ore sample responded very well to the split flowsheet with a basic reagent regime. The Fe/MgO ratio and MgO content of the final concentrate were within the accepted limits in this circuit.

The testwork completed thus far on the High Ni Composite show the production of a bulk concentrate with 14.5% Cu+Ni grade at the average Cu and Ni recoveries of 88% and 73%, respectively. At the same test conditions the combined Pt, Pd and Au grade of 9 g/t at 38%, 73% and 62% recoveries respectively, was produced.

Based on the results and observations of this test program, a number of recommendations are made for future testing. These additional tests would help to increase the confidence in the metallurgical predictions and to further the development of this material.

- It is anticipated that improved performance is possible in terms of Ni and PGE grade and recoveries through better combinations of reagent selection and optimization.
- Variability testing extended to:
    - Production composites, lithology composites, special location and grade variance. Point samples should be used to confirm the developed flowsheet from a geometallurgical perspective.

  - Design comminution testing should be considered for proper mill sizing and production forecasting. Selection of specific samples for SAG mill design (including and not limited to JK DWT, SMC, SPI, CWI) and ball mill sizing (BWI).

- The collection of additional variability information is recommended through a variability test programme on the samples from various geological origin and grades.

- Conduct further grinding tests on more variability composites.

Appendix A – Sample Preparation

Appendix B – Chemical Analysis

Appendix C – Comminution Testing

Appendix D – Grind Calibration Tests

Appendix E – Flotation Tests

Appendix F – Locke Cycle Tests

Appendix G – QEMSCAN Analysis

An Investigation into

METALLURGICAL TESTWORK OF
CU/NI/PGE SAMPLES FROM THE WELLGREEN PROPERTY

prepared for

PROPHECY PLATINUM CORPORATION

Project 50149-001 – Final Report

Appendix A, B, C, D, E, F, G
August 7, 2012

NOTE:
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SGS Canada Inc. | 50-655 West Kent Avenue North, Vancouver, BC, V6P 6T7
Tel: (604) 324-1166 Fax: (604) 324-1177 www.met.sgs.com www.ca.sgs.com
Member of the SGS Group (SGS SA)

Appendix A – Sample Preparation

50149-001
Prophecy

First shipment

Pail	Contents	Weight
1	large pieces, cut edges	25.2
2	large pieces, cut edges	25.1
3	large chunks upto 8", rough rocks	25.6
4	large chunks upto 8", rough rocks	25.7
5	large chunks upto 8", rough rocks	26.9
6	large chunks upto 8", rough rocks	26.9
		155.4

Second shipment

There were 5 pails and 1 tote. Labeled as 2-7 of 13.

2 of 13 is the tote and weighs 25.9 kg	25.9
3 of 13 is a pail and weighs 23.75 kg	24.0
4 of 13 is a pail and weighs 24.95 kg	25.0
5 of 13 is a pail and weighs 26.4 kg	26.0
6 of 13 is a pail and weighs 23.1 kg	23.0
7 of 13 is a pail and weighs 25.4 kg	25.0
	148.9

Total, first and second **304**

Third Shipment

09-Nov-11

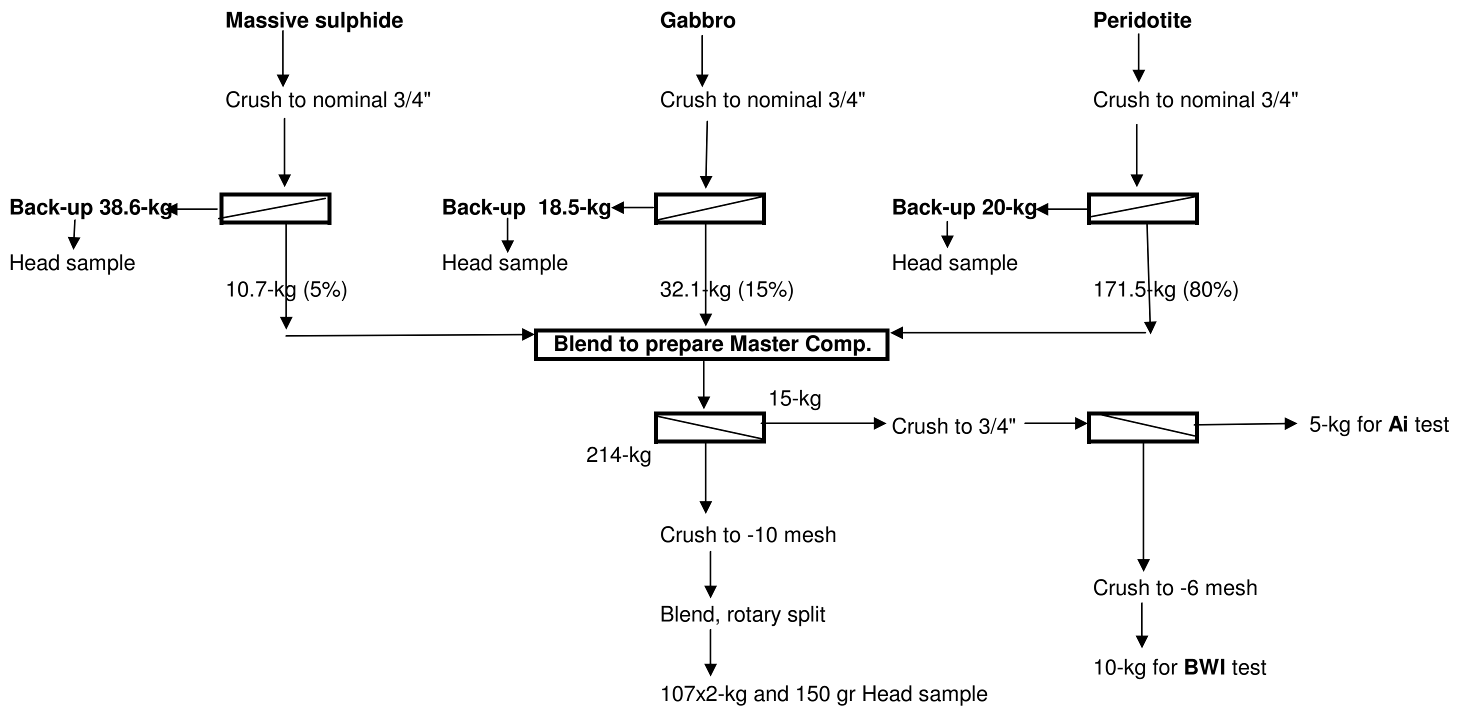
Tag: Van329		**Total, kg**
Gabbro, 1 rice bag		23.0
Peridotite 3 rice bags	17.2	
	16.7	
	20.6	
		54.5
Massive Sulphide		41.6
		119

Prophecy, Wellgreen samples 50149-001

A-Sample receipt, Log-in and Inventory

Massive sulphide: **50 kg**
Gabbro: **51 kg**
Peridotite: **203 kg**

1-Massive sulphide comp. (Combine pails 1+2)
2-Gabbro comp. (Combine pails 3+4)
3-Peridotite comp. (Combine pails 5+6 and second shipment sample)



Appendix B – Chemical Analysis

Client (8117) Jalal Tajadod
Reference Head Assays
Project CAVM-50149-001
Batch 0283-sep11
Supervisor wattt

Received 16-Sep-11 15:53
Requested 21-Sep-11 15:53
Created 16-Sep-11 15:53
Finished 06-Oct-11 08:36
Samples 4,0,0 - 45

Notes:
Reporting limits for Li,P raised due to interference.Sep30.slm

Tag	Type	Sample ID	Cu %	Ni %	Co %	Fe %	Ni Sulfide/Metallic	S %
1	SMP	Massive sulphide	1.57	2.59	0.15	44.0	2.45	28.8
2	SMP	Gabbro	0.43	0.19	0.015	9.77	0.17	2.38
3	SMP	Peridotite	0.25	0.36	0.017	11.0	0.30	1.47
4	SMP	Master Comp	0.33	0.42	0.018	11.9	0.37	2.53

Tag	C(t) %	Pt g/t	Pd g/t	Au g/t	Rh g/t	MgO %	Ag g/t	Al g/t
1	0.06	1.01	0.69	0.08	0.39	0.56	5	16200
2	0.08	0.53	0.27	0.12	< 0.02	12.7	3	47800
3	0.06	0.25	0.35	0.02	0.03	25.9	< 2	30800
4	0.06	0.41	0.45	0.04	0.04	22.8	< 2	27900

Tag	As g/t	Ba g/t	Be g/t	Bi g/t	Ca g/t	Cd g/t	Cr g/t	K g/t
1	< 30	134	0.30	< 20	32100	< 2	128	2860
2	< 30	1740	0.36	< 20	110000	< 2	573	953
3	< 30	51.4	0.20	< 20	24800	< 2	2227	1650
4	< 30	521	0.22	< 20	29800	< 2	1915	1750

Tag	Li g/t	Mn g/t	Mo g/t	Na g/t	P g/t	Pb g/t	Sb g/t	Se g/t
1	< 20	322	< 5	1590	< 200	82	< 10	66
2	33	1400	< 5	1670	539	112	< 10	< 30
3	< 20	1300	< 5	425	310	< 20	< 10	< 30
4	21	1300	< 5	1390	313	< 20	< 10	< 30

Tag	Sn g/t	Sr g/t	Ti g/t	Tl g/t	U g/t	V g/t	Y g/t	Zn g/t
1	< 20	45.9	1110	< 30	79	118	4.8	72
2	< 20	40.0	4960	< 30	26	169	14.0	106

Tag	Sn g/t	Sr g/t	Ti g/t	Tl g/t	U g/t	V g/t	Y g/t	Zn g/t
3	< 20	21.6	3460	< 30	< 20	114	7.6	90
4	< 20	19.2	3650	< 30	< 20	126	8.5	91

Tag	Buck wt. g
1	155
2	155
3	175
4	180

OnLine LIMS

Client	**(8117) Jesse Ding**	Received	**02-Dec-11 15:39**
Reference	**Head Assays**	Requested	**05-Dec-11 15:39**
Project	**CAVM-50149-001**	Created	**02-Dec-11 15:39**
Batch	**0042-DEC11**	Finished	**12-Jan-12 09:35**
Supervisor	**wattt**	Samples	**3,0,0 - 44**

Notes:
ICP9440.LBR - Strong Acid Digest for Highly Mineralized
Samples with FUSION

Tag	Type	Sample ID	Ag g/t	Al g/t	As g/t	Ba g/t	Be g/t	Bi g/t
1	**SMP**	**Massive Sulphide**	< 2	12400	< 30	106	0.20	< 20
2	**SMP**	**Gabbro**	2	39200	< 30	165	0.34	< 20
3	**SMP**	**peridotite**	< 2	24500	< 30	61.3	0.18	< 20

Tag	Ca g/t	Cd g/t	Cr g/t	K g/t	Li g/t	Mn g/t	Mo g/t	Na g/t
1	25800	< 2	130	1790	< 5	290	< 5	582
2	78900	< 2	909	882	29	1220	< 5	1000
3	23600	< 2	3070	1560	14	1220	< 5	533

Tag	P g/t	Pb g/t	Sb g/t	Se g/t	Sn g/t	Sr g/t	Ti g/t	Tl g/t
1	< 200	< 200	< 10	79	< 20	27.0	744	< 30
2	455	< 200	< 10	< 30	< 20	29.3	3910	< 30
3	266	< 200	< 10	< 30	< 20	13.4	3200	< 30

Tag	U g/t	V g/t	Y g/t	Zn g/t	Cu %	Ni %	Co %	Fe %
1	< 80	92	3.0	105	1.40	3.12	0.17	47.8
2	< 80	146	10.7	96	0.51	0.27	0.024	12.1
3	< 80	104	6.5	90	0.30	0.40	0.020	11.0

Tag	Ni Sulfide/Metallic	S %	C(t) %	Au g/t	Pt g/t	Pd g/t	Rh g/t	MgO %
1	2.70	29.7	0.08	0.09	1.29	0.86	0.17	0.41
2	0.24	3.02	0.07	0.04	0.64	0.33	0.03	14.3
3	0.33	1.79	0.06	0.05	0.41	0.60	0.03	25.5

OnLine LIMS

Client	(8117) Jalal Tajadod	Received	09-Dec-11 13:15
Reference	Head Assays	Requested	14-Dec-11 13:15
Project	CAVM-50149-001	Created	09-Dec-11 13:15
Batch	0138-DEC11	Finished	12-Jan-12 09:34
Supervisor	wattt	Samples	1,0,2 - 44

Notes:
ICP9440.LBR - Strong Acid Digest for Highly Mineralized Samples with FUSION

Tag	Type	Sample ID	Ag g/t	Al g/t	As g/t	Ba g/t	Be g/t	Bi g/t
1	SMP	High Ni Comp	< 2	30000	< 30	70.7	0.20	< 20

Tag	Ca g/t	Cd g/t	Cr g/t	K g/t	Li g/t	Mn g/t	Mo g/t	Na g/t
1	33500	< 2	1530	1280	10	1050	< 5	434

Tag	P g/t	Pb g/t	Sb g/t	Se g/t	Sn g/t	Sr g/t	Ti g/t	Tl g/t
1	285	< 60	< 10	< 30	< 20	17.7	2760	< 30

Tag	U g/t	V g/t	Y g/t	Zn g/t	Cu %	Ni %	Co %	Fe %
1	< 30	107	6.5	87	0.52	0.83	0.044	18.1

Tag	Ni Sulfide/Metallic	S %	C(t) %	Au g/t	Pt g/t	Pd g/t	Rh g/t	MgO %
1	0.69	6.45	0.04	0.10	0.57	0.61	0.10	19.8

OnLine LIMS

Certificate of Analysis

Work Order: VC120756

To: **Met - Jalal Tajadod**
F400101 SGS CANADA INC
50-655 WEST KENT AVE NORTH
VANCOUVER BC V6P 6T7

Date: May 11, 2012

P.O. No.	:	PO: 50149-001 / TEST:LCT 2&3 additional
Project No.	:	-
No. Of Samples	:	4
Date Submitted	:	May 09, 2012
Report Comprises	:	Pages 1 to 5 (Inclusive of Cover Sheet)

Distribution of unused material:
Active files - upstairs:

Certified By : ______________________
Satpaul Gill
QAQC Chemist

SGS Minerals Services Geochemistry, Vancouver, BC is ISO 9001:2008 certified.

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
Methods marked with the @ symbol (e.g. @AAS21E) denote accredited tests

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Element	As	Se	Te	Hg	F	Cl	Al	As	Ba	Be
Method	ICM14B	ICM14B	ICM14B	ICM14B	ISE07A	ISE08B	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	1	1	0.05	0.01	20	50	0.01	30	10	5
Units	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
LCT 2 CLNR 3 CON D/E/F	16	61	12.6	0.77	60	<50	1.25	<30	30	<5
LCT 3 BULK CLNR 2 CON D/E/F	18	75	16.6	1.15	40	<50	0.84	40	20	<5
LCT 3 NI CLNR CON D/E/F	16	40	3.42	0.30	70	<50	1.14	40	<10	<5
LCT 3 MAG CLNR CON D/E/F	24	27	6.42	0.28	80	<50	1.51	30	<10	<5

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Element	Ca	Cd	Cr	Co	Cu	Fe	K	La	Li	Mg
Method	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	0.1	10	10	10	10	0.01	0.1	10	10	0.01
Units	%	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%
LCT 2 CLNR 3 CON D/E/F	1.5	10	900	3660	67800	24.8	<0.1	<10	10	6.53
LCT 3 BULK CLNR 2 CON D/E/F	1.2	10	360	5230	105995	31.1	<0.1	<10	<10	2.54
LCT 3 NI CLNR CON D/E/F	0.6	10	1020	980	6660	22.0	<0.1	<10	<10	11.0
LCT 3 MAG CLNR CON D/E/F	1.1	<10	5370	620	9030	24.9	<0.1	<10	<10	11.1

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Final : VC120756 Revision REVISED Order: PO: 50149-001 / TEST:LCT 2&3

Element	Mn	Mo	Ni	P	Pb	Sb	Sc	Sn	Sr	Ti
Method	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	10	10	10	0.01	20	50	5	50	10	0.01
Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
LCT 2 CLNR 3 CON D/E/F	560	<10	62400	<0.01	310	<50	5	<50	20	0.12
LCT 3 BULK CLNR 2 CON D/E/F	300	<10	89300	<0.01	490	<50	<5	<50	10	0.07
LCT 3 NI CLNR CON D/E/F	600	<10	18200	<0.01	40	<50	6	<50	<10	0.12
LCT 3 MAG CLNR CON D/E/F	1170	<10	12400	<0.01	20	<50	10	<50	<10	0.28

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Final : VC120756 Revision REVISED Order: PO: 50149-001 / TEST:LCT 2&3

Element	V	W	Y	Zn	Si	SiO2
Method	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	10	50	5	10	0.01	0.01
Units	ppm	ppm	ppm	ppm	%	%
LCT 2 CLNR 3 CON D/E/F	70	320	<5	470	10.0	21.4
LCT 3 BULK CLNR 2 CON D/E/F	50	410	<5	560	4.65	9.95
LCT 3 NI CLNR CON D/E/F	50	300	<5	260	15.5	33.1
LCT 3 MAG CLNR CON D/E/F	180	340	<5	420	13.4	28.6

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Certificate of Analysis

Work Order: VC120590A

To: **Met - Jalal Tajadod**
F400101 SGS CANADA INC
50-655 WEST KENT AVE NORTH
VANCOUVER BC V6P 6T7

Date: Apr 19, 2012

P.O. No.	:	PO: 50149-001/ TEST: LCT 2
Project No.	:	-
No. Of Samples	:	23
Date Submitted	:	Apr 17, 2012
Report Comprises	:	Pages 1 to 2 (Inclusive of Cover Sheet)

Certified By : ______________________
Satpaul Gill
QAQC Chemist

SGS Minerals Services Geochemistry, Vancouver, BC is ISO 9001:2008 certified.

Report Footer:

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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

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Final : VC120590A Revision REVISED Order: PO: 50149-001/ TEST: LCT 2

Element	Se	Te
Method	ICM14B	ICM14B
Det.Lim.	1	0.05
Units	ppm	ppm
3RD CLEANER CON. A	N.A.	N.A.
3RD CLEANER CON. B	N.A.	N.A.
3RD CLEANER CON. C	N.A.	N.A.
3RD CLEANER CON. D	N.A.	N.A.
3RD CLEANER CON. E	N.A.	N.A.
3RD CLEANER CON. F	59	12.6
3RD CLEANER TAIL. F	N.A.	N.A.
2ND CLEANER TAIL. F	N.A.	N.A.
1ST CLEANER TAILS A	N.A.	N.A.
1ST CLEANER TAILS B	N.A.	N.A.
1ST CLEANER TAILS C	N.A.	N.A.
1ST CLEANER TAILS D	N.A.	N.A.
1ST CLEANER TAILS E	N.A.	N.A.
1ST CLEANER REGRIND CON F	N.A.	N.A.
1ST CLEANER REGRIND TAIL F	N.A.	N.A.
ROUGHER TAILS A	N.A.	N.A.
ROUGHER TAILS B	N.A.	N.A.
ROUGHER TAILS C	N.A.	N.A.
ROUGHER TAILS D	N.A.	N.A.
ROUGHER TAILS E	N.A.	N.A.
ROUGHER TAILS F	N.A.	N.A.
MAGNETIC CON F	N.A.	N.A.
MAGNETIC TAIL F	N.A.	N.A.

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Certificate of Analysis

Work Order: VC120590

To: Met - Jalal Tajadod
F400101 SGS CANADA INC
50-655 WEST KENT AVE NORTH
VANCOUVER BC V6P 6T7

Date: Apr 13, 2012

P.O. No.	:	PO: 50149-001/ TEST: LCT 2
Project No.	:	-
No. Of Samples	:	23
Date Submitted	:	Apr 10, 2012
Report Comprises	:	Pages 1 to 6 (Inclusive of Cover Sheet)

Distribution of unused material:
Active files - upstairs:

Certified By :

Satpaul Gill
QAQC Chemist

SGS Minerals Services Geochemistry, Vancouver, BC is ISO 9001:2008 certified.

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
Methods marked with the @ symbol (e.g. @AAS21E) denote accredited tests

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Final : VC120590 Revision REVISED Order: PO: 50149-001/ TEST: LCT 2

Element	S	Au	Pt	Pd	Al	As	Ba	Be	Ca	Cd
Method	CSA06V	FAI313	FAI313	FAI313	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	0.01	1	10	5	0.01	30	10	5	0.1	10
Units	%	ppb	ppb	ppb	%	ppm	ppm	ppm	%	ppm
3RD CLEANER CON. A	23.2	813	2740	8300	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. B	21.2	849	2820	8030	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. C	24.0	620	2660	7990	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. D	20.3	405	2180	5940	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. E	19.6	606	2540	7280	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. F	15.5	543	2430	6360	1.26	<30	30	7	1.5	<10
3RD CLEANER TAIL. F	7.50	142	2080	2290	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2ND CLEANER TAIL. F	4.26	67	1040	824	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS A	3.04	27	690	389	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS B	3.13	23	720	447	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS C	3.57	28	750	546	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS D	3.11	21	630	335	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS E	3.38	20	640	346	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND CON F	4.55	195	2170	1730	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND TAIL F	4.20	21	620	280	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS A	1.96	12	250	136	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS B	1.98	12	270	143	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS C	1.94	10	250	135	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS D	1.95	14	250	135	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS E	1.90	11	250	134	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS F	1.42	9	190	70	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC CON F	3.33	214	1400	1380	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC TAIL F	4.49	18	410	275	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

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Final : VC120590 Revision REVISED Order: PO: 50149-001/ TEST: LCT 2

Element	Cr	Co	Cu	Fe	K	La	Li	Mg	Mn	Mo
Method	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A	ICP90A
Det.Lim.	10	10	10	0.01	0.1	10	10	0.01	10	10
Units	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	ppm
3RD CLEANER CON. A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. F	1080	3320	60400	22.3	<0.1	<10	10	8.07	590	<10
3RD CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2ND CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND CON F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC CON F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

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Element Method Det.Lim. Units	Ni ICP90A 10 ppm	P ICP90A 0.01 %	Pb ICP90A 20 ppm	Sb ICP90A 50 ppm	Sc ICP90A 5 ppm	Sn ICP90A 50 ppm	Sr ICP90A 10 ppm	Ti ICP90A 0.01 %	V ICP90A 10 ppm	W ICP90A 50 ppm
3RD CLEANER CON. A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3RD CLEANER CON. F	57200	<0.01	210	<50	9	<50	30	0.12	70	<50
3RD CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2ND CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND CON F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1ST CLEANER REGRIND TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ROUGHER TAILS F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC CON F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MAGNETIC TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

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Element	Y	Zn	Cl	F	As	Cu	Fe	MgO	Ni	SiO2
Method	ICP90A	ICP90A	ISE08B	ISE07A	ICP90Q	ICP90Q	ICP90Q	ICP90Q	ICP90Q	ICP90Q
Det.Lim.	5	10	50	20	0.01	0.01	0.01	0.01	0.01	0.01
Units	ppm	ppm	ppm	ppm	%	%	%	%	%	%
3RD CLEANER CON. A	N.A.	N.A.	N.A.	N.A.	N.A.	10.1	28.4	5.73	8.02	N.A.
3RD CLEANER CON. B	N.A.	N.A.	N.A.	N.A.	N.A.	13.1	26.9	6.81	3.83	N.A.
3RD CLEANER CON. C	N.A.	N.A.	N.A.	N.A.	N.A.	8.39	29.7	5.93	9.82	N.A.
3RD CLEANER CON. D	N.A.	N.A.	N.A.	N.A.	N.A.	6.91	27.1	8.47	7.72	N.A.
3RD CLEANER CON. E	N.A.	N.A.	N.A.	N.A.	N.A.	7.28	25.0	9.92	6.48	N.A.
3RD CLEANER CON. F	7	400	<50	110	<0.01	5.90	21.4	13.5	5.28	25.7
3RD CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	0.68	N.A.	N.A.	3.46	N.A.
2ND CLEANER TAIL. F	N.A.	N.A.	N.A.	N.A.	N.A.	0.25	N.A.	N.A.	1.46	N.A.
1ST CLEANER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	0.11	N.A.	N.A.	0.37	N.A.
1ST CLEANER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	0.14	N.A.	N.A.	0.50	N.A.
1ST CLEANER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	0.14	N.A.	N.A.	0.49	N.A.
1ST CLEANER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	0.10	N.A.	N.A.	0.33	N.A.
1ST CLEANER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	0.10	N.A.	N.A.	0.36	N.A.
1ST CLEANER REGRIND CON F	N.A.	N.A.	N.A.	N.A.	N.A.	0.51	N.A.	N.A.	1.40	N.A.
1ST CLEANER REGRIND TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.46	N.A.
ROUGHER TAILS A	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.14	N.A.
ROUGHER TAILS B	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.16	N.A.
ROUGHER TAILS C	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.15	N.A.
ROUGHER TAILS D	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.15	N.A.
ROUGHER TAILS E	N.A.	N.A.	N.A.	N.A.	N.A.	0.05	N.A.	N.A.	0.15	N.A.
ROUGHER TAILS F	N.A.	N.A.	N.A.	N.A.	N.A.	0.04	N.A.	N.A.	0.13	N.A.
MAGNETIC CON F	N.A.	N.A.	N.A.	N.A.	N.A.	0.28	N.A.	N.A.	0.45	N.A.
MAGNETIC TAIL F	N.A.	N.A.	N.A.	N.A.	N.A.	0.03	N.A.	N.A.	0.21	N.A.

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Element	Hg
Method	ICM14B
Det.Lim.	0.01
Units	ppm
3RD CLEANER CON. A	N.A.
3RD CLEANER CON. B	N.A.
3RD CLEANER CON. C	N.A.
3RD CLEANER CON. D	N.A.
3RD CLEANER CON. E	N.A.
3RD CLEANER CON. F	0.71
3RD CLEANER TAIL. F	N.A.
2ND CLEANER TAIL. F	N.A.
1ST CLEANER TAILS A	N.A.
1ST CLEANER TAILS B	N.A.
1ST CLEANER TAILS C	N.A.
1ST CLEANER TAILS D	N.A.
1ST CLEANER TAILS E	N.A.
1ST CLEANER REGRIND CON F	N.A.
1ST CLEANER REGRIND TAIL F	N.A.
ROUGHER TAILS A	N.A.
ROUGHER TAILS B	N.A.
ROUGHER TAILS C	N.A.
ROUGHER TAILS D	N.A.
ROUGHER TAILS E	N.A.
ROUGHER TAILS F	N.A.
MAGNETIC CON F	N.A.
MAGNETIC TAIL F	N.A.

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Client	(8117) Jalal Tajadod	Received	02-Apr-12 13:48
Reference	LCT 1 continued	Requested	04-Apr-12 13:48
Project	CAVM-50149-001	Created	02-Apr-12 13:48
Batch	0013-APR12	Finished	15-May-12 12:43
Supervisor	ricea	Samples	5,0,0 - 6

Tag	Type	Sample ID	Rh ppb	Ru ppb	Ir ppb	Os ppb
1	SMP	LCT 1 Cu Clnr 1 Con E,F,G combined	177	192	150	140
2	SMP	LCT 1 Cu Ro Tail E,F,G Combined	323	455	329	270
3	SMP	LCT 1 Ni 3rd Clnr Con E,F,G Combine	311	430	338	290
4	SMP	LCT 1 Ni 1st Clnr Tail E,F,G Combine	90	112	106	72
5	SMP	LCT 1 Ni Scav Tail E,F,G Combined	< 20	< 50	23	19

Tag	Buck wt. g
1	15
2	14
3	15
4	15.5
5	15.5

Client	**(8117) Jalal Tajadod**	Received	**22-Mar-12 08:43**
Reference	**LCT 1**	Requested	**26-Mar-12 08:43**
Project	**CAVM-50149-001**	Created	**22-Mar-12 08:43**
Batch	**0288-MAR12**	Finished	**04-Apr-12 11:21**
Supervisor	**wattt**	Samples	**5,1,0 - 7**

Notes:
Samples received Mar20 instructions recieved
Mar22/12-nb
Cancelled Rh, Ru, Ir and Os. Client will send more sample
and log under a new Lims. Mar 30/12 Tom Watt

Tag	Type	Sample ID	Co %	Au g/t	Pt g/t	Pd g/t
1	SMP	LCT 1 Cu Clnr 1 Con E,F,G Combined	0.045	1.44	2.16	4.83
2	SMP	LCT 1 Cu Ro Tail E,F,G, Combined	0.87	0.32	3.34	10.9
3	SMP	LCT 1 Ni 3rd Clnr Con E,F,G Combine	0.36	0.43	5.72	5.90
4	SMP	LCT 1 Ni 1st Clnr Tail E,F,G Combine	0.023	0.05	1.02	0.61
5	SMP	LCT 1 Ni Scav Tail E,F,G Combined	< 0.01	0.02	0.22	0.09

Tag	Buck wt. g
1	21
2	16.1
3	5.4
4	17.1
5	39.7

Appendix C – Comminution Testing

SGS Minerals Services

Standard Bond Ball Mill Grindability Test

Project No.:	50149-001 Product: Minus 6 Mesh Date: SEPT 13,2011
Sample.:	MC Comp
Purpose:	To determine the ball mill grindability of the sample in terms of a Bond work index number.
Procedure:	The equipment and procedure duplicate the Bond method for determining ball mill work indices.

Test Conditions:	Mesh of grind:	150 mesh
	Test feed weight (700 mL):	1431.1 grams
	Equivalent to : 2044 kg/m³ at Minus 6 mesh	
	Weight % of the undersize material in the ball mill feed:	4.2 %
	Weight of undersize product for 250% circulating load:	409 grams
Results:	Average for Last Three Stages = **0.91g.**	**246%** Circulation load

CALCULATION OF A BOND WORK INDEX

$$BWI = \frac{44.5}{P1^{0.23} \times Grp^{0.82} \times \left\{ \frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}} \right\}}$$

P1 = 100% passing size of the product	106 microns
Grp = Grams per revolution	0.91 grams
P80 = 80% passing size of product	80 microns
F80 = 80% passing size of the feed	2621 microns

BWI = **17.9** (imperial)

BWI = **19.7** (metric)

Grindability Test Data Project No.: 50149-001 Test No.: MC Comp

Stage No.	Revs	New Feed (grams)	Undersize In Feed (grams)	Undersize To Be Ground (grams)	U'Size In Product (grams)	Undersize Product Total (grams)	Undersize Product Per Mill Rev (grams)
1	150	1,431	60	349	229	169	1.13
2	354	229	10	399	302	292	0.83
3	480	302	13	396	411	399	0.83
4	472	411	17	392	437	419	0.89
5	440	437	18	391	415	396	0.90
6	435	415	17	392	408	390	0.90
7	437	408	17	392	420	403	0.92

Average for Last Three Stages = 414g. 0.91g.

Feed K80

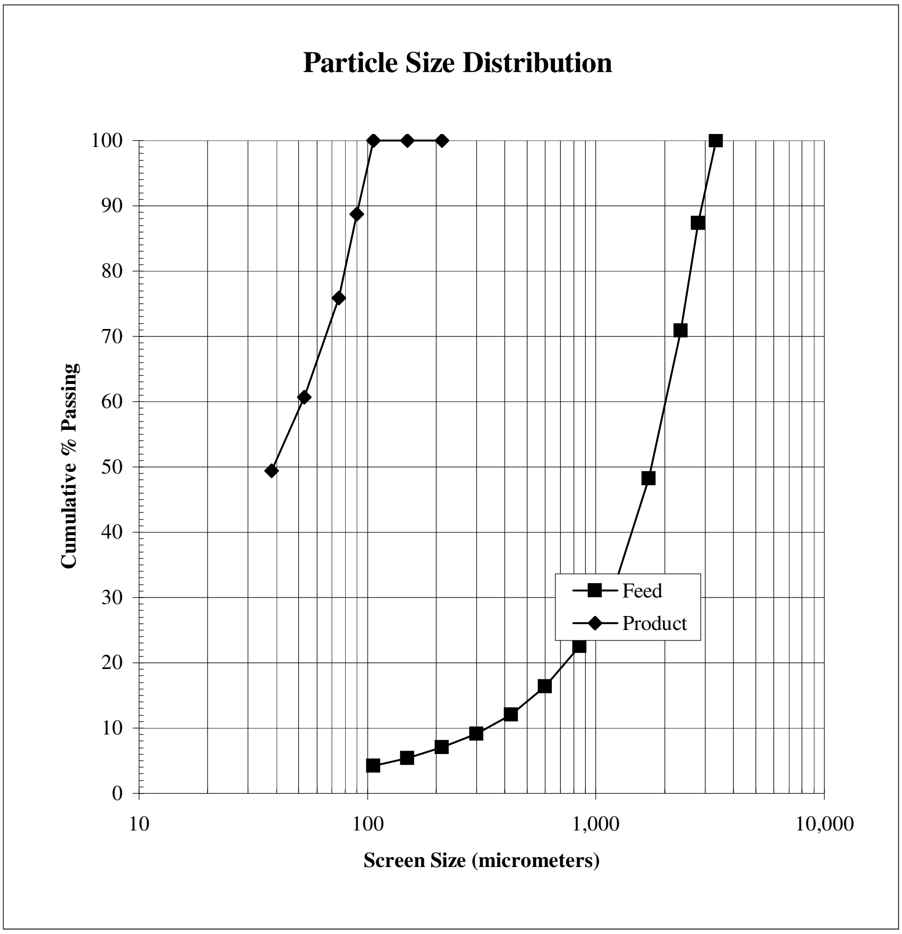
Size Mesh	Size µm	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
6	3,360	0.0	0.0	0.0	100.0
7	2,800	31.2	12.6	12.6	87.4
8	2,360	40.8	16.5	29.1	70.9
10	1,700	55.8	22.6	51.7	48.3
14	1,180	43.4	17.6	69.3	30.7
20	850	20.2	8.2	77.5	22.5
28	600	15.1	6.1	83.6	16.4
35	425	10.8	4.4	88.0	12.0
48	300	7.2	2.9	90.9	9.1
65	212	5.0	2.0	92.9	7.1
100	150	4.2	1.7	94.6	5.4
150	106	3.0	1.2	95.8	4.2
Pan	-106	10.3	4.2	100.0	0.0
Total	**-**	**247.0**	**100.0**	**-**	**-**

K80 **2,621**

Product K80

Size Mesh	Size µm	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
65	212	0.0	0.0	0.0	100.0
100	150	0.0	0.0	0.0	100.0
150	106	0.0	0.0	0.0	100.0
170	90	17.2	11.2	11.2	88.8
200	75	19.7	12.9	24.1	75.9
270	53	23.4	15.3	39.4	60.6
400	38	17.2	11.2	50.6	49.4
Pan	-38	75.7	49.4	100.0	0.0
Total	**-**	153.2	**100.0**	**-**	**-**

K80 **80**


Particle Size Distribution
Cumulative % Passing
100
90
80
70
60
50
40
30
20
10
0
10
100
1,000
10,000
Screen Size (micrometers)
Feed
Product

SGS Minerals Services

STANDARD BOND ABRASION TEST

Project No.:	50149-001	Date (mm/dd/yy):	21-Sep-11
Sample:	MASTER COMP		

Purpose: To determine the Abrasion Index of the sample

Procedure: The equipment and procedure duplicate the Bond method for determining an abrasion index.

Feed: 1,600 grams minus 3/4 inch plus 1/2 inch fraction

Results:	Original paddle weight, grams:	94.4255
	Final paddle weight, grams:	94.3375
	Abrasion Index, Ai:	**0.088**

Predicted Wear Rates:

		lb/kwh	kg/kwh
Wet rod mill, rods:	0.35*(Ai-0.020)^0.20	0.20	0.09
Wet rod mill, liners:	0.035*(Ai-0.015)^0.30	0.016	0.007
Ball Mill (overflow and grate discharge types)			
Wet ball mill, balls:	0.35*(Ai-0.015)^0.33	0.15	0.067
Wet ball mill, liners:	0.026*(Ai-0.015)^0.30	0.012	0.0054
Ball Mill (grate discharge type)			
Dry ball mill, balls:	0.05*(Ai)^0.5	0.015	0.007
Dry ball mill, liners:	0.005*(Ai)^0.5	0.0015	0.0007
Crushers (gyratory, jaw, cone)			
Crusher, liners:	(Ai+0.22)/11	0.028	0.013
Roll crusher, shells:	(Ai/10)^0.67	0.042	0.019

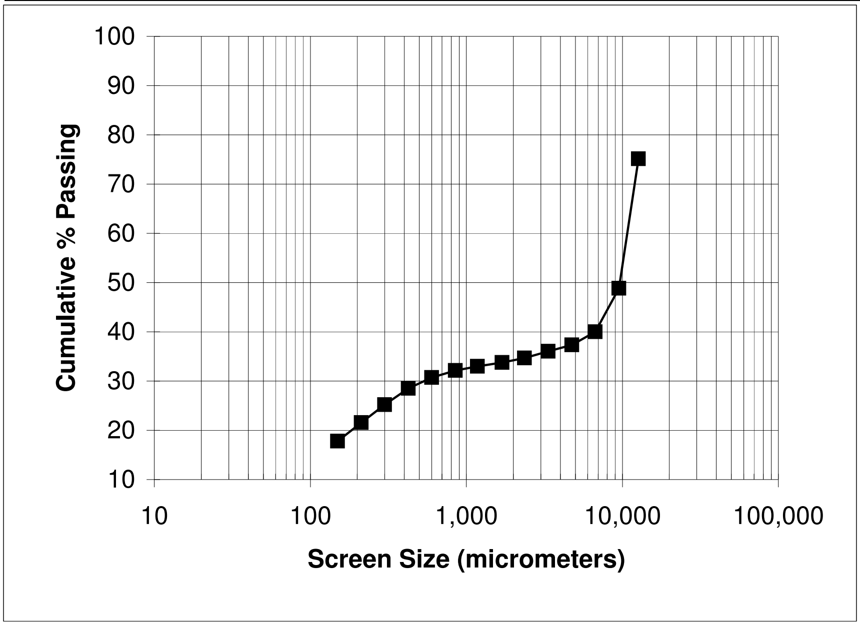
SGS Minerals Services

STANDARD BOND ABRASION TEST

Project No.: 50149-001 Date: 21-Sep-11
Sample: MASTER COMP

Product Particle Size Analysis

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
1/2 in	12,700	199.3	24.8	24.8	75.2
3/8 in	9,500	211.4	26.3	51.2	48.8
3	6,700	70.9	8.84	60.0	40.0
4	4,750	21.0	2.62	62.6	37.4
6	3,350	10.6	1.32	64.0	36.0
8	2,360	10.9	1.36	65.3	34.7
10	1,700	7.10	0.88	66.2	33.8
14	1,180	6.30	0.79	67.0	33.0
20	850	6.80	0.85	67.8	32.2
28	600	11.6	1.45	69.3	30.7
35	425	17.8	2.22	71.5	28.5
48	300	26.4	3.29	74.8	25.2
65	212	29.1	3.63	78.4	21.6
100	150	30.4	3.79	82.2	17.8
-100	-150	142.8	17.8	100.0	-
	Total	802.4	100.0	**K80**	**13,868**



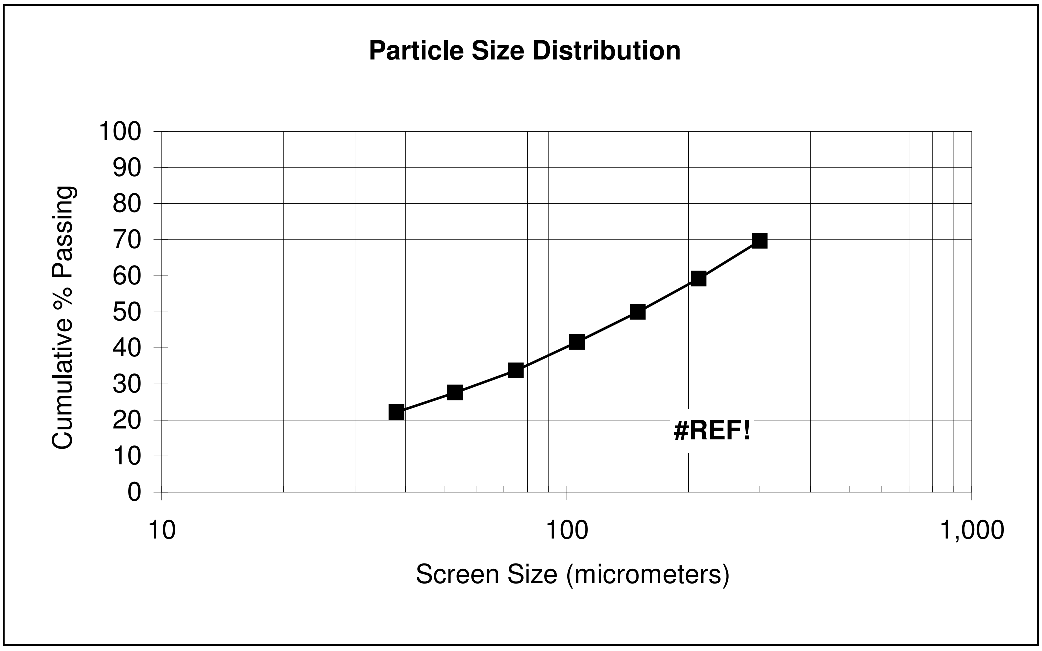
Appendix D – Grind Calibration Tests

SGS Minerals Services

Date:Sept. 14, 2011 **Size Distribution Analysis** Project No. **50149-001**

Sample: **MC (2Kg)** Test No.: **20minutes**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	77.9	30.4	30.4	69.6
65	212	26.7	10.4	40.8	59.2
100	150	23.7	9.2	50.0	50.0
150	106	21.5	8.4	58.4	41.6
200	75	20.3	7.9	66.3	33.7
270	53	15.6	6.1	72.4	27.6
400	38	14.0	5.5	77.9	22.1
Pan	-38	56.8	22.1	100.0	0.0
Total	**-**	**256.5**	100.0	**-**	**-**
K80	**#REF!**				



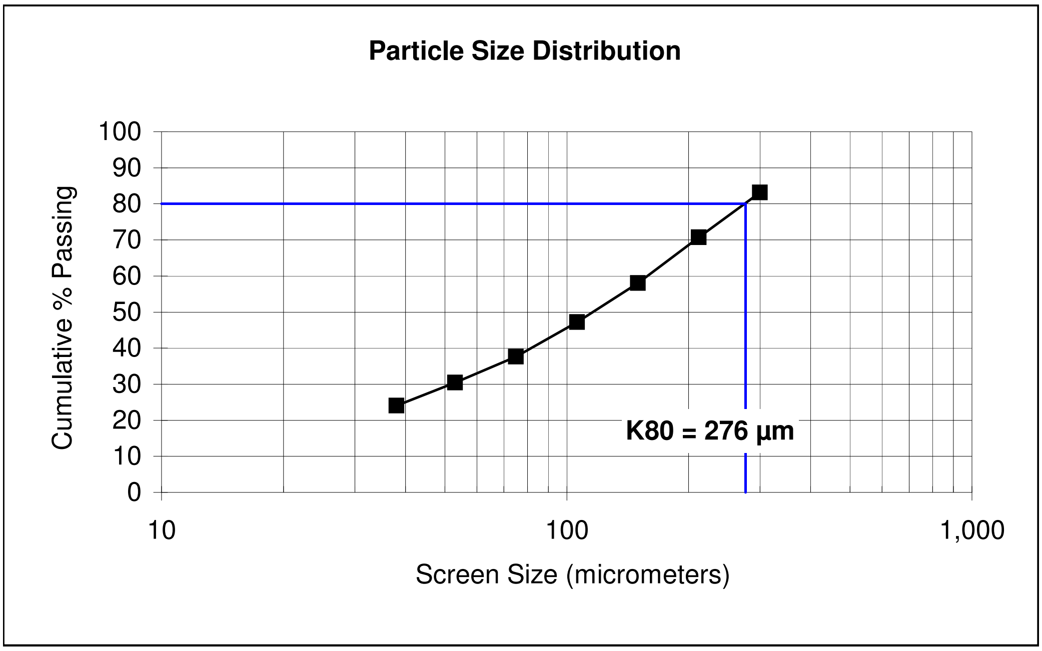
SGS Minerals Services
Size Distribution Analysis

Date:Sept. 14, 2011

Project No. **50149-001**

Sample: **MC (2Kg)** Test No.: **30minutes**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	45.2	16.9	16.9	83.1
65	212	33.3	12.4	29.3	70.7
100	150	33.9	12.6	41.9	58.1
150	106	29.1	10.9	52.8	47.2
200	75	25.7	9.6	62.4	37.6
270	53	19.2	7.2	69.6	30.4
400	38	17.2	6.4	76.0	24.0
Pan	-38	64.4	24.0	100.0	0.0
Total	**-**	**268.0**	100.0	**-**	**-**
K80	**276**				



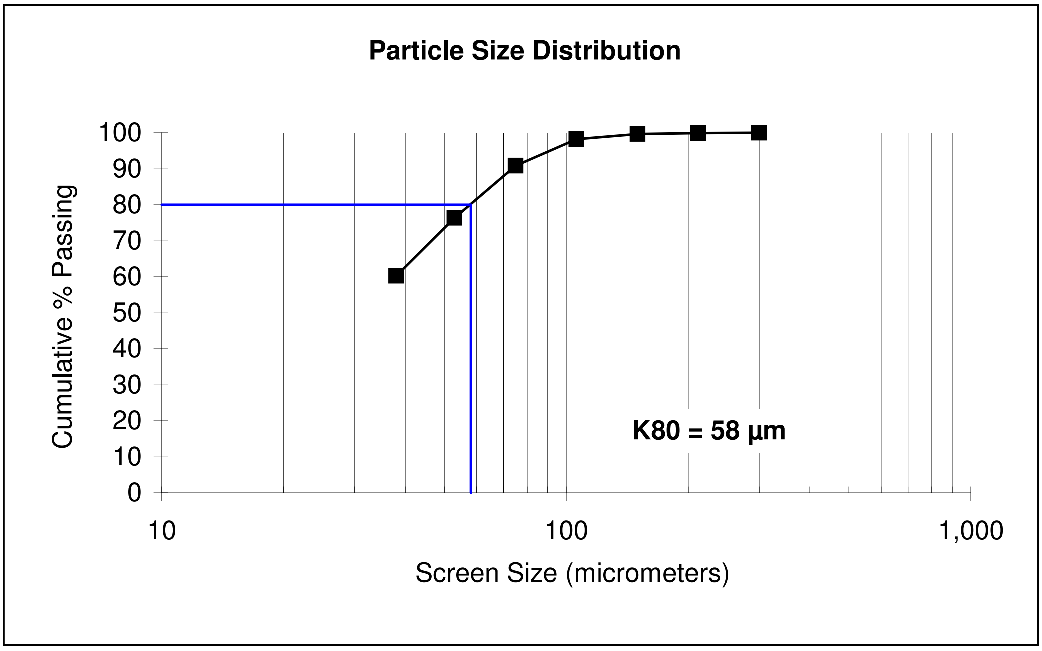
Date:Sept. 14, 2011

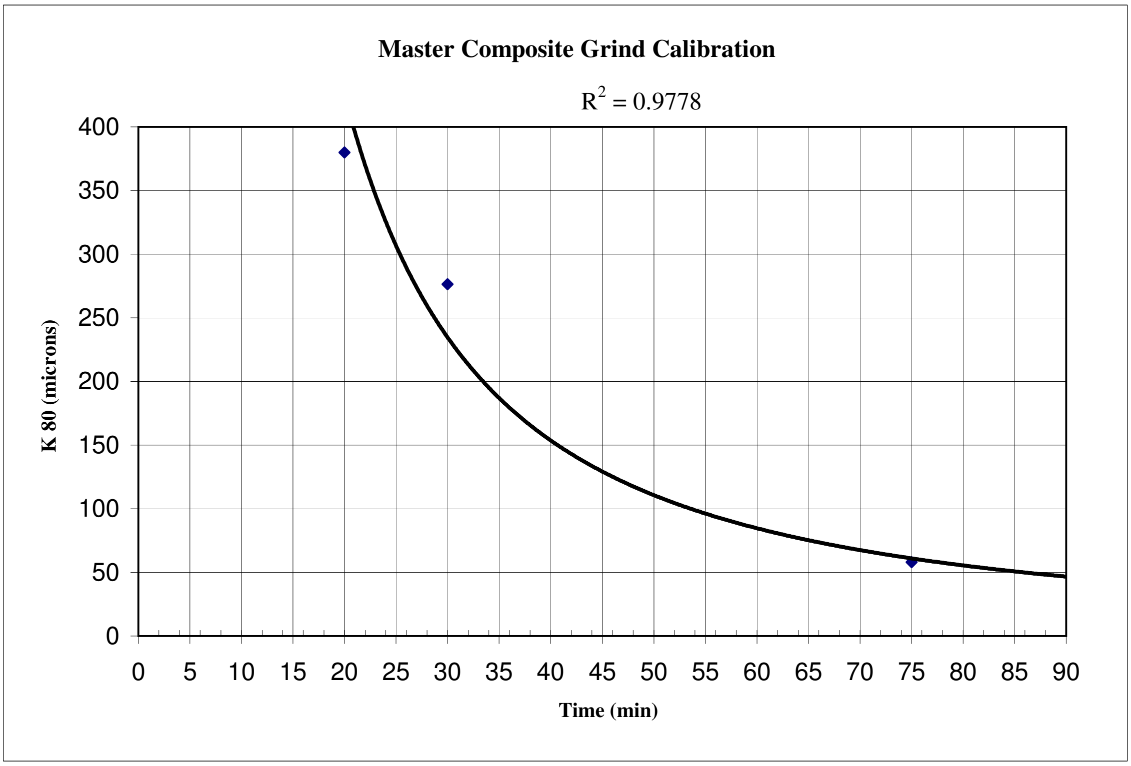
SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **MC (2Kg)** Test No.: **75minutes**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.1	0.0	0.0	100.0
65	212	0.2	0.1	0.1	99.9
100	150	0.5	0.2	0.3	99.7
150	106	3.7	1.4	1.8	98.2
200	75	19.0	7.4	9.2	90.8
270	53	36.8	14.4	23.6	76.4
400	38	41.3	16.2	39.8	60.2
Pan	-38	153.9	60.2	100.0	0.0
Total	**-**	**255.5**	100.0	**-**	**-**
K80	**58**				





Master Composite Grind Calibration
$R^2 = 0.9778$
K 80 (microns)
400
350
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
Time (min)

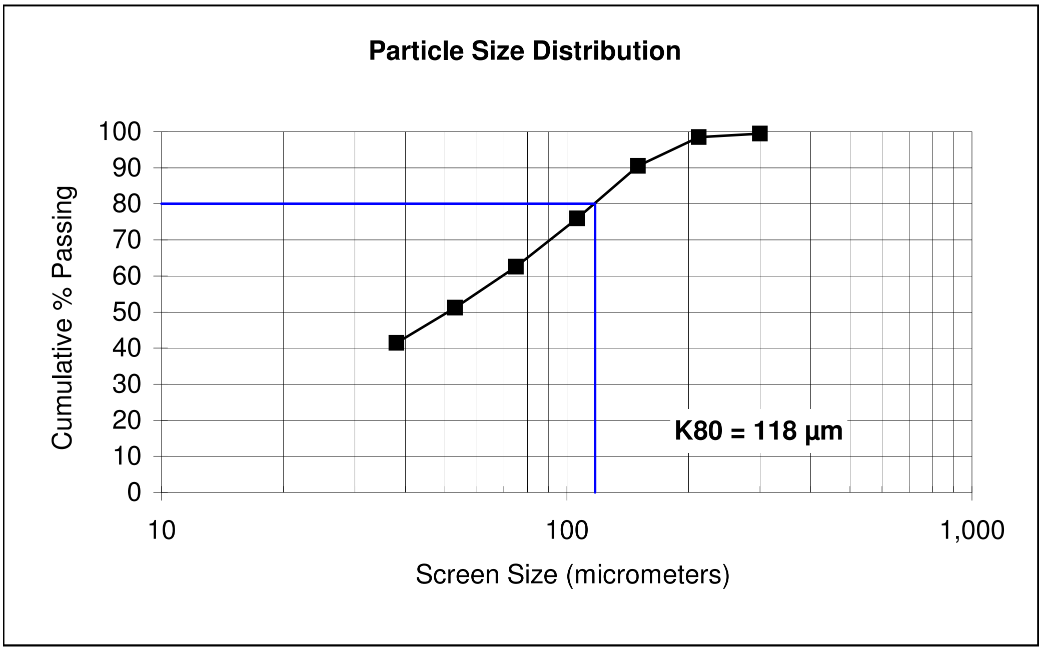
Date:Sept. 14, 2011

SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **High Ni Composite** Test No.: **2kg-50 minutes**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	1.3	0.5	0.5	99.5
65	212	2.3	1.0	1.5	98.5
100	150	19.3	8.0	9.5	90.5
150	106	35.3	14.6	24.1	75.9
200	75	32.4	13.4	37.5	62.5
270	53	27.4	11.3	48.8	51.2
400	38	23.7	9.8	58.6	41.4
Pan	-38	100.1	41.4	100.0	0.0
Total	**-**	**241.8**	100.0	**-**	**-**
K80	**118**				



Appendix E – Flotation Tests

Test No.: F1 **Project No.**: 50149-001 **Operator**: YW **Date**: September 15 2011

Purpose: Rougher flotation sighter test
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH
	245	SIPX	3477	PAX	CMC	Lime	MIBC*	Grind	Cond.	Froth	
Grind								57			
Condition		40					10		1		9.0
Rougher 1										4	
Condition		30					5		1		8.8
Rougher 2										6	
Condition		30					5		1		8.9
Rougher 3										8	
Total	0	100	0	0	0	0	20	57	3	18	

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
PSA on tail

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	191.6	11.1	2.81	3.00	11.3	1.78	3.33	0.351	84.7	70.8	39.7	44.8	73.1	72.5
Ro Conc 2	148.5	8.57	0.23	0.50	7.91	1.11	0.62	0.064	5.4	9.1	21.5	21.7	10.5	10.2
Ro Conc 3	150.0	8.65	0.09	0.26	5.77	0.54	0.30	0.032	2.1	4.8	15.8	10.6	5.1	5.2
Ro Tail	1244	71.7	0.04	0.10	1.01	0.14	0.08	0.009	7.8	15.3	23.0	22.9	11.3	12.1
Head (calc.)	1734	100	0.37	0.47	3.15	0.44	0.50	0.053	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.040						

Combined Prod	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	191.6	11.1	2.81	3.00	11.3	1.78	3.33	0.35	84.7	70.8	39.7	44.8	73.1	72.5
Ro Conc 1-2	340.1	19.6	1.68	1.91	9.84	1.49	2.15	0.23	90.1	79.9	61.2	66.5	83.7	82.8
Ro Conc 1-3	**490.1**	**28.3**	**1.20**	**1.40**	**8.60**	**1.20**	**1.58**	**0.17**	**92.2**	**84.7**	**77.0**	**77.1**	**88.7**	**87.9**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	191.6	11.1	8.14	8.40	15.0	68.4	84.7	73.2	26.7	8.3
Rougher 2	148.5	8.57	0.67	1.21	19.2	79.0	5.4	8.2	26.4	7.4
Rougher 3	150.0	8.65	0.26	0.58	14.4	84.7	2.1	3.9	20.1	8.0
Rougher Tail	1244	71.7	0.12	0.26	2.33	97.3	7.8	14.7	26.8	76.3
Head (calc.)	1734	100	1.06	1.27	6.22	91.4	100	100	100	100
Combined Products										
Ro Conc 1		11.1	8.14	8.40	15.0	68.4	84.7	73.2	26.7	8.3
Ro Conc 1-2		19.6	4.88	5.26	16.8	73.0	90.1	81.4	53.1	15.7
Ro Conc 1-3		28.3	3.47	3.83	16.1	76.6	92.2	85.3	73.2	23.7
Ro Tail		71.7	0.12	0.26	2.33	97.3	7.82	14.7	26.8	76.3

Test No.: F2 **Project No.**: 50149-001 **Operator**: YW **Date**: September 15 2011

Purpose: Rougher flotation sighter test
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :92 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH
	245	SIPX	3477	PAX	CMC	Lime	MIBC*	Grind	Cond.	Froth	
Grind								57			
Condition				30			10		1		9.1
Rougher 1										4	
Condition				30			5		1		8.9
Rougher 2										6	
Condition				20			5		1		8.9
Rougher 3										8	
Total	0	0	0	80	0	0	20	57	3	18	

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
PSA on tail

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	180.8	9.12	3.10	2.73	8.92	1.16	2.56	0.193	79.0	53.7	26.3	26.2	57.2	47.3
Ro Conc 2	184.5	9.31	0.30	1.06	8.08	1.29	0.75	0.063	7.80	21.3	24.3	29.7	17.1	15.7
Ro Conc 3	127.7	6.44	0.15	0.40	6.60	0.78	0.44	0.039	2.70	5.56	13.7	12.4	6.96	6.75
Ro Tail	1489	75.1	0.05	0.12	1.47	0.17	0.10	0.015	10.5	19.4	35.7	31.6	18.8	30.2
Head (calc.)	1982	100	0.36	0.46	3.10	0.40	0.41	0.037	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.040						

Combined Prod	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	180.8	9.12	3.10	2.73	8.92	1.16	2.56	0.19	79.0	53.7	26.3	26.2	57.2	47.3
Ro Conc 1-2	365.3	18.4	1.69	1.89	8.50	1.23	1.65	0.13	86.8	75.0	50.6	55.9	74.3	63.0
Ro Conc 1-3	**493.0**	**24.9**	**1.29**	**1.50**	**8.00**	**1.11**	**1.33**	**0.10**	**89.5**	**80.6**	**64.3**	**68.4**	**81.2**	**69.8**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	180.8	9.12	8.99	7.70	8.51	74.8	79.0	56.0	12.7	7.45
Rougher 2	184.5	9.31	0.87	2.82	18.0	78.3	7.80	20.9	27.5	7.96
Rougher 3	127.7	6.44	0.43	0.96	16.1	82.5	2.70	4.92	17.0	5.80
Rougher Tail	1489	75.1	0.14	0.30	3.47	96.1	10.5	18.1	42.7	78.8
Head (calc.)	1982	100.0	1.04	1.26	6.1	91.6	100	100	100	100
Combined Products										
Ro Conc 1		9.12	8.99	7.70	8.51	74.8	79.0	56.0	12.7	7.45
Ro Conc 1-2		18.4	4.89	5.24	13.3	76.6	86.8	76.9	40.2	15.4
Ro Conc 1-3		24.9	3.73	4.13	14.0	78.1	89.5	81.9	57.3	21.2
Ro Tail		75.1	0.14	0.30	3.47	96.1	10.5	18.1	42.7	78.8

Test No.: F3 **Project No.**: 50149-001 **Operator**: YW **Date**: September 23 2011

Purpose: Rougher Flotation test, Decrease SIPX
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1						10			1	2	8.8	53
Rougher 2		5				5			1	2	8.7	42
Rougher 3		10				5			1	4	8.7	22
Rougher 4		20				5			1	4	8.8	0.6
Rougher 5		30							1	8	8.7	23
Total	0	70	0	0	0	25	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	68.8	3.47	2.26	0.38	3.81	0.50	2.55	0.14	22.1	2.84	4.40	3.90	19.7	11.0
Ro Conc 2	93.2	4.70	4.53	4.75	12.5	2.04	3.92	0.33	60.1	48.1	19.6	21.6	41.0	35.2
Ro Conc 3	86.7	4.37	0.61	2.25	9.47	2.19	1.41	0.10	7.53	21.2	13.8	21.5	13.7	9.92
Ro Conc 4	40.6	2.05	0.27	0.69	9.34	1.91	0.71	0.06	1.56	3.05	6.36	8.79	3.24	2.79
Ro Conc 5	68.3	3.44	0.15	0.48	11.4	1.43	0.53	0.05	1.46	3.56	13.1	11.1	4.06	3.91
Ro Tail	1626	82.0	0.03	0.12	1.57	0.18	0.10	0.02	7.18	21.2	42.8	33.2	18.3	37.2
			Ro Tails Ni(s)=0.061											
Head (calc.)	1983	100	0.35	0.46	3.00	0.44	0.45	0.04	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	68.8	3.47	2.26	0.38	3.81	0.50	2.55	0.14	22.1	2.84	4.40	3.90	19.7	11.0
Ro Conc 1-2	162.0	8.17	3.57	2.89	8.81	1.39	3.34	0.25	82.3	51.0	24.0	25.4	60.7	46.2
Ro Conc 1-3	248.7	12.5	2.54	2.67	9.04	1.67	2.67	0.20	89.8	72.2	37.7	47.0	74.4	56.1
Ro Conc 1-4	289.3	14.6	2.22	2.39	9.08	1.70	2.39	0.18	91.4	75.2	44.1	55.8	77.7	58.9
Ro Conc 1-5	**357.6**	**18.0**	**1.82**	**2.03**	**9.52**	**1.65**	**2.04**	**0.15**	**92.8**	**78.8**	**57.2**	**66.8**	**81.7**	**62.8**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	68.8	3.47	6.55	1.05	3.08	89.3	22.1	2.90	1.82	3.37
Rougher 2	93.2	4.70	13.1	13.5	9.11	64.3	60.1	50.3	7.29	3.29
Rougher 3	86.7	4.37	1.77	6.22	17.9	74.1	7.53	21.6	13.3	3.53
Rougher 4	40.6	2.05	0.78	1.72	22.4	75.1	1.56	2.79	7.80	1.67
Rougher 5	68.3	3.44	0.43	1.04	28.7	69.8	1.46	2.86	16.8	2.62
Rougher Tail	1626	82.0	0.09	0.30	3.79	95.8	7.18	19.5	52.9	85.5
Head (calc.)	1983	100	1.03	1.26	5.87	91.8	100	100	100	100
Combined Products										
Ro Conc 1		3.47	6.55	1.05	3.08	89.3	22.1	2.90	1.82	3.37
Ro Conc 1-2		8.17	10.3	8.19	6.55	74.9	82.3	53.2	9.11	6.66
Ro Conc 1-3		12.5	7.35	7.51	10.5	74.6	89.8	74.8	22.4	10.2
Ro Conc 1-4		14.6	6.43	6.69	12.2	74.7	91.4	77.6	30.2	11.9
Ro Conc 1-5		18.0	5.28	5.62	15.3	73.8	92.8	80.5	47.1	14.5
Ro Tail		82.0	0.09	0.30	3.79	95.8	7.18	19.5	52.9	85.5

Test No.: F4 **Project No.**: 50149-001 **Operator**: YW **Date**: September 23 2011

Purpose: Rougher Flotation test, Increase pH using Soda ash
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target Feed K_{80} : :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	Soda ash	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind	400	5						57				
Condition									1			
Rougher 1	654					10			1	2	9.8	-11
Rougher 2		5				5			1	2	9.6	15
Rougher 3		10				5			1	4	9.5	-0.6
Rougher 4		20				5			1	4	9.5	-11
Rougher 5		30							1	8	9.5	-21
Total	1054	70	0	0	0	25	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	59.9	3.02	1.86	0.38	3.55	0.61	3.73	0.14	15.7	2.54	3.36	4.48	25.4	8.64
Ro Conc 2	93.8	4.72	4.99	5.24	15.1	2.24	3.84	0.43	66.0	54.8	22.4	25.8	41.0	41.5
Ro Conc 3	124	6.25	0.48	1.36	9.94	1.96	1.09	0.09	8.41	18.8	19.5	29.8	15.4	11.5
Ro Conc 4	48.5	2.44	0.23	0.47	7.70	1.43	0.59	0.05	1.57	2.54	5.90	8.50	3.26	2.50
Ro Conc 5	79.4	4.00	0.12	0.41	12.5	1.04	0.46	0.04	1.34	3.63	15.7	10.1	4.16	3.27
Ro Tail	1580	79.6	0.03	0.10	1.33	0.11	0.06	0.02	6.91	17.6	33.2	21.3	10.8	32.5
Head (calc.)	1985.9	100	0.36	0.45	3.19	0.41	0.44	0.049	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.040						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	59.90	3.02	1.86	0.38	3.55	0.61	3.73	0.14	15.7	2.54	3.36	4.48	25.4	8.64
Ro Conc 1-2	153.7	7.74	3.77	3.35	10.6	1.60	3.80	0.32	81.8	57.4	25.7	30.2	66.4	50.2
Ro Conc 1-3	277.8	14.0	2.30	2.46	10.3	1.76	2.59	0.22	90.2	76.2	45.2	60.1	81.8	61.7
Ro Conc 1-4	326.3	16.4	1.99	2.16	9.92	1.71	2.29	0.19	91.7	78.7	51.1	68.6	85.1	64.2
Ro Conc 1-5	**405.7**	**20.4**	**1.63**	**1.82**	**10.4**	**1.58**	**1.93**	**0.16**	**93.1**	**82.4**	**66.8**	**78.7**	**89.2**	**67.5**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	59.9	3.02	5.39	1.05	3.47	90.1	15.7	2.59	1.64	2.97
Rougher 2	93.8	4.72	14.5	14.8	13.5	57.2	66.0	57.5	10.0	2.96
Rougher 3	124	6.25	1.39	3.64	21.7	73.3	8.41	18.7	21.3	5.01
Rougher 4	48.5	2.44	0.67	1.13	18.7	79.5	1.57	2.27	7.15	2.13
Rougher 5	79.4	4.00	0.35	0.81	31.9	67.0	1.34	2.65	20.0	2.93
Rougher Tail	1580	79.6	0.09	0.25	3.20	96.5	6.91	16.3	39.9	84.0
Head (calc.)	1985.9	100.0	1.03	1.22	6.38	91.4	100	100	100	100
Combined Products										
Ro Conc 1		3.02	5.4	1.05	3.47	90.1	15.7	2.59	1.64	3.0
Ro Conc 1-2		7.74	10.9	9.45	9.62	70.0	81.8	60.1	11.7	5.9
Ro Conc 1-3		14.0	6.7	6.85	15.0	71.5	90.2	78.8	32.9	10.9
Ro Conc 1-4		16.4	5.8	6.00	15.6	72.7	91.7	81.1	40.1	13.1
Ro Conc 1-5		20.4	4.7	4.99	18.8	71.5	93.1	83.7	60.1	16.0
Ro Tail		79.6	0.09	0.25	3.20	96.5	6.91	16.3	39.93	84.0

Test No.: F5 **Project No.**: 50149-001 **Operator**: YW **Date**: September 29 2011

Purpose: Rougher Flotation test, Repeat F3, finer primary grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 88 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :50 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		5						88				
Condition									1			
Rougher 1						10			1	2	9.0	-42.0
Rougher 2		5				5			1	2	8.9	20.4
Rougher 3		10				5			1	4	8.9	15.2
Rougher 4		20				5			1	4	8.9	14.1
Rougher 5		30							1	8	8.9	4.8
Total	0	70	0	0	0	25	0	88	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
PSA on tail
Assays to Lakefield

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	72.0	3.63	0.32	0.37	1.94	1.70	5.38	0.28	3.25	2.85	2.38	13.1	40.4	26.7
Ro Conc 2	86.3	4.36	5.93	1.64	8.62	1.96	2.29	0.11	72.1	15.1	12.7	18.1	20.6	12.6
Ro Conc 3	110	5.53	1.05	4.72	9.20	1.72	1.12	0.07	16.2	55.3	17.2	20.2	12.8	10.2
Ro Conc 4	71.2	3.59	0.24	0.66	7.85	1.32	0.61	0.06	2.41	5.02	9.54	10.1	4.53	5.66
Ro Conc 5	101	5.10	0.12	0.33	6.89	0.82	0.38	0.03	1.71	3.56	11.9	8.86	4.00	4.02
Ro Tail	1541	77.8	0.02	0.11	1.76	0.18	0.11	< 0.02	4.34	18.1	46.3	29.7	17.7	40.8
Head (calc.)	1981.1	100	0.358	0.47	2.96	0.47	0.484	0.038	100	100	100	100	100	100
Head (direct)			0.330	0.42	2.53	0.41	0.450	0.040						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	72.00	3.63	0.32	0.37	1.94	1.70	5.38	0.28	3.25	2.85	2.38	13.1	40.4	26.7
Ro Conc 1-2	158.3	7.99	3.38	1.06	5.58	1.84	3.70	0.19	75.3	18.0	15.1	31.2	61.0	39.3
Ro Conc 1-3	267.9	13.5	2.43	2.56	7.06	1.79	2.64	0.14	91.5	73.3	32.3	51.4	73.8	49.5
Ro Conc 1-4	339.1	17.1	1.97	2.16	7.23	1.69	2.22	0.12	94.0	78.3	41.8	61.4	78.3	55.1
Ro Conc 1-5	**440.1**	**22.2**	**1.54**	**1.74**	**7.15**	**1.49**	**1.79**	**0.10**	**95.7**	**81.9**	**53.7**	**70.3**	**82.3**	**59.2**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	72.0	3.63	0.93	1.02	3.37	94.7	3.25	2.88	2.14	3.74
Rougher 2	86.3	4.36	17.2	4.65	2.81	75.3	72.1	15.8	2.14	3.57
Rougher 3	110	5.53	3.04	13.4	9.79	73.8	16.2	57.6	9.49	4.44
Rougher 4	71.2	3.59	0.70	1.67	18.6	79.1	2.41	4.69	11.7	3.09
Rougher 5	101	5.10	0.35	0.75	17.2	81.7	1.71	2.97	15.3	4.53
Rougher Tail	1541	77.8	0.06	0.26	4.35	95.3	4.34	16.0	59.2	80.6
Head (calc.)	1981	100	1.04	1.28	5.71	92	100	100	100	100
Combined Products										
Ro Conc 1		3.63	0.93	1.02	3.37	94.7	3.25	2.88	2.14	3.74
Ro Conc 1-2		7.99	9.79	3.00	3.06	84.1	75.3	18.7	4.29	7.31
Ro Conc 1-3		13.5	7.03	7.24	5.82	79.9	91.5	76.3	13.8	11.7
Ro Conc 1-4		17.1	5.70	6.07	8.49	79.7	94.0	81.0	25.5	14.8
Ro Conc 1-5		22.2	4.47	4.85	10.5	80.2	95.7	84.0	40.8	19.4
Ro Tail		77.8	0.06	0.26	4.35	95.3	4.34	16.0	59.2	80.6

Test No.: F6 **Project No.**: 50149-001 **Operator**: YW **Date**: September 29 2011

Purpose: Rougher Flotation test, Repeat F3, coarser primary grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 43 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :144 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		5						43				
Condition									1			
Rougher 1						10			1	2	8.9	11.5
Rougher 2		5				5			1	2	9.0	22.4
Rougher 3		10				5			1	4	8.9	21.4
Rougher 4		20				5			1	4	8.8	-5.0
Rougher 5		30							1	8	8.7	-12.3
Total	0	70	0	0	0	25	0	43	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
PSA on tail
Assays to Lakefield

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	86.4	4.36	5.59	2.75	10.7	0.33	1.01	0.09	67.1	26.2	15.5	3.51	10.6	9.63
Ro Conc 2	67.8	3.42	1.31	4.61	11.7	1.43	4.79	0.31	12.3	34.5	13.3	12.0	39.3	26.0
Ro Conc 3	98.0	4.94	0.53	1.13	8.21	1.92	2.09	0.12	7.21	12.2	13.5	23.2	24.8	14.6
Ro Conc 4	75.4	3.80	0.23	0.52	8.31	1.96	0.60	0.05	2.41	4.32	10.5	18.2	5.48	4.67
Ro Conc 5	111	5.62	0.10	0.33	7.24	1.20	0.36	0.05	1.55	4.05	13.5	16.5	4.86	6.90
Ro Tail	1544	77.9	0.044	0.11	1.30	0.14	0.08	< 0.02	9.43	18.7	33.7	26.6	15.0	38.2
Head (calc.)	1983.0	100	0.363	0.46	3.01	0.41	0.416	0.041	100	100	100	100	100	100
Head (direct)			0.330	0.42	2.53	0.41	0.450	0.040						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	86.40	4.36	5.59	2.75	10.7	0.33	1.01	0.09	67.1	26.2	15.5	3.51	10.6	9.63
Ro Conc 1-2	154.2	7.78	3.71	3.57	11.1	0.81	2.67	0.19	79.4	60.7	28.8	15.5	49.9	35.6
Ro Conc 1-3	252.2	12.7	2.47	2.62	10.0	1.24	2.45	0.16	86.6	72.9	42.3	38.7	74.7	50.2
Ro Conc 1-4	327.6	16.5	1.96	2.14	9.61	1.41	2.02	0.14	89.0	77.2	52.8	56.9	80.2	54.9
Ro Conc 1-5	**439.0**	**22.1**	**1.49**	**1.68**	**9.01**	**1.36**	**1.60**	**0.11**	**90.6**	**81.3**	**66.3**	**73.4**	**85.0**	**61.8**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	86.4	4.36	16.2	7.78	6.48	69.5	67.1	27.4	4.81	3.30
Rougher 2	67.8	3.42	3.80	13.0	16.0	67.2	12.3	35.8	9.33	2.50
Rougher 3	98.0	4.94	1.54	3.03	17.6	77.9	7.21	12.1	14.8	4.19
Rougher 4	75.4	3.80	0.67	1.26	20.2	77.9	2.41	3.85	13.1	3.23
Rougher 5	111	5.62	0.29	0.74	18.1	80.8	1.55	3.33	17.4	4.94
Rougher Tail	1544	77.9	0.13	0.28	3.06	96.5	9.43	17.5	40.6	81.8
Head (calc.)	1983	100	1.05	1.24	5.87	91.8	100	100	100	100
Combined Products										
Ro Conc 1		4.36	16.2	7.78	6.48	69.5	67.1	27.4	4.81	3.30
Ro Conc 1-2		7.78	10.7	10.1	10.7	68.5	79.4	63.2	14.1	5.80
Ro Conc 1-3		12.7	7.17	7.33	13.3	72.1	86.6	75.3	28.9	10.0
Ro Conc 1-4		16.5	5.67	5.94	14.9	73.5	89.0	79.1	42.0	13.2
Ro Conc 1-5		22.1	4.31	4.62	15.7	75.3	90.6	82.5	59.4	18.2
Ro Tail		77.9	0.13	0.28	3.06	96.5	9.43	17.5	40.6	81.8

Test No.: F7 **Project No.**: 50149-001 **Operator**: YW **Date**: October 6 2011

Purpose: Rougher Flotation test, repeat F3 talc pre-float
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind								57				
Talc Pre-Float 1						20			1	2	8.8	62.9
Talc Pre-Float 2						10			1	2		
Condition									1			
Rougher 1		5							1	2	8.6	34.4
Rougher 2		5				5			1	2	8.6	29.8
Rougher 3		10				5			1	4	8.6	20.4
Rougher 4		20							1	4	8.6	28.2
Rougher 5		30							1	8	8.7	22.8
Total	0	70	0	0	0	40	0	57	8	24		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
To Lakefield

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Talc Conc 1	67.1	3.40	0.65	0.24	1.19	0.26	1.09	0.05	6.14	1.79	1.32	2.03	7.72	4.18
Talc Conc 2	36.6	1.85	1.08	0.31	2.01	0.40	1.27	0.05	5.56	1.26	1.22	1.71	4.90	2.28
Ro Conc 1	66.3	3.36	7.82	4.05	14.8	2.27	6.41	0.46	73.0	29.9	16.22	17.5	44.9	38.0
Ro Conc 2	47.5	2.41	0.67	6.21	11.1	1.84	2.63	0.11	4.48	32.8	8.7	10.2	13.2	6.5
Ro Conc 3	65.7	3.33	0.30	1.10	8.07	2.08	1.13	0.06	2.78	8.04	8.8	15.9	7.8	4.92
Ro Conc 4	76.3	3.87	0.10	0.47	12.8	1.39	0.50	0.04	1.03	3.99	16.14	12.4	4.03	3.81
Ro Conc 5	169	8.57	0.04	0.24	7.12	0.59	0.21	0.02	0.93	4.52	19.9	11.6	3.75	4.22
Ro Tail	1444	73.2	0.03	0.11	1.16	0.17	0.09	< 0.02	6.10	17.7	27.7	28.6	13.7	36.0
Head (calc.)	1973	100	0.360	0.46	3.07	0.43	0.48	0.041	100	100	100	100	100	100
Head (direct)			0.330	0.42	2.53	0.41	0.45	0.040						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Talc Conc 1-2	**103.7**	**5.25**	**1.73**	**0.55**	**3.20**	**0.66**	**2.36**	**0.10**	**11.7**	**3.05**	**2.5**	**3.74**	**12.6**	**6.47**
Ro Conc 1	66.29	3.36	7.82	4.05	14.8	2.27	6.41	0.46	73.0	29.9	16.22	17.5	44.9	38.0
Ro Conc 1-2	113.8	5.77	4.84	4.95	13.3	2.09	4.83	0.31	77.5	62.7	24.9	27.7	58.0	44.6
Ro Conc 1-3	179.5	9.10	3.18	3.54	11.4	2.09	3.48	0.22	80.2	70.8	33.7	43.7	65.9	49.5
Ro Conc 1-4	255.8	13.0	2.26	2.63	11.8	1.88	2.59	0.17	81.3	74.7	49.9	56.0	69.9	53.3
Ro Conc 1-5	**424.9**	**21.5**	**1.37**	**1.68**	**9.93**	**1.37**	**1.64**	**0.11**	**82.2**	**79.3**	**69.8**	**67.6**	**73.7**	**57.5**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	66.3	3.55	22.7	11.5	8.10	57.8	82.7	32.3	4.55	2.24
Rougher 2	47.5	2.54	1.94	17.6	12.1	68.3	5.07	35.5	4.89	1.90
Rougher 3	65.7	3.52	0.87	2.94	17.9	78.3	3.14	8.20	9.97	3.01
Rougher 4	76.3	4.08	0.28	0.97	32.6	66.2	1.17	3.14	21.1	2.95
Rougher 5	169	9.05	0.11	0.48	18.2	81.2	1.05	3.43	26.1	8.03
Rougher Tail	1444	77.3	0.09	0.28	2.73	96.9	6.91	17.4	33.4	81.9
Head (calc.)	1869.1	100	0.97	1.26	6.31	91.5	100	100	100	100
Combined Products										
Ro Conc 1		3.55	22.67	11.5	8.10	57.8	82.7	32.3	4.55	2.24
Ro Conc 1-2		6.09	14.0	14.0	9.78	62.2	87.7	67.9	9.44	4.14
Ro Conc 1-3		9.60	9.20	9.97	12.7	68.1	90.9	76.1	19.4	7.1
Ro Conc 1-4		13.7	6.54	7.29	18.7	67.5	92.0	79.2	40.5	10.1
Ro Conc 1-5		22.7	3.98	4.58	18.5	73.0	93.1	82.6	66.6	18.1
Ro Tail		77.3	0.09	0.28	2.73	96.9	6.91	17.4	33.4	81.9

Test No.: F8 **Project No.**: 50149-001 **Operator**: YW **Date**: October 6 2011

Purpose: Rougher Flotation test, repeat F3 add CMC in the rougher
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1					40	20			1	2	9.1	26.8
Rougher 2		5			10	5			1	2	9.1	14.8
Rougher 3		10			10				1	4	8.9	46.6
Rougher 4		20							1	4	8.9	-14.4
Rougher 5		30							1	8	8.9	-12.3
Total	0	70	0	0	60	25	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
To Lakefield

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	89.1	4.50	5.93	0.90	8.92	1.44	4.80	0.43	72.9	8.92	13.05	14.5	45.6	41.3
Ro Conc 2	77.3	3.90	1.15	6.61	13.8	2.18	2.73	0.14	12.3	56.8	17.5	19.0	22.5	11.7
Ro Conc 3	76.9	3.88	0.40	1.06	7.93	1.97	1.08	0.09	4.25	9.06	10.0	17.1	8.86	7.45
Ro Conc 4	60.1	3.03	0.16	0.47	9.44	1.33	0.54	0.04	1.33	3.14	9.31	9.03	3.46	2.59
Ro Conc 5	86.8	4.38	0.07	0.27	7.14	0.81	0.28	0.03	0.86	2.61	10.2	7.95	2.59	2.80
Ro Tail	1591	80.3	0.04	0.11	1.53	0.18	0.10	< 0.02	8.34	19.5	39.9	32.4	17.0	34.3
Head (calc.)	1981	100	0.366	0.45	3.08	0.45	0.47	0.047	100	100	100	100	100	100
Head (direct)			0.330	0.42	2.53	0.41	0.45	0.040						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	89.1	4.50	5.93	0.90	8.92	1.44	4.80	0.43	72.9	8.92	13.05	14.5	45.6	41.3
Ro Conc 1-2	166.4	8.40	3.71	3.55	11.2	1.78	3.84	0.30	85.2	65.7	30.6	33.5	68.1	52.9
Ro Conc 1-3	243.3	12.3	2.66	2.76	10.2	1.84	2.97	0.23	89.5	74.8	40.6	50.7	77.0	60.4
Ro Conc 1-4	303.4	15.3	2.17	2.31	10.0	1.74	2.49	0.19	90.8	77.9	49.9	59.7	80.4	62.9
Ro Conc 1-5	**390.2**	**19.7**	**1.70**	**1.86**	**9.38**	**1.53**	**2.00**	**0.16**	**91.7**	**80.5**	**60.1**	**67.6**	**83.0**	**65.7**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	89.1	4.50	17.2	2.51	5.46	74.8	72.9	9.19	4.06	3.67
Rougher 2	77.3	3.90	3.33	18.7	17.0	61.0	12.3	59.4	11.0	2.60
Rougher 3	76.9	3.88	1.16	2.83	17.3	78.7	4.25	8.95	11.1	3.33
Rougher 4	60.1	3.03	0.46	1.07	23.5	75.0	1.33	2.65	11.8	2.48
Rougher 5	86.8	4.38	0.21	0.56	18.1	81.1	0.86	2.01	13.1	3.88
Rougher Tail	1591	80.3	0.11	0.27	3.69	95.9	8.34	17.8	48.9	84.0
Head (calc.)	1981	100	1.06	1.23	6.05	91.7	100	100	100	100
Combined Products										
Ro Conc 1		4.50	17.2	2.51	5.46	74.8	72.9	9.19	4.06	3.67
Ro Conc 1-2		8.40	10.8	10.0	10.8	68.4	85.2	68.6	15.0	6.27
Ro Conc 1-3		12.3	7.72	7.75	12.9	71.6	89.5	77.5	26.2	9.60
Ro Conc 1-4		15.3	6.28	6.43	15.0	72.3	90.8	80.2	37.9	12.1
Ro Conc 1-5		19.7	4.93	5.12	15.7	74.3	91.7	82.2	51.1	16.0
Ro Tail		80.3	0.11	0.27	3.69	95.9	8.34	17.8	48.9	84.0

Test No.: F9 **Project No.**: 50149-001 **Operator**: YW **Date**: 17-Oct-11

Purpose: Baseline cleaner flotation test,
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.8	42.8
Rougher 2		5	5						1	2	8.8	17.5
Rougher 3		10	5						1	4	8.8	34.4
Rougher 4		20	5						1	6	8.8	29.2
Regrind (PM)								0				
1st Cleaner		5							1	8	8.9	10.2
1st Cleaner Scav		10							1	4	8.6	50.1
2nd Cleaner									1	6	8.7	37.5
3rd Cleaner									1	4	8.7	53.4
Total	0	55	25	0			0	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.
Sulphide sulphur assay for Rougher tail
Malvern on combined products

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	96.5	4.9	5.88	4.40	15.5	2.17	6.45	0.56	82.0	46.8	25.3	24.2	62.7	51.2
3rd Clnr Tls	61.5	3.1	0.57	2.67	8.82	1.81	1.68	0.13	5.1	18.1	9.2	12.8	10.4	7.6
2nd Clnr Tls	68.4	3.5	0.29	1.12	10.1	1.66	1.02	0.10	2.9	8.4	11.7	13.1	7.0	6.5
1st Clnr Scv Conc	31.6	1.6	0.18	0.64	11.7	1.58	0.74	0.07	0.8	2.2	6.2	5.8	2.4	2.1
1st Clnr Scv Tls	145	7.3	0.06	0.22	3.66	0.57	0.22	0.02	1.3	3.5	9.0	9.5	3.2	2.7
Rougher Tails	1579	79.7	0.04	0.12	1.45	0.19	0.09	0.02	8.0	20.9	38.7	34.6	14.3	29.9
					S" = 1.41									
Head (calc.)	1982	100	0.35	0.46	2.99	0.44	0.50	0.05	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**96.5**	**4.87**	**5.88**	**4.40**	**15.5**	**2.17**	**6.45**	**0.56**	**82.0**	**46.8**	**25.3**	**24.2**	**62.7**	**51.2**
2nd Clnr Conc	158	7.97	3.81	3.73	12.9	2.03	4.59	0.39	87.0	64.9	34.4	37.0	73.1	58.8
1st Clnr Conc	226	11.4	2.75	2.94	12.1	1.92	3.51	0.30	89.9	73.4	46.1	50.1	80.1	65.2
1st Cl & ClScv Conc	258	13.0	2.43	2.66	12.0	1.88	3.17	0.28	90.7	75.6	52.3	55.9	82.5	67.3
Rghr Conc	**403**	**20.3**	**1.58**	**1.78**	**9.00**	**1.41**	**2.11**	**0.18**	**92.0**	**79.1**	**61.3**	**65.4**	**85.7**	**70.1**

Cleaner Circuit Unit Performance	Mass rec	Upgrade						Unit Recovery					
	24%	3.72	2.47	1.72	1.54	3.06	3.05	90%	64%	56%	52%	77%	77%

Product	Weight		Assays, %				% Distribution				Cu+Ni	PGE
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	96.5	4.9	17.0	12.4	14.3	56.2	82.0	48.7	11.9	3.0		
3rd Cleaner Tail	61.5	3.1	1.65	7.45	15.2	75.7	5.1	18.6	8.1	2.6		
2nd Cleaner Tail	68.4	3.5	0.84	2.93	23.3	73.0	2.9	8.2	13.7	2.7		
1st Cleaner Scav Cor	31.6	1.6	0.52	1.50	29.0	69.0	0.8	1.9	7.9	1.2		
1st Cleaner Scav Tai	145	7.3	0.18	0.53	9.01	90.3	1.3	3.1	11.3	7.2		
Rougher Tail	1579	79.7	0.10	0.30	3.46	96.1	8.0	19.5	47.1	83.3		
Head (calc.)	1982.3	100	1.01	1.24	5.85	91.9	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		4.9	17.0	12.4	14.3	56.2	82.0	48.7	11.9	3.0	10.3	9.2
2nd Cleaner Conc		8.0	11.1	10.5	14.7	63.8	87.0	67.3	20.0	5.5	7.5	7.0
1st Cleaner Conc		11.4	7.97	8.20	17.3	66.6	89.9	75.5	33.7	8.3	5.7	5.7
1st Cl + Sc Conc		13.0	7.06	7.38	18.7	66.9	90.7	77.4	41.6	9.5	5.1	5.3
Rougher Conc		20.3	4.58	4.91	15.2	75.3	92.0	80.5	52.9	16.7	3.4	3.7
Rougher Tail'		79.7	0.10	0.30	3.46	96.1	8.0	19.5	47.1	83.3		

Test No.: F10 **Project No.**: 50149-001 **Operator**: YW **Date**: 18-Oct-11

Purpose: Cleaner flotation test, repeat F9 CMC in the cleaner
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.9	56.9
Rougher 2		5	5						1	2	8.8	14.0
Rougher 3		10	5						1	4	8.8	41.2
Rougher 4		20	5						1	6	8.8	30.4
Regrind (PM)								0				
1st Cleaner		5		20					1	8	8.9	14.3
1st Cleaner Scav		10							1	4	8.5	40.7
2nd Cleaner				10					1	6	8.8	43.5
3rd Cleaner			7	5					1	4	8.7	77.2
Total	0	55	32	35			0	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Malvern on combined products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	140.2	7.0	4.49	4.36	14.3	2.52	5.23	0.31	86.9	65.5	34.9	37.9	72.4	47.0
3rd Clnr Tls	55.2	2.8	0.28	0.98	6.10	1.47	0.85	0.06	2.1	5.8	5.9	8.7	4.6	3.6
2nd Clnr Tls	78.8	4.0	0.15	0.56	6.93	1.15	0.55	0.05	1.6	4.7	9.5	9.7	4.3	4.3
1st Clnr Scv Conc	31.0	1.6	0.10	0.41	8.67	1.07	0.42	0.26	0.4	1.4	4.7	3.6	1.3	8.7
1st Clnr Scv Tls	147.7	7.4	0.05	0.18	2.82	0.35	0.15	0.02	1.0	2.8	7.3	5.5	2.2	3.2
Rougher Tails	1538	77.2	0.04	0.12	1.41	0.21	0.10	0.02	7.9	19.8	37.8	34.6	15.2	33.3
Head (calc.)	1991	100	0.36	0.47	2.88	0.47	0.51	0.05	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**140.2**	**7.04**	**4.49**	**4.36**	**14.3**	**2.52**	**5.23**	**0.31**	**86.9**	**65.5**	**34.9**	**37.9**	**72.4**	**47.0**
2nd Clnr Conc	195	9.82	3.30	3.41	12.0	2.22	3.99	0.24	89.1	71.3	40.8	46.6	77.1	50.6
1st Clnr Conc	274	13.8	2.40	2.59	10.5	1.91	3.00	0.18	90.7	76.0	50.3	56.3	81.3	54.8
1st Cl & ClScv Conc	305	15.3	2.16	2.37	10.3	1.83	2.74	0.19	91.1	77.4	55.0	59.8	82.6	63.6
Rghr Conc	**453**	**22.8**	**1.47**	**1.65**	**7.89**	**1.35**	**1.90**	**0.14**	**92.1**	**80.2**	**62.2**	**65.4**	**84.8**	**66.7**

	Mass rec	Upgrade						Unit Recovery					
Cleaner Circuit Unit Performance	31%	3.05	2.64	1.81	1.87	2.76	2.27	95%	85%	68%	66%	88%	75%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	140.2	7.0	13.0	12.3	15.0	59.7	86.9	67.8	19.1	4.6		
3rd Cleaner Tail	55.2	2.8	0.81	2.65	13.0	83.5	2.1	5.8	6.5	2.5		
2nd Cleaner Tail	78.8	4.0	0.43	1.41	16.6	81.5	1.6	4.4	11.9	3.5		
1st Cleaner Scav Co	31.0	1.6	0.28	0.92	21.8	77.0	0.4	1.1	6.2	1.3		
1st Cleaner Scav Tai	147.7	7.4	0.14	0.44	6.91	92.5	1.0	2.5	9.3	7.4		
Rougher Tail	1538	77.2	0.11	0.30	3.35	96.2	7.9	18.4	46.9	80.7		
Head (calc.)	1990.5	100	1.05	1.28	5.51	92.2	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		7.0	13.0	12.3	15.0	59.7	86.9	67.8	19.1	4.6	8.9	8.1
2nd Cleaner Conc		9.8	9.57	9.56	14.4	66.5	89.1	73.5	25.7	7.1	6.7	6.5
1st Cleaner Conc		13.8	6.94	7.22	15.0	70.8	90.7	77.9	37.6	10.6	5.0	5.1
1st Cl + Sc Conc		15.3	6.27	6.58	15.7	71.4	91.1	79.0	43.8	11.9	4.5	4.8
Rougher Conc		22.8	4.27	4.58	12.9	78.3	92.1	81.6	53.1	19.3	3.1	3.4
Rougher Tail'		77.2	0.11	0.30	3.35	96.2	7.9	18.4	46.9	80.7		

Test No.: F11 **Project No.:** 50149-001 **Operator:** YW **Date:** 19-Oct-11

Purpose: Cleaner flotation test, Repeat F10 with regrind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind: 25 minutes

Target K_{80} :90 µm
Regind K_{80} :28 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	9.0	50.1
Rougher 2		5	5						1	2	8.9	15.5
Rougher 3		10	5						1	4	8.9	40.0
Rougher 4		20	5						1	6	8.8	21.4
Regrind (PM)								25				
1st Cleaner		5		20					1	8	8.9	44.5
1st Cleaner Scav		10							1	4	8.5	31.1
2nd Cleaner				10					1	6	8.7	53.9
3rd Cleaner			7	5					1	4	8.6	46.2
Total	0	55	32	35			0	82	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Malvern on combined products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	44.7	2.3	11.3	2.84	16.5	2.88	13.7	0.98	83.6	15.8	16.4	16.1	60.3	48.6
3rd Clnr Tls	56.8	2.9	0.32	1.86	3.51	1.28	1.25	0.07	3.0	13.2	4.4	9.1	7.0	4.4
2nd Clnr Tls	64.2	3.2	0.19	3.17	6.44	1.51	1.17	0.06	2.0	25.3	9.2	12.1	7.4	4.3
1st Clnr Scv Conc	30.6	1.5	0.15	2.75	8.37	0.93	0.66	0.03	0.8	10.5	5.7	3.6	2.0	1.0
1st Clnr Scv Tls	179.1	9.0	0.04	0.50	5.52	0.84	0.33	0.03	1.3	11.2	22.0	18.8	5.8	6.0
Rougher Tails	1610	81.1	0.04	0.12	1.18	0.20	0.11	< 0.02	9.3	24.1	42.3	40.3	17.4	35.7
Head (calc.)	1985	100	0.30	0.40	2.26	0.40	0.51	0.05	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**44.7**	**2.25**	**11.3**	**2.84**	**16.5**	**2.88**	**13.7**	**0.98**	**83.6**	**15.8**	**16.4**	**16.1**	**60.3**	**48.6**
2nd Clnr Conc	102	5.11	5.16	2.29	9.23	1.98	6.73	0.47	86.6	29.0	20.8	25.2	67.3	53.0
1st Clnr Conc	166	8.35	3.23	2.63	8.15	1.80	4.58	0.31	88.6	54.3	30.0	37.3	74.7	57.3
1st Cl & ClScv Conc	196	9.89	2.75	2.65	8.18	1.67	3.97	0.27	89.4	64.8	35.7	40.9	76.7	58.3
Rghr Conc	**375**	**18.9**	**1.46**	**1.62**	**6.91**	**1.27**	**2.23**	**0.15**	**90.7**	**75.9**	**57.7**	**59.7**	**82.6**	**64.3**

Cleaner Circuit Unit Performance	Mass rec	Upgrade						Unit Recovery					
	12%	7.74	1.75	2.39	2.27	6.14	6.35	94%	36%	67%	58%	80%	85%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	44.7	2.3	32.8	8.04	6.27	52.9	83.6	16.3	3.4	1.3		
3rd Cleaner Tail	56.8	2.9	0.93	5.27	3.81	90.0	3.0	13.6	2.6	2.7		
2nd Cleaner Tail	64.2	3.2	0.55	8.96	8.66	81.8	2.0	26.2	6.7	2.8		
1st Cleaner Scav Co	30.6	1.5	0.43	7.69	15.0	76.9	0.8	10.7	5.5	1.3		
1st Cleaner Scav Tai	179.1	9.0	0.13	1.28	13.3	85.3	1.3	10.4	28.7	8.2		
Rougher Tail	1610	81.1	0.10	0.31	2.74	96.8	9.3	22.8	53.1	83.7		
Head (calc.)	1985.0	100	0.88	1.11	4.2	93.8	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		2.3	32.8	8.04	6.27	52.9	83.6	16.3	3.4	1.3	14.1	17.6
2nd Cleaner Conc		5.1	14.9	6.49	4.89	73.7	86.6	30.0	6.0	4.0	7.4	9.2
1st Cleaner Conc		8.3	9.37	7.45	6.35	76.8	88.6	56.1	12.7	6.8	5.9	6.7
1st Cl + Sc Conc		9.9	7.97	7.48	7.69	76.8	89.4	66.8	18.2	8.1	5.4	5.9
Rougher Conc		18.9	4.23	4.52	10.4	80.9	90.7	77.2	46.9	16.3	3.1	3.7
Rougher Tail'		81.1	0.10	0.31	2.74	96.8	9.3	22.8	53.1	83.7		

Test No.: F12 **Project No.**: 50149-001 **Operator**: YW **Date**: 01-Nov-11

Purpose: Cleaner flotation test, Repeat F10 with higher CMC in the clnrs
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t: Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Time, minutes: Grind	Cond.	Froth	pH	Eh
Grind		5						57				
Condition												
Rougher 1			10						1	2	8.9	25.3
Rougher 2		5	5						1	2	8.8	-9.1
Rougher 3		10	5						1	4	8.8	-9.5
Rougher 4		20	5						1	6	8.8	-27.8
Regrind (PM)								0				
1st Cleaner		5		75					1	8	8.8	19.3
1st Cleaner Scav		10							1	4	8.5	-9.2
2nd Cleaner			5	75					1	6	8.7	29.0
3rd Cleaner			5	50					1	4	8.6	39.2
Total	0	55	35	200			0	57	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight g	%	Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %) Cu	Ni	S	Pt	Pd	Au	% Distribution Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	61.5	3.1	10.2	8.02	26.2	3.62	9.14	0.99	79.2	48.5	23.0	22.1	52.8	52.7
3rd Clnr Tls	102.2	5.1	0.76	2.46	14.3	2.36	2.13	0.14	9.8	24.7	20.8	23.9	20.4	12.4
2nd Clnr Tls	143.1	7.2	0.19	0.50	5.92	0.93	0.57	0.04	3.4	7.0	12.1	13	7.7	5.0
1st Clnr Scv Conc	33.9	1.7	0.12	0.39	7.57	0.93	0.44	0.04	0.5	1.3	3.7	3.1	1.4	1.2
1st Clnr Scv Tls	112.4	5.6	0.04	0.16	2.54	0.34	0.16	0.02	0.6	1.8	4.1	3.8	1.7	1.9
Rougher Tails	1548	77.4	0.03	0.11	1.65	0.22	0.11	0.02	6.4	16.7	36.4	33.8	16.0	26.8
			Ni(S)=	0.07										
Head (calc.)	2001	100	0.40	0.51	3.51	0.50	0.53	0.06	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

1st Clnr Scv Tls Ni(S)=0.12

Combined Products

Product	Weight g	%	Assays, (Pt, Pd, Au g/t), (Cu, Ni, fe, MgO %) Cu	Ni	S	Pt	Pd	Au	% Distribution Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**61.5**	**3.07**	**10.2**	**8.02**	**26.2**	**3.62**	**9.1**	**0.99**	**79.2**	**48.5**	**23.0**	**22.1**	**52.8**	**52.7**
2nd Clnr Conc	164	8.18	4.31	4.55	18.8	2.83	4.76	0.46	89.0	73.2	43.8	46.1	73.3	65.1
1st Clnr Conc	307	15.3	2.39	2.66	12.8	1.95	2.81	0.26	92.4	80.2	55.9	59.3	80.9	70.1
1st Cl & ClScv Conc	341	17.0	2.16	2.43	12.3	1.84	2.57	0.24	92.9	81.5	59.5	62.4	82.3	71.2
Rghr Conc	**453**	**22.6**	**1.64**	**1.87**	**9.85**	**1.47**	**1.97**	**0.19**	**93.6**	**83.3**	**63.6**	**66.2**	**84.0**	**73.2**

	Mass rec	Upgrade						Unit Recovery					
Cleaner Circuit Unit Performance	14%	6.24	4.29	2.66	2.46	4.63	5.31	85%	60%	43%	39%	65%	75%

Product	Weight g	%	Assays, % Cp	Pn	Po	Gangue	% Distribution Cp	Pn	Po	Gangue	Cu+Ni	PGE
3rd Cleaner Conc	61.5	3.1	29.6	22.7	22.0	25.7	79.2	50.7	9.7	0.9		
3rd Cleaner Tail	102.2	5.1	2.20	6.69	29.8	61.3	9.8	24.9	21.8	3.5		
2nd Cleaner Tail	143.1	7.2	0.55	1.27	14.0	84.2	3.4	6.6	14.3	6.7		
1st Cleaner Scav Conc	33.9	1.7	0.35	0.90	18.8	79.9	0.5	1.1	4.6	1.5		
1st Cleaner Scav Tail	112.4	5.6	0.13	0.39	6.2	93.3	0.6	1.6	5.0	5.8		
Rougher Tail	1548	77.4	0.10	0.27	4.0	95.6	6.4	15.1	44.6	81.7		
Head (calc.)	2001	100	1.15	1.37	7.0	90.5	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		3.1	29.6	22.7	22.0	25.7	79.2	50.7	9.7	0.9	18.2	13.8
2nd Cleaner Conc		8.2	12.5	12.7	26.9	47.9	89.0	75.6	31.5	4.3	8.9	8.1
1st Cleaner Conc		15.3	6.92	7.36	20.9	64.9	92.4	82.2	45.8	11.0	5.0	5.0
1st Cl + Sc Conc		17.0	6.26	6.72	20.7	66.4	92.9	83.3	50.4	12.5	4.6	4.7
Rougher Conc		22.6	4.74	5.15	17.1	73.0	93.6	84.9	55.4	18.3	3.5	3.6
Rougher Tail'		77.4	0.10	0.27	4.02	95.6	6.4	15.1	44.6	81.7		

Test No.: F13 **Project No.**: 50149-001 **Operator**: YW **Date**: 01-Nov-11

Purpose: Cleaner flotation test, Repeat F12 with guar gum in the clnrs
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	Guar Gum	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	9.1	24.8
Rougher 2		5	5						1	2	9.0	-17.5
Rougher 3		10	5						1	4	9.0	-47.0
Rougher 4		20	5						1	6	8.9	-86.6
Regrind (PM)								0				
1st Cleaner		5		50			75		1	8	9.0	19.2
1st Cleaner Scav		10							1	4	8.6	-21.1
2nd Cleaner			5	50			150		1	6	8.8	40.2
3rd Cleaner			5	50			150		1	4	8.6	53.8
Total	0	55	35	150			375	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	14.3	0.7	20.7	4.23	27.9	2.78	10.0	1.60	50.9	7.7	9.1	4.9	15.0	26.1
3rd Clnr Tls	25.2	1.3	4.54	4.17	13.7	3.86	8.22	0.51	19.7	13.4	7.9	12.1	21.8	14.7
2nd Clnr Tls	134	7.0	0.70	3.04	10.5	2.27	2.92	0.12	16.1	51.8	32.2	38	41.1	18.4
1st Clnr Scv Conc	50.2	2.6	0.11	0.32	5.59	0.76	0.45	0.04	0.9	2.0	6.4	4.7	2.4	2.3
1st Clnr Scv Tls	188	9.8	0.05	0.17	2.45	0.37	0.20	0.02	1.5	4.1	10.6	8.7	4.0	4.3
Rougher Tails	1503	78.5	0.04	0.11	0.98	0.17	0.10	< 0.02	10.9	21.0	33.7	31.8	15.8	34.3
Head (calc.)	1915	100	0.30	0.41	2.28	0.42	0.50	0.05	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**14.3**	**0.75**	**20.7**	**4.23**	**27.9**	**2.78**	**10.0**	**1.60**	**50.9**	**7.7**	**9.1**	**4.9**	**15.0**	**26.1**
2nd Clnr Conc	39.5	2.06	10.4	4.19	18.8	3.47	8.86	0.90	70.6	21.0	17.0	17.0	36.8	40.8
1st Clnr Conc	173.6	9.06	2.90	3.30	12.4	2.54	4.27	0.30	86.7	72.9	49.3	54.9	77.9	59.1
1st Cl & ClScv Conc	223.8	11.7	2.28	2.63	10.9	2.14	3.42	0.24	87.7	74.9	55.7	59.6	80.3	61.4
Rghr Conc	**412.0**	**21.5**	**1.26**	**1.51**	**7.02**	**1.33**	**1.95**	**0.14**	**89.1**	**79.0**	**66.3**	**68.2**	**84.2**	**65.7**

	Mass rec	Upgrade						Unit Recovery					
Cleaner Circuit Unit Performance	3%	16.4	2.81	3.97	2.09	5.14	11.45	59%	15%	30%	20%	23%	46%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue	Cu+Ni	PGE
3rd Cleaner Conc	14.3	0.7	60.0	12.0	7.74	20.3	50.9	8.0	1.4	0.2		
3rd Cleaner Tail	25.2	1.3	13.2	11.8	13.7	61.4	19.7	13.7	4.3	0.9		
2nd Cleaner Tail	134	7.0	2.03	8.48	18.4	71.1	16.1	52.7	30.6	5.3		
1st Cleaner Scav Co	50.2	2.6	0.32	0.76	13.8	85.2	0.9	1.8	8.6	2.4		
1st Cleaner Scav Tai	188	9.8	0.13	0.42	6.0	93.5	1.5	3.6	13.9	9.8		
Rougher Tail	1503	78.5	0.12	0.29	2.22	97.4	10.9	20.2	41.3	81.5		
Head (calc.)	1915.2	100	0.88	1.13	4.2	93.8	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		0.7	60.0	12.0	7.74	20.3	50.9	8.0	1.4	0.2	24.9	14.4
2nd Cleaner Conc		2.1	30.1	11.8	11.6	46.5	70.6	21.7	5.7	1.0	14.6	13.2
1st Cleaner Conc		9.1	8.42	9.24	16.8	65.5	86.7	74.4	36.2	6.3	6.2	7.1
1st Cl + Sc Conc		11.7	6.60	7.34	16.2	69.9	87.7	76.2	44.8	8.7	4.9	5.8
Rougher Conc		21.5	3.65	4.18	11.5	80.7	89.1	79.8	58.7	18.5	2.8	3.4
Rougher Tail'		78.5	0.12	0.29	2.22	97.4	10.9	20.2	41.3	81.5		

Test No.: F14 **Project No.**: 50149-001 **Operator**: YW **Date**: 28-Oct-11

Purpose: Cleaner flotation test, Repeat F12 with disperssant in the clnrs
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	Calgon	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.8	62.1
Rougher 2		5	5						1	2	8.8	59.8
Rougher 3		10	5						1	4	8.8	28.4
Rougher 4		20	5						1	6	8.8	46.7
Regrind (PM)								0				
1st Cleaner		5					150		1	8	8.9	59.1
1st Cleaner Scav		10							1	4	8.5	63.1
2nd Cleaner			5				75		1	6	8.7	63.5
3rd Cleaner			5				75		1	4	8.5	74.4
Total	0	55	35	0			300	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	136.5	6.9	3.88	4.16	13.4	2.51	4.96	0.26	88.6	63.9	39.6	39.2	68.1	42.1
3rd Clnr Tls	41.0	2.1	0.38	1.01	5.30	1.56	1.13	0.21	2.6	4.7	4.7	7.3	4.7	10.2
2nd Clnr Tls	42.9	2.2	0.21	0.64	4.89	1.22	0.64	0.06	1.5	3.1	4.5	6	2.8	3.1
1st Clnr Scv Conc	36.3	1.8	0.21	0.55	7.65	1.21	0.72	0.05	1.3	2.2	6.0	5.0	2.6	2.2
1st Clnr Scv Tls	135.1	6.8	0.04	0.19	2.44	0.39	0.20	0.03	1.0	2.9	7.1	6	2.7	4.8
Rougher Tails	1591	80.2	0.02	0.13	1.10	0.20	0.12	0.02	5.1	23.3	37.9	36.4	19.2	37.7
Head (calc.)	1983	100	0.30	0.45	2.33	0.44	0.50	0.04	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc		**6.88**	**3.88**	**4.16**	**13.4**	**2.51**	**5.0**	**0.26**	**88.6**	**63.9**	**39.6**	**39.2**	**68.1**	**42.1**
2nd Clnr Conc		8.95	3.07	3.43	11.5	2.29	4.08	0.25	91.2	68.5	44.4	46.5	72.7	52.3
1st Clnr Conc		11.1	2.51	2.89	10.2	2.08	3.41	0.21	92.7	71.6	48.9	52.5	75.5	55.3
1st Cl & ClScv Conc		12.9	2.19	2.56	9.87	1.96	3.03	0.19	94.0	73.9	54.9	57.6	78.1	57.5
Rghr Conc		**19.8**	**1.45**	**1.74**	**7.31**	**1.42**	**2.05**	**0.13**	**94.9**	**76.7**	**62.1**	**63.6**	**80.8**	**62.3**

Cleaner Circuit Unit Performance	Mass rec	Upgrade						Unit Recovery					
	35%	2.68	2.39	1.83	1.77	2.42	1.94	94%	87%	75%	71%	88%	75%

Product	Weight		Assays, %				% Distribution				Cu+Ni	PGE
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	136.5	6.9	11.2	11.7	14.7	62.3	88.6	65.4	23.9	4.6		
3rd Cleaner Tail	41.0	2.1	1.10	2.77	10.5	85.6	2.6	4.6	5.1	1.9		
2nd Cleaner Tail	42.9	2.2	0.61	1.70	10.8	86.9	1.5	3.0	5.5	2.0		
1st Cleaner Scav Co	36.3	1.8	0.61	1.36	18.4	79.6	1.3	2.0	7.9	1.6		
1st Cleaner Scav Tai	135.1	6.8	0.12	0.48	5.9	93.5	1.0	2.6	9.5	6.8		
Rougher Tail	1591	80.2	0.06	0.34	2.55	97.1	5.1	22.3	48.1	83.2		
Head (calc.)	1982.8	100	0.87	1.23	4.2	93.6	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		6.9	11.2	11.7	14.7	62.3	88.6	65.4	23.9	4.6	8.0	7.7
2nd Cleaner Conc		9.0	8.9	9.65	13.8	67.7	91.2	70.1	29.0	6.5	6.5	6.6
1st Cleaner Conc		11.1	7.29	8.10	13.2	71.4	92.7	73.1	34.5	8.5	5.4	5.7
1st Cl + Sc Conc		12.9	6.34	7.15	13.9	72.6	94.0	75.1	42.4	10.0	4.7	5.2
Rougher Conc		19.8	4.20	4.85	11.2	79.8	94.9	77.7	51.9	16.8	3.2	3.6
Rougher Tail'		80.2	0.06	0.34	2.55	97.1	5.1	22.3	48.1	83.2		

Test No.: F15 **Project No.**: 50149-001 **Operator**: YW **Date**: 08-Nov-11

Purpose: Cleaner flotation test, Repeat F13 adjust CMC and Guar gum dosages
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	Guar Gum	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.3	33.8
Rougher 2		5	5						1	2	8.5	7.9
Rougher 3		10	5						1	4	8.5	-2.1
Rougher 4		20	5						1	6	8.6	-18.5
Regrind (PM)								0				
1st Cleaner		5		50			75		1	8	8.7	4.0
1st Cleaner Scav		10	5						1	4	8.8	0.3
2nd Cleaner			10	20			30		1	6	8.9	-22.4
3rd Cleaner			10	5			7.5		1	4	8.7	49.3
Total	0	55	50	75			113	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	31.6	1.6	15.4	3.68	23.3	3.29	11.4	0.89	76.9	13.6	16.2	12.9	37.9	31.7
3rd Clnr Tls	29.2	1.5	1.38	8.31	15.1	3.00	6.04	0.60	6.4	28.5	9.7	10.9	18.6	19.8
2nd Clnr Tls	81.5	4.1	0.28	2.64	8.89	1.86	2.05	0.07	3.6	25.3	16.0	18.8	17.6	6.4
1st Clnr Scv Conc	60.1	3.0	0.13	0.54	6.73	0.94	0.51	0.03	1.2	3.8	8.9	7.0	3.2	2.0
1st Clnr Scv Tls	143	7.2	0.07	0.23	2.70	0.56	0.25	0.02	1.6	3.9	8.5	9.9	3.8	3.2
Rougher Tails	1635	82.5	0.04	0.13	1.13	0.20	0.11	< 0.02	10.3	24.9	40.7	40.5	18.9	36.9
Head (calc.)	1980	100	0.32	0.43	2.29	0.41	0.48	0.04	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**31.6**	**1.60**	**15.4**	**3.68**	**23.3**	**3.29**	**11.4**	**0.89**	**76.9**	**13.6**	**16.2**	**12.9**	**37.9**	**31.7**
2nd Clnr Conc	60.8	3.07	8.67	5.90	19.4	3.15	8.83	0.75	83.2	42.1	25.9	23.7	56.5	51.5
1st Clnr Conc	142.3	7.19	3.86	4.03	13.4	2.41	4.95	0.36	86.8	67.4	41.9	42.5	74.1	57.9
1st Cl & ClScv Conc	202.4	10.2	2.75	3.00	11.4	1.97	3.63	0.26	88.1	71.2	50.8	49.5	77.3	59.9
Rghr Conc	**345.7**	**17.5**	**1.64**	**1.85**	**7.79**	**1.39**	**2.23**	**0.16**	**89.7**	**75.1**	**59.3**	**59.5**	**81.1**	**63.1**

Cleaner Circuit Unit Performance	Mass rec	Upgrade						Unit Recovery					
	9%	9.38	1.99	2.99	2.37	5.12	5.49	88%	23%	42%	38%	51%	55%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	44.7	2.3	44.6	10.4	11.2	33.8	79.5	15.6	6.1	0.8		
3rd Cleaner Tail	56.8	2.9	4.00	23.6	15.6	56.8	9.1	45.0	10.8	1.7		
2nd Cleaner Tail	64.2	3.2	0.81	7.36	16.3	75.6	2.1	15.9	12.7	2.6		
1st Cleaner Scav Co	30.6	1.5	0.38	1.36	16.2	82.1	0.5	1.4	6.0	1.4		
1st Cleaner Scav Tai	179.1	9.0	0.21	0.58	6.4	92.8	1.5	3.5	14.0	9.0		
Rougher Tail	1610	81.1	0.12	0.34	2.57	97.0	7.4	18.5	50.4	84.5		
Head (calc.)	1985.0	100	1.26	1.50	4.1	93.1	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		2.3	44.6	10.4	11.2	33.8	79.5	15.6	6.1	0.8	19.1	15.6
2nd Cleaner Conc		5.1	21.9	17.8	13.6	46.7	88.6	60.7	16.9	2.6	14.6	12.7
1st Cleaner Conc		8.3	13.7	13.7	14.7	57.9	90.6	76.6	29.6	5.2	7.9	7.7
1st Cl + Sc Conc		9.9	11.6	11.8	14.9	61.7	91.1	78.0	35.6	6.5	5.8	5.9
Rougher Conc		18.9	6.19	6.45	10.8	76.5	92.6	81.5	49.6	15.5	3.5	3.8
Rougher Tail'		81.1	0.12	0.34	2.57	97.0	7.4	18.5	50.4	84.5		

Test No.: F16 **Project No.:** 50149-001 **Operator:** YW **Date:** Nov 15 2011

Purpose: Cleaner flotation test, Repeat F15 adjust CMC and Guar gum dosages
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	Guar Gum	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.9	41.4
Rougher 2		5	5						1	2	8.4	41.3
Rougher 3		10	5						1	4	8.4	33.4
Rougher 4		20	5						1	6	8.2	27.1
Regrind (PM)								0				
1st Cleaner		5		50			75		1	8	8.9	40.3
1st Cleaner Scav		10	5						1	4	8.8	-24.3
2nd Cleaner			10	10			7.5		1	6	9.2	57.5
3rd Cleaner			10	5			2.5		1	4	8.8	56.1
Total	0	55	50	65			85	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

target mass pull including paper 73 gr Actual 81 gr

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	48.1	2.4	11.9	6.58	24.0	2.69	8.55	0.85	79.7	33.0	18.3	15.0	45.1	43.4
3rd Clnr Tls	36.9	1.9	1.22	6.17	14.4	2.31	3.45	0.19	6.3	23.7	8.4	9.9	14.0	7.4
2nd Clnr Tls	74.1	3.7	0.33	1.81	9.23	1.76	1.60	0.10	3.4	14.0	10.9	15.2	13.0	7.9
1st Clnr Scv Conc	61.9	3.1	0.15	0.72	12.2	1.31	0.72	0.06	1.3	4.6	12.0	9.4	4.9	3.9
1st Clnr Scv Tls	189	9.5	0.06	0.26	3.58	0.47	0.20	0.02	1.7	5.1	10.7	10.3	4.1	4.0
Rougher Tails	1570	79.3	0.04	0.12	1.59	0.22	0.11	0.02	7.7	19.6	39.6	40.2	18.9	33.3
Head (calc.)	1980	100	0.36	0.49	3.18	0.43	0.46	0.05	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**48.1**	**2.4**	**11.9**	**6.58**	**24.0**	**2.69**	**8.55**	**0.85**	**79.7**	**33.0**	**18.3**	**15.0**	**45.1**	**43.4**
2nd Clnr Conc	85.0	4.3	7.26	6.40	19.8	2.53	6.34	0.56	86.0	56.7	26.8	24.9	59.0	50.8
1st Clnr Conc	159	8.0	4.03	4.26	14.9	2.17	4.13	0.35	89.4	70.6	37.6	40.1	72.0	58.7
1st Cl & ClScv Conc	221	11.2	2.95	3.27	14.1	1.93	3.18	0.27	90.7	75.3	49.6	49.5	76.9	62.7
Rghr Conc	**410**	**20.7**	**1.62**	**1.88**	**9.28**	**1.26**	**1.80**	**0.15**	**92.3**	**80.4**	**60.4**	**59.8**	**81.1**	**66.7**

Cleaner Circuit Unit Performance	Mass rec	Upgrade						Unit Recovery					
	12%	7.35	3.49	2.59	2.14	4.74	5.55	88%	47%	48%	42%	61%	71%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	48.1	2.4	34.5	18.6	15.2	31.7	79.7	34.4	5.9	0.8		
3rd Cleaner Tail	36.9	1.9	3.54	17.4	19.5	59.5	6.3	24.7	5.8	1.2		
2nd Cleaner Tail	74.1	3.7	0.96	4.95	19.1	75.0	3.4	14.1	11.4	3.1		
1st Cleaner Scav Co	61.9	3.1	0.43	1.71	30.2	67.6	1.3	4.1	15.1	2.3		
1st Cleaner Scav Tai	188.7	9.5	0.18	0.64	8.7	90.5	1.7	4.7	13.2	9.4		
Rougher Tail	1570	79.3	0.10	0.30	3.83	95.8	7.7	18.0	48.5	83.1		
Head (calc.)	1979.9	100	1.05	1.31	6.3	91.4	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		2.4	34.5	18.6	15.2	31.7	79.7	34.4	5.9	0.8	18.5	12.1
2nd Cleaner Conc		4.3	21.1	18.1	17.1	43.8	86.0	59.1	11.7	2.1	13.7	9.4
1st Cleaner Conc		8.0	11.69	12.0	18.0	58.3	89.4	73.2	23.1	5.1	8.3	6.6
1st Cl + Sc Conc		11.2	8.54	9.10	21.4	60.9	90.7	77.3	38.2	7.4	6.2	5.4
Rougher Conc		20.7	4.69	5.21	15.6	74.5	92.3	82.0	51.5	16.9	3.5	3.2
Rougher Tail'		79.3	0.10	0.30	3.83	95.8	7.7	18.0	48.5	83.1		

Test No.: F17 **Project No.**: 50149-001 **Operator**: YW **Date**: Nov 22 2011

Purpose: Cleaner flotation test, Repeat F12 with lower CMC in the second and third clnrs
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3501	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.9	11.0
Rougher 2		5	5						1	2	8.8	20.0
Rougher 3		10	5						1	4	8.8	-0.7
Rougher 4		20	5						1	6	8.9	-2.0
Regrind (PM)								0				
1st Cleaner		5		75					1	8	8.9	25.5
1st Cleaner Scav		10							1	4	8.6	57.6
2nd Cleaner			5	35					1	6	8.8	54.3
3rd Cleaner			5	10					1	4	8.6	63.2
Total	0	55	35	120			0	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au
MgO assay for 3rd Clnr Conc.

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	48.3	2.4	11.2	7.85	26.3	3.21	8.70	0.59	30.0	3.70	74.1	40.7	20.0	18.2	46.0	31.5	5.8	0.4
3rd Clnr Tls	47.5	2.4	1.46	4.24	15.8	2.70	3.32	0.27	24.6	12.1	9.5	21.6	11.8	15.1	17.3	14.2	4.7	1.4
2nd Clnr Tls	121	6.1	0.34	0.90	6.60	1.20	0.89	0.09	15.8	20.6	5.7	11.7	12.6	17.1	11.8	12.1	7.6	5.9
1st Clnr Scv Conc	38.3	1.9	0.17	0.54	11.4	1.13	0.63	0.06	23.4	17.2	0.9	2.2	6.9	5.1	2.6	2.5	3.6	1.6
1st Clnr Scv Tls	149	7.5	0.05	0.21	3.94	0.43	0.20	0.03	13.7	21.2	1.0	3.4	9.2	7.5	3.3	4.9	8.1	7.4
Rougher Tails	1575	79.6	0.04	0.12	1.60	0.20	0.11	< 0.02	11.2	22.5	8.8	20.3	39.6	37.0	19.0	34.8	70.3	83.4
Head (calc.)	1979	100	0.37	0.47	3.22	0.43	0.46	0.05	12.7	21.5	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**48.3**	**2.44**	**11.2**	**7.85**	**26.3**	**3.21**	**8.70**	**0.59**	**30.0**	**3.70**	**74.1**	**40.7**	**20.0**	**18.2**	**46.0**	**31.5**	**5.8**	**0.4**
2nd Clnr Conc	95.8	4.84	6.37	6.06	21.1	2.96	6.03	0.43	27.3	7.86	83.6	62.4	31.8	33.3	63.3	45.7	10.4	1.8
1st Clnr Conc	217	11.0	3.00	3.18	13.0	1.98	3.16	0.24	20.9	15.0	89.2	74.1	44.3	50.4	75.1	57.7	18.1	7.7
1st Cl & ClScv Conc	256	12.9	2.58	2.78	12.8	1.85	2.78	0.21	21.3	15.3	90.1	76.3	51.2	55.5	77.8	60.3	21.6	9.2
Rghr Conc	**404**	**20.4**	**1.65**	**1.84**	**9.51**	**1.33**	**1.83**	**0.15**	**18.5**	**17.5**	**91.2**	**79.7**	**60.4**	**63.0**	**81.0**	**65.2**	**29.7**	**16.6**

Cleaner Circuit Unit Performance	Mass rec	Upgrade								Unit Recovery							
	12%	6.80	4.28	2.76	2.42	4.75	4.04	1.62	0.21	82%	55%	48%	41%	61%	56%	47%	47%

Product	Weight		Assays, %				% Distribution				Cu+Ni	PGE
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	48.3	2.4	32.5	22.2	20.0	25.3	74.1	42.6	7.7	0.7		
3rd Cleaner Tail	47.5	2.4	4.23	11.8	27.4	56.5	9.5	22.3	10.3	1.5		
2nd Cleaner Tail	121.4	6.1	0.99	2.41	14.4	82.2	5.7	11.6	13.8	5.5		
1st Cleaner Scav Co	38.3	1.9	0.49	1.22	28.5	69.8	0.9	1.9	8.7	1.5		
1st Cleaner Scav Tai	148.6	7.5	0.15	0.49	9.81	89.6	1.0	2.9	11.6	7.4		
Rougher Tail	1575	79.6	0.12	0.30	3.84	95.7	8.8	18.7	48.0	83.5		
Head (calc.)	1978.7	100	1.07	1.27	6.37	91.3	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		2.4	32.5	22.2	20.0	25.3	74.1	42.6	7.7	0.7	19.1	12.5
2nd Cleaner Conc		4.8	18.5	17.0	23.7	40.8	83.6	64.9	18.0	2.2	12.4	9.4
1st Cleaner Conc		11.0	8.70	8.86	18.5	64.0	89.2	76.5	31.8	7.7	6.2	5.4
1st Cl + Sc Conc		12.9	7.47	7.72	20.0	64.8	90.1	78.4	40.5	9.2	5.4	4.8
Rougher Conc		20.4	4.77	5.06	16.2	73.9	91.2	81.3	52.0	16.5	3.5	3.3
Rougher Tail'		79.6	0.12	0.30	3.84	95.7	8.8	18.7	48.0	83.5		

Test No.: F18 **Project No.**: 50149-001 **Operator**: YW **Date**: Dec 10 2011

Purpose: To try split flowsheet
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 88 minutes / 2 kg @ 65% solids in laboratory Ball Mill — Target Primary grind: K_{80} = 50 µm.
Regrind:
Conditions:

Stage		Reagents added, g/t Lime	SIPX	MIBC*	CMC*	DF250	PAX	3501	Time, minutes Grind	Cond.	Froth	pH	Eh
Grind			5						88				
Rougher 1(High Cu Pre-float)				10						1	2	8.9	63.7
Rougher 2			5	5						1	2	8.9	24.2
Keep Rghr I,2 Conc. Separate for Cleaning													
Rougher 3			10	5						1	4	8.8	24.5
Rougher 4			20	5						1	4	8.8	-15.5
Rougher 5			30							1	8	8.7	17.5
Combine Bulk Rghrs 3-5													
Bulk cleaner 1			3		30					1	3	8.8	38.7
			2		25					1	3	8.7	43.0
			2		10					1	2	8.5	64.3
Bulk cleaner 1 scavanger			10							1	4	8.5	-24.1
Combine Bulk Clnr 1 conc. & Bulk Clnr 1 scave conc.													
Bulk cleaner 2				5	60						6	8.7	43.5
Bulk cleaner 3				5	10						4	8.4	74.3
Clean Rougher 1 (Cu Pre-float)													
Ro1-2 Cu Clnr 1			4		5					1	2	8.7	84.4
Ro1-2 Cu Clnr 2		140								1	1.5	10.8	-64.5
Ro1-2 Cu Clnr 3 (High Cu Conc.)		985								1	1	11.5	-108.3
Total		1125	91	35	140		0	0	88	12	46.5		

Stage	Roughers	1stClnr and Scav	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

*As needed

Assay for: Cu, Ni, Pt, Pd, Au, S, Fe, MgO
Assay for: Ni(S) for Bulk rougher tail

Metallurgical Balance

Product	Weight g	%	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %) Cu	Ni	Pt	Pd	Au	S	Fe	MgO	% Distribution Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk Clnr 3 Conc.	15.3	0.8	1.34	4.02	7.10	2.68	0.33	19.7	29.2	2.74	2.9	6.8	13.5	4.7	5.2	5.1	1.7	0.1
Bulk Clnr 3 Tail	17.2	0.9	0.61	2.22	3.77	1.84	0.14	20.6	38.6	8.86	1.5	4.2	8.0	3.6	2.5	6.0	2.5	0.4
Bulk Clnr 2 Tail	85.6	4.3	0.25	0.76	1.44	0.78	0.07	10.1	22.6	17.8	3.1	7.2	15.3	7.7	6.2	14.5	7.3	3.5
Bulk Clnr 1 Scav.Tail	123	6.2	0.08	0.23	0.43	0.23	0.02	4.23	14.3	22.5	1.4	3.1	6.6	3.3	2.6	8.8	6.7	6.4
Bulk Rougher Tail	1554	78.4	0.04	0.11	0.14	0.07	0.02	1.51	12.0	22.7	8.0	18.9	27.0	12.5	32.3	39.5	70.8	81.2
Ro1-2 Cu Clnr 3 Conc.	6.6	0.3	28.4	0.46	1.82	13.20	1.72	29.5	28.4	2.79	26.9	0.3	1.5	10.0	11.8	3.3	0.7	0.0
Ro1-2 Cu Clnr 3 Tail	16.2	0.8	16.2	1.67	2.51	10.60	1.43	19.6	23.7	9.09	37.6	3.0	5.0	19.7	24.1	5.3	1.5	0.3
Ro1-2 Cu Clnr 2 Tail	36.9	1.9	2.27	5.03	1.59	4.96	0.19	9.21	15.7	18.5	12.0	20.5	7.3	21.0	7.3	5.7	2.2	1.6
Ro1-2 Cu Clnr 1 Tail	128	6.5	0.36	2.54	0.99	1.19	0.06	5.50	13.5	22.1	6.6	36.0	15.8	17.5	8.0	11.9	6.6	6.5
Head (calc.)	1984	100	0.35	0.46	0.41	0.44	0.05	3.00	13.3	21.9	100.0	100	100	100	100.0	100	100	100
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								

Bulk Rghr Tail Ni(S)= 0.06
Ro1-2 Cu Clnr 1 Tail Ni(S)= 2.36

Combined Products

Product	Weight %	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %) Cu	Ni	Pt	Pd	Au	S	Fe	MgO	% Distribution Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk Clnr 3 Conc	**0.8**	**1.34**	**4.02**	**7.10**	**2.68**	**0.33**	**19.7**	**29.2**	**2.74**	**2.9**	**6.8**	**13.5**	**4.7**	**5.2**	**5.1**	**1.7**	**0.1**
Bulk Clnr 2 Conc	1.6	0.95	3.07	5.34	2.24	0.23	20.2	34.2	5.98	4.4	11.0	21.5	8.3	7.7	11.0	4.2	0.4
Bulk Clnr 1 + Clnr 1 Scav Conc	6.0	0.44	1.39	2.51	1.18	0.11	12.9	25.8	14.5	7.5	18.2	36.8	16.0	14.0	25.6	11.6	4.0
Bulk Rghr 3-5 Conc	**12.2**	**0.26**	**0.80**	**1.45**	**0.70**	**0.07**	**8.46**	**19.9**	**18.6**	**8.9**	**21.3**	**43.4**	**19.3**	**16.5**	**34.3**	**18.3**	**10.3**
Bulk Rghr Tail	78.4	0.04	0.11	0.14	0.07	0.02	1.51	12.0	22.7	8.0	18.9	27.0	12.5	32.3	39.5	70.8	81.2
Ro1-2 Cu Clnr 3 Conc.(High Cu Con	**0.3**	**28.4**	**0.46**	**1.82**	**13.2**	**1.72**	**29.5**	**28.4**	**2.79**	**26.9**	**0.3**	**1.5**	**10.0**	**11.8**	**3.3**	**0.7**	**0.0**
Ro1-2 Cu Clnr 2 Conc.	1.1	19.7	1.32	2.31	11.4	1.51	22.5	25.1	7.27	64.5	3.3	6.5	29.7	35.9	8.6	2.2	0.4
Ro1-2 Cu Clnr 1 Conc.	3.0	8.94	3.61	1.87	7.40	0.70	14.3	19.3	14.2	76.5	23.8	13.8	50.7	43.2	14.3	4.4	2.0
Rghr 1-2 Conc	**9.5**	**3.09**	**2.88**	**1.27**	**3.16**	**0.26**	**8.29**	**15.3**	**19.6**	**83.1**	**59.8**	**29.6**	**68.2**	**51.2**	**26.2**	**10.9**	**8.5**
Rghr 1-5 Conc	**21.6**	**1.50**	**1.71**	**1.37**	**1.78**	**0.15**	**8.38**	**17.9**	**19.0**	**92.0**	**81.1**	**73.0**	**87.5**	**67.7**	**60.5**	**29.2**	**18.8**

Test No.: Sep-F1 **Project No.**: 50149-001 **Operator**: **Date**: Dec 7 2011

Purpose:

Procedure: To conduct Cu/Ni separation test based on F12

Feed: As outlined below.

Grind: 2 kg of minus 10 mesh of Master Composite Target Primary grind: K_{80} = 90 µm.

Regrind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill

Conditions:

Stage	Reagents added, g/t								Time, minutes			pH	Eh
		Lime	SIPX	MIBC*	CMC	DF250	PAX	3501	Grind	Cond.	Froth		
Grind			5						57				
Condition										1			
Rougher 1				10						1	2	8.9	38.9
Rougher 2			5	5						1	2	8.8	41.0
Rougher 3			10	5						1	4	8.8	11.4
Rougher 4			20	5						1	4	8.7	-3.5
Rougher 5			30							1	8	8.7	-35.2
Cleaner													
Regrind													
1st cleaner			5		75					1	8	8.6	43.6
1st cleaner scavanger			10							1	4	8.5	12.6
Combine 1st Clnr conc. & 1st Clnr scave conc.													
2nd cleaner				5	75					1	6	8.6	74.1
3rd cleaner				5	50					1	4	8.5	60.0
Separation													
Regrind		100							5				
Cu Rougher		2380	5							1	2	11.5	-97.0
Cu Cleaner 1		3745								1	1.5	12.0	-89.2
Total		6225	90	35	200		0	0	62	12	45.5		

Stage	Roughers	1stClnr and Sca	2nd, 3rd Cleaner & Sep.
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Malvern on Cu/Ni separation circuit

Assay for: Cu, Ni, Pt, Pd, Au, S, Fe, MgO

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Cu Cleaner 1 Conc.	3.8	0.2	31.3	0.38	1.50	6.04	0.83	31.4	30.4	0.70	19.1	0.2	0.8	2.4	3.8	2.6	0.5	0.01
Cu Cleaner 1 Tails	17.2	0.9	14.9	2.01	2.38	9.83	0.71	20.5	19.3	1.90	41.1	4.2	5.4	17.7	14.6	7.8	1.4	0.07
Cu Rghr Tails(Ni Conc.)	40.1	2.0	2.51	9.75	4.52	9.47	0.33	22.3	31.9	5.70	16.2	47.4	24.0	39.7	15.9	19.8	5.3	0.49
Bulk 3rd Clnr Tail	39.7	2.0	0.87	2.42	2.61	2.54	0.20	11.6	24.0	16.7	5.5	11.7	13.7	10.5	9.5	10.2	4.0	1.41
Bulk 2nd Clnr Tail	129	6.5	0.24	0.62	0.97	0.72	0.09	5.56	15.5	23.0	5.0	9.7	16.6	9.7	13.9	15.9	8.3	6.30
Bulk 1st Clnr Scav.Tail	157	7.9	0.05	0.18	0.36	0.19	0.02	2.24	12.3	23.7	1.2	3.4	7.5	3.1	3.8	7.8	8.0	7.91
Bulk Rougher Tail	1610	80.6	0.05	0.12	0.15	0.10	< 0.02	1.01	10.8	24.5	11.9	23.4	32.0	16.8	38.6	36.0	72.5	83.8
			Ni(S)=	0.06														
Head (calc.)	1997	100	0.31	0.41	0.38	0.48	0.04	2.26	12.0	23.6	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								

Combined Products

Product	Weight	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, fe, MgO %)								% Distribution							
	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Cu Cleaner 1 Conc.	**0.2**	**31.3**	**0.38**	**1.50**	**6.04**	**0.83**	**31.4**	**30.4**	**0.70**	**19.1**	**0.2**	**0.8**	**2.4**	**3.8**	**2.6**	**0.5**	**0.0**
Cu Rghr Conc.	1.1	17.9	**1.72**	2.22	9.14	0.73	22.5	21.3	1.68	60.2	**4.4**	**6.2**	**20.1**	**18.4**	**10.4**	**1.9**	**0.1**
Ni Conc.	**2.0**	**2.51**	**9.75**	**4.52**	**9.47**	**0.33**	**22.3**	**31.9**	**5.70**	**16.2**	**47.4**	**24.0**	**39.7**	**15.9**	**19.8**	**5.3**	**0.5**
Bulk 3rd Clnr Conc	3.1	7.79	6.99	3.73	9.36	0.47	22.4	28.3	4.32	76.4	51.8	30.2	59.8	34.3	30.2	7.2	0.6
Bulk 2nd Clnr Conc	5.0	5.06	5.19	3.29	6.67	0.36	18.1	26.6	9.20	81.9	63.4	43.9	70.3	43.8	40.4	11.2	2.0
Bulk 1st Clnr + Clnr Scav Conc	11.5	2.36	2.63	1.99	3.33	0.21	11.1	20.4	16.9	86.9	73.1	60.5	80.0	57.7	56.3	19.5	8.3
Bulk Rghr Conc	**19.4**	**1.42**	**1.63**	**1.33**	**2.06**	**0.13**	**7.49**	**17.1**	**19.7**	**88.1**	**76.6**	**68.0**	**83.2**	**61.4**	**64.0**	**27.5**	**16.2**
Bulk Rghr Tail	80.6	0.05	0.12	0.15	0.10	0.02	1.01	10.8	24.5	11.9	23.4	32.0	16.8	38.6	36.0	72.5	83.8

Test No.: F19 **Project No.**: 50149-001 **Operator**: YW **Date**: December 8 2011

Purpose: Cleaner flotation test, coarse grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 40 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80}: 150 µm
Regind K_{80}: 23 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						40				
Condition												
Rougher 1			10						1	2	8.8	19.6
Rougher 2		5	5						1	2	8.8	50.4
Rougher 3		10	5						1	4	8.8	31.8
Rougher 4		20	5						1	6	8.7	54.7
Regrind (PM)								16				
1st Cleaner		5		75					1	8	8.7	74.6
1st Cleaner Scav		10							1	4	8.4	96.5
2nd Cleaner			5	75					1	6	8.5	80.7
3rd Cleaner			5	50					1	4	8.3	99.1
Total	0	55	35	200			0	56	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO
Ni(S) for Roghr tail
Malvern on regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	20.6	1.0	23.6	3.51	31.6	3.26	15.0	1.51	30.7	2.52	68.5	8.0	10.4	7.6	31.9	34.7	2.5	0.1
3rd Clnr Tls	18.3	0.9	2.31	8.72	15.3	4.02	8.55	0.47	23.6	12.4	6.0	17.6	4.5	8.3	16.2	9.6	1.7	0.5
2nd Clnr Tls	74.2	3.7	0.39	3.44	7.94	1.81	1.81	0.11	16.2	20.3	4.1	28.2	9.4	15	13.9	9.1	4.8	3.3
1st Clnr Scv Conc	23.9	1.2	0.20	2.57	10.4	2.08	1.05	0.07	20.8	18.3	0.7	6.8	4.0	5.6	2.6	1.9	2.0	1.0
1st Clnr Scv Tls	169.3	8.6	0.06	0.63	6.85	0.75	0.35	0.04	18.7	19.8	1.5	11.8	18.6	14.3	6.1	7.5	12.8	7.3
Rougher Tails	1672	84.5	0.08	0.15	1.98	0.26	0.17	0.02	11.3	24.1	19.3	27.7	53.1	49.0	29.4	37.3	76.1	87.8
			Ni(S)=	0.10														
Head (calc.)	1979	100	0.36	0.46	3.15	0.45	0.49	0.05	12.5	23.2	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**20.6**	**1.04**	**23.6**	**3.51**	**31.6**	**3.26**	**15.0**	**1.51**	**30.7**	**2.52**	**68.5**	**8.0**	**10.4**	**7.6**	**31.9**	**34.7**	**2.5**	**0.1**
2nd Clnr Conc	38.9	1.97	13.6	5.96	23.9	3.62	12.0	1.02	27.4	7.17	74.4	25.6	14.9	15.9	48.1	44.2	4.3	0.6
1st Clnr Conc	113.1	5.72	4.93	4.31	13.4	2.43	5.30	0.42	20.0	15.78	78.5	53.8	24.4	31.0	61.9	53.3	9.1	3.9
1st Cl & ClScv Conc	137.0	6.92	4.10	4.00	12.9	2.37	4.56	0.36	20.2	16.22	79.2	60.5	28.3	36.6	64.5	55.2	11.1	4.8
Rghr Conc	**306.3**	**15.5**	**1.87**	**2.14**	**9.56**	**1.47**	**2.23**	**0.18**	**19.4**	**18.20**	**80.7**	**72.3**	**46.9**	**51.0**	**70.6**	**62.7**	**23.9**	**12.2**

	Mass red	Upgrade								Unit Recovery							
Cleaner Circuit Unit Performance	7%	12.62	1.64	3.31	2.21	6.72	8.21	1.59	0.14	87%	27%	62%	43%	54%	67%	64%	61%

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
3rd Cleaner Conc	20.6	1.0	68.4	9.9	11.6	10.1	68.5	8.3	1.9	0.1
3rd Cleaner Tail	18.3	0.9	6.70	24.8	12.6	55.9	6.0	18.5	1.9	0.6
2nd Cleaner Tail	74.2	3.7	1.13	9.70	11.4	77.7	4.1	29.4	6.8	3.2
1st Cleaner Scav Coı	23.9	1.2	0.58	7.11	20.7	71.7	0.7	6.9	4.0	0.9
1st Cleaner Scav Tai	169.3	8.6	0.19	1.61	16.5	81.7	1.5	11.2	22.5	7.6
Rougher Tail	1672	84.5	0.24	0.38	4.67	94.7	19.3	25.6	62.9	87.5
Head (calc.)	1978.7	100	1.04	1.24	6.3	91.5	100	100	100	100
Combined Products										
3rd Cleaner Conc		1.0	68.4	9.9	11.6	10.1	68.5	8.3	1.9	0.1
2nd Cleaner Conc		2.0	39.4	16.9	12.0	31.7	74.4	26.9	3.8	0.7
1st Cleaner Conc		5.7	14.3	12.2	11.6	61.9	78.5	56.3	10.6	3.9
1st Cl + Sc Conc		6.9	11.9	11.3	13.2	63.6	79.2	63.2	14.6	4.8
Rougher Conc		15.5	5.42	5.94	15.0	73.6	80.7	74.4	37.1	12.5
Rougher Tail'		84.5	0.24	0.38	4.67	94.7	19.3	25.6	62.9	87.5

Cu+Ni	PGE
27.1	19.8
19.5	16.6
9.2	8.2
8.1	7.3
4.0	3.9

Test No.: F20 **Project No.:** 50149-001 **Operator**: YW **Date**: Dec 13 2011

Purpose: Cleaner flotation test, coarse grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 40 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80}: 150 µm
Regind K_{80}: 34 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						40				
Condition												
Rougher 1			10						1	2	8.7	37.8
Rougher 2		5	5						1	2	8.7	-11.6
Rougher 3		10	5						1	4	8.6	34.9
Rougher 4		20	5						1	6	8.6	34.4
Regrind (PM)								10				
1st Cleaner		5		75					1	8	8.6	41.3
1st Cleaner Scav		10							1	4	8.5	44.8
2nd Cleaner			5	75					1	6	8.5	57.4
3rd Cleaner			5	50					1	4	7.3	
Total	0	55	35	200			0	50	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO
Ni(S) for Roghr tail

PSA on regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	33.3	1.7	15.8	8.47	27.8	3.47	12.4	0.90	33.0	2.32	77.2	32.6	17.3	12.9	46.2	36.8	4.7	0.2
3rd Clnr Tls	23.0	1.2	0.87	7.07	15.0	3.62	4.08	0.20	25.4	13.3	2.9	18.8	6.5	9.3	10.5	5.7	2.5	0.7
2nd Clnr Tls	62.5	3.2	0.24	1.65	5.25	1.72	1.06	0.07	16.2	22.0	2.2	11.9	6.1	12	7.4	5.4	4.3	3.1
1st Clnr Scv Conc	12.0	0.6	0.19	1.47	8.13	2.23	0.83	0.10	22.0	17.8	0.3	2.0	1.8	3.0	1.1	1.5	1.1	0.5
1st Clnr Scv Tls	145.2	7.4	0.09	0.54	6.66	0.84	0.39	0.05	17.4	19.6	1.9	9.1	18.1	13.6	6.3	8.9	10.8	6.5
Rougher Tails	1699	86.0	0.06	0.13	1.58	0.26	0.15	0.02	10.5	22.9	15.5	25.5	50.2	49.3	28.5	41.8	76.5	89.0
				Ni(S)=0.09														
Head (calc.)	1975	100	0.35	0.44	2.71	0.45	0.45	0.04	11.81	22.1	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**33.3**	**1.69**	**15.8**	**8.47**	**27.8**	**3.47**	**12.4**	**0.90**	**33.0**	**2.32**	**77.2**	**32.6**	**17.3**	**12.9**	**46.2**	**36.8**	**4.7**	**0.2**
2nd Clnr Conc	56.3	2.85	9.70	7.90	22.6	3.53	9.00	0.61	29.9	6.81	80.1	51.4	23.8	22.2	56.7	42.5	7.2	0.9
1st Clnr Conc	118.8	6.01	4.72	4.61	13.5	2.58	4.82	0.33	22.7	14.8	82.3	63.3	29.9	34.2	64.1	47.8	11.6	4.0
1st Cl & ClScv Conc	130.8	6.62	4.31	4.32	13.0	2.55	4.46	0.31	22.6	15.1	82.6	65.4	31.7	37.1	65.2	49.3	12.7	4.5
Rghr Conc	**276.0**	**14.0**	**2.09**	**2.33**	**9.65**	**1.65**	**2.32**	**0.17**	**19.9**	**17.5**	**84.5**	**74.5**	**49.8**	**50.7**	**71.5**	**58.2**	**23.5**	**11.0**

Cleaner Circuit Unit Performance	Mass red	Upgrade								Unit Recovery							
	12%	7.57	3.63	2.88	2.10	5.35	5.24	1.66	0.13	94%	56%	71%	52%	73%	79%	66%	61%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	33.3	1.7	45.8	24.1	10.1	20.1	77.2	34.1	3.3	0.4		
3rd Cleaner Tail	23.0	1.2	2.52	20.0	19.8	57.7	2.9	19.5	4.5	0.7		
2nd Cleaner Tail	62.5	3.2	0.70	4.61	9.2	85.5	2.2	12.2	5.6	2.9		
1st Cleaner Scav Co	12.0	0.6	0.55	4.00	17.4	78.0	0.3	2.0	2.0	0.5		
1st Cleaner Scav Tai	145.2	7.4	0.26	1.36	16.1	82.3	1.9	8.4	22.9	6.5		
Rougher Tail	1699	86.0	0.18	0.33	3.71	95.8	15.5	23.8	61.7	88.9		
Head (calc.)	1975.3	100	1.00	1.19	5.2	92.6	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		1.7	45.8	24.1	10.1	20.1	77.2	34.1	3.3	0.4	24.3	16.8
2nd Cleaner Conc		2.9	28.1	22.4	14.0	35.4	80.1	53.6	7.7	1.1	17.6	13.1
1st Cleaner Conc		6.0	13.69	13.04	11.5	61.8	82.3	65.8	13.4	4.0	9.3	7.7
1st Cl + Sc Conc		6.6	12.49	12.21	12.0	63.3	82.6	67.9	15.4	4.5	8.6	7.3
Rougher Conc		14.0	6.05	6.50	14.2	73.3	84.5	76.2	38.3	11.1	4.4	4.1
Rougher Tail'		86.0	0.18	0.33	3.71	95.8	15.5	23.8	61.7	88.9		

Test No.: F21 **Project No.**: 50149-001 **Operator**: YW **Date**: Dec 22 2011

Purpose: Cleaner flotation test, coarse grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 40 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80}: 150 µm
Regind K_{80}: 72 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						40				
Condition												
Rougher 1			10						1	2	8.8	73.8
Rougher 2		5	5						1	2	8.8	44.0
Rougher 3		10	5						1	4	8.8	24.1
Rougher 4		20	5						1	6	8.7	-28.8
Regrind (PM)								5				
1st Cleaner		5		75					1	8	8.7	82.2
1st Cleaner Scav		10							1	4	8.5	40.0
2nd Cleaner			5	75					1	6	8.7	60.9
3rd Cleaner			5	50					1	4	8.5	83.7
Total	0	55	35	200			0	45	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO
Ni(S) for Roghr tail
Malvern on regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	46.0	2.3	8.99	8.78	23.6	3.60	11.2	0.59	31.7	6.57	69.5	47.0	23.9	19.3	52.0	29.2	6.1	0.6
3rd Clnr Tls	40.7	2.1	0.47	2.02	6.75	2.19	2.15	0.12	16.3	22.5	3.2	9.6	6.0	10.4	8.8	5.2	2.8	1.9
2nd Clnr Tls	89.4	4.5	0.13	0.57	3.33	0.89	0.53	0.04	12.8	26.5	2.0	5.9	6.6	9	4.8	3.8	4.8	4.8
1st Clnr Scv Conc	32.9	1.7	0.15	0.81	7.18	1.17	0.66	0.06	19.3	21.5	0.8	3.1	5.2	4.5	2.2	2.1	2.7	1.4
1st Clnr Scv Tls	134.5	6.8	0.12	0.39	4.70	0.72	0.44	0.05	16.8	23.2	2.7	6.1	13.9	11.3	6.0	7.2	9.5	6.3
Rougher Tails	1626	82.6	0.08	0.15	1.24	0.24	0.16	0.03	10.9	25.8	21.8	28.4	44.4	45.4	26.2	52.4	74.2	85.0
			Ni(S)=	0.08														
Head (calc.)	1969	100	0.30	0.44	2.31	0.44	0.50	0.05	12.1	25.1	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**46.0**	**2.34**	**8.99**	**8.78**	**23.6**	**3.60**	**11.2**	**0.59**	**31.7**	**6.57**	**69.5**	**47.0**	**23.9**	**19.3**	**52.0**	**29.2**	**6.1**	**0.6**
2nd Clnr Conc	86.7	4.40	4.99	5.61	15.7	2.94	6.95	0.37	24.5	14.0	72.7	56.5	29.9	29.6	60.8	34.4	8.9	2.5
1st Clnr Conc	176.1	8.9	2.52	3.05	9.4	1.90	3.69	0.20	18.5	20.4	74.6	62.4	36.5	38.9	65.6	38.3	13.7	7.3
1st Cl & ClScv Conc	209.0	10.6	2.15	2.70	9.1	1.78	3.21	0.18	18.7	20.5	75.4	65.5	41.7	43.4	67.8	40.4	16.3	8.7
Rghr Conc	**343.5**	**17.4**	**1.35**	**1.79**	**7.35**	**1.37**	**2.13**	**0.13**	**17.9**	**21.6**	**78.2**	**71.6**	**55.6**	**54.6**	**73.8**	**47.6**	**25.8**	**15.0**

	Mass red	Upgrade								Unit Recovery							
Cleaner Circuit Unit Performance	13%	6.64	4.89	3.21	2.63	5.26	4.57	1.77	0.30	92%	74%	68%	56%	79%	76%	60%	46%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	46.0	2.3	26.1	24.9	16.5	32.6	69.5	48.5	9.1	0.8		
3rd Cleaner Tail	40.7	2.1	1.36	5.64	11.6	81.4	3.2	9.7	5.7	1.8		
2nd Cleaner Tail	89.4	4.5	0.38	1.55	7.1	91.0	2.0	5.9	7.6	4.4		
1st Cleaner Scav Co	32.9	1.7	0.43	2.12	16.6	80.8	0.8	3.0	6.6	1.4		
1st Cleaner Scav Tai	134.5	6.8	0.35	0.99	11.2	87.5	2.7	5.6	18.1	6.4		
Rougher Tail	1626	82.6	0.23	0.40	2.70	96.7	21.8	27.4	52.9	85.2		
Head (calc.)	1969.1	100	0.88	1.20	4.2	93.7	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		2.3	26.1	24.9	16.5	32.6	69.5	48.5	9.1	0.8	17.8	15.4
2nd Cleaner Conc		4.4	14.5	15.9	14.2	55.5	72.7	58.2	14.8	2.6	10.6	10.3
1st Cleaner Conc		8.9	7.31	8.59	10.6	73.5	74.6	64.1	22.4	7.0	5.6	5.8
1st Cl + Sc Conc		10.6	6.23	7.57	11.5	74.7	75.4	67.0	29.0	8.5	4.8	5.2
Rougher Conc		17.4	3.93	4.99	11.4	79.7	78.2	72.6	47.1	14.8	3.1	3.6
Rougher Tail'		82.6	0.23	0.40	2.70	96.7	21.8	27.4	52.9	85.2		

Test No.: F22 **Project No.**: 50149-001 **Operator**: YW **Date**: December 21 2011

Purpose: Cleaner flotation test, Repeat F12, Regrind 1st cleaner concentrate
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} : 90 µm
Regrind K_{80}: 51 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	$CuSO_4$	Grind	Cond.	Froth		
Grind		5						57				
Condition												
Rougher 1			10						1	2	9.2	70.3
Rougher 2		5	5						1	2	9.2	43.3
Rougher 3		10	5						1	4	9.1	17.9
Rougher 4		20	5						1	6	9.1	-17.1
1st Cleaner		5		75					1	8	9.1	50.3
1st Cleaner Scav		10							1	4	8.7	-4.0
Regrind (PM)								3				
2nd Cleaner			5	75					1	6	8.9	-84.4
3rd Cleaner			5	50					1	4	8.8	77.7
Total	0	55	35	200			0	60	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO
Ni(S) for Roghr tail
Malvern on regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	48.1	2.4	10.1	7.82	25.7	3.90	11.2	0.78	30.0	5.86	76.9	42.6	25.5	21.2	52.3	35.5	5.3	0.7
3rd Clnr Tls	49.2	2.5	0.56	2.87	10.4	2.53	2.55	0.16	21.5	17.9	4.4	16.0	10.6	14.1	12.2	7.5	3.9	2.1
2nd Clnr Tls	120	6.0	0.16	0.89	6.32	1.20	0.74	0.08	16.4	21.4	3.0	12.1	15.6	16.2	8.6	9.1	7.2	6.0
1st Clnr Scv Conc	26.3	1.3	0.09	0.39	6.74	0.99	0.45	0.05	17.7	20.8	0.4	1.2	3.7	2.9	1.1	1.2	1.7	1.3
1st Clnr Scv Tls	104	5.2	0.04	0.20	2.53	0.42	0.20	0.16	13.1	22.8	0.6	2.4	5.4	4.9	2.0	15.7	5.0	5.5
Rougher Tails	1633	82.5	0.06	0.14	1.16	0.22	0.15	0.02	12.9	22.1	14.7	25.9	39.1	40.6	23.8	30.9	77.0	84.5
Head (calc.)	1980	100	0.32	0.45	2.44	0.45	0.52	0.05	13.8	21.6	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**48.1**	**2.43**	**10.1**	**7.82**	**25.7**	**3.90**	**11.2**	**0.78**	**30.0**	**5.86**	**76.9**	**42.6**	**25.5**	**21.2**	**52.3**	**35.5**	**5.3**	**0.7**
2nd Clnr Conc	97.3	4.91	5.28	5.32	18.0	3.21	6.83	0.47	25.7	11.9	81.2	58.6	36.1	35.3	64.5	43.0	9.1	2.7
1st Clnr Conc	217.0	11.0	2.45	2.88	11.5	2.10	3.47	0.25	20.6	17.2	84.3	70.6	51.8	51.5	73.1	52.1	16.3	8.7
1st Cl & ClScv Conc	243.3	12.3	2.20	2.61	11.0	1.98	3.14	0.23	20.3	17.6	84.6	71.8	55.4	54.5	74.2	53.3	18.0	10.0
Rghr Conc	**347.2**	**17.5**	**1.55**	**1.89**	**8.48**	**1.51**	**2.26**	**0.21**	**18.1**	**19.1**	**85.3**	**74.1**	**60.9**	**59.4**	**76.2**	**69.1**	**23.0**	**15.5**

	Mass rec	Upgrade								Unit Recovery							
Cleaner Circuit Unit Performance	14%	6.51	4.15	3.03	2.58	4.95	3.71	1.66	0.31	91%	61%	51%	44%	71%	74%	45%	40%

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
3rd Cleaner Conc	48.1	2.4	29.3	22.1	21.5	27.1	76.9	43.9	11.6	0.7
3rd Cleaner Tail	49.2	2.5	1.62	7.98	18.9	71.5	4.4	16.2	10.4	1.9
2nd Cleaner Tail	119.7	6.0	0.46	2.38	14.1	83.0	3.0	11.8	18.9	5.4
1st Cleaner Scav Conc	26.3	1.3	0.26	0.92	16.7	82.1	0.4	1.0	4.9	1.2
1st Cleaner Scav Tail	103.9	5.2	0.11	0.50	6.1	93.3	0.6	2.2	7.1	5.2
Rougher Tail	1633	82.5	0.17	0.37	2.58	96.9	14.7	25.0	47.1	85.6
Head (calc.)	1980.3	100	0.92	1.22	4.5	93.3	100	100	100	100
Combined Products										
3rd Cleaner Conc		2.4	29.3	22.1	21.5	27.1	76.9	43.9	11.6	0.7
2nd Cleaner Conc		4.9	15.3	15.0	20.2	49.6	81.2	60.1	22.0	2.6
1st Cleaner Conc		11.0	7.11	8.02	16.9	68.0	84.3	71.9	40.9	8.0
1st Cl + Sc Conc		12.3	6.37	7.25	16.8	69.5	84.6	72.9	45.8	9.2
Rougher Conc		17.5	4.50	5.23	13.6	76.6	85.3	75.0	52.9	14.4
Rougher Tail'		82.5	0.17	0.37	2.58	96.9	14.7	25.0	47.1	85.6

Cu+Ni	PGE
17.9	15.9
10.6	10.5
5.3	5.8
4.8	5.4
3.4	4.0

Test No.: F23 **Project No.**: 50149-001 **Operator**: YW **Date**: Dec 22 2011

Purpose: Cleaner flotation test, Repeat F12, Use CuSO4
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	$CuSO_4$	Grind	Cond.	Froth		
Grind		5						57				
Condition												
Rougher 1			10						1	2	9.0	51.7
Rougher 2		5	5						1	2	8.9	46.7
Rougher 3		10	5				125		1	4	8.7	33.3
Rougher 4		20	5				50		1	6	8.7	35.2
Regrind (PM)								0				
1st Cleaner		5		75			20		1	8	9.0	52.2
1st Cleaner Scav		10					20		1	4	8.6	-41.6
2nd Cleaner			5	75			20		1	6	8.5	54.0
3rd Cleaner			5	50			10		1	4	8.6	49.0
Total	0	55	35	200			245	57	8	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO
Ni(S) for Roghr tail

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	93.2	4.7	5.61	6.50	18.8	4.00	6.78	0.43	39.5	5.17	79.2	64.0	40.4	46.8	66.0	45.4	15.5	1.0
3rd Clnr Tls	51.8	2.6	0.44	0.97	6.86	1.15	1.03	0.08	15.9	22.5	3.5	5.3	8.2	7.5	5.6	4.7	3.5	2.3
2nd Clnr Tls	110.1	5.6	0.19	0.44	3.09	0.56	0.42	0.05	12.0	26.3	3.2	5.1	7.8	8	4.8	6.2	5.5	5.8
1st Clnr Scv Conc	57.1	2.9	0.16	0.38	4.00	0.58	0.40	0.07	14.0	24.8	1.4	2.3	5.3	4.2	2.4	4.5	3.4	2.9
1st Clnr Scv Tls	126.0	6.4	0.06	0.16	1.07	0.19	0.15	0.03	10.7	26.6	1.1	2.1	3.1	3.0	2.0	4.3	5.7	6.8
Rougher Tails	1539	77.8	0.05	0.13	0.99	0.16	0.12	0.02	10.3	26.2	11.7	21.1	35.2	30.9	19.3	34.9	66.5	81.2
				Ni(S)=	0.06													
Head (calc.)	1977	100	0.33	0.48	2.19	0.40	0.48	0.04	12.0	25.1	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**93.2**	**4.71**	**5.61**	**6.50**	**18.8**	**4.00**	**6.8**	**0.43**	**39.5**	**5.17**	**79.2**	**64.0**	**40.4**	**46.8**	**66.0**	**45.4**	**15.5**	**1.0**
2nd Clnr Conc	145.0	7.33	3.76	4.52	14.5	2.98	4.73	0.30	31.1	11.4	82.6	69.3	48.6	54.2	71.5	50.1	18.9	3.3
1st Clnr Conc	255.1	12.9	2.22	2.76	9.6	1.94	2.87	0.19	22.8	17.8	85.8	74.4	56.5	62.0	76.4	56.3	24.5	9.2
1st Cl & ClScv Conc	312.2	15.8	1.84	2.33	8.6	1.69	2.42	0.17	21.2	19.1	87.2	76.7	61.7	66.1	78.7	60.8	27.8	12.0
Rghr Conc	**438.2**	**22.2**	**1.33**	**1.70**	**6.41**	**1.26**	**1.76**	**0.13**	**18.2**	**21.2**	**88.3**	**78.9**	**64.8**	**69.1**	**80.7**	**65.1**	**33.5**	**18.8**

Cleaner Circuit Unit Performance	Mass rec	Upgrade								Unit Recovery							
	21%	4.21	3.82	2.93	3.18	3.84	3.28	2.17	0.24	91%	84%	67%	72%	84%	76%	63%	41%

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	93.2	4.7	16.3	18.4	18.6	46.8	79.2	65.3	23.5	2.3		
3rd Cleaner Tail	51.8	2.6	1.28	2.60	14.6	81.5	3.5	5.1	10.3	2.3		
2nd Cleaner Tail	110.1	5.6	0.55	1.18	6.6	91.7	3.2	5.0	9.9	5.4		
1st Cleaner Scav Conc	57.1	2.9	0.46	0.98	9.2	89.3	1.4	2.1	7.2	2.7		
1st Cleaner Scav Tail	126.0	6.4	0.17	0.43	2.3	97.1	1.1	2.1	3.9	6.6		
Rougher Tail	1539	77.8	0.14	0.35	2.17	97.3	11.7	20.4	45.3	80.6		
Head (calc.)	1977.4	100	0.97	1.32	3.7	94.0	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		4.7	16.3	18.4	18.6	46.8	79.2	65.3	23.5	2.3	12.1	11.2
2nd Cleaner Conc		7.3	10.9	12.7	17.1	59.2	82.6	70.5	33.7	4.6	8.3	8.0
1st Cleaner Conc		12.9	6.44	7.75	12.6	73.2	85.8	75.4	43.6	10.1	5.0	5.0
1st Cl + Sc Conc		15.8	5.34	6.51	12.0	76.2	87.2	77.6	50.8	12.8	4.2	4.3
Rougher Conc		22.2	3.86	4.76	9.2	82.2	88.3	79.6	54.7	19.4	3.0	3.2
Rougher Tail'		77.8	0.14	0.35	2.17	97.3	11.7	20.4	45.3	80.6		

Test No.: F24 **Project No.**: 50149-001 **Operator**: YW **Date**: January 12 2012

Purpose: Rougher Flotation test, 20 g/t SIPX in the grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		20						57				
Condition									1			
Rougher 1						12			1	4	8.8	67.1
Rougher 2		10							1	4	8.8	21.4
Rougher 3		10							1	4	8.6	12.9
Rougher 4		10							1	4	8.7	32.8
Rougher 5		10							1	4	8.6	26.9
Total	0	60	0	0	0	12	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
Ro tails Ni(S)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	128.5	6.46	3.93	0.97	6.64	1.54	4.40	0.25	13.5	20.0	77.7	14.4	18.1	24.43	56.0	36.3	7.0	5.1
Ro Conc 2	76.9	3.86	0.77	5.81	11.1	1.94	2.35	0.21	20.4	17.7	9.1	51.8	18.1	18.4	17.9	18.2	6.3	2.7
Ro Conc 3	56	2.81	0.26	0.85	6.62	1.58	0.87	0.07	18.3	22.9	2.24	5.5	7.9	10.9	4.8	4.42	4.1	2.57
Ro Conc 4	44	2.21	0.13	0.4	5.16	1.04	0.47	0.04	16.6	23.6	0.88	2.04	4.8	5.65	2.05	1.99	2.95	2.08
Ro Conc 5	31.8	1.60	0.09	0.36	5.32	0.98	0.37	0.05	17.8	22.7	0.44	1.33	3.6	3.8	1.17	1.79	2.28	1.45
Ro Tail	1653	83.1	0.04	0.13	1.36	0.18	0.11	< 0.02	11.6	26.0	9.66	24.9	47.6	36.7	18.0	37.3	77.3	86.0
			Ro Tails Ni(s)=0.06															
Head (calc.)	1990	100	0.33	0.43	2.37	0.41	0.51	0.04	12.5	25.1	100	100	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	128.5	6.46	3.93	0.97	6.64	1.54	4.40	0.25	13.5	20.0	77.7	14.4	18.1	24.43	56.0	36.3	7.0	5.1
Ro Conc 1-2	205.4	10.3	2.75	2.78	8.31	1.69	3.63	0.24	16.1	19.1	86.8	66.2	36.1	42.8	73.9	54.5	13.3	7.9
Ro Conc 1-3	261.4	13.1	2.21	2.37	7.95	1.67	3.04	0.20	16.6	19.9	89.0	71.7	44.0	53.8	78.8	58.9	17.5	10.4
Ro Conc 1-4	305.4	15.3	1.91	2.08	7.55	1.58	2.67	0.18	16.6	20.5	89.9	73.8	48.8	59.4	80.8	60.9	20.4	12.5
Ro Conc 1-5	**337.2**	**16.9**	**1.74**	**1.92**	**7.34**	**1.52**	**2.45**	**0.16**	**16.7**	**20.7**	**90.3**	**75.1**	**52.4**	**63.3**	**82.0**	**62.7**	**22.7**	**14.0**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	128.5	6.46	11.4	2.72	4.62	81.3	77.7	14.8	6.9	5.6
Rougher 2	76.9	3.86	2.23	16.5	12.9	68.4	9.1	53.5	11.5	2.8
Rougher 3	56.0	2.81	0.75	2.26	14.8	82.2	2.2	5.3	9.6	2.5
Rougher 4	44.0	2.21	0.38	1.00	12.4	86.3	0.9	1.9	6.3	2.0
Rougher 5	31.8	1.60	0.26	0.88	13.0	85.9	0.4	1.2	4.8	1.5
Rougher Tail	1653	83.1	0.11	0.34	3.19	96.4	9.7	23.4	61.0	85.6
Head (calc.)	1990	100	0.95	1.19	4.34	93.5	100	100	100	100
Combined Products										
Ro Conc 1		6.46	11.39	2.72	4.62	81.3	77.7	14.8	6.88	5.61
Ro Conc 1-2		10.32	8.0	7.86	7.71	76.5	86.8	68.2	18.3	8.44
Ro Conc 1-3		13.1	6.42	6.66	9.2	77.7	89.0	73.6	27.9	10.9
Ro Conc 1-4		15.3	5.55	5.85	9.7	78.9	89.9	75.4	34.2	13.0
Ro Conc 1-5		16.9	5.05	5.38	10.0	79.6	90.3	76.6	39.0	14.4
Ro Tail		83.1	0.11	0.34	3.19	96.4	9.66	23.4	61.0	85.6

Test No.: F25 **Project No.**: 50149-001 **Operator**: YW **Date**: January 12 2012

Purpose: Cleaner flotation test, Repeat F12 with 90, 45, 25 g/t CMC in the clnrs
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		20						57				
Condition												
Rougher 1									1	4	9.0	63.1
Rougher 2		10	12						1	4	9.0	13.2
Rougher 3		10							1	4	8.9	13.5
Regrind (PM)								0				
1st Cleaner		5		90					1	6	8.9	56.8
1st Cleaner Scav		5							1	4	8.5	19.1
2nd Cleaner		2.5	15	45					1	5	8.6	63.7
3rd Cleaner		2.5	20	25					1	4	8.6	19.7
Total	0	55	47	160			0	57	7	31	.	.

* As required

Stage	Roughers	IstClnr and Scav	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	27.1	1.4	16.0	7.98	28.0	4.57	12.9	0.97	33.9	2.63	65.6	24.6	16.0	18.0	38.4	28.3	3.6	0.2
3rd Clnr Tls	29.0	1.5	2.70	7.12	17.6	3.89	7.31	0.58	28.1	9.24	11.8	23.5	10.7	16.4	23.3	18.1	3.2	0.6
2nd Clnr Tls	89.4	4.5	0.60	1.91	7.19	1.63	1.88	0.13	17.0	18.4	8.1	19.4	13.5	21	18.4	12.5	6.0	3.7
1st Clnr Scv Conc	31.0	1.6	0.21	0.69	5.98	1.48	0.83	0.06	16.5	23.4	1.0	2.4	3.9	6.7	2.8	2.0	2.0	1.6
1st Clnr Scv Tls	112.1	5.6	0.05	0.23	2.34	0.35	0.18	< 0.02	12.1	23.9	0.9	2.9	5.5	5.7	2.2	2.4	5.3	6.1
Rougher Tails	1700	85.5	0.05	0.14	1.41	0.13	0.08	< 0.02	12.0	22.7	12.6	27.1	50.4	32.1	14.9	36.6	79.9	87.7
Head (calc.)	1989	100	0.33	0.44	2.39	0.35	0.46	0.05	12.8	22.1	100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**27.1**	**1.4**	**16.0**	**7.98**	**28.0**	**4.57**	**12.9**	**0.97**	**33.9**	**2.63**	**65.6**	**24.6**	**16.0**	**18.0**	**38.4**	**28.3**	**3.6**	**0.2**
2nd Clnr Conc	56.1	2.8	9.12	7.54	22.6	4.22	10.01	0.77	30.9	6.05	77.4	48.1	26.7	34.4	61.6	46.4	6.8	0.8
1st Clnr Conc	146	7.3	3.89	4.08	13.1	2.63	5.01	0.38	22.4	13.6	85.5	67.5	40.2	55.5	80.0	59.0	12.7	4.5
1st Cl & ClScv Conc	177	8.9	3.24	3.48	11.9	2.43	4.28	0.32	21.3	15.4	86.5	70.0	44.1	62.2	82.9	61.0	14.8	6.2
Rghr Conc	**289**	**14.5**	**2.00**	**2.22**	**8.18**	**1.62**	**2.69**	**0.20**	**17.7**	**18.7**	**87.4**	**72.9**	**49.6**	**67.9**	**85.1**	**63.4**	**20.1**	**12.3**

Cleaner Circuit Unit Performance	Mass rec	Upgrade								Unit Recovery							
	9%	7.99	3.59	3.42	2.82	4.80	4.76	1.91	0.14	76%	38%	43%	35%	48%	48%	44%	51%

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
3rd Cleaner Conc	27.1	1.4	46.4	22.7	11.3	19.7	65.6	25.5	3.5	0.3
3rd Cleaner Tail	29.0	1.5	7.83	20.1	21.7	50.4	11.8	24.2	7.3	0.8
2nd Cleaner Tail	89.4	4.5	1.74	5.31	12.7	80.2	8.1	19.7	13.1	3.9
1st Cleaner Scav Conc	31.0	1.6	0.61	1.82	13.6	84.0	1.0	2.3	4.9	1.4
1st Cleaner Scav Tail	112.1	5.6	0.16	0.59	5.5	93.8	0.9	2.8	7.1	5.7
Rougher Tail	1700	85.5	0.14	0.36	3.3	96.2	12.6	25.6	64.1	88.0
Head (calc.)	1989	100	0.96	1.21	4.4	93.5	100	100	100	100
Combined Products										
3rd Cleaner Conc		1.4	46.4	22.7	11.3	19.7	65.6	25.5	3.5	0.3
2nd Cleaner Conc		2.8	26.4	21.3	16.6	35.6	77.4	49.6	10.8	1.1
1st Cleaner Conc		7.3	11.27	11.49	14.2	63.0	85.5	69.3	23.9	4.9
1st Cl + Sc Conc		8.9	9.39	9.79	14.1	66.7	86.5	71.7	28.8	6.3
Rougher Conc		14.5	5.81	6.22	10.8	77.2	87.4	74.4	35.9	12.0
Rougher Tail'		85.5	0.14	0.36	3.26	96.2	12.6	25.6	64.1	88.0

Test No.: F26 **Project No.**: 50149-001 **Operator**: YW **Date**: Jan 23 2012

Purpose: Rougher Flotation test,repeat F24, 20 g/t 4037 in the grind
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	4037	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		20						57				
Condition									1			
Rougher 1									1	4	8.8	36.1
		SIPX										
Rougher 2		10				3			1	4	8.7	26.6
Rougher 3		10							1	4	8.6	59.9
Rougher 4		10							1	4	8.5	45.7
Rougher 5		10							1	4	8.6	20.6
Total	0	60	0	0	0	3	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au, Fe, MgO
Ro tails Ni(S)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
		%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	82.3	4.15	6.32	0.53	8.21	1.65	4.89	0.40	15.4	19.6	71.4	4.8	11.7	14.91	41.9	38.7	5.0	3.8
Ro Conc 2	62	3.12	1.18	6.14	10.6	2.00	2.65	0.13	18.6	16.4	10.0	42.2	11.4	13.6	17.1	9.5	4.5	2.4
Ro Conc 3	56.1	2.83	0.46	2.99	8.31	1.70	1.40	0.09	18.2	17.8	3.5	18.6	8.1	10.5	8.2	5.9	4.0	2.34
Ro Conc 4	47.9	2.41	0.28	1.03	6.78	1.45	0.76	0.07	17.7	20.3	1.8	5.5	5.6	7.6	3.8	3.9	3.3	2.28
Ro Conc 5	33.3	1.68	0.21	0.69	6.65	1.30	0.67	0.05	18.5	17.9	1.0	2.5	3.8	4.8	2.3	2.0	2.4	1.40
Ro Tail	1703.5	85.8	0.05	0.14	2.02	0.26	0.15	0.02	12.0	22.0	12.2	26.4	59.5	48.6	26.6	40.0	80.6	87.8
			Ni(S)=	0.08														
Head (calc.)	1985	100	0.37	0.45	2.91	0.46	0.48	0.04	12.8	21.5	100	100	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	82.3	4.15	6.32	0.53	8.21	1.65	4.89	0.40	15.4	19.6	71.4	4.8	11.7	14.9	41.9	38.7	5.0	3.8
Ro Conc 1-2	144.3	7.3	4.11	2.94	9.24	1.80	3.93	0.28	16.8	18.2	81.5	47.0	23.0	28.5	59.1	48.1	9.5	6.2
Ro Conc 1-3	200.4	10.1	3.09	2.95	8.98	1.77	3.22	0.23	17.2	18.1	85.0	65.6	31.1	39.0	67.3	54.1	13.6	8.5
Ro Conc 1-4	248.3	12.5	2.55	2.58	8.55	1.71	2.75	0.20	17.3	18.5	86.9	71.0	36.7	46.6	71.0	58.0	16.9	10.8
Ro Conc 1-5	**281.6**	**14.2**	**2.27**	**2.36**	**8.33**	**1.66**	**2.50**	**0.18**	**17.4**	**18.5**	**87.8**	**73.6**	**40.5**	**51.4**	**73.4**	**60.0**	**19.4**	**12.2**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	82.3	4.15	18.32	1.47	3.45	76.8	71.4	5.0	2.5	3.5
Rougher 2	62.0	3.12	3.4	17.4	9.61	69.5	10.0	44.1	5.3	2.4
Rougher 3	56.1	2.83	1.33	8.39	13.4	76.9	3.54	19.2	6.7	2.4
Rougher 4	47.9	2.41	0.81	2.78	14.7	81.7	1.84	5.4	6.3	2.1
Rougher 5	33.3	1.68	0.61	1.80	15.4	82.2	0.96	2.4	4.6	1.5
Rougher Tail	1704	85.8	0.15	0.34	4.88	94.6	12.2	23.9	74.5	88.2
Head (calc.)	1985	100	1.06	1.24	5.62	92.1	100	100	100	100
Combined Products										
Ro Conc 1		4.15	18.32	1.47	3.45	76.8	71.4	4.95	2.55	3.46
Ro Conc 1-2		7.27	11.9	8.33	6.10	73.7	81.5	49.0	7.89	5.81
Ro Conc 1-3		10.1	8.95	8.35	8.1	74.6	85.0	68.2	14.6	8.2
Ro Conc 1-4		12.5	7.38	7.27	9.4	76.0	86.9	73.6	20.9	10.3
Ro Conc 1-5		14.2	6.58	6.63	10.1	76.7	87.8	76.1	25.5	11.8
Ro Tail		85.8	0.15	0.34	4.88	94.6	12.17	23.9	74.5	88.2

Test No.: F27 **Project No.**: 50149-001 **Operator**: YW **Date**: Jan 23 2012

Purpose: Rougher Flotation test, Repeat F24, 20 g/t SIPX in the 1st rougher
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind								57				
Condition									1			
Rougher 1		20				12			1	4	8.9	40.6
Rougher 2		10							1	4	8.9	42.2
Rougher 3		10							1	4	8.9	13.3
Rougher 4		10							1	4	8.8	2.7
Rougher 5		10							1	4	8.7	18.7
Total	0	60	0	0	0	12	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au, Fe, MgO
Ro tails Ni(S)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	111.7	5.64	4.32	2.63	8.99	1.50	4.42	0.27	16.0	17.0	74.3	35.3	21.2	18.92	50.7	40.1	7.5	4.4
Ro Conc 2	81.2	4.10	0.52	2.38	5.69	1.38	1.61	0.07	14.6	20.8	6.5	23.2	9.8	12.7	13.4	7.6	5.0	3.9
Ro Conc 3	49.2	2.48	0.34	1.27	5.23	1.38	1.01	0.05	15.1	21.0	2.6	7.5	5.4	7.7	5.1	3.3	3.1	2.4
Ro Conc 4	38.8	1.96	0.26	0.82	5.15	1.32	0.78	0.06	15.7	20.4	1.6	3.8	4.2	5.8	3.1	3.1	2.6	1.8
Ro Conc 5	28.9	1.46	0.20	0.58	5.04	1.22	0.66	0.04	15.7	20.9	0.89	2.0	3.1	4.0	2.0	1.5	1.9	1.4
Ro Tail	1672.4	84.4	0.06	0.14	1.59	0.27	0.15	< 0.02	11.3	22.3	14.2	28.1	56.2	51.0	25.7	44.5	79.8	86.1
			Ni(S)=	0.08														
Head (calc.)	1982	100	0.33	0.42	2.39	0.45	0.49	0.04	11.9	21.9	100	100	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	111.7	5.64	4.32	2.63	8.99	1.50	4.42	0.27	16.0	17.0	74.3	35.3	21.2	18.92	50.7	40.1	7.5	4.4
Ro Conc 1-2	192.9	9.7	2.72	2.52	7.60	1.45	3.24	0.19	15.4	18.6	80.8	58.5	31.0	31.6	64.1	47.6	12.6	8.3
Ro Conc 1-3	242.1	12.2	2.24	2.27	7.12	1.44	2.78	0.16	15.3	19.1	83.4	66.0	36.5	39.2	69.2	50.9	15.7	10.7
Ro Conc 1-4	280.9	14.2	1.96	2.07	6.85	1.42	2.51	0.14	15.4	19.3	84.9	69.9	40.7	45.0	72.3	54.0	18.3	12.5
Ro Conc 1-5	**309.8**	**15.6**	**1.80**	**1.93**	**6.68**	**1.40**	**2.34**	**0.13**	**15.4**	**19.4**	**85.8**	**71.9**	**43.8**	**49.0**	**74.3**	**55.5**	**20.2**	**13.9**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	111.7	5.64	12.5	7.45	5.66	74.4	74.3	36.5	7.2	4.5
Rougher 2	81.2	4.10	1.51	6.71	7.76	84.0	6.5	23.9	7.2	3.7
Rougher 3	49.2	2.48	0.99	3.52	9.80	85.7	2.6	7.6	5.5	2.3
Rougher 4	38.8	1.96	0.75	2.22	10.9	86.1	1.6	3.8	4.9	1.8
Rougher 5	28.9	1.46	0.58	1.53	11.4	86.5	0.9	1.9	3.8	1.3
Rougher Tail	1672	84.4	0.16	0.36	3.73	95.8	14.2	26.2	71.4	86.4
Head (calc.)	1982	100	0.95	1.15	4.40	93.5	100	100	100	100
Combined Products										
Ro Conc 1		5.64	12.52	7.45	5.66	74.4	74.3	36.53	7.24	4.48
Ro Conc 1-2		9.73	7.9	7.14	6.54	78.4	80.8	60.5	14.45	8.16
Ro Conc 1-3		12.2	6.48	6.40	7.20	79.9	83.4	68.0	20.0	10.4
Ro Conc 1-4		14.2	5.69	5.82	7.72	80.8	84.9	71.8	24.8	12.2
Ro Conc 1-5		15.6	5.21	5.42	8.06	81.3	85.8	73.8	28.6	13.6
Ro Tail		84.4	0.16	0.36	3.73	95.8	14.17	26.2	71.4	86.4

Test No.: F28 **Project No.**: 50149-001 **Operator**: YW **Date**: Jan 23 2012

Purpose: Rougher Flotation test, Repeat F27 with 5 min aeration
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Feed K_{80} :90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind								57				
Aeration									5			
Rougher 1		20				12			1	4	9.0	25.8
Rougher 2		10							1	4	8.8	24.0
Rougher 3		10							1	4	8.8	20.0
Rougher 4		10							1	4	8.7	16.0
Rougher 5		10							1	4	8.7	23.2
Total	0	60	0	0	0	12	0	57	10	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au, Fe, MgO
Ro tails Ni(S)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	89.4	4.50	5.29	2.76	9.97	1.63	5.24	0.38	16.6	19.2	73.6	29.3	19.1	15.94	47.8	42.0	6.2	3.6
Ro Conc 2	46.7	2.35	0.78	3.93	7.36	1.88	2.52	0.11	15.6	21.1	5.7	21.8	7.4	9.6	12.0	6.3	3.1	2.0
Ro Conc 3	54.4	2.74	0.43	1.94	5.38	1.57	1.32	0.06	15.2	23.1	3.6	12.5	6.3	9.3	7.3	4.0	3.5	2.6
Ro Conc 4	38.8	1.95	0.31	1.04	4.60	1.57	0.92	0.05	15.1	23.1	1.9	4.8	3.8	6.7	3.6	2.4	2.5	1.9
Ro Conc 5	36.1	1.82	0.23	0.67	4.46	1.44	0.78	0.06	15.1	23.2	1.3	2.9	3.5	5.7	2.9	2.7	2.3	1.7
Ro Tail	1722.8	86.7	0.05	0.14	1.62	0.28	0.15	< 0.02	11.4	24.6	13.9	28.7	59.9	52.8	26.4	42.6	82.5	88.2
			Ni(S)=	0.08														
Head (calc.)	1988	100	0.32	0.42	2.34	0.46	0.49	0.04	12.0	24.18	100	100	100	100	100	100	100	100
Head (direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Ro Conc 1	89.4	4.50	5.29	2.76	9.97	1.63	5.24	0.38	16.6	19.2	73.6	29.3	19.1	15.94	47.8	42.0	6.2	3.6
Ro Conc 1-2	136.1	6.8	3.74	3.16	9.07	1.72	4.31	0.29	16.3	19.9	79.3	51.1	26.5	25.5	59.8	48.3	9.3	5.6
Ro Conc 1-3	190.5	9.6	2.80	2.81	8.02	1.67	3.45	0.22	16.0	20.8	82.9	63.7	32.8	34.9	67.1	52.4	12.8	8.2
Ro Conc 1-4	229.3	11.5	2.38	2.51	7.44	1.66	3.03	0.19	15.8	21.2	84.8	68.5	36.6	41.5	70.8	54.8	15.2	10.1
Ro Conc 1-5	**265.4**	**13.3**	**2.08**	**2.26**	**7.04**	**1.63**	**2.72**	**0.18**	**15.7**	**21.4**	**86.1**	**71.3**	**40.1**	**47.2**	**73.6**	**57.4**	**17.5**	**11.8**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	89.4	4.50	15.33	7.82	5.32	71.5	73.6	30.3	5.6	3.4
Rougher 2	46.7	2.35	2.3	11.1	7.61	79.0	5.7	22.6	4.2	2.0
Rougher 3	54.4	2.74	1.25	5.45	8.3	85.0	3.6	12.8	5.3	2.5
Rougher 4	38.8	1.95	0.90	2.87	8.8	87.4	1.9	4.8	4.0	1.8
Rougher 5	36.1	1.82	0.67	1.81	9.6	88.0	1.3	2.8	4.0	1.7
Rougher Tail	1723	86.7	0.15	0.36	3.81	95.7	13.9	26.6	77.0	88.6
Head (calc.)	1988	100	0.94	1.16	4.29	93.6	100	100	100	100
Combined Products										
Ro Conc 1		4.50	15.33	7.82	5.32	71.5	73.6	30.33	5.57	3.44
Ro Conc 1-2		6.85	10.8	8.96	6.11	74.1	79.3	52.9	9.73	5.42
Ro Conc 1-3		9.6	8.11	7.96	6.7	77.2	82.9	65.7	15.0	7.9
Ro Conc 1-4		11.5	6.89	7.10	7.1	78.9	84.8	70.6	19.0	9.7
Ro Conc 1-5		13.3	6.04	6.38	7.4	80.2	86.1	73.4	23.0	11.4
Ro Tail		86.7	0.15	0.36	3.81	95.7	13.94	26.6	77.0	88.6

Test: F29 | **Project: 150149-001** | **Date:** 08-Feb-12 | **Operator:** YW

Purpose: Split flowsheet including Cu separation
Procedure: As below.
Feed: 2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 2 minutes in the pebble mill (bulk clnr 1 concentrate)
Regrind 6 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} :90 µm
Cu regrind K80: 31 µm
Ni regrind K80: 26 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	4037	CMC		MIBC*	Grind	Cond.	Froth	pH	Eh
Grind		20					57				
Bulk Rougher 1						10		1	2	8.7	124.6
Bulk Rougher 2		10						1	2	8.7	48.2
Ni Scav 1		30							6	8.7	85.3
Ni Scav 2		30							6	8.6	29.2
Combine Ro Conc 1-2											
Bulk 1st Cleaner		0+5+2		20+20+0		5		2	3+2+1	8.7	101.2
Regrind (PM)							2				
Bulk 2nd Cleaner		0+2		0+5		10		2	2+2	8.1	143.4
Bulk 3rd Cleaner				10		10		2	6	7.7	174.4
Condition								5			
Cu Rougher	600							1	2	11.3	-2.9
Cu 1st Cleaner	95							1	1	11.0	16.9
Combine Scav Conc 1-2											
Ni 1st Cleaner		10+5		50+20				2	3+3	8.6	98.7
Regrind (PM)	100						6				
Ni 2nd Cleaner		5+2		10+10		5		2	2.5	10.0	49.9
Ni 3rd Cleaner				5		8		2	1.5	9.1	101.4
Ni 4th Cleaner								2	1	8.0	144.3
Total	795	90	0	15	0	48	65	21	29		

*As needed

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep	
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12	
Speed: r.p.m.	1800	1600	1200	

PSA On Bulk Regrind
PSA On Ni Regrind
Assay for Cu, Ni, S

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Cu 1st Cl Conc	7.9	0.40	29.3	0.40	30.7	40.3	0.4	5.1
Cu 1st Cl Tail	4.3	0.22	15.0	2.67	23.5	11.2	1.4	2.1
Cu Ro Tail	15.4	0.78	**5.22**	**10.9**	20.4	14.0	20.8	6.7
Bulk 3rd Clnr Tail	9.1	0.46	2.06	9.53	15.9	3.3	10.8	3.1
Bulk 2nd Clnr Tail	18.9	0.96	0.90	4.37	10.1	3.0	10.3	4.0
Bulk 1st Clnr Tail	52.9	2.68	0.12	0.43	1.80	1.1	2.8	2.0
Ni 4th Clnr Conc	4.0	0.20	7.29	9.33	28.7	5.1	4.6	2.4
Ni 4th Clnr Tail	1.6	0.08	1.95	6.54	23.4	0.5	1.3	0.8
Ni 3rd Clnr Tail	7.9	0.40	0.82	4.40	17.6	1.1	4.3	2.9
Ni 2nd Clnr Tail	46.8	2.37	0.26	2.07	13.9	2.1	12.0	13.8
Ni 1st Clnr Tail	111	5.63	0.10	0.28	3.39	1.9	3.9	8.0
Ni Scav Tail	1696	85.8	0.06	0.13	1.36	16.3	27.4	48.9
Head (calc.)	1976	100.0	0.29	0.41	2.39	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Cu 1st Clnr Conc	7.9	0.40	**29.3**	**0.40**	30.7	**40.3**	**0.39**	5.15
Cu Rougher Conc	12.2	0.62	24.3	1.20	28.2	51.6	1.82	7.29
Bulk 3rd Clnr Conc	27.6	1.40	**13.6**	**6.61**	23.8	**65.6**	**22.7**	14.0
Bulk 2nd Clnr Conc	36.7	1.86	10.8	7.34	21.9	68.9	33.4	17.0
Bulk 1st Clnr Conc	55.6	2.81	7.41	6.33	17.9	71.8	43.7	21.1
Bulk Rougher Conc	**109**	**5.49**	**3.86**	**3.45**	**10.0**	**72.9**	**46.5**	**23.1**
Ni 4th Clnr Conc	4.0	0.20	**7.29**	**9.33**	28.7	**5.1**	**4.6**	2.4
Ni 3rd Clnr Conc	5.6	0.28	5.76	8.53	27.2	5.6	5.9	3.2
Ni 2nd Clnr Conc	13.5	0.68	2.87	6.11	21.6	6.8	10.2	6.2
Ni 1st Clnr Conc	60.3	3.05	0.84	2.98	15.6	8.9	22.3	20.0
Ni Scav Conc	172	8.68	0.36	1.23	7.69	10.8	26.1	28.0
Bulk Rghr+Scav Conc	280	**14.2**	1.72	2.09	8.60	83.7	72.6	51.1

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Cu 1st Cl Conc	7.9	0.40	**29.3**	**0.40**	30.7	39.6	84.7	1.13	1.79	12.4	40.3	0.4	5.1	40.3	0.5	0.2	0.1
Cu 1st Cl Tail	4.3	0.22	15.0	2.67	23.5	58.8	43.4	7.54	15.1	34.0	11.2	1.4	2.1	11.2	1.7	0.7	0.1
Cu Ro Tail (Ni Conc.)	15.4	0.78	**5.22**	**10.9**	20.4	63.5	15.1	31.8	12.0	41.1	14.0	20.8	6.7	14.0	25.3	2.0	0.3
Bulk 3rd Clnr Tail	9.1	0.46	2.06	9.53	15.9	72.5	5.95	27.7	12.1	54.2	3.3	10.8	3.1	3.3	13.0	1.2	0.3
Bulk 2nd Clnr Tail	18.9	0.96	0.90	4.37	10.1	84.6	2.60	12.5	13.1	71.8	3.0	10.3	4.0	3.0	12.2	2.7	0.7
Bulk 1st Clnr Tail	52.9	2.68	0.12	0.43	1.80	97.7	0.35	1.06	3.44	95.2	1.1	2.8	2.0	1.1	2.9	2.0	2.7
Ni 4th Clnr Conc	4.0	0.20	**7.29**	**9.33**	28.7	54.7	21.1	26.8	32.3	19.8	5.1	4.6	2.4	5.1	5.5	1.4	0.0
Ni 4th Clnr Tail	1.6	0.08	1.95	6.54	23.4	68.1	5.64	18.5	39.7	36.2	0.5	1.3	0.8	0.5	1.5	0.7	0.0
Ni 3rd Clnr Tail	7.9	0.40	0.82	4.40	17.6	77.2	2.37	12.3	32.9	52.4	1.1	4.3	2.9	1.1	5.0	2.9	0.2
Ni 2nd Clnr Tail	46.8	2.37	0.26	2.07	13.9	83.8	0.75	5.45	30.7	63.1	2.1	12.0	13.8	2.1	13.2	15.9	1.6
Ni 1st Clnr Tail	111	5.63	0.10	0.28	3.39	96.2	0.29	0.55	8.05	91.1	1.9	3.9	8.0	1.9	3.1	9.9	5.5
Ni Scav Tail	1696	85.8	0.06	0.13	1.36	98.5	0.16	0.18	3.22	96.4	16.3	27.4	48.9	16.3	16.1	60.4	88.4
Head (calc.)	1976	100.0	0.29	0.41	2.39	96.9	0.84	0.98	4.58	93.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Cu 1st Clnr Conc	7.9	0.40	29.3	0.40	30.7	39.6	84.7	1.13	1.79	12.4	40.3	0.4	5.1	40.3	0.5	0.2	0.1
Cu Rougher Conc	12.2	0.62	24.3	1.20	28.2	46.4	70.1	3.39	6.49	20.0	51.6	1.8	7.3	51.6	2.1	0.9	0.1
Bulk 3rd Clnr Conc	27.6	1.40	13.6	6.61	23.8	55.9	39.4	19.2	9.56	31.8	65.6	22.7	14.0	65.6	27.4	2.9	0.5
Bulk 2nd Clnr Conc	36.7	1.86	10.8	7.34	21.9	60.0	31.1	21.3	10.2	37.4	68.9	33.4	17.0	68.9	40.4	4.1	0.7
Bulk 1st Clnr Conc	55.6	2.81	7.41	6.33	17.9	68.4	21.4	18.3	11.2	49.1	71.8	43.7	21.1	71.8	52.6	6.9	1.5
Bulk Rougher Conc	109	5.49	3.86	3.45	10.0	82.7	11.1	9.92	7.41	71.5	72.9	46.5	23.1	72.9	55.5	8.9	4.2
Ni 4th Clnr Conc	4.0	0.20	7.29	9.33	28.7	54.7	21.1	26.8	32.3	19.8	5.1	4.6	2.4	5.1	5.5	1.4	0.0
Ni 3rd Clnr Conc	5.6	0.28	5.76	8.53	27.2	58.5	16.7	24.5	34.4	24.5	5.6	5.9	3.2	5.6	7.1	2.1	0.1
Ni 2nd Clnr Conc	13.5	0.68	2.87	6.11	21.6	69.4	8.30	17.3	33.6	40.8	6.8	10.2	6.2	6.8	12.1	5.0	0.3
Ni 1st Clnr Conc	60.3	3.05	0.84	2.98	15.6	80.6	2.44	8.11	31.3	58.1	8.9	22.3	20.0	8.9	25.2	20.9	1.9
Ni Scav Conc	172	8.68	0.36	1.23	7.69	90.7	1.05	3.21	16.2	79.5	10.8	26.1	28.0	10.8	28.4	30.8	7.4
Bulk Rghr+Scav Conc	280	14.2	1.72	2.09	8.60	87.6	4.96	5.81	12.8	76.4	83.7	72.6	51.1	83.7	83.9	39.6	11.6

Test: F30 **Project:** 150149-001 **Date:** 09-Feb-12 **Operator:** YW

Purpose: Split flowsheet
Procedure: As below.
Feed: 2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (Ni clnr 1 concentrate)
Regrind

Feed K_{80} :90 µm
Cu regrind K80: 74 µm
Ni regrind K80: 30 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	4037	CMC	Calgon	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		10		40		10		1	2	8.8	124.4
Bulk Rougher 2		5		40		5		1	2	8.7	66.7
Ni Scav 1		30		40					6	8.7	53.4
Ni Scav 2		30		40					6	8.7	47.8
Combine Ro Conc 1-2											
Bulk 1st Cleaner		0+0+2		10+10+0		0+2+0			3+2+1	8.6	92.2
Regrind (PM)							0				
Bulk 2nd Cleaner				5					2+2	8.4	109.6
Bulk 3rd Cleaner									2		
Combine Scav Conc 1-2											
Ni 1st Cleaner		10+10		30+0					2+2	8.7	79.5
Regrind (PM)							4				
Ni 2nd Cleaner		5+5		5+0					2	8.5	59.0
Ni 3rd Cleaner					10				2	7.5	165.8
Total	0	75	0	165	10	15	61	2	22		

*As needed

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep	
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12	
Speed: r.p.m.	1800	1600	1200	

PSA On Ni Regrind
Assay for Cu, Ni, S

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Bulk 3rd Clnr Conc.	31.7	1.62	**14.2**	**4.79**	22.4	75.3	19.7	14.9
Bulk 3rd Clnr Tail	1.6	0.08	1.12	4.24	21.1	0.3	0.9	0.7
Bulk 2nd Clnr Tail	28.7	1.47	0.95	5.83	9.51	4.6	21.7	5.7
Bulk 1st Clnr Tail	48.6	2.48	0.17	1.41	3.93	1.4	8.9	4.0
Ni 3rd Clnr Conc	8.6	0.44	**2.64**	**6.08**	13.2	3.8	6.8	2.4
Ni 3rd Clnr Tail	2.8	0.14	2.68	6.18	26.4	1.3	2.2	1.6
Ni 2nd Clnr Tail	24.3	1.24	0.34	1.97	14.4	1.4	6.2	7.4
Ni 1st Clnr Tail	114.8	5.86	0.18	0.47	7.40	3.5	7.0	17.9
Ni Scav Tail	1697	86.7	0.03	0.12	1.27	8.5	26.5	45.4
Head (calc.)	1959	100.0	0.31	0.39	2.43	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Bulk 3rd Clnr Conc	31.7	1.62	**14.2**	**4.79**	22.4	**75.3**	**19.7**	14.9
Bulk 2nd Clnr Conc	33.3	1.70	13.6	4.76	22.3	75.6	20.6	15.7
Bulk 1st Clnr Conc	62.0	3.17	7.73	5.26	16.4	80.2	42.4	21.4
Bulk Rougher Conc	**111**	**5.65**	**4.41**	**3.57**	**10.9**	**81.6**	**51.3**	**25.4**
Ni 3rd Clnr Conc	8.6	0.44	**2.64**	**6.08**	13.2	3.8	6.8	2.4
Ni 2nd Clnr Conc	11.4	0.58	2.65	6.10	16.4	5.1	9.0	3.9
Ni 1st Clnr Conc	35.7	1.82	1.08	3.29	15.1	6.4	15.3	11.3
Ni Scav Conc	151	7.68	0.39	1.14	9.22	9.9	22.3	29.2
Bulk Rghr+Scav Conc	261	**13.3**	2.09	2.17	9.94	91.5	73.5	54.62

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 3rd Clnr Conc.	31.7	1.62	**14.2**	**4.79**	22.4	58.6	41.0	13.9	8.95	36.1	75.3	19.7	14.9	75.3	24.0	3.1	0.6
Bulk 3rd Clnr Tail	1.6	0.08	1.12	4.24	21.1	73.5	3.24	11.7	41.8	43.3	0.3	0.9	0.7	0.3	1.0	0.7	0.04
Bulk 2nd Clnr Tail	28.7	1.47	0.95	5.83	9.51	83.7	2.75	16.9	7.70	72.7	4.6	21.7	5.7	4.6	26.5	2.4	1.1
Bulk 1st Clnr Tail	48.6	2.48	0.17	1.41	3.93	94.5	0.49	3.90	6.40	89.2	1.4	8.9	4.0	1.4	10.4	3.4	2.4
Ni 3rd Clnr Conc	8.6	0.44	**2.64**	**6.08**	13.2	78.1	7.63	17.6	12.3	62.5	3.8	6.8	2.4	3.8	8.2	1.1	0.3
Ni 3rd Clnr Tail	2.8	0.14	2.68	6.18	26.4	64.7	7.75	17.3	46.6	28.4	1.3	2.2	1.6	1.3	2.6	1.4	0.0
Ni 2nd Clnr Tail	24.3	1.24	0.34	1.97	14.4	83.3	0.98	5.14	32.0	61.9	1.4	6.2	7.4	1.4	6.8	8.5	0.8
Ni 1st Clnr Tail	114.8	5.86	0.18	0.47	7.40	92.0	0.52	0.95	17.9	80.6	3.5	7.0	17.9	3.5	5.9	22.4	5.1
Ni Scav Tail	1697	86.7	0.03	0.12	1.27	98.6	0.09	0.16	3.08	96.7	8.5	26.5	45.4	8.5	14.5	56.9	89.6
Head (calc.)	1959	100.0	0.31	0.39	2.43	96.9	0.88	0.94	4.68	93.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 3rd Clnr Conc	31.7	1.62	14.2	4.79	22.4	58.6	41.0	13.9	8.95	36.1	75.3	19.7	14.9	75.3	24.0	3.1	0.6
Bulk 2nd Clnr Conc	33.3	1.70	13.6	4.76	22.3	59.3	39.2	13.8	10.5	36.5	75.6	20.6	15.7	75.6	25.0	3.8	0.7
Bulk 1st Clnr Conc	62.0	3.17	7.73	5.26	16.4	70.6	22.3	15.2	9.22	53.2	80.2	42.4	21.4	80.2	51.5	6.2	1.8
Bulk Rougher Conc	111	5.65	4.41	3.57	10.9	81.1	12.7	10.2	7.98	69.0	81.6	51.3	25.4	81.6	61.9	9.6	4.2
Ni 3rd Clnr Conc	8.6	0.44	2.64	6.08	13.2	78.1	7.63	17.6	12.3	62.5	3.8	6.8	2.4	3.8	8.2	1.1	0.3
Ni 3rd Clnr Conc	11.4	0.58	2.65	6.10	16.4	74.8	7.66	17.5	20.7	54.1	5.1	9.0	3.9	5.1	10.9	2.6	0.3
Ni 1st Clnr Conc	35.7	1.82	1.08	3.29	15.1	80.6	3.11	9.09	28.4	59.4	6.4	15.3	11.3	6.4	17.7	11.1	1.2
Ni Scav Conc	151	7.68	0.39	1.14	9.22	89.3	1.14	2.88	20.4	75.6	9.9	22.3	29.2	9.9	23.6	33.4	6.2
Bulk Rghr+Scav Conc	261	13.3	2.09	2.17	9.94	85.8	6.05	6.00	15.1	72.8	91.5	73.5	54.6	91.5	85.5	43.1	10.4

Test: F31 **Project: 150149-001** **Date:** 09-Feb-12 **Operator:** YW

Purpose: Split flowsheet
Procedure: As below.
Feed: 2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (Ni clnr 1 concentrate)
Regrind

Feed K_{80} :90 µm
Cu regrind K80: 75 µm
Ni regrind K80: 51 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	CuSO4	CMC	Guar Gum	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		10		40		10		1	2	9.0	-133.1
Bulk Rougher 2		5		40		5		1	2	9.0	83.5
Ni Scav 1		30		40				1	6	9.0	70.0
Ni Scav 2		30		40				1	6	8.8	70.5
Ni Scav 3		30	200						2		
Combine Ro Conc 1-2											
Bulk 1st Cleaner		0+2		15					3+1		
Regrind (PM)							0				
Bulk 2nd Cleaner		0+2			10				4		
Bulk 3rd Cleaner									2	7.9	135.9
Combine Scav Conc 1-2											
Ni 1st Cleaner		20		30					4	8.7	115.7
Regrind (PM)							4				
Ni 2nd Cleaner		10			10	10			2	8.4	130.1
Ni 3rd Cleaner									2	7.7	144.7
Total	0	135	200	205	20	25	61	4	32		

*As needed

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep	
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12	
Speed: r.p.m.	1800	1600	1200	

Assay for Cu, Ni, S

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Bulk 3rd Clnr Conc.	23.4	1.19	**16.4**	**3.70**	24.4	63.8	10.8	12.3
Bulk 3rd Clnr Tail	11.2	0.57	3.51	7.90	17.4	6.5	11.1	4.2
Bulk 2nd Clnr Tail	38.8	1.97	0.76	6.17	11.4	4.9	29.9	9.5
Bulk 1st Clnr Tail	45.3	2.30	0.09	0.66	2.79	0.7	3.7	2.7
Ni 3rd Clnr Conc	2.7	0.14	**4.65**	**6.76**	30.3	2.1	2.3	1.8
Ni 3rd Clnr Tail	1.9	0.10	1.45	4.53	26.0	0.5	1.1	1.1
Ni 2nd Clnr Tail	28.3	1.44	0.39	1.98	20.9	1.8	7.0	12.7
Ni 1st Clnr Tail	91.6	4.65	0.18	0.45	5.30	2.7	5.2	10.4
Ni Scav 3	27.9	1.42	0.12	0.39	10.4	0.6	1.4	6.2
Ni Scav Tail	1699	86.2	0.06	0.13	1.07	16.4	27.6	39.1
Head (calc.)	1970	100.0	0.31	0.41	2.36	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Bulk 3rd Clnr Conc	23.4	1.19	**16.4**	**3.70**	24.4	63.8	10.8	12.3
Bulk 2nd Clnr Conc	34.6	1.76	12.2	5.06	22.1	70.3	21.9	16.5
Bulk 1st Clnr Conc	73.4	3.73	6.17	5.65	16.5	75.3	51.8	26.0
Bulk Rougher Conc	**119**	**6.03**	**3.85**	**3.74**	**11.2**	**75.9**	**55.5**	**28.7**
Ni 3rd Clnr Conc	2.7	0.14	**4.65**	**6.76**	30.3	**2.1**	**2.3**	1.8
Ni 2nd Clnr Conc	4.6	0.23	3.33	5.84	28.5	2.5	3.4	2.8
Ni 1st Clnr Conc	32.9	1.67	0.80	2.52	22.0	4.4	10.4	15.5
Ni Scav 1 & 2 Conc	125	6.32	0.34	1.00	9.70	7.1	15.5	26.0
Bulk Rghr+Scav Conc	271	**13.8**	1.85	2.14	10.4	83.6	72.4	60.9

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 3rd Clnr Conc.	23.4	1.19	**16.4**	**3.70**	24.4	55.5	47.4	10.6	11.1	30.8	63.8	10.8	12.3	65.2	14.1	3.1	0.4
Bulk 3rd Clnr Tail	11.2	0.57	3.51	7.90	17.4	71.2	10.1	22.9	16.3	50.7	6.5	11.1	4.2	6.7	14.5	2.2	0.3
Bulk 2nd Clnr Tail	38.8	1.97	0.76	6.17	11.4	81.7	2.2	17.8	12.3	67.7	4.9	29.9	9.5	5.0	39.1	5.7	1.4
Bulk 1st Clnr Tail	45.3	2.30	0.09	0.66	2.79	96.5	0.3	1.71	5.53	92.5	0.7	3.7	2.7	0.7	4.4	3.0	2.3
Ni 3rd Clnr Conc	2.7	0.14	**4.65**	**6.76**	30.3	58.3	13.4	19.0	50.1	17.5	2.1	2.3	1.8	2.1	2.9	1.6	0.0
Ni 3rd Clnr Tail	1.9	0.10	1.45	4.53	26.0	68.0	4.2	12.3	53.0	30.5	0.5	1.1	1.1	0.5	1.3	1.2	0.0
Ni 2nd Clnr Tail	28.3	1.44	0.39	1.98	20.9	76.7	0.5	0.98	12.4	86.1	1.8	7.0	12.7	0.9	1.6	4.2	1.3
Ni 1st Clnr Tail	91.6	4.65	0.18	0.45	5.30	94.1	0.3	0.58	26.1	72.9	2.7	5.2	10.4	1.9	3.0	28.5	3.6
Ni Scav 3	27.9	1.42	0.12	0.39	10.4	89.1	0.2	0.20	2.45	97.2	0.6	1.4	6.2	0.3	0.3	0.8	1.5
Ni Scav Tail	1698.9	86.2	0.06	0.13	1.07	98.7	0.2	0.20	2.45	97.2	16.4	27.6	39.1	16.8	18.8	49.7	89.2
Head (calc.)	1970.0	100.0	0.31	0.41	2.36	96.9	0.86	0.90	4.26	94.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 3rd Clnr Conc	23.4	1.19	**16.4**	**3.70**	24.4	55.5	47.4	10.6	11.1	30.8	63.8	10.8	12.3	65.2	14.1	3.1	0.4
Bulk 2nd Clnr Conc	34.6	1.76	12.2	5.06	22.1	60.6	35.3	14.6	12.8	37.2	70.3	21.9	16.5	71.9	28.6	5.3	0.7
Bulk 1st Clnr Conc	73.4	3.73	6.17	5.65	16.5	71.7	17.8	16.3	12.5	53.3	75.3	51.8	26.0	76.9	67.7	11.0	2.1
Bulk Rougher Conc	**118.7**	**6.03**	**3.85**	**3.74**	**11.2**	**81.2**	**11.1**	**10.7**	**9.9**	**68.3**	**75.9**	**55.5**	**28.7**	**77.6**	**72.1**	**14.0**	**4.4**
Ni 3rd Clnr Conc	2.7	0.14	**4.65**	**6.76**	30.3	58.3	13.4	19.0	50.1	17.5	2.1	2.3	1.8	2.1	2.9	1.6	0.0
Ni 3rd Clnr Conc	4.6	0.23	3.33	5.84	28.5	62.3	9.62	16.2	51.3	22.9	2.5	3.4	2.8	2.6	4.2	2.8	0.1
Ni 1st Clnr Conc	32.9	1.67	0.80	2.52	22.0	74.7	1.79	3.11	17.9	77.2	4.4	10.4	15.5	3.5	5.8	7.0	1.4
Ni Scav 1 & 2 Conc	124.5	6.32	0.34	1.00	9.70	89.0	0.73	1.25	23.9	74.1	7.1	15.5	26.0	5.3	8.8	35.5	5.0
Bulk Rghr+Scav Conc	271.1	13.76	1.84	2.10	9.38	86.7	5.20	5.27	15.3	63.9	83.6	72.4	60.9	83.2	81.2	50.3	10.8

Test: F32 **Project:** 150149-001 **Date:** 09-Feb-12 **Operator:** YW

Purpose: Split flowsheet including Cu separation
Procedure: As below.
Feed: 2x2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (bulk clnr 1 concentrate)
Regrind 8 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} : 90 µm
Cu regrind K80: 44 µm
Ni regrind K80: 53 µm

Conditions:

	Reagents added, grams per tonne						Time, minutes				
Stage	Lime	SIPX	4037	CMC		MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		10		40		24		1	2	8.5	150.7
Bulk Rougher 2		5		40				1	2	8.5	97.8
Ni Scav 1		30		40		10			6		
Ni Scav 2		30+30		40	CuSO4: 200 g/t	12			6+2	8.5	100.0
Combine Ro Conc 1-2											
Bulk 1st Cleaner		0+2		15+0					3+1	8.6	115.4
Regrind (PM)							4				
Bulk 2nd Cleaner		0+2+2			Guar gum: 10 g/t					8.2	97.8
Condition	700							5		11.3	-31.9
Cu Rougher					5100: 1.25 g/t	4+4			2	11.1	-16.3
Cu 1st Cleaner	116.5								1		
Combine Scav Conc 1-2											
Ni 1st Cleaner		20+10		30					4+2	8.7	64.3
Regrind (PM)					Guar Gum		8				
Ni 2nd Cleaner		5			10				3+2	8.4	113.2
Ni 3rd Cleaner					10				2		
Total	816.5	50	0	190	20	46	69	7	15		

*As needed

Stage	Rougher	2nd clnr	3rd clnr & sep
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

PSA On Bulk Regrind
PSA On Ni Regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Cu 1st Cl Conc	14.3	0.36	30.3	0.47	1.71	6.17	1.27	30.1	31.5	1.15	37.6	0.4	1.6	5.0	11.5	4.6	0.9	0.02
Cu 1st Cl Tail	3.5	0.09	20.3	2.80	3.47	19.0	1.69	27.3	31.8	3.43	6.2	0.6	0.8	3.7	3.7	1.0	0.2	0.01
Cu Ro Tail	14.0	0.35	9.65	14.0	3.10	21.1	0.84	26.6	30.2	4.37	11.7	11.8	2.9	16.6	7.4	4.0	0.9	0.1
Bulk 2nd Clnr Tail	31.4	0.79	3.16	6.23	2.08	7.82	0.23	13.2	20.3	16.2	8.6	11.8	4.3	13.8	4.6	4.5	1.3	0.5
Bulk 1st Clnr Tail	59.7	1.51	0.14	0.43	0.53	0.44	0.03	2.05	10.0	26.4	0.7	1.6	2.1	1.5	1.1	1.3	1.2	1.6
Ni 3rd Clnr Conc	47.6	1.20	3.14	9.32	7.10	7.80	0.44	30.5	44.1	2.2	13.0	26.8	22.3	20.9	13.2	15.6	4.3	0.1
Ni 3rd Clnr Tail	50.3	1.27	0.47	2.87	3.19	1.92	0.17	17.1	29.6	14.7	2.1	8.7	10.6	5.4	5.4	9.3	3.1	0.8
Ni 2nd Clnr Tail	80.0	2.02	0.26	1.37	1.40	0.94	0.09	13.6	24.8	16.0	1.8	6.6	7.4	4.2	4.6	11.7	4.1	1.3
Ni 1st Clnr Tail	171	4.32	0.18	0.41	0.80	0.54	0.04	3.40	13.3	25.0	2.7	4.2	9.0	5.2	4.3	6.3	4.7	4.4
Ni Scav Tail	3490	88.1	0.05	0.13	0.17	0.12	<0.02	1.11	11.1	25.6	15.7	27.4	39.1	23.6	44.1	41.7	79.4	91.2
Head (calc.)	3962	100.0	0.29	0.42	0.38	0.45	0.04	2.35	12.3	24.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Cu 1st Clnr Conc	14.3	0.36	30.3	0.47	1.7	6.2	1.27	30.1	31.5	1.2	37.6	0.41	1.61	4.97	11.5	4.63	0.92	0.02
Cu Rougher Conc	17.8	0.45	28.3	0.93	2.1	8.7	1.35	29.5	31.6	1.6	43.7	1.00	2.41	8.71	15.2	5.66	1.15	0.03
Bulk 2nd Clnr Conc	31.8	0.80	20.1	6.68	2.5	14.2	1.13	28.3	31.0	2.8	55.5	12.8	5.27	25.3	22.7	9.67	2.02	0.09
Bulk 1st Clnr Conc	63.2	1.60	11.7	6.46	2.3	11.0	0.68	20.8	25.7	9.5	64.1	24.7	9.58	39.2	27.2	14.1	3.32	0.61
Bulk Rougher Conc	122.9	3.10	6.08	3.53	1.44	5.87	0.36	11.7	18.1	17.7	64.8	26.2	11.7	40.6	28.4	15.4	4.55	2.22
Ni 3rd Clnr Conc	47.6	1.20	3.14	9.32	7.1	7.80	0.44	30.5	44.1	2.2	13.0	26.8	22.3	20.9	13.2	15.6	4.30	0.11
Ni 2nd Clnr Conc	97.9	2.47	1.77	6.01	5.1	4.78	0.30	23.6	36.7	8.6	15.0	35.5	32.8	26.3	18.6	24.9	7.35	0.86
Ni 1st Clnr Conc	177.9	4.49	1.09	3.92	3.4	3.05	0.21	19.1	31.3	12.0	16.8	42.1	40.2	30.6	23.2	36.6	11.4	2.17
Ni Scav Conc	348.9	8.81	0.64	2.20	2.14	1.82	0.12	11.4	22.5	18.35	19.5	46.4	49.2	35.8	27.5	42.9	16.1	6.54
Bulk Rghr+Scav Conc	471.8	11.91	2.06	2.55	1.96	2.88	0.187	11.5	21.3	18.18	84.3	72.6	60.9	76.4	55.9	58.3	20.6	8.76

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Cu 1st Cl Conc	14.3	0.36	30.3	0.47	30.1	39.1	87.6	1.41	-2.63	13.6	37.6	0.4	4.6	37.6	0.5	-0.2	0.1
Cu 1st Cl Tail	3.5	0.09	20.3	2.80	27.3	49.6	58.7	8.01	10.7	22.6	6.2	0.6	1.0	6.2	0.7	0.2	0.0
Cu Ro Tail (Ni Conc.)	14.0	0.35	9.65	14.0	26.6	49.8	27.9	41.0	8.58	22.5	11.7	11.8	4.0	11.7	14.3	0.7	0.1
Bulk 2nd Clnr Tail	31.4	0.79	3.16	6.23	13.2	77.4	9.13	18.0	10.5	62.3	8.6	11.8	4.5	8.6	14.1	1.9	0.5
Bulk 1st Clnr Tail	59.7	1.51	0.14	0.43	2.05	97.4	0.40	1.05	4.04	94.5	0.7	1.6	1.3	0.7	1.6	1.4	1.5
Ni 3rd Clnr Conc	47.6	1.20	3.14	9.32	30.5	57.0	9.08	26.5	48.1	16.3	13.0	26.8	15.6	13.0	31.5	13.0	0.2
Ni 3rd Clnr Tail	50.3	1.27	0.47	2.87	17.1	79.6	1.36	7.72	36.5	54.5	2.1	8.7	9.3	2.05	9.7	10.4	0.7
Ni 2nd Clnr Tail	80.0	2.02	0.26	1.37	13.6	84.8	0.75	3.38	31.7	64.2	1.8	6.6	11.7	1.80	6.7	14.4	1.4
Ni 1st Clnr Tail	171	4.32	0.18	0.41	3.40	96.0	0.52	0.94	7.53	91.0	2.7	4.2	6.3	2.67	4.0	7.3	4.2
Ni Scav Tail	3490	88.1	0.05	0.13	1.11	98.7	0.15	0.19	2.57	97.1	15.7	27.4	41.7	15.7	16.9	51.0	91.3
Head (calc.)	3962	100.0	0.29	0.42	2.35	96.9	0.84	1.01	4.45	93.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Cu 1st Clnr Conc	14.3	0.36	30.3	0.47	30.1	39.1	87.6	1.41	-2.63	13.6	37.6	0.4	4.6	37.6	0.5	-0.21	0.1
Cu Rougher Conc	17.8	0.45	28.3	0.93	29.5	41.2	81.9	2.71	-0.01	15.4	43.7	1.0	5.7	43.7	1.2	0.0	0.1
Bulk 2nd Clnr Conc	31.8	0.80	20.1	6.68	28.3	45.0	58.1	19.6	3.77	18.6	55.5	12.8	9.7	55.5	15.5	0.7	0.2
Bulk 1st Clnr Conc	63.2	1.60	11.7	6.46	20.8	61.1	33.8	18.8	7.11	40.3	64.1	24.7	14.1	64.1	29.6	2.5	0.7
Bulk Rougher Conc	122.9	3.10	6.08	3.53	11.7	78.7	17.6	10.18	5.62	66.6	64.8	26.2	15.4	64.8	31.2	3.9	2.2
Ni 3rd Clnr Conc	47.6	1.20	3.14	9.32	30.5	57.0	9.08	26.5	48.1	16.3	13.0	26.8	15.6	13.0	31.5	13.0	0.2
Ni 2nd Clnr Conc	97.9	2.47	1.77	6.01	23.6	68.6	5.11	16.9	42.1	35.9	15.0	35.5	24.9	15.0	41.2	23.4	0.9
Ni 1st Clnr Conc	177.9	4.49	1.09	3.92	19.1	75.9	3.15	10.8	37.4	48.6	16.8	42.1	36.6	16.8	47.9	37.8	2.3
Ni Scav Conc	348.9	8.81	0.64	2.20	11.41	85.7	1.86	5.97	22.8	69.4	19.5	46.4	42.9	19.5	51.9	45.1	6.5
Bulk Rghr+Scav Conc	471.8	11.91	2.06	2.55	11.48	83.9	5.95	7.07	18.30	68.7	84.3	72.6	58.3	84.3	83.1	49.0	8.7

Test: F33-MF2 **Project: 50149-001** **Date:** 10-Feb-12 **Operator** YW

Purpose: Test MF2 flowsheet as recommended by Wardrop in Draft PEA
Procedure: As below, adapted by Mike Ounpuu
Feed: 2 kg of -10 mesh Master Composite
Prim Grind: 19 minutes/2 kg at 65% solids in a lab mill — Target ~ 300 micron
Sec Grind: 38 minutes/2 kg at ~65% solids in a lab mill — Target 90 micron
Regrind 8 min in Pebble Mill

Prim Clnrs K_{80} : 52 µm
Sec Clnrs K_{80} : 71 µm
Scav. Reg. K_{80} : 30 µm

Conditions:

Stage	Reagents added, grams per tonne: Lime	SIPX	4037	CMC	Guar	MIBC*	Time, minutes: Grind	Cond.	Froth	pH	Eh
Prim Grind							19				
Prim Rougher		10		40		10		1	2	8.6	165.0
Prim 1st Cleaner				10		5		1	1.5	8.4	91.4
Prim 2nd Cleaner					5	6		1	1	7.8	143.3
Prim Ro Tail to Sec Grind											
Sec Grind							38				
Sec Scav 1		30		40		6			6	8.8	109.2
Sec Scav 2		30		40					6	8.8	40.7
Combine Scav Conc 1-2											
Sec 1st Cleaner		0+2		30		5		2	2+2	8.8	62.9
Sec 2nd Cleaner					10	15		2	4	8.5	114.3
Sec 3rd Cleaner					5			2	3	8.1	130.7
Sec 1st Cl Tail to Regrind											
Regrind							4				
Regrind Scav		10			10				2	8.6	84.0
Total	0	70	0	160	20	47	57	9	23.5		

*As needed

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1800	1600	1200

PSA on Sec Scav tail
PSA on Pri Clnr
PSA on Sec Clnr
PSA on Regrind

Metallurgical Balance

Product	Weight g	%	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %): Cu	Ni	Pt	Pd	Au	S	Fe	MgO	% Distribution: Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Prim Cl 2 Conc	7.9	0.40	22.4	2.64	2.47	10.1	1.60	29.2	31.8	2.89	29.4	2.4	2.3	8.0	13.7	4.8	1.0	0.0
Prim Cl 2 Tail	11.9	0.61	3.54	13.2	2.63	11.2	0.44	23.9	30.3	5.58	7.0	18.2	3.6	13.4	5.7	5.9	1.4	0.1
Prim Cl 1 Tail	33.9	1.73	0.38	2.10	0.75	1.20	0.06	4.60	12.6	18.0	2.1	8.2	3.0	4.1	2.2	3.2	1.7	1.3
Sec Cl 3 Conc	29.7	1.51	7.53	6.61	3.82	9.44	0.72	23.7	29.9	4.75	37.2	22.7	13.2	28.1	23.2	14.5	3.6	0.3
Sec Cl 3 Tail	52.3	2.66	0.88	2.40	3.43	3.24	0.19	8.95	19.1	19.5	7.7	14.5	20.9	17.0	10.8	9.7	4.0	2.2
Sec Cl 3 Tail	11.2	0.57	0.40	1.51	2.03	1.47	0.09	8.37	18.8	20.7	0.7	2.0	2.6	1.6	1.1	1.9	0.8	0.5
Regrind Scav Conc	4.6	0.23	0.70	1.23	2.92	2.03	0.37	6.88	15.9	20.5	0.5	0.7	1.6	0.9	1.8	0.7	0.3	0.2
Regrind Scav Tail	91.9	4.68	0.08	0.32	0.63	0.30	0.04	3.44	13.1	21.8	1.2	3.4	6.7	2.8	4.0	6.5	4.8	4.3
Sec Scav Tail	1722	87.6	0.05	0.14	0.23	0.14	0.02	1.49	11.9	24.8	14.0	27.9	46.1	24.2	37.4	52.9	82.3	91.1
Head (calc.)	1965	100.0	0.31	0.44	0.44	0.51	0.05	2.47	12.7	23.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Prim 2nd Clnr Conc	7.9	0.4	22.4	2.64	2.47	10.1	1.60	29.2	31.8	2.9	29.4	2.4	2.3	8.0	13.7	4.8	1.0	0.0
Prim 1st Clnr Conc	19.8	1.0	11.1	8.99	2.57	10.8	0.90	26.0	30.9	4.5	36.5	20.6	5.9	21.4	19.4	10.6	2.5	0.2
Prim Rougher Conc	53.7	2.7	4.32	4.64	1.42	4.73	0.37	12.5	19.3	13.0	38.6	28.8	8.9	25.4	21.6	13.8	4.2	1.5
Sec 3rd Clnr Conc	29.7	1.5	7.53	6.61	3.82	9.44	0.72	23.7	29.9	4.75	37.2	22.7	13.2	28.1	23.2	14.5	3.6	0.3
Sec 2nd Clnr Conc	82.0	4.2	3.29	3.92	3.57	5.49	0.38	14.3	23.0	14.2	44.9	37.3	34.1	45.1	34.0	24.2	7.6	2.5
Sec 1st Clnr Conc	93.2	4.7	2.94	3.63	3.39	5.00	0.35	13.6	22.5	14.9	45.6	39.2	36.7	46.7	35.1	26.1	8.4	3.0
Sec Scav Conc	190	9.7	1.50	1.97	2.04	2.65	0.20	8.51	17.8	18.4	47.4	43.3	45.0	50.4	41.0	33.3	13.6	7.4
Regrind Scav Conc	4.6	0.2	0.70	1.23	2.92	2.03	0.37	6.88	15.9	20.5	0.5	0.7	1.6	0.9	1.8	0.7	0.3	0.2
Regrind Scav Feed	96.5	4.9	0.11	0.36	0.74	0.38	0.06	3.60	13.2	21.7	1.7	4.1	8.3	3.7	5.8	7.2	5.1	4.5
Comb Clnr Conc	37.6	1.9	10.7	5.78	3.54	9.58	0.90	24.9	30.3	4.36	66.7	25.1	15.5	36.1	37.0	19.3	4.6	0.3
Comb Ro & Scav Cor	243	12.4	2.12	2.56	1.90	3.11	0.24	9.39	18.1	17.2	86.0	72.1	54	76	63	47.1	17.7	9

Metallurgical Balance

Product	Weight g	%	Assays, %: Cu	Ni	S	other	Cp	Pn	Po	Ga	% Distribution: Cu	Ni	S	Cp	Pn	Po	Ga
Prim Cl 2 Conc	7.90	0.40	22.4	2.64	29.2	45.8	64.7	7.55	10.5	17.2	29.4	2.4	4.8	29.4	2.83	0.9	0.1
Prim Cl 2 Tail	11.9	0.61	3.54	13.2	23.9	59.4	10.2	38.4	19.8	31.6	7.0	18.2	5.9	7.0	21.7	2.6	0.2
Prim Cl 1 Tail	33.9	1.73	0.38	2.10	4.60	92.9	1.10	5.95	5.84	87.1	2.1	8.2	3.2	2.1	9.6	2.2	1.6
Sec Cl 3 Conc	29.7	1.51	7.53	6.61	23.7	62.2	21.8	18.9	25.5	33.8	37.2	22.7	14.5	37.2	26.7	8.2	0.5
Sec Cl 3 Tail	52.3	2.66	0.88	2.40	8.95	87.8	2.54	6.68	15.2	75.6	7.7	14.5	9.7	7.7	16.6	8.6	2.2
Sec Cl 3 Tail	11.2	0.57	0.40	1.51	8.37	89.7	1.16	4.02	17.2	77.6	0.7	2.0	1.9	0.7	2.1	2.1	0.5
Regrind Scav Conc	4.60	0.23	0.70	1.23	6.88	91.2	2.02	3.26	13.2	81.5	0.5	0.7	0.7	0.5	0.7	0.7	0.2
Regrind Scav Tail	91.9	4.68	0.08	0.32	3.44	96.2	0.23	0.66	8.14	91.0	1.2	3.4	6.5	1.2	2.9	8.1	4.6
Sec Scav Tail	1722	87.6	0.05	0.14	1.49	98.3	0.14	0.21	3.55	96.1	14.0	27.9	52.9	14.0	17.0	66.6	90.2
Head (calc.)	1965	100.0	0.31	0.44	2.47	96.8	0.88	1.07	4.67	93.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Prim 2nd Clnr Conc	7.90	0.4	22.4	2.64	29.2	45.8	64.7	7.55	10.5	17.2	29.4	2.4	4.8	29.4	2.8	0.9	0.1
Prim 1st Clnr Conc	19.8	1.0	11.1	8.99	26.0	53.9	32.0	26.1	16.1	25.8	36.5	20.6	10.6	36.5	24.5	3.5	0.3
Prim Rougher Conc	53.7	2.7	4.32	4.64	12.5	78.5	12.5	13.4	9.6	64.5	38.6	28.8	13.8	38.6	34.1	5.6	1.9
Sec 3rd Clnr Conc	29.7	1.5	7.53	6.61	23.7	62.2	21.8	18.9	25.5	33.8	37.2	22.7	14.5	37.2	26.7	8.2	0.5
Sec 2nd Clnr Conc	82.0	4.2	3.29	3.92	14.3	78.5	9.50	11.1	18.9	60.5	44.9	37.3	24.2	44.9	43.2	16.9	2.7
Sec 1st Clnr Conc	93.2	4.7	2.94	3.63	13.6	79.8	8.50	10.3	18.7	62.5	45.6	39.2	26.1	45.6	45.4	19.0	3.2
Sec Scav Conc	190	9.7	1.50	1.97	8.51	88.0	4.34	5.45	13.4	76.8	47.4	43.3	33.3	47.4	49.0	27.8	7.9
Regrind Scav Conc	4.60	0.2	0.70	1.23	6.88	91.2	2.02	3.26	13.2	81.5	0.5	0.7	0.7	0.5	0.7	0.7	0.2
Regrind Scav Feed	96.5	4.9	0.11	0.36	3.60	95.9	0.31	0.79	8.38	90.5	1.7	4.1	7.2	1.7	3.6	8.8	4.8
Comb Conc	37.6	1.9	10.7	5.78	24.9	58.7	30.8	16.5	22.3	30.3	66.7	25.1	19.3	66.7	29.5	9.1	0.6

Test: F34 **Project:** 150149-001 **Date:** 10-Feb-12 **Operator:** YW

Purpose: Split flowsheet
Procedure: As below.
Feed: 2x2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (bulk clnr 1 concentrate)
Regrind 6 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} :90 µm
Cu regrind K80: 38 µm
Ni regrind K80: 36 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	4037	CMC	Guar gum	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		20		40		12		1	2	8.9	98.2
Bulk Rougher 2		5		40					2	8.9	39.4
Ni Scav 1		30		40					4	8.8	39.7
Ni Scav 2		30							4	8.8	-42.1
Ni Scav 3		30							4		
Combine Ro Conc 1-2											
Bulk 1st Cleaner		0+0+2.5		10+5		5			2+1	8.8	72.9
Regrind (PM)							4				
Bulk 2nd Cleaner		2			10	2			2.5	8.4	87.2
Bulk 3rd Cleaner		0+2			5	2.5			3	8.1	114.5
Combine Scav Conc 1-2											
Ni 1st Cleaner		20+5		30	10	5			3	8.8	72.7
Regrind (PM)							6				
Ni 2nd Cleaner		10+10			10	5			2+2	8.7	86.4
Ni 2nd Cleaner Scav					5100: 5 g/t	3477: 5 g/t			2		
Total	0	117	0	150	35	31.5	67	1	26.5		

*As needed

Stage	Rougher	2nd clnr	3rd clnr	
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12	
Speed: r.p.m.	1500	1600	1200	

PSA On Bulk Regrind
PSA On Ni Regrind

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 3rd Clnr conc	32.1	0.82	23.2	3.65	2.51	12.0	1.41	29.2	30.2	2.34	60.4	6.8	4.7	20.3	25.2	8.9	1.9	0.1
Bulk 3rd Clnr Tail	16.2	0.41	4.80	11.0	3.21	13.4	0.49	19.6	24.9	9.92	6.3	10.4	3.0	11.4	4.4	3.0	0.8	0.2
Bulk 2nd Clnr Tail	96.0	2.44	1.59	6.48	2.41	5.14	0.21	12.8	21.6	15.8	12.4	36.3	13.6	26.0	11.2	11.6	4.2	1.7
Bulk 1st Clnr Tail	69.0	1.75	0.10	0.43	0.79	0.34	0.04	2.65	11.1	24.3	0.6	1.7	3.2	1.2	1.5	1.7	1.5	1.9
Ni 2nd Clnr Conc	16.0	0.41	**3.11**	**7.05**	9.33	**7.69**	**1.12**	29.6	**42.3**	3.69	4.0	6.6	8.8	6.5	10.0	4.5	1.4	0.1
Ni 2nd Clnr Scav.Conc	13.8	0.35	**0.44**	**2.19**	3.81	**1.86**	**0.20**	23.8	**37.3**	8.30	0.5	1.8	3.1	1.4	1.5	3.1	1.0	0.1
Ni 2nd Clnr Scav. Tail	35.8	0.91	0.29	1.44	2.14	1.09	0.13	16.7	31.2	12.4	0.8	3.0	4.5	2.1	2.6	5.7	2.2	0.5
Ni 1st Clnr Tail	164.3	4.18	0.19	0.52	1.04	0.63	0.05	5.27	15.3	22.0	2.5	5.0	10.0	5.5	4.6	8.2	5.0	4.1
Ni Scav Tail	3489	88.7	0.04	0.14	0.24	0.14	0.02	1.61	11.7	23.2	12.5	28.5	49.1	25.7	38.9	53.2	81.9	91.4
Head (calc.)	3932	100.0	0.31	0.44	0.43	0.48	0.05	2.68	12.7	22.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Bulk 3rd Clnr Conc	32.1	0.82	**23.2**	**3.65**	2.51	12.0	1.41	29.2	30.2	2.3	60.4	6.83	4.73	20.3	25.2	8.9	1.9	0.08
Bulk 2nd Clnr Conc	48.3	1.23	17.0	6.12	2.74	12.47	1.10	26.0	28.4	4.9	66.7	17.2	7.77	31.7	29.6	11.9	2.8	0.27
Bulk 1st Clnr Conc	144	3.67	6.76	6.36	2.52	7.59	0.51	17.2	23.9	12.1	79.1	53.5	21.3	57.7	40.9	23.5	6.9	1.98
Bulk Rougher Conc	**213**	**5.42**	**4.60**	**4.44**	**1.96**	**5.25**	**0.36**	**12.5**	**19.7**	**16.1**	**79.6**	**55.2**	**24.5**	**58.9**	**42.4**	**25.3**	**8.4**	**3.87**
Ni 2nd Clnr Conc	16.0	0.41	**3.11**	**7.05**	9.33	7.69	1.12	29.6	42.3	3.7	4.0	6.6	8.75	6.48	9.99	4.49	1.36	0.07
Ni 2nd Clnr + Scav. Conc	29.8	0.76	1.87	4.80	6.77	4.99	0.69	26.9	40.0	5.8	4.5	8.3	11.8	7.83	11.5	7.60	2.39	0.20
Ni 1st Clnr Conc	65.6	1.67	1.01	2.97	4.24	2.86	0.39	21.3	35.2	9.4	5.4	11.3	16.3	9.89	14.1	13.3	4.63	0.70
Ni Scav Conc	230	5.85	0.42	1.22	1.95	1.27	0.15	9.86	21.0	18.4	7.9	16.3	26.4	15.3	18.7	21.5	9.7	4.78
Bulk Rghr+Scav Conc	443	11.3	2.44	2.77	1.96	3.18	0.25	11.1	20.4	17.3	87.5	71.5	50.9	74.3	61.1	46.8	18.1	8.65

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 3rd Clnr Conc	32.1	0.82	23.2	3.65	29.2	44.0	67.1	10.6	5.78	16.6	60.4	6.8	8.9	40.1	3.7	0.3	0.2
Bulk 3rd Clnr Tail	16.2	0.41	4.80	11.0	19.6	64.6	13.9	32.1	10.8	43.3	6.3	10.4	3.0	4.2	5.7	0.3	0.2
Bulk 2nd Clnr Tail	96.0	2.44	1.59	6.5	12.8	79.1	4.60	18.7	13.0	63.7	12.4	36.3	11.6	8.2	19.7	2.3	1.9
Bulk 1st Clnr Tail	69.0	1.75	0.10	0.43	2.65	96.8	4.60	18.7	13.0	63.7	0.6	1.7	1.7	5.9	14.1	1.7	1.4
Ni 2nd Clnr Conc	16.0	0.41	**3.11**	**7.05**	29.6	60.2	0.29	1.03	5.73	93.0	4.0	6.6	4.5	0.1	0.2	0.2	0.5
Ni 2nd Clnr Scav.Conc	13.8	0.35	0.44	2.19	23.8	73.6	8.99	19.8	51.6	19.6	0.5	1.8	3.1	2.3	3.0	1.3	0.1
Ni 2nd Clnr Scav. Tail	35.8	0.91	0.29	1.44	16.7	81.6	1.27	5.40	55.9	37.4	0.8	3.0	5.7	0.8	2.1	3.7	0.4
Ni 1st Clnr Tail	164.3	4.18	0.19	0.52	5.27	94.0	0.84	3.45	39.6	56.2	2.5	5.0	8.2	2.6	6.2	12.0	2.8
Ni Scav Tail	3489	88.7	0.04	0.14	1.61	98.2	0.55	1.19	12.1	86.1	12.5	28.5	53.2	35.7	45.3	78.2	92.6
Head (calc.)	3932	100.0	0.31	0.44	2.68	96.6	1.36	2.33	13.8	82.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 3rd Clnr Conc	32.1	0.82	23.2	3.65	29.2	44.0	67.1	10.6	5.78	16.6	60.4	6.8	8.9	40.1	3.7	0.3	0.2
Bulk 2nd Clnr Conc	48.3	1.23	17.0	6.12	26.0	50.9	49.2	17.8	7.45	25.5	66.7	17.2	11.9	44.3	9.4	0.7	0.4
Bulk 1st Clnr Conc	144.3	3.67	6.76	6.36	17.2	69.7	19.5	18.4	11.1	50.9	79.1	53.5	23.5	52.5	29.1	3.0	2.3
Bulk Rougher Conc	213	5.42	4.60	4.44	12.5	78.5	14.7	18.5	11.7	55.0	79.6	55.2	25.3	58.5	43.2	4.6	3.6
Ni 2nd Clnr Conc	16.0	0.41	3.11	7.05	29.6	60.2	0.29	1.03	5.73	93.0	4.0	6.6	4.5	0.1	0.2	0.2	0.5
Ni 2nd Clnr + Scav. Conc	29.8	0.76	1.87	4.80	26.9	66.4	4.32	9.72	27.0	59.0	4.5	8.3	7.6	2.4	3.2	1.5	0.5
Ni 1st Clnr Conc	65.6	1.67	1.01	2.97	21.3	74.7	2.66	7.36	42.8	47.2	5.4	11.3	13.3	3.2	5.3	5.2	1.0
Ni Scav Conc	230	5.85	0.42	1.22	9.86	88.5	1.36	4.57	40.5	53.6	7.9	16.3	21.5	5.8	11.5	17.2	3.8
Bulk Rghr+Scav Conc	443	11.27	2.44	2.77	11.1	83.7	7.78	11.3	26.6	54.3	87.5	71.5	46.8	64.3	54.7	21.8	7.4

Test: F35 **Project: 150149-001** **Date:** 14-Feb-12 **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix
Procedure: As below.
Feed: 2x2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (bulk clnr 1 concentrate)
Regrind 8 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} : 90 µm
Cu regrind K80: 41 µm
Ni regrind K80: 35 µm

Conditions:

Stage	Reagents added, grams per tonne: Lime	SIPX	4037	CMC	Guar	MIBC*	Time, minutes: Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		15		30	30			1	2	8.8	26.9
Bulk Rougher 2		10		20	20			1	2	8.7	19.4
Ni Scav 1		30		20	20				4	8.7	25.9
Ni Scav 2		30							4	8.7	13.9
Ni Scav 3		30							4	8.7	-59.6
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.7	64.0
B		2							2		
Regrind (PM)							4				
Bulk 2nd Cleaner		0		5	5				2		
		5							2		
Bulk 3rd Cleaner A (this may not be needed)		0		2.5	2.5				2	7.9	105.0
B		2							2		
Combine Scav Conc 1-3											
Ni 1st Cleaner		20		15	15				3	8.8	53.4
		10							3	8.7	-44.0
Regrind (PM)							8				
Ni 2nd Cleaner		5		5	5				4	8.6	54.1
Ni 3rd Cleaner		5		2.5	2.5				3	8.4	87.8
Total	0	164	0	110	110	0	69	2	41		

*As needed

Stage	Rougher	2nd clnr	3rd clnr
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

Metallurgical Balance

Product	Weight g	%	Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %) Cu	Ni	Pt	Pd	Au	S	Fe	MgO	% Distribution Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 3rd Clnr Conc.	50.0	1.26	18.5	7.53	3.10	15.5	1.57	30.3	31.3	2.11	70.2	21.6	8.8	34.9	37.7	13.2	3.0	0.1
Bulk 3rd Clnr Tail	8.2	0.21	3.18	11.6	4.19	7.87	0.42	21.6	29.1	7.91	2.0	5.5	1.9	2.9	1.7	1.5	0.5	0.1
Bulk 2nd Clnr Tail	70.1	1.77	1.68	7.01	2.92	4.69	0.20	16.3	25.6	12.1	8.9	28.2	11.6	14.8	6.7	9.9	3.5	0.9
Bulk 1st Clnr Tail	106	2.69	0.22	0.85	1.08	0.96	0.05	4.12	12.2	25.4	1.8	5.2	6.5	4.6	2.5	3.8	2.5	2.9
Ni 3rd Clnr Conc	12.2	0.31	**3.00**	**4.13**	5.51	**6.00**	**1.60**	32.9	**48.0**	2.32	2.8	2.9	3.8	3.3	9.4	3.5	1.1	0.0
Ni 3rd Clnr Tail	13.5	0.34	0.75	2.61	4.52	2.25	0.23	26.5	42.3	6.61	0.8	2.0	3.5	1.4	1.5	3.1	1.1	0.1
Ni 2nd Clnr Tail	70.3	1.78	0.33	1.30	2.29	1.16	0.12	17.2	32.0	12.7	1.8	5.3	9.1	3.7	4.0	10.5	4.4	1.0
Ni 1st Clnr Tail	121	3.07	0.18	0.45	1.03	0.54	0.05	4.40	14.6	23.3	1.7	3.1	7.1	3.0	2.9	4.6	3.4	3.1
Ni Scav Tail	3504	88.6	0.04	0.13	0.24	0.20	<0.02	1.63	11.8	24.2	10.1	26.2	47.7	31.5	33.6	49.7	80.4	91.8
Head (calc.)	3956	100.0	0.33	0.44	0.45	0.56	0.05	2.90	13.0	23.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Bulk 3rd Clnr Conc	50.0	1.26	**18.5**	**7.53**	3.10	15.5	1.57	30.3	31.3	2.11	**70.2**	**21.6**	8.79	34.9	37.7	13.2	3.0	0.1
Bulk 2nd Clnr Conc	58.2	1.47	16.3	8.10	3.25	14.4	1.41	29.1	31.0	2.93	72.2	27.1	10.7	37.8	39.3	14.7	3.5	0.2
Bulk 1st Clnr Conc	128	3.24	8.33	7.51	3.07	9.11	0.75	22.1	28.0	7.94	81.1	55.3	22.3	52.6	46.0	24.7	7.0	1.1
Bulk Rougher Conc	**235**	**5.93**	**4.66**	**4.49**	**2.17**	**5.41**	**0.43**	**14.0**	**20.9**	**15.9**	**82.9**	**60.5**	**28.8**	**57.2**	**48.6**	**28.5**	**9.5**	**4.0**
Ni 3rd Clnr Conc	12.2	0.31	**3.00**	**4.13**	5.51	6.00	1.60	32.9	48.0	2.32	2.8	2.9	3.8	3.3	9.4	3.5	1.1	0.0
Ni 2nd Clnr Conc	25.7	0.65	1.82	3.33	4.99	4.03	0.88	29.5	45.0	4.57	3.5	4.9	7.3	4.7	10.9	6.6	2.2	0.1
Ni 1st Clnr Conc	96.0	2.43	0.73	1.84	3.01	1.93	0.32	20.5	35.5	10.5	5.3	10.2	16.4	8.3	14.9	17.1	6.6	1.1
Ni Scav Conc	217	5.49	0.42	1.07	1.91	1.15	0.17	11.5	23.8	17.7	7.0	13.3	23.5	11.3	17.8	21.8	10.1	4.2
Bulk Rghr+Scav Conc	452	11.4	2.62	2.84	2.04	3.37	0.31	12.8	22.3	16.7	89.9	73.8	52.3	68.5	66.4	50.3	19.6	8.2

Metallurgical Balance

Product	Weight g	%	Assays, % Cu	Ni	S	other	Cp	Pn	Po	Ga	% Distribution Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 3rd Clnr Conc.	50.0	1.26	18.5	7.53	30.3	43.7	53.5	21.9	11.3	13.3	70.2	21.6	13.2	70.2	26.2	2.5	0.18
Bulk 3rd Clnr Tail	8.2	0.21	3.18	11.6	21.6	63.6	9.2	33.7	18.8	38.3	2.0	5.5	1.5	2.0	6.6	0.7	0.09
Bulk 2nd Clnr Tail	70.1	1.77	1.68	7.01	16.3	75.0	4.9	20.2	20.6	54.4	8.94	28.2	9.9	8.9	33.8	6.3	1.0
Bulk 1st Clnr Tail	106	2.69	0.22	0.85	4.12	94.8	0.6	2.22	8.20	88.9	1.8	5.2	3.8	1.8	5.7	3.8	2.6
Ni 3rd Clnr Conc	12.2	0.31	**3.00**	**4.13**	32.9	60.0	8.7	10.9	68.0	12.4	2.8	2.9	3.5	2.8	3.2	3.7	0.0
Ni 3rd Clnr Tail	13.5	0.34	0.75	2.61	26.5	70.1	2.2	6.55	61.1	30.2	0.8	2.0	3.1	0.8	2.1	3.6	0.1
Ni 2nd Clnr Tail	70.3	1.78	0.33	1.30	17.2	81.2	1.0	3.02	41.1	54.9	1.8	5.3	10.5	1.8	5.1	12.7	1.1
Ni 1st Clnr Tail	121	3.07	0.18	0.45	4.40	95.0	0.5	1.02	10.1	88.4	1.66	3.1	4.6	1.66	2.9	5.4	2.9
Ni Scav Tail	3504	88.6	0.04	0.13	1.63	98.2	0.1	0.17	3.98	95.7	10.1	26.2	49.7	10.1	14.4	61.3	91.9
Head (calc.)	3956	100.0	0.33	0.44	2.90	96.3	0.96	1.06	5.75	92.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 3rd Clnr Conc	50.0	1.26	**18.5**	**7.53**	30.3	43.7	53.5	21.9	11.3	13.3	70.2	21.6	13.2	70.2	26.2	2.5	0.2
Bulk 2nd Clnr Conc	58.2	1.47	16.3	8.10	29.1	46.5	47.2	23.6	12.3	16.9	72.2	27.1	14.7	72.2	32.8	3.2	0.3
Bulk 1st Clnr Conc	128.3	3.24	8.33	7.51	22.1	62.1	24.1	21.7	16.8	37.4	81.1	55.3	24.7	81.1	66.7	9.5	1.3
Bulk Rougher Conc	**234.6**	**5.93**	**4.66**	**4.49**	**14.0**	**76.9**	**13.5**	**12.9**	**12.9**	**60.7**	**82.9**	**60.5**	**28.5**	**82.9**	**72.3**	**13.3**	**3.9**
Ni 3rd Clnr Conc	12.2	0.31	**3.00**	**4.13**	32.9	60.0	8.67	10.9	68.0	12.4	2.8	2.9	3.5	2.8	3.2	3.7	0.0
Ni 2nd Clnr Conc	25.7	0.65	1.82	3.33	29.5	65.3	5.25	8.63	64.4	21.7	3.5	4.9	6.6	3.5	5.3	7.3	0.2
Ni 1st Clnr Conc	96.0	2.43	0.73	1.84	20.5	76.9	2.11	4.52	47.3	46.0	5.3	10.2	17.1	5.3	10.4	20.0	1.2
Ni Scav Conc	217.4	5.49	0.42	1.07	11.51	87.0	1.22	2.56	26.5	69.7	7.0	13.3	21.8	7.0	13.3	25.4	4.2
Bulk Rghr+Scav Conc	452.0	11.4	2.62	2.84	12.78	81.8	7.57	7.92	19.5	65.0	89.9	73.8	50.3	89.9	85.6	38.7	8.1

Test: F36 **Project:** 150149-001 **Date:** Feb 23 2012 **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix similar to F-35, but more aggressive for recovery
Procedure: As below.
Feed: 2x2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind
Regrind 8 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} : 90 µm
Ni regrind K80: µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		15		30	30	12		1	3	8.3	110.7
Bulk Rougher 2		20		20	20			1	3	8.4	55.2
Ni Scav 1		30	200						6	8.2	137.2
Ni Scav 2		30							6		
Ni Scav 3		30							6	8.2	16.4
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.4	70.9
B		10							2		
Bulk 2nd Cleaner A		0		5	5				2	8.2	101.1
B		5							2		
Combine Scav Conc 1-3											
Ni 1st Cleaner		20		15	15				3	8.3	81.3
		10							3		
Regrind (PM)							8				
Ni 2nd Cleaner		20	50	5	5				4	8.4	67.5
Ni 3rd Cleaner		10		2.5	2.5				3	7.8	44.2
Total	0	200	250	87.5	87.5	12	65	2	45		

*As needed

Stage	Rougher	2nd clnr	3rd clnr
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 2nd Clnr Conc.	126.5	3.22	8.85	8.94	2.22	6.79	0.72	26.6	32.1	4.77	**80.1**	**59.3**	20.9	55.3	29.6	28.7	8.4	0.7
Bulk 2nd Clnr Tail	46.1	1.17	0.38	1.67	1.50	1.52	0.18	6.55	14.0	21.4	1.3	4.0	5.2	4.5	2.74	2.6	1.3	1.2
Bulk 1st Clnr Tail	126	3.21	0.18	0.59	0.87	0.67	0.06	3.81	11.6	22.8	1.6	3.9	8.2	5.5	2.46	4.1	3.0	3.4
Ni 3rd Clnr Conc	111.1	2.83	0.41	1.32	1.30	0.78	0.17	30.8	47.3	5.23	3.3	7.7	10.8	5.6	6.06	29.2	10.8	0.7
Ni 3rd Clnr Tail	52.7	1.34	0.32	0.75	1.42	0.75	0.14	16.0	29.9	14.9	1.2	2.1	5.6	2.6	2.40	7.2	3.2	0.9
Ni 2nd Clnr Tail	85.1	2.17	0.28	0.50	0.94	0.39	0.08	12.3	26.4	16.3	1.7	2.2	6.0	2.1	2.21	8.9	4.6	1.6
Ni 1st Clnr Tail	150	3.82	0.15	0.27	0.65	0.43	0.09	2.48	11.9	22.7	1.6	2.1	7.3	4.1	4.14	3.2	3.7	4.0
Ni Scav Tail	3232	82.2	0.04	0.11	0.15	0.10	0.05	0.59	9.75	23.2	9.2	18.6	36.1	20.4	50.4	16.2	64.9	87.6
Head (calc.)	3929	100.0	0.36	0.49	0.34	0.40	0.08	2.99	12.4	21.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Bulk 2nd Clnr Conc	126.5	3.22	**8.85**	**8.94**	2.2	6.79	0.72	26.6	32.1	4.8	80.1	59.3	20.9	55.3	29.6	28.7	8.4	0.7
Bulk 1st Clnr Conc	172.6	4.39	6.59	7.00	2.0	5.38	0.58	21.2	27.3	9.2	81.3	63.3	26.1	59.8	32.3	31.2	9.7	1.9
Bulk Rougher Conc	**298.6**	**7.60**	**3.88**	**4.29**	**1.54**	**3.40**	**0.36**	**13.9**	**20.7**	**14.9**	**83.0**	**67.2**	**34.3**	**65.2**	**34.8**	**35.3**	**12.7**	**5.2**
Ni 3rd Clnr Conc	111.1	2.83	**0.41**	**1.32**	1.3	0.78	0.17	30.8	47.3	5.2	3.3	7.7	10.8	5.58	6.06	29.2	10.8	0.7
Ni 2nd Clnr Conc	163.8	4.17	0.38	1.14	1.3	0.77	0.16	26.0	41.7	8.3	4.5	9.8	16.3	8.13	8.46	36.3	14.1	1.6
Ni 1st Clnr Conc	248.9	6.33	0.35	0.92	1.2	0.64	0.13	21.3	36.5	11.1	6.2	12.0	22.3	10.3	10.7	45.3	18.7	3.2
Ni Scav Conc	398.9	10.2	0.27	0.67	0.99	0.56	0.11	14.2	27.2	15.4	7.8	14.1	29.6	14.4	14.8	48.4	22.4	7.2
Bulk Rghr+Scav Conc	697.5	17.8	1.82	2.22	1.23	1.77	0.22	14.1	24.4	15.2	90.8	81.4	63.9	79.6	49.6	83.8	35.1	12.4

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	126.5	3.22	**8.85**	**8.94**	26.6	55.6	25.6	25.8	23.6	25.0	80.1	59.3	28.7	80.1	69.9	13.1	0.87
Bulk 2nd Clnr Tail	46.1	1.17	0.38	1.67	6.55	91.4	1.10	4.58	12.1	82.3	1.3	4.0	2.6	1.3	4.5	2.4	1.05
Bulk 1st Clnr Tail	126	3.21	0.18	0.59	3.81	95.4	0.52	1.46	8.15	89.9	1.6	3.9	4.1	1.6	3.9	4.5	3.1
Ni 3rd Clnr Conc	111.1	2.83	**0.41**	**1.32**	30.8	67.5	1.18	2.50	76.6	19.7	3.3	7.7	29.2	3.3	5.9	37.4	0.6
Ni 3rd Clnr Tail	52.7	1.34	0.32	0.75	16.0	82.9	0.92	1.43	39.4	58.3	1.2	2.1	7.2	1.2	1.6	9.1	0.8
Ni 2nd Clnr Tail	85.1	2.17	0.28	0.50	12.3	86.9	0.81	0.83	30.4	67.9	1.7	2.2	8.9	1.7	1.5	11.4	1.6
Ni 1st Clnr Tail	150	3.82	0.15	0.27	2.48	97.1	0.43	0.56	5.55	93.5	1.6	2.1	3.2	1.6	1.8	3.7	3.9
Ni Scav Tail	3232	82.2	0.04	0.11	0.59	99.3	0.12	0.16	1.29	98.4	9.2	18.6	16.2	9.2	10.8	18.3	88.0
Head (calc.)	3929	100.0	0.36	0.49	2.99	96.2	1.03	1.19	5.79	92.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 2nd Clnr Conc	127	3.22	**8.85**	**8.94**	26.6	55.6	25.6	25.8	23.6	25.0	80.1	59.3	28.7	80.1	69.9	13.1	0.9
Bulk 1st Clnr Conc	173	4.39	6.59	7.00	21.2	65.2	19.0	20.2	20.5	40.3	81.3	63.3	31.2	81.3	74.4	15.6	1.9
Bulk Rougher Conc	**299**	**7.60**	**3.88**	**4.29**	**13.9**	**77.9**	**11.2**	**12.3**	**15.3**	**61.2**	**83.0**	**67.2**	**35.3**	**83.0**	**78.4**	**20.1**	**5.1**
Ni 3rd Clnr Conc	111	2.83	**0.41**	**1.32**	30.8	67.5	1.18	2.50	76.6	19.7	3.3	7.7	29.2	3.3	5.9	37.4	0.6
Ni 2nd Clnr Conc	164	4.17	0.38	1.14	26.0	72.4	1.10	2.16	64.6	32.1	4.5	9.8	36.3	4.5	7.6	46.5	1.5
Ni 1st Clnr Conc	249	6.33	0.35	0.92	21.3	77.4	1.00	1.70	52.9	44.4	6.2	12.0	45.3	6.2	9.1	57.9	3.1
Ni Scav Conc	399	10.2	0.27	0.67	14.2	84.8	0.79	1.27	35.1	62.8	7.8	14.1	48.4	7.8	10.9	61.6	6.9
Bulk Rghr+Scav Conc	698	17.8	1.82	2.22	14.1	81.9	5.26	5.98	26.6	62.1	90.8	81.4	83.8	90.8	89.2	81.7	12.0

Test: F37 **Project:** 150149-001 **Date:** Feb 23 2012 **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix similar to F-36, no CMC or Guar in the roughers
Procedure: As below.
Feed: 2x2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind
Regrind 8 minutes in the pebble mill (Ni clnr 1 concentrate)

Feed K_{80} : 90 µm
Ni regrind K80: µm

Conditions:

Stage	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
	Reagents added, grams per tonne						Time, minutes				
Grind							57				
Bulk Rougher 1		15				12		1	3	8.8	76.3
Bulk Rougher 2		20				6		1	3	8.8	8.9
Ni Scav 1		30	200			6			6	8.7	32.5
Ni Scav 2		30							6	8.5	38.9
Ni Scav 3		30							6	8.3	11.2
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2		
B		10							2	8.4	74.0
Bulk 2nd Cleaner A		0		5	5				2	8.3	71.5
B		5							2		
Combine Scav Conc 1-3											
Ni 1st Cleaner		20		15	15				3	8.5	74.1
		10							3	8.4	21.4
Regrind (PM)							8				
Ni 2nd Cleaner		20	50	5	5				4		
Ni 3rd Cleaner		10		2.5	2.5				3	7.9	87.6
Total	0	200	250	37.5	37.5	24	65	2	45		

*As needed

Stage	Rougher	2nd clnr	3rd clnr
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 2nd Clnr Conc.	119.7	3.01	10.8	8.56	1.88	6.27	0.94	29.2	30.9	4.30	81.5	53.3	13.9	51.7	39.4	24.2	7.3	0.6
Bulk 2nd Clnr Tail	52.1	1.31	0.37	1.97	1.58	2.00	0.21	7.34	13.9	21.4	1.2	5.3	5.1	7.2	3.7	2.6	1.4	1.3
Bulk 1st Clnr Tail	145	3.64	0.16	0.63	0.84	0.62	0.14	4.45	11.7	22.2	1.5	4.7	7.5	6.2	7.1	4.5	3.3	3.9
Ni 3rd Clnr Conc	137.5	3.46	**0.44**	**1.69**	3.02	**0.31**	**0.37**	32.1	**46.7**	5.36	3.8	12.1	25.7	2.9	17.7	30.5	12.6	0.9
Ni 3rd Clnr Tail	43.4	1.09	0.41	0.83	1.71	0.91	0.15	18.1	30.4	14.3	1.1	1.9	4.6	2.7	2.3	5.4	2.6	0.7
Ni 2nd Clnr Tail	79.8	2.01	0.28	0.54	0.39	0.26	0.17	17.4	30.3	13.5	1.4	2.2	1.9	1.4	4.7	9.6	4.7	1.3
Ni 1st Clnr Tail	111	2.79	0.17	0.29	0.70	0.41	0.14	2.27	10.9	22.4	1.2	1.7	4.8	3.2	5.6	1.7	2.4	3.0
Ni Scav Tail	3286	82.7	0.04	0.11	0.18	0.11	0.02	0.94	10.2	22.4	8.3	18.8	36.5	24.7	19.5	21.4	65.7	88.3
Head (calc.)	3974	100.0	0.40	0.48	0.41	0.37	0.07	3.64	12.8	21.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	0.41	0.45	0.04	2.53	11.9	22.8								
Combined Products																		
Bulk 2nd Clnr Conc	119.7	3.01	**10.8**	**8.56**	1.9	6.27	0.94	29.2	30.9	4.3	81.5	53.3	13.9	51.7	39.4	24.2	7.3	0.6
Bulk 1st Clnr Conc	171.8	4.32	7.64	6.56	1.8	4.98	0.72	22.6	25.7	9.5	82.7	58.6	19.0	58.9	43.2	26.8	8.7	2.0
Bulk Rougher Conc	**316.6**	**7.97**	**4.22**	**3.85**	**1.35**	**2.98**	**0.45**	**14.3**	**19.3**	**15.3**	**84.2**	**63.3**	**26.5**	**65.1**	**50.3**	**31.3**	**12.0**	**5.8**
Ni 3rd Clnr Conc	137.5	3.46	**0.44**	**1.69**	3.0	0.31	0.37	32.1	46.7	5.4	3.8	12.1	25.7	2.9	17.7	30.5	12.6	0.9
Ni 2nd Clnr Conc	180.9	4.55	0.43	1.48	2.7	0.45	0.32	28.7	42.8	7.5	4.9	14.0	30.2	5.7	20.0	36.0	15.2	1.6
Ni 1st Clnr Conc	260.7	6.56	0.39	1.19	2.0	0.40	0.27	25.3	39.0	9.3	6.3	16.2	32.2	7.1	24.6	45.6	19.9	2.9
Ni Scav Conc	371.6	9.35	0.32	0.92	1.61	0.40	0.23	18.4	30.6	13.2	7.5	17.9	37.0	10.3	30.2	47.3	22.3	5.9
Bulk Rghr+Scav Conc	688.2	17.3	2.11	2.27	1.49	1.59	0.34	16.5	25.4	14.2	91.7	81.2	63.5	75.3	80.5	78.6	34.3	11.7

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	119.7	3.01	10.8	8.56	29.2	51.4	31.2	24.7	26.2	17.9	81.5	53.3	24.2	81.5	64.1	10.7	0.60
Bulk 2nd Clnr Tail	52.1	1.31	0.37	1.97	7.34	90.3	1.07	5.44	13.4	80.1	1.2	5.3	2.6	1.2	6.1	2.38	1.16
Bulk 1st Clnr Tail	145	3.64	0.16	0.63	4.45	94.8	0.46	1.55	9.8	88.2	1.5	4.7	4.5	1.5	4.9	4.8	3.6
Ni 3rd Clnr Conc	137.5	3.46	0.44	1.69	32.1	65.8	1.27	3.55	79.0	16.2	3.8	12.1	30.5	3.8	10.6	37.0	0.6
Ni 3rd Clnr Tail	43.4	1.09	0.41	0.83	18.1	80.7	1.18	1.58	44.5	52.8	1.1	1.9	5.4	1.1	1.5	6.6	0.6
Ni 2nd Clnr Tail	79.8	2.01	0.28	0.54	17.4	81.8	0.81	0.74	43.7	54.7	1.4	2.2	9.6	1.4	1.3	11.9	1.2
Ni 1st Clnr Tail	111	2.79	0.17	0.29	2.27	97.3	0.49	0.63	4.90	94.0	1.2	1.7	1.7	1.2	1.5	1.9	2.9
Ni Scav Tail	3286	82.7	0.04	0.11	0.94	98.9	0.12	0.14	2.21	97.5	8.3	18.8	21.4	8.3	10.1	24.8	89.3
Head (calc.)	3974	100.0	0.40	0.48	3.64	95.5	1.15	1.16	7.38	90.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 2nd Clnr Conc	119.7	3.01	**10.8**	**8.56**	29.2	51.4	31.2	24.7	26.2	17.9	**81.5**	**53.3**	24.2	81.5	64.1	10.7	0.6
Bulk 1st Clnr Conc	171.8	4.32	7.64	6.56	22.6	63.2	22.1	18.9	22.3	36.7	82.7	58.6	26.8	82.7	70.2	13.1	1.8
Bulk Rougher Conc	**316.6**	**7.97**	**4.22**	**3.85**	14.3	77.7	12.2	10.9	16.6	60.3	**84.2**	**63.3**	**31.3**	**84.2**	**75.1**	**17.9**	**5.3**
Ni 3rd Clnr Conc	137.5	3.46	**0.44**	**1.69**	32.1	65.8	1.27	3.55	79.0	16.2	3.8	12.1	30.5	3.8	10.6	37.0	0.6
Ni 2nd Clnr Conc	180.9	4.55	0.43	1.48	28.7	69.3	1.25	3.08	70.7	25.0	4.9	14.0	36.0	4.9	12.1	43.6	1.3
Ni 1st Clnr Conc	260.7	6.56	0.39	1.19	25.3	73.1	1.12	2.36	62.4	34.1	6.3	16.2	45.6	6.3	13.4	55.5	2.5
Ni Scav Conc	371.6	9.35	0.32	0.92	18.4	80.3	0.93	1.84	45.3	52.0	7.5	17.9	47.3	7.5	14.9	57.3	5.4
Bulk Rghr+Scav Conc	688.2	17.3	2.11	2.27	16.5	79.1	6.11	6.03	32.1	55.8	91.7	81.2	78.6	91.7	89.9	75.2	10.7

Test: F38 | **Project: 150149-001** | **Date:** 06-Mar-12 | **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix similar to F-36, no CMC or Guar in the roughers
Procedure: As below.
Feed: 2 kg of -10 mesh Master Composite
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 15 minutes in the pebble mill

Feed K_{80} : 90 µm
Ni regrind K80: 41 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		15				12		1	3	8.5	81.9
Bulk Rougher 2		20				6		1	3	8.5	49.8
Ni Scav 1		30	200			6			6	8.2	121.9
Ni Scav 2		30							6	8.3	57.6
Ni Scav 3		30							6	8.2	18.2
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.5	53.5
B		10							2		
Bulk 2nd Cleaner A		0		5	5				2	8.3	65.3
B		5							2		
Combine Scav Conc 1-3											
Regrind (PM)							15				
Ni 1st Cleaner		20		15	15				3	8.5	79.0
		10							3		
Ni 2nd Cleaner		5		5	5				4	8.4	29.6
Ni 3rd Cleaner		1		2.5	2.5				3	8.2	6.5
Total	0	176	200	37.5	37.5	24	72	2	45		

*As needed
Assay for Cu, Ni, S
PSA on regrind
Send to sherbrooke

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1800	1600	1200

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Bulk 2nd Clnr Conc.	62.8	3.18	9.34	7.20	24.2	79.4	47.5	23.3
Bulk 2nd Clnr Tail	55.3	2.80	0.55	2.85	9.60	4.1	16.6	8.1
Bulk 1st Clnr Tail	63	3.19	0.13	0.66	4.73	1.1	4.4	4.6
Ni 3rd Clnr Conc	26.8	1.36	**0.69**	**1.50**	30.0	2.5	4.2	12.3
Ni 3rd Clnr Tail	26.7	1.35	0.27	1.07	23.8	1.0	3.0	9.7
Ni 2nd Clnr Tail	39.1	1.98	0.25	0.81	14.7	1.3	3.3	8.8
Ni 1st Clnr Tail	138	6.97	0.11	0.31	7.95	2.1	4.5	16.8
Ni Scav Tail	1565	79.2	0.04	0.10	0.68	8.5	16.5	16.3
Head (calc.)	1976	100.0	0.37	0.48	3.30	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Bulk 2nd Clnr Conc	62.8	3.18	**9.34**	**7.20**	24.2	79.4	47.5	23.3
Bulk 1st Clnr Conc	118.1	5.98	5.22	5.16	17.4	83.6	64.1	31.4
Bulk Rougher Conc	**181.1**	**9.17**	**3.45**	**3.60**	**13.0**	**84.7**	**68.5**	**36.0**
Ni 3rd Clnr Conc	26.8	1.36	**0.69**	**1.50**	30.0	2.5	4.2	12.3
Ni 2nd Clnr Conc	53.5	2.71	0.48	1.29	26.9	3.5	7.2	22.1
Ni 1st Clnr Conc	92.6	4.69	0.38	1.08	21.8	4.8	10.6	30.9
Ni Scav Conc	230.3	11.7	0.22	0.62	13.5	6.9	15.1	47.7
Bulk Rghr+Scav Conc	411.4	20.8	1.64	1.93	13.3	91.5	83.5	83.7

	Cu	Ni
Bulk 2nd Clnr Conc	95.1	74.2
Bulk 1st Clnr Conc	98.7	93.6

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	62.8	3.18	9.34	7.20	24.2	59.3	27.0	20.8	20.5	31.8	79.4	47.5	23.3	79.4	56.6	9.89	1.11
Bulk 2nd Clnr Tail	55.3	2.80	0.55	2.85	9.60	87.0	1.59	7.98	16.6	73.8	4.1	16.6	8.1	4.1	19.2	7.07	2.27
Bulk 1st Clnr Tail	63	3.19	0.13	0.66	4.73	94.5	0.38	1.63	10.5	87.5	1.1	4.4	4.6	1.1	4.5	5.1	3.1
Ni 3rd Clnr Conc	26.8	1.36	0.69	1.50	30.0	67.8	1.99	3.09	73.3	21.6	2.5	4.2	12.3	2.5	3.6	15.1	0.3
Ni 3rd Clnr Tail	26.7	1.35	0.27	1.07	23.8	74.9	0.78	2.05	59.2	38.0	1.0	3.0	9.7	1.0	2.4	12.2	0.6
Ni 2nd Clnr Tail	39.1	1.98	0.25	0.81	14.7	84.2	0.72	1.66	36.0	61.6	1.3	3.3	8.8	1.3	2.8	10.8	1.3
Ni 1st Clnr Tail	138	6.97	0.11	0.31	7.95	91.6	0.32	0.44	19.9	79.3	2.1	4.5	16.8	2.1	2.7	21.1	6.1
Ni Scav Tail	1565	79.2	0.04	0.10	0.68	99.2	0.12	0.12	1.55	98.2	8.5	16.5	16.3	8.5	8.3	18.7	85.3
Head (calc.)	1976	100.0	0.37	0.48	3.30	95.8	1.08	1.17	6.57	91.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 2nd Clnr Conc	62.8	3.18	**9.34**	**7.20**	24.2	59.3	27.0	20.8	20.5	31.8	**79.4**	**47.5**	23.3	79.4	56.6	9.9	1.1
Bulk 1st Clnr Conc	118.1	5.98	5.22	5.16	17.4	72.2	15.1	14.8	18.7	51.5	83.6	64.1	31.4	83.6	75.8	17.0	3.4
Bulk Rougher Conc	**181.1**	9.17	**3.45**	**3.60**	13.0	80.0	10.0	10.2	15.8	64.0	**84.7**	**68.5**	**36.0**	**84.7**	**80.3**	**22.1**	**6.4**
Ni 3rd Clnr Conc	26.8	1.36	**0.69**	**1.50**	30.0	67.8	1.99	3.09	73.3	21.6	2.5	4.2	12.3	2.5	3.6	15.1	0.3
Ni 2nd Clnr Conc	53.5	2.71	0.48	1.29	26.9	71.3	1.39	2.57	66.3	29.8	3.5	7.2	22.1	3.5	6.0	27.3	0.9
Ni 1st Clnr Conc	92.6	4.69	0.38	1.08	21.8	76.8	1.11	2.18	53.5	43.2	4.8	10.6	30.9	4.8	8.8	38.1	2.2
Ni Scav Conc	230.3	11.66	0.22	0.62	13.5	85.7	0.64	1.14	33.4	64.8	6.9	15.1	47.7	6.9	11.4	59.2	8.3
Bulk Rghr+Scav Conc	411.4	20.8	1.64	1.93	13.3	83.2	4.75	5.13	25.7	64.4	91.5	83.5	83.7	91.5	91.7	81.3	14.7

Test: F39-MF2 **Project: 50149-001** **Date:** 15-Mar-12 **Operator:** YW

Purpose: Test MF2 flowsheet as recommended by Wardrop in Draft PEA

Procedure: As below, adapted by Mike Ounpuu

Feed: 2 kg of -10 mesh Master Composite

Prim Grind: 18 minutes/2 kg at 65% solids in a lab mill Target ~ 300 micron

Sec Grind: 36 minutes/2 kg at ~65% solids in a lab mill Target 90 micron

Regrind 8 min in Pebble Mill

Prim Clnrs K_{80} : 102 µm

Sec Clnrs K_{80} : 100 µm

Scav. Reg. K_{80} : 30 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	4037	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Prim Grind							18				
Prim Rougher		10				10		1	2	8.5	
Prim Rougher		20				5			2	8.4	
Prim 1st Cleaner				10	10	5		1	1	8.1	
Prim 1st Cleaner		5				2			1		
Prim 1st Cleaner Scavenger 1	4037: 15 g/t								1		
Prim 1st Cleaner Scavenger 2		20							1		
Prim 2nd Cleaner				5	5	5		1	1	7.6	320.8
Prim 2nd Cleaner		5				3			1		
Prim Ro Tail to Sec Grind											
Sec Grind							36				
Sec Scav 1		30				10			4	8.7	21.9
Sec Scav 2		30				5			4	8.7	-24.9
Sec Scav 3		30				5			4	8.7	27.2
Combine Scav Conc 1-3											
Sec 1st Cleaner				15	15	5		1	2	8.7	20.7
		5							2		
		5							2		
Sec 2nd Cleaner					5	10		1	2	8.3	64.9
		10							2		
Sec 1st Cl Tail to Regrind											
Regrind							8				
Regrind Scav		20		2.5	2.5				2		
Total	0	170	0	30	35	65	54	5	32		430.6

*As needed

Stage	Rougher	1st cleaners	2nd & 3rd clnr & sep
Flotation Cell	1000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1800	1600	1200

Assay only Cu, Ni, S

PSA on Sec Scav tail
PSA on Pri Clnr
PSA on Sec Clnr
PSA on Regrind

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Prim Clnr 2 Conc	18.9	0.96	15.5	7.28	29.7	40.9	14.9	8.6
Prim Clnr 2 Tail	7.6	0.39	1.96	9.61	24.0	2.1	7.9	2.8
Prim Clnr 1 Scav Tail	12.0	0.61	1.98	8.66	23.6	3.3	11.2	4.3
Prim 1st Clnr Scav 1Conc	9.2	0.47	0.97	6.36	20.9	1.2	6.3	2.9
Prim 1st Clnr Scav 2 Conc	46.3	2.35	0.25	1.20	6.35	1.6	6.0	4.5
Sec Clnr 2 Conc	50.8	2.58	5.31	4.20	20.7	37.6	23.1	16.1
Sec Clnr 2 Tail	38.8	1.97	0.41	1.01	10.8	2.2	4.2	6.4
Regrind Scav Conc	4.2	0.21	0.65	0.98	7.80	0.4	0.4	0.5
Regrind Scav Tail	101.2	5.14	0.09	0.37	6.50	1.3	4.1	10.0
Sec Scav Tail	1682	85.3	0.04	0.12	1.71	9.4	21.8	43.9
Head (calc.)	1971	100.0	0.36	0.47	3.32	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Prim Clnr 2 Conc	18.9	1.0	15.5	7.28	29.7	40.9	14.9	8.6
Prim Clnr 1 Conc	26.5	1.3	11.6	7.95	28.1	42.9	22.8	11.4
Prim Rougher Conc	94.0	4.8	3.75	4.56	16.1	49.1	46.4	23.1
Sec Clnr 2 Conc	50.8	2.6	5.31	4.20	20.7	37.6	23.1	16.1
Sec Clnr 1 Conc	89.6	4.5	3.19	2.82	16.4	39.8	27.3	22.5
Sec Scav Conc	195.0	9.9	1.53	1.51	11.1	41.5	31.8	33.0
Regrind Scav Conc	4.2	0.2	0.65	0.98	7.80	0.4	0.4	0.5
Regrind Scav Feed	105.4	5.3	0.11	0.39	6.55	1.7	4.5	10.5
Comb Clnr Conc	69.7	3.5	8.07	5.04	23.1	78.5	38.0	24.6
Comb Ro & Scav Conc	289.0	14.7	2.25	2.50	12.7	90.6	78.2	56.1

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Prim Clnr 2 Conc	18.9	0.96	15.5	7.28	29.7	47.5	44.8	21.1	18.3	15.8	40.9	14.9	8.6	35.2	9.96	1.0	0.2
Prim Clnr 2 Tail	7.60	0.39	1.96	9.61	24.0	64.4	5.66	27.6	33.4	33.3	2.1	7.9	2.8	1.8	5.3	0.8	0.2
Prim Clnr 1 Scav Tail	12.0	0.61	1.98	8.66	23.6	65.8	5.72	24.8	34.7	34.7	3.3	11.2	4.3	2.9	7.5	1.2	0.3
Prim 1st Clnr Scav 1Conc	9.20	0.47	0.97	6.36	20.9	71.8	5.72	24.8	34.7	34.7	1.2	6.3	2.9	2.2	5.7	1.0	0.2
Prim 1st Clnr Scav 2 Conc	46.3	2.35	0.25	1.20	6.35	92.2	2.80	18.0	36.2	43.0	1.6	6.0	4.5	5.4	20.9	5.0	1.3
Sec Clnr 2 Conc	50.8	2.58	5.31	4.20	20.7	69.8	0.72	3.18	13.1	83.0	37.6	23.1	16.1	1.5	4.0	2.0	2.7
Sec Clnr 2 Tail	38.8	1.97	0.41	1.01	10.8	87.8	15.3	11.8	29.7	43.2	2.2	4.2	6.4	24.8	11.4	3.4	1.1
Regrind Scav Conc	4.20	0.21	0.65	0.98	7.80	90.6	1.18	2.43	24.8	71.6	0.4	0.4	0.5	0.2	0.3	0.3	0.2
Regrind Scav Tail	101	5.14	0.09	0.37	6.50	93.0	1.88	2.48	16.4	79.3	1.3	4.1	10.0	7.9	6.3	4.9	5.1
Sec Scav Tail	1682	85.3	0.04	0.12	1.71	98.1	0.26	0.68	16.0	83.0	9.4	21.8	43.9	18.2	28.8	80.3	88.9
Head (calc.)	1971	100.0	0.36	0.47	3.32	95.8	1.22	2.03	17.0	79.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Prim Clnr 2 Conc	18.9	0.96	15.5	7.28	29.7	47.5	44.8	21.1	18.3	15.8	40.9	14.9	8.6	35.2	10.0	1.0	0.2
Prim Clnr 1 Conc	26.5	1.34	11.6	7.95	28.1	52.4	33.6	22.9	22.6	20.8	42.9	22.8	11.4	37.0	15.2	1.8	0.4
Prim Rougher Conc	94.0	4.77	3.75	4.56	16.1	75.6	12.1	20.9	32.1	34.9	47.5	40.4	18.6	42.0	28.4	4.0	0.8
Sec Clnr 2 Conc	50.8	2.58	5.31	4.20	20.7	69.8	0.7	3.2	13.1	83.0	1.6	6.0	4.5	5.4	20.9	5.0	1.3
Sec Clnr 1 Conc	89.6	4.55	3.19	2.82	16.4	77.6	7.06	6.9	20.3	65.8	39.2	29.1	20.5	6.9	24.9	7.0	4.0
Sec Scav Conc	195	9.90	1.53	1.51	11.1	85.9	4.24	4.5	18.3	72.9	41.5	33.3	26.9	31.7	36.3	10.4	5.0
Regrind Scav Conc	4.20	0.21	0.65	0.98	7.80	90.6	1.18	2.43	24.8	71.6	43.1	37.8	37.5	39.8	42.9	15.7	10.3
Regrind Scav Feed	105	5.35	0.11	0.39	6.55	92.9	1.85	2.47	16.7	79.0	0.4	0.4	0.5	0.2	0.3	0.3	0.2
Comb Clnr Conc	69.7	3.54	8.07	5.04	23.14	63.8	12.7	8.03	14.50	64.8	1.7	4.5	10.5	8.1	6.5	5.3	5.3
Comb Ro & Scav Conc	289	14.7	2.25	2.50	12.71	82.5	6.81	9.85	22.81	60.5	11.0	26.3	54.4	26.3	35.3	85.6	94.2

Test No.: F40 **Project No.**: 50149-001 **Operator**: YW **Date**: March 16 2012

Purpose: Cleaner flotation test, Repeat F17
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target K_{80} :90 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3501	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.6	43.9
Rougher 2		5	5						1	2	8.6	36.5
Rougher 3		10	5						1	4	8.5	21.6
Rougher 4		20	5						1	6	8.5	-14.7
Rougher tails to Magnetic separation												
Regrind (PM)								0				
1st Cleaner		5		75					1	8	8.5	89.2
1st Cleaner Scav		10							1	4	8.0	12.0
2nd Cleaner			10	35					1	6	8.2	79.0
3rd Cleaner			5	10					1	4		
Total	0	55	40	120			0	57	9	36	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S,
Magnetic Conc. Extra assays for Pt, Pd, Au

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	33.4	1.7	16.0	9.06	30.3	–	–	–	71.6	32.1	15.2	–	–	–
3rd Clnr Tls	20.8	1.1	2.96	7.89	22.0	–	–	–	8.3	17.4	6.9	–	–	–
2nd Clnr Tls	58.7	3.0	1.09	3.47	19.0	–	–	–	8.6	21.6	16.7	–	–	–
1st Clnr Scv Conc	24.9	1.3	0.17	0.53	10.7	–	–	–	0.6	1.4	4.0	–	–	–
1st Clnr Scv Tls	114	5.8	0.06	0.23	3.60	–	–	–	0.9	2.8	6.2	–	–	–
Magnetic Conc.	122	6.2	0.09	0.34	7.70	0.94	0.81	0.04	1.5	4.4	14.1	–	–	–
Rougher Tails	1605	81.1	0.04	0.12	1.53	–	–	–	8.6	20.4	36.9	–	–	–
Head (calc.)	1979	100	0.38	0.48	3.37	–	–	–	100	100	100	0.0	0.0	0.0
(direct)			0.33	0.42	2.53	0.41	0.45	0.04						

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S, %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
3rd Clnr Conc	**33.4**	**1.69**	**16.0**	**9.06**	**30.3**	–	–	–	**71.6**	**32.1**	**15.2**	–	–	–
2nd Clnr Conc	54.2	2.74	11.0	8.61	27.1	–	–	–	79.9	49.4	22.1	–	–	–
1st Clnr Conc	113	5.70	5.85	5.94	22.9	–	–	–	88.4	71.0	38.8	–	–	–
1st Cl & ClScv Conc	138	6.96	4.82	4.96	20.7	–	–	–	89.0	72.4	42.8	–	–	–
Magnetic Conc.	122	6.18	0.09	0.34	7.70	0.94	0.81	0.04	1.5	4.4	14.1	–	–	–
Rghr Conc	**252**	**12.7**	**2.66**	**2.82**	**12.9**	–	–	–	**89.9**	**75.2**	**49.0**	**0.0**	**0.0**	**0.0**

Cleaner Circuit Unit Performance	Mass re	Upgrade						Unit Recovery					
	13%	6.01	3.22	2.34	–	–	–	81%	46%	44%	######	######	######

Product	Weight		Assays, %				% Distribution					
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue		
3rd Cleaner Conc	33.4	1.7	46.4	25.7	14.7	13.2	71.6	33.8	3.7	0.2		
3rd Cleaner Tail	20.8	1.1	8.58	22.2	30.7	38.5	8.3	18.1	4.8	0.4		
2nd Cleaner Tail	58.7	3.0	3.16	9.47	38.9	48.5	8.6	21.8	17.1	1.6		
1st Cleaner Scav Co	24.9	1.3	0.49	1.21	26.7	71.6	0.6	1.2	5.0	1.0		
1st Cleaner Scav Tai	114.3	5.8	0.17	0.56	8.8	90.4	0.9	2.5	7.6	5.7		
Magnetic Conc.	122.3	6.2	0.26	0.75	19.4	79.6	1.5	3.6	17.8	5.4		
Rougher Tail	1605	81.1	0.12	0.30	3.66	95.9	8.6	19.0	44.1	85.6		
Head (calc.)	1979	100	1.09	1.29	6.7	90.9	100	100	100	100		
Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		1.7	46.4	25.72	14.69	13.2	71.6	33.8	3.7	0.2	25.1	######
2nd Cleaner Conc		2.7	31.9	24.36	20.84	22.9	79.9	51.9	8.5	0.7	19.6	######
1st Cleaner Conc		5.7	16.94	16.62	30.21	36.2	88.4	73.7	25.6	2.3	11.8	######
1st Cl + Sc Conc		7.0	13.97	13.84	29.57	42.6	89.0	74.9	30.6	3.3	9.8	######
Rougher Conc		12.7	7.72	7.81	20.2	64.3	89.9	77.4	38.2	9.0	5.5	######
Rougher Tail'		81.1	0.12	0.30	3.66	95.9	8.6	19.0	44.1	85.6		

Test: F41 **Project:** ˙**50149-001** **Date:** YW **Operator:** 19-Mar-12
Purpose: Split flowsheet , Finer primary grind
Procedure: As below.
Feed: 2 kg of -10 mesh Master Composite
Grind: 73 minutes/2 kg at 65% solids in a lab mill
Regrind 2 minutes in the pebble mill

Feed K_{80} : 71 µm
Ni regrind K80: 43 µm

Conditions:

	Reagents added, grams per tonne						Time, minutes				
Stage	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							73				
Bulk Rougher 1		15				12		1	3	8.3	125.5
Bulk Rougher 2		20				6		1	3	8.3	27.2
Ni Scav 1		30		20	20			1	4	8.3	23.0
Ni Scav 2		30						1	4	8.2	-39.1
Ni Scav 3		30						1	4	8.2	-67.1
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				12	12				2	8.3	55.1
B		10							2		
Bulk 2nd Cleaner A				7	7				2		
B		5							2		
Combine Scav Conc 1-3											
Ni 1st Cleaner A		20		15	15	10		1	3	8.4	19.1
B		10				5		1	3	8.2	-33.1
Regrind (PM)							2				
Ni 2nd Cleaner		5		2+2	2+2			1	2+2		
Total	0	175	0	54	54	33	75	8	32		

*As needed

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

PSA on Ni Scav tails
PSA On Ni Regrind
Assay only Cu, Ni, S

Metallurgical Balance

Product	Weight		Assays, %			% Distribution		
	g	%	Cu	Ni	S	Cu	Ni	S
Bulk 2nd Clnr Conc.	63.1	3.20	11.2	8.26	25.8	**86.6**	**52.0**	24.1
Bulk 2nd Clnr Tail	47.4	2.40	0.42	3.02	9.43	2.4	14.3	6.6
Bulk 1st Clnr Tail	98.2	4.98	0.14	0.66	5.10	1.7	6.5	7.4
Ni 2nd Clnr Conc	12.1	0.61	0.91	1.66	25.9	1.3	2.0	4.6
Ni 2nd Clnr Tail	33.7	1.71	0.16	0.70	17.8	0.7	2.4	8.9
Ni 1st Clnr Tail	92.9	4.71	0.11	0.38	6.82	1.3	3.5	9.4
Ni Scav Tail	1625	82.4	0.03	0.12	1.62	6.0	19.4	39.0
Head (calc.)	1972	100.0	0.41	0.51	3.43	100.0	100.0	100.0
(direct)			0.33	0.42	2.53			
Combined Products								
Bulk 2nd Clnr Conc	63.1	3.20	**11.2**	**8.26**	25.8	86.6	52.0	24.1
Bulk 1st Clnr Conc	111	5.60	6.58	6.01	18.8	89.1	66.2	30.7
Bulk Rougher Conc	**209**	**10.6**	**3.55**	**3.49**	**12.3**	**90.8**	**72.7**	**38.1**
Ni 2nd Clnr Conc	12.1	0.61	**0.91**	**1.66**	25.9	1.3	2.0	4.6
Ni 1st Clnr Conc	45.8	2.32	0.36	0.95	19.9	2.0	4.4	13.5
Ni Scav Conc	139	7.03	0.19	0.57	11.2	3.3	7.9	22.9
Bulk Rghr+Scav Conc	347	17.6	2.21	2.33	11.9	94.0	80.6	61.0

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	63.1	3.20	**11.2**	**8.26**	25.8	54.7	32.4	23.4	17.8	26.4	86.6	52.0	24.1	86.6	56.8	8.4	0.93
Bulk 2nd Clnr Tail	47.4	2.40	0.42	3.02	9.43	87.1	1.2	8.4	16.4	74.0	2.4	14.3	6.6	2.4	15.3	5.8	1.96
Bulk 1st Clnr Tail	98	4.98	0.14	0.66	5.10	94.1	0.4	1.7	11.6	86.3	1.7	6.5	7.4	1.7	6.4	8.5	4.7
Ni 2nd Clnr Conc	12.1	0.61	**0.91**	**1.66**	25.9	71.5	2.6	4.0	62.3	31.0	1.3	2.0	4.6	1.3	1.9	5.6	0.2
Ni 2nd Clnr Tail	33.7	1.71	0.16	0.70	17.8	81.3	0.5	1.4	45.2	52.8	0.7	2.4	8.9	0.7	1.9	11.4	1.0
Ni 1st Clnr Tail	93	4.71	0.11	0.38	6.82	92.7	0.3	0.8	16.9	81.9	1.3	3.5	9.4	1.3	3.0	11.8	4.3
Ni Scav Tail	1625	82.4	0.03	0.12	1.62	98.2	0.1	0.2	4.0	95.7	6.0	19.4	39.0	6.0	14.7	48.5	86.9
Head (calc.)	1972	100.0	0.41	0.51	3.43	95.7	1.20	1.32	6.77	90.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												
Combined Products																	
Bulk 2nd Clnr Conc	63	3.20	**11.20**	**8.26**	25.8	54.7	32.4	23.4	17.8	26.4	86.6	52.0	24.1	86.6	56.8	8.4	0.9
Bulk 1st Clnr Conc	111	5.60	6.58	6.01	18.8	68.6	19.0	17.0	17.2	46.8	89.1	66.2	30.7	89.1	72.2	14.2	2.9
Bulk Rougher Conc	**209**	**10.6**	**3.55**	**3.49**	**12.3**	**80.6**	**10.3**	**9.8**	**14.5**	**65.4**	**90.8**	**72.7**	**38.1**	**90.8**	**78.6**	**22.7**	**7.6**
Ni 2nd Clnr Conc	12	0.61	**0.91**	**1.66**	25.9	71.5	2.63	4.01	62.3	31.0	1.3	2.0	4.6	1.3	1.9	5.6	0.2
Ni 1st Clnr Conc	46	2.32	0.36	0.95	19.9	78.7	1.04	2.13	49.7	47.1	2.0	4.4	13.5	2.0	3.8	17.0	1.2
Ni Scav Conc	139	7.03	0.19	0.57	11.2	88.1	0.55	1.26	27.7	70.4	3.3	7.9	22.9	3.3	6.8	28.8	5.5
Bulk Rghr+Scav Conc	347	17.6	2.21	2.33	11.9	83.6	6.38	6.38	19.8	67.4	94.0	80.6	61.0	94.0	85.3	51.5	13.1

Test No.: HNI-F1 **Project No.**: 50149-001 **Operator**: YW **Date**: Dec 15 2011

Purpose: Rougher Flotation test
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of Master Composite
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

Target Feed K_{80}: 90 µm

Conditions:

Stage	Reagents added, grams per tonne							Time, minutes			pH	Eh
	245	SIPX	3477	PAX	CMC	MIBC*	DF 250	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1						10			1	2	8.8	22.7
Rougher 2		5				5			1	2	8.6	56.7
Rougher 3		10				5			1	4	8.7	32.8
Rougher 4		20				5			1	4	8.6	36.5
Rougher 5		30							1	8	8.1	-29.4
Total	0	70	0	0	0	25	0	57	6	20		

* As required

Stage	Rougher
Flotation Cell	1000-D12
Speed: rpm	1800

Assay for: Cu, Ni, S, Pt, Pd, Au
Extra assay:Ro Tails assay for Ni(s)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	45.9	2.33	1.10	0.44	3.00	0.58	4.02	0.23	4.8	1.2	1.0	2.3	16.9	8.5
Ro Conc 2	80.5	4.08	9.30	2.53	15.9	1.96	4.21	0.66	71.0	12.4	9.8	13.9	31.1	42.9
Ro Conc 3	134	6.80	1.01	7.45	18.6	1.74	1.96	0.14	12.8	60.7	19.0	20.5	24.1	15.2
Ro Conc 4	102	5.16	0.33	1.14	18.2	1.83	0.70	0.06	3.2	7.1	14.1	16.4	6.5	4.9
Ro Conc 5	154	7.82	0.15	0.58	20.0	1.11	0.38	0.04	2.2	5.4	23.5	15.0	5.4	5.0
Ro Tail	1455	73.8	0.04	0.15	2.94	0.25	0.12	0.02	5.94	13.3	32.6	31.9	16.0	23.5
			Ro Tails Ni(s)=	0.09										
Head (calc.)	1972	100	0.53	0.83	6.66	0.58	0.55	0.06	100	100	100	100	100	100
Head (direct)			0.52	0.83	6.45	0.57	0.61	0.10						

Combined Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, S %)						% Distribution					
	g	%	Cu	Ni	S	Pt	Pd	Au	Cu	Ni	S	Pt	Pd	Au
Ro Conc 1	45.9	2.3	1.10	0.44	3.00	0.58	4.02	0.23	4.8	1.2	1.0	2.3	16.9	8.5
Ro Conc 1-2	126	6.4	6.32	1.77	11.2	1.46	4.14	0.50	75.8	13.6	10.8	16.2	48.0	51.4
Ro Conc 1-3	260	13.2	3.59	4.69	15.0	1.60	3.02	0.32	88.7	74.3	29.8	36.7	72.1	66.6
Ro Conc 1-4	362	18.4	2.67	3.69	15.9	1.67	2.37	0.24	91.9	81.3	43.9	53.0	78.6	71.5
Ro Conc 1-5	**516**	**26.2**	**1.92**	**2.77**	**17.1**	**1.50**	**1.77**	**0.18**	**94.1**	**86.7**	**67.4**	**68.1**	**84.0**	**76.5**

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Rougher 1	45.9	2.33	3.19	1.21	3.91	91.7	4.8	1.27	0.6	2.6
Rougher 2	80.5	4.08	27.0	7.10	10.8	55.1	71.0	13.0	3.1	2.7
Rougher 3	134	6.80	2.93	21.0	28.0	48.1	12.8	64.1	13.5	4.0
Rougher 4	102	5.16	0.96	2.75	44.6	51.7	3.2	6.4	16.3	3.3
Rougher 5	154	7.82	0.43	1.07	51.3	47.2	2.2	3.76	28.3	4.5
Rougher Tail	1455	73.8	0.12	0.34	7.32	92.2	5.9	11.4	38.2	82.9
Head (calc.)	1972	100	1.55	2.22	14.16	82.1	100	100	100	100

Combined Products

Product	Weight	Assays, %				% Distribution			
	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
Ro Conc 1	2.33	3.19	1.21	3.91	91.7	4.8	1.3	0.6	2.6
Ro Conc 1-2	6.41	18.3	4.97	8.32	68.4	75.8	14.3	3.8	5.3
Ro Conc 1-3	13.2	10.4	13.2	18.5	57.9	88.7	78.4	17.2	9.3
Ro Conc 1-4	18.4	7.75	10.3	25.8	56.2	91.9	84.8	33.5	12.6
Ro Conc 1-5	26.2	5.56	7.52	33.4	53.5	94.1	88.6	61.8	17.1
Ro Tail	73.8	0.12	0.34	7.32	92.2	5.94	11.4	38.2	82.9

Test No.: NHI-F2 **Project No.**: 50149-001 **Operator**: YW **Date**: Jan 6 2012

Purpose: Cleaner flotation test, based on Master Composite flotation test F12
Procedure: As outlined below.
Feed: 2 kg of minus 10 mesh of **High Ni Composite**
Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill
Regrind:

$K_{80:}$ 103 µm
Clnr $K_{80:}$ 58 µm

Conditions:

Stage	Reagents added, g/t							Time, minutes			pH	Eh
	Lime	SIPX	MIBC*	CMC	DF250	PAX	3477	Grind	Cond.	Froth		
Grind		5						57				
Condition									1			
Rougher 1			10						1	2	8.7	34.5
Rougher 2		5	5						1	2	8.6	30.8
Rougher 3		10	5						1	4	8.6	9.3
Rougher 4		20	5						1	6	8.5	-3.0
Regrind (PM)								0				
1st Cleaner		5		75					1	8	8.5	75.9
1st Cleaner Scav		10							1	3	8.3	13.5
2nd Cleaner			5	75					1	7	8.5	41.1
3rd Cleaner			5	50					1	6	8.4	50.0
Total	0	55	35	200			0	57	9	38	.	.

* As required

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

PSA on rougher tail
Extra assay:Ro Tails assay for Ni(s)

Metallurgical Balance

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	134.4	6.8	6.53	8.21	25.0	2.53	5.54	0.68	36.0	3.02	85.2	66.5	27.1	29.1	65.6	61.5	13.4	1.0
3rd Clnr Tls	67.1	3.4	0.56	2.28	21.1	2.03	1.47	0.17	37.8	9.51	3.6	9.2	11.4	11.6	8.7	7.7	7.0	1.5
2nd Clnr Tls	108.3	5.5	0.16	0.69	12.2	1.00	0.41	0.09	26.0	18.5	1.7	4.5	10.6	9	3.9	6.6	7.8	4.9
1st Clnr Scv Conc	25.7	1.3	0.16	0.69	14.7	1.27	0.46	0.08	32.6	14.6	0.4	1.1	3.0	2.8	1.0	1.4	2.3	0.9
1st Clnr Scv Tls	103.7	5.2	0.07	0.33	5.88	0.58	0.20	0.03	18.3	21.0	0.7	2.1	4.9	5.1	1.8	2.1	5.2	5.3
Rougher Tails	1539	77.8	0.06	0.18	3.46	0.32	0.14	0.02	15.1	23.2	8.4	16.7	42.9	42.1	19.0	20.7	64.3	86.4
			Ni(S)=	0.11														
Head (calc.)	1978	100	0.52	0.84	6.27	0.59	0.57	0.08	18.3	20.9	100	100	100	100	100	100	100	100
(direct)			0.52	0.83	6.45	0.57	0.61	0.10	18.1	19.8								

Combined Products

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Conc	**134.4**	**6.79**	**6.53**	**8.21**	**25.0**	**2.53**	**5.5**	**0.68**	**36.0**	**3.02**	**85.2**	**66.5**	**27.1**	**29.1**	**65.6**	**61.5**	**13.4**	**1.0**
2nd Clnr Conc	201.5	10.2	4.54	6.24	23.7	2.36	4.18	0.51	36.6	5.18	88.9	75.7	38.5	40.7	74.2	69.2	20.4	2.5
1st Clnr Conc	309.8	15.7	3.01	4.30	19.7	1.89	2.87	0.36	32.9	9.84	90.6	80.2	49.1	50.0	78.2	75.8	28.2	7.4
1st Cl & ClScv Conc	335.5	17.0	2.79	4.02	19.3	1.84	2.68	0.34	32.9	10.2	91.0	81.3	52.2	52.8	79.2	77.2	30.5	8.3
Rghr Conc	**439.2**	**22.2**	**2.15**	**3.15**	**16.1**	**1.54**	**2.10**	**0.27**	**29.4**	**12.8**	**91.6**	**83.3**	**57.1**	**57.9**	**81.0**	**79.3**	**35.7**	**13.6**

Cleaner Circuit Unit Performance	Mass rec	Upgrade								Unit Recovery							
	31%	3.04	2.61	1.55	1.64	2.64	2.54	1.22	0.24	94%	82%	56%	59%	83%	80%	52%	46%

Product	Weight		Assays, %				% Distribution			
	g	%	Cp	Pn	Po	Gangue	Cp	Pn	Po	Gangue
3rd Cleaner Conc	134.4	6.8	18.9	23.1	28.3	29.7	85.2	69.9	14.6	2.4
3rd Cleaner Tail	67.1	3.4	1.62	5.96	48.9	43.6	3.6	9.0	12.6	1.8
2nd Cleaner Tail	108.3	5.5	0.46	1.63	30.3	67.6	1.7	4.0	12.6	4.5
1st Cleaner Scav Co	25.7	1.3	0.46	1.55	36.9	61.1	0.4	0.9	3.6	1.0
1st Cleaner Scav Tai	103.7	5.2	0.19	0.78	14.6	84.4	0.7	1.8	5.8	5.3
Rougher Tail	1539	77.8	0.16	0.42	8.59	90.8	8.4	14.4	50.8	85.1
Head (calc.)	1978.4	100	1.51	2.25	13.2	83.1	100	100	100	100

Combined Products											Cu+Ni	PGE
3rd Cleaner Conc		6.8	18.9	23.1	28.3	29.7	85.2	69.9	14.6	2.4	14.7	8.8
2nd Cleaner Conc		10.2	13.2	17.4	35.1	34.3	88.9	78.9	27.2	4.2	10.8	7.1
1st Cleaner Conc		15.7	8.72	11.89	33.4	46.0	90.6	82.9	39.8	8.7	7.3	5.1
1st Cl + Sc Conc		17.0	8.09	11.10	33.7	47.1	91.0	83.8	43.4	9.6	6.8	4.9
Rougher Conc		22.2	6.23	8.66	29.2	55.9	91.6	85.6	49.2	14.9	5.3	3.9
Rougher Tail'		77.8	0.16	0.42	8.59	90.8	8.4	14.4	50.8	85.1		

Test: HNI-F3 | **Project:** 150149-001 | **Date:** 15-Feb-12 | **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix
Procedure: As below.
Feed: 2x2 kg of -10 mesh **High Ni Composite**
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 4 minutes in the pebble mill (bulk clnr 1 concentrate)
Regrind 8 minutes in the pebble mill (Ni clnr 1 concentrate)

Target Feed K_{80} : 90 µm
Cu regrind K80: 42 µm

Conditions:

Stage	Reagents added, grams per tonne						Time, minutes				
	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		15		30	30			1	2	8.6	45.0
Bulk Rougher 2		10		20	20			1	2	8.6	73.4
Ni Scav 1		30		20	20				4	8.5	57.0
Ni Scav 2		30							4	8.6	4.3
Ni Scav 3		30							4	8.5	-4.9
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.6	78.5
B		2							2		
Regrind (PM)							4				
Bulk 2nd Cleaner		0		5	5				2	8.1	123.2
		5							2		
Bulk 3rd Cleaner A (this may not be needed)		0		2.5	2.5				2	8.0	118.7
B		2							2		
Combine Scav Conc 1-3											
Ni 1st Cleaner		20		15	15				3	8.6	48.1
		10							3		
Regrind (PM)							8				
Ni 2nd Cleaner		5		5	5				4	8.4	42.3
Ni 3rd Cleaner		5		2.5	2.5				3	8.1	108.0
Total	0	164	0	110	110	0	69	2	41		

*As needed

Stage	Rougher	2nd clnr	3rd clnr & sep
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

PSA on Bulk regrind
PSA on Ni Regrind

Metallurgical Balance

Product	Weight		Assays, %								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 3rd Clnr Conc.	124	3.12	10.3	11.0	2.32	8.11	0.94	28.8	33.9	1.82	67.6	41.8	12.6	44.9	40.2	13.9	5.9	0.3
Bulk 3rd Clnr Tail	42.8	1.07	1.12	8.25	1.77	2.54	0.16	24.2	34.8	7.68	2.5	10.8	3.3	4.8	2.4	4.0	2.1	0.4
Bulk 2nd Clnr Tail	78.9	1.98	1.71	4.13	2.34	2.63	0.12	19.2	31.2	9.78	7.1	10.0	8.0	9.2	3.3	5.9	3.4	1.0
Bulk 1st Clnr Tail	175	4.40	0.41	1.91	1.52	1.05	0.10	15.6	29.0	14.2	3.8	10.2	11.6	8.2	6.0	10.6	7.1	3.3
Ni 3rd Clnr Conc	43	1.08	**1.50**	**1.80**	2.64	**1.54**	**0.31**	34.1	**53.8**	0.98	3.4	2.4	4.9	2.9	4.6	5.7	3.2	0.1
Ni 3rd Clnr Tail	32.8	0.82	0.49	1.40	1.99	0.84	0.13	29.5	49.9	3.73	0.8	1.4	2.8	1.2	1.5	3.8	2.3	0.2
Ni 2nd Clnr Tail	93.2	2.34	0.35	0.97	1.55	0.67	0.11	25.9	42.7	5.63	1.7	2.8	6.3	2.8	3.5	9.4	5.5	0.7
Ni 1st Clnr Tail	211	5.28	0.29	0.64	1.26	0.650	0.08	10.7	24.0	16.7	3.2	4.1	11.5	6.1	5.8	8.7	7.0	4.6
Ni Scav Tail	3190	79.9	0.06	0.17	0.28	0.140	0.03	3.08	14.3	21.4	9.8	16.6	38.9	19.9	32.9	38.1	63.5	89.5
Head (calc.)	3991	100.0	0.47	0.82	0.58	0.56	0.07	6.46	18.0	19.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	0.57	0.61	0.10	6.45	18.1	19.8								
Combined Products																		
Bulk 3rd Clnr Conc	124	3.12	**10.3**	**11.0**	2.32	8.11	0.94	28.8	33.9	1.82	**67.6**	**41.8**	12.6	44.9	40.2	13.9	5.87	0.30
Bulk 2nd Clnr Conc	167	4.19	7.95	10.3	2.18	6.68	0.74	27.6	34.1	3.32	70.1	52.6	15.9	49.7	42.5	17.9	7.94	0.73
Bulk 1st Clnr Conc	246	6.17	5.95	8.32	2.23	5.38	0.54	24.9	33.2	5.39	77.3	62.6	23.9	58.9	45.8	23.8	11.4	1.74
Bulk Rougher Conc	**422**	**10.6**	**3.64**	**5.65**	**1.93**	**3.58**	**0.36**	**21.0**	**31.4**	**9.06**	**81.0**	**72.8**	**35.5**	**67.1**	**51.8**	**34.4**	**18.4**	**5.00**
Ni 3rd Clnr Conc	43	1.08	**1.50**	**1.80**	2.64	1.54	0.31	34.1	53.8	0.98	**3.4**	**2.4**	4.94	2.94	4.58	5.68	3.22	0.06
Ni 2nd Clnr Conc	76	1.90	1.06	1.63	2.36	1.24	0.23	32.1	52.1	2.17	4.3	3.8	7.78	4.17	6.04	9.44	5.50	0.22
Ni 1st Clnr Conc	169	4.24	0.67	1.26	1.9	0.92	0.16	28.7	46.9	4.08	6.0	6.5	14.1	6.95	9.56	18.8	11.0	0.90
Ni Scav Conc	380	9.51	0.46	0.92	1.55	0.77	0.12	18.7	34.2	11.1	9.2	10.6	25.6	13.0	15.3	27.5	18.1	5.51
Bulk Rghr+Scav Conc	801	**20.1**	**2.14**	**3.41**	1.75	2.25	0.24	19.9	32.8	10.0	**90.2**	**83.4**	61.1	80.1	67.1	61.9	36.5	10.5

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 3rd Clnr Conc.	124.4	3.12	10.3	11.0	28.8	49.9	29.8	32.0	20.3	18.0	67.6	41.8	13.9	67.6	48.7	4.6	0.7
Bulk 3rd Clnr Tail	42.8	1.07	1.12	8.25	24.2	66.4	3.24	23.5	39.7	33.6	2.5	10.8	4.0	2.5	12.3	3.1	0.4
Bulk 2nd Clnr Tail	78.9	1.98	1.71	4.13	19.2	75.0	4.94	11.5	35.5	48.1	7.1	10.0	5.9	7.1	11.1	5.1	1.1
Bulk 1st Clnr Tail	175.4	4.40	0.41	1.91	15.6	82.1	1.18	4.91	35.1	58.8	3.8	10.2	10.6	3.8	10.5	11.2	3.1
Ni 3rd Clnr Conc	43.0	1.08	**1.50**	**1.80**	34.1	62.6	4.34	3.85	81.1	10.7	3.4	2.4	5.7	3.4	2.0	6.4	0.1
Ni 3rd Clnr Tail	32.8	0.82	0.49	1.40	29.5	68.6	1.42	2.80	72.7	23.0	0.8	1.4	3.8	0.8	1.1	4.3	0.2
Ni 2nd Clnr Tail	93.2	2.34	0.35	0.97	25.9	72.8	1.01	1.66	64.8	32.6	1.7	2.8	9.4	1.7	1.9	11.0	0.9
Ni 1st Clnr Tail	210.5	5.28	0.29	0.64	10.7	88.4	0.84	1.32	25.8	72.0	3.2	4.1	8.7	3.2	3.4	9.9	4.6
Ni Scav Tail	3190	79.9	0.06	0.17	3.08	96.7	0.17	0.23	7.63	92.0	9.8	16.6	38.1	9.8	9.0	44.4	88.7
Head (calc.)	3991	100.0	0.47	0.82	6.46	92.2	1.37	2.05	13.7	82.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	6.45												
Combined Products																	
Bulk 3rd Clnr Conc	124	3.12	10.3	11.0	28.8	49.9	29.8	32.0	20.3	18.0	67.6	41.8	13.9	67.6	48.7	4.6	0.7
Bulk 2nd Clnr Conc	167	4.19	7.95	10.3	27.6	54.1	23.0	29.8	25.2	22.0	70.1	52.6	17.9	70.1	61.0	7.7	1.1
Bulk 1st Clnr Conc	246	6.17	5.95	8.32	24.9	60.8	17.2	23.9	28.5	30.4	77.3	62.6	23.8	77.3	72.0	12.8	2.3
Bulk Rougher Conc	422	10.6	3.64	5.65	21.0	69.7	10.5	16.0	31.3	42.2	81.0	72.8	34.4	81.0	82.6	24.0	5.4
Ni 3rd Clnr Conc	43.0	1.08	1.50	1.80	34.1	62.6	4.34	3.85	81.1	10.7	3.4	2.4	5.7	3.4	2.0	6.4	0.1
Ni 2nd Clnr Conc	75.8	1.90	1.06	1.63	32.1	65.2	3.07	3.39	77.5	16.0	4.3	3.8	9.4	4.3	3.1	10.7	0.4
Ni 1st Clnr Conc	169	4.24	0.67	1.26	28.7	69.4	1.94	2.44	70.5	25.2	6.0	6.5	18.8	6.0	5.0	21.7	1.3
Ni Scav Conc	380	9.51	0.46	0.92	18.7	79.9	1.33	1.82	45.7	51.1	9.2	10.6	27.5	9.2	8.4	31.6	5.9
Bulk Rghr+Scav Conc	801	**20.1**	**2.14**	**3.41**	19.9	74.5	6.17	9.29	38.1	46.4	**90.2**	**83.4**	61.9	90.2	91.0	55.6	11.3

Test: HNI-F4 | **Project:** 150149-001 | **Date:** March 1 2012 | **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix
Procedure: As below.
Feed: 2 kg of -10 mesh **High Ni Composite**
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 8 minutes in the pebble mill (Ni scav concentrate)

Target Feed K_{80} : 90 µm

Conditions:

	Reagents added, grams per tonne						Time, minutes				
Stage	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
Grind							57				
Bulk Rougher 1		15				12		1	3	8.4	94.1
Bulk Rougher 2		10						1	3	8.4	24.6
Ni Scav 1		30							6	8.4	-8.8
Ni Scav 2		30							6	8.3	-7.2
Ni Scav 3		30							6	8.2	-55.4
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.3	74.3
B		2							2		
Bulk 2nd Cleaner		0		5	5				2	8.0	82.5
		5							2		
Combine Scav Conc 1-3											
Regrind (PM)							8				
Ni 1st Cleaner		7.5		10	10				3	8.5	61.1
		5							3		
Ni 2nd Cleaner		2		1	1				4	7.6	113.3
Ni 3rd Cleaner									3		
Total	0	136.5	0	26	26	12	65	2	45		

*As needed

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Metallurgical Balance

Product	Weight		Assays, %								% Distribution							
	g	%	Cu	Ni	Pt	Pd	Au	S	Fe	MgO	Cu	Ni	Pt	Pd	Au	S	Fe	MgO
Bulk 2nd Clnr Conc.	79.0	4.00	9.68	9.07	2.35	7.46	0.81	28.0	35.3	2.51	77.0	43.3	17.3	52.1	32.94	16.6	7.7	0.5
Bulk 2nd Clnr Tail	44.0	2.23	0.78	5.55	1.80	2.59	0.14	16.5	27.3	12.9	3.5	14.8	7.4	10.1	3.17	5.4	3.3	1.5
Bulk 1st Clnr Tail	77.8	3.94	0.27	2.13	1.10	0.72	0.06	10.6	20.5	18.2	2.1	10.0	8.0	5.0	2.40	6.2	4.4	3.7
Ni 3rd Clnr Conc	31.0	1.57	**1.62**	**2.80**	3.2	**2.00**	**1.46**	30.2	**47.2**	4.31	5.1	5.2	9.1	5.5	23.30	7.0	4.1	0.4
Ni 3rd Clnr Tail	16.8	0.85	0.45	1.88	2.06	1.02	0.26	27.2	44.3	6.44	0.8	1.9	3.2	1.5	2.25	3.4	2.1	0.3
Ni 2nd Clnr Tail	42.8	2.17	0.33	1.35	1.78	0.81	0.20	21.0	36.8	10.5	1.4	3.5	7.1	3.1	4.41	6.7	4.4	1.2
Ni 1st Clnr Tail	154	7.80	0.13	0.50	0.84	0.38	0.10	13.4	26.0	14.2	2.0	4.7	12.1	5.2	7.93	15.5	11.1	5.8
Ni Scav Tail	1529	77.4	0.05	0.18	0.25	0.13	0.03	3.42	14.8	21.4	8.2	16.6	35.7	17.6	23.61	39.2	62.9	86.6
Head (calc.)	1974	100.0	0.50	0.84	0.54	0.57	0.10	6.76	18.2	19.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	0.57	0.61	0.10	6.45	18.1	19.8								
Combined Products																		
Bulk 2nd Clnr Conc	79	4.00	**9.68**	**9.07**	2.4	7.46	0.81	28.0	35.3	2.51	**77.0**	**43.3**	17.34	52.14	32.94	16.57	7.75	0.52
Bulk 1st Clnr Conc	123	6.23	6.50	7.81	2.2	5.72	0.57	23.9	32.4	6.23	80.5	58.1	24.74	62.22	36.11	22.01	11.1	2.03
Bulk Rougher Conc	**201**	**10.2**	**4.08**	**5.61**	**1.75**	**3.78**	**0.37**	**18.7**	**27.8**	**10.9**	**82.6**	**68.1**	**32.74**	**67.17**	**38.51**	**28.19**	**15.5**	**5.78**
Ni 3rd Clnr Conc	31	1.57	**1.62**	**2.80**	3.2	2.00	1.46	30.2	47.2	4.31	**5.1**	**5.2**	9.12	5.48	23.30	7.01	4.06	0.35
Ni 2nd Clnr Conc	48	2.42	1.21	2.48	2.8	1.66	1.04	29.1	46.2	5.06	5.8	7.2	12.35	7.00	25.55	10.44	6.13	0.64
Ni 1st Clnr Conc	91	4.59	0.79	1.94	2.3	1.26	0.64	25.3	41.7	7.63	7.2	10.6	19.47	10.07	29.95	17.17	10.5	1.83
Ni Scav Conc	245	12.4	0.38	1.04	1.38	0.70	0.30	17.8	31.8	11.8	9.3	15.3	31.56	15.24	37.88	32.63	21.6	7.62
Bulk Rghr+Scav Conc	445	**22.6**	**2.05**	**3.10**	1.55	2.09	0.33	18.2	30.0	11.4	**91.8**	**83.4**	64.29	82.42	76.39	60.82	37.1	13.39

Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	79.0	4.00	9.68	9.07	28.0	53.3	28.0	26.2	24.8	21.0	77.0	43.3	16.6	77.0	50.2	6.9	1.0
Bulk 2nd Clnr Tail	44.0	2.23	0.78	5.55	16.5	77.2	2.3	15.8	27.2	54.8	3.5	14.8	5.4	3.5	16.8	4.2	1.5
Bulk 1st Clnr Tail	77.8	3.94	0.27	2.13	10.6	87.0	0.8	5.8	21.8	71.6	2.1	10.0	6.2	2.1	10.9	6.0	3.4
Ni 3rd Clnr Conc	31.0	1.57	**1.62**	**2.80**	30.2	65.4	4.7	7.0	68.0	20.3	5.1	5.2	7.0	5.1	5.3	7.4	0.4
Ni 3rd Clnr Tail	16.8	0.85	0.45	1.88	27.2	70.5	1.3	4.3	65.6	28.8	0.8	1.9	3.4	0.8	1.8	3.9	0.3
Ni 2nd Clnr Tail	42.8	2.17	0.33	1.35	21.0	77.3	1.0	3.0	51.0	45.1	1.4	3.5	6.7	1.4	3.1	7.7	1.2
Ni 1st Clnr Tail	154.0	7.80	0.13	0.50	13.4	86.0	0.4	0.8	33.7	65.1	2.0	4.7	15.5	2.0	2.9	18.2	6.2
Ni Scav Tail	1529	77.4	0.05	0.18	3.42	96.3	0.2	0.2	8.5	91.1	8.2	16.6	39.2	8.2	9.1	45.7	86.0
Head (calc.)	1974	100.0	0.50	0.84	6.76	91.9	1.45	2.09	14.4	82.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	6.45												
Combined Products																	
Bulk 2nd Clnr Conc	79	4.00	9.68	9.07	28.0	53.3	28.0	26.2	24.8	21.0	77.0	43.3	16.6	77.0	50.2	6.9	1.0
Bulk 1st Clnr Conc	123	6.23	6.50	7.81	23.9	61.8	18.8	22.5	25.6	33.1	80.5	58.1	22.0	80.5	67.0	11.1	2.5
Bulk Rougher Conc	201	10.2	4.08	5.61	18.7	71.6	11.8	16.0	24.2	48.0	82.6	68.1	28.2	82.6	77.9	17.1	6.0
Ni 3rd Clnr Conc	31.0	1.57	1.62	2.80	30.2	65.4	4.68	7.01	68.0	20.3	5.1	5.2	7.0	5.1	5.3	7.4	0.4
Ni 2nd Clnr Conc	47.8	2.42	1.21	2.48	29.1	67.2	3.49	6.06	67.2	23.3	5.8	7.2	10.4	5.8	7.0	11.3	0.7
Ni 1st Clnr Conc	91	4.59	0.79	1.94	25.3	72.0	2.29	4.62	59.5	33.6	7.2	10.6	17.2	7.2	10.1	19.0	1.9
Ni Scav Conc	245	12.4	0.38	1.04	17.8	80.8	1.09	2.20	43.3	53.4	9.3	15.3	32.6	9.3	13.1	37.2	8.1
Bulk Rghr+Scav Conc	445	**22.6**	**2.05**	**3.10**	18.2	76.6	5.92	8.42	34.7	51.0	**91.8**	**83.4**	60.8	91.8	90.9	54.3	14.0

Test: HNI-F5 | **Project: 150149-001** | **Date:** 06-Mar-12 | **Operator:** YW

Purpose: Split flowsheet, CMC and Guar 50:50 mix
Procedure: As below.
Feed: 2 kg of -10 mesh **High Ni Composite**
Grind: 57 minutes/2 kg at 65% solids in a lab mill
Regrind 15 minutes in the pebble mill (Ni scav concentrate)

Target Feed K_{80} : 90 µm
Ni regrind K80: 37 µm

Conditions:

Stage	Lime	SIPX	CuSO4	CMC	Guar	MIBC*	Grind	Cond.	Froth	pH	Eh
	Reagents added, grams per tonne						Time, minutes				
Grind							57				
Bulk Rougher 1		15				12		1	3	8.6	3.7
Bulk Rougher 2		15						1	3	8.6	-71.1
Ni Scav 1		20							6	8.6	-8.3
Ni Scav 2		20							6	8.5	-2.2
Ni Scav 3		20							6	8.5	-1.3
Combine Ro Conc 1-2											
Bulk 1st Cleaner A				10	10				2	8.5	64.7
B		2							2		
Bulk 2nd Cleaner		0		5	5				2	8.3	63.7
		5							2		
Combine Scav Conc 1-3											
Regrind (PM)							15				
Ni 1st Cleaner		5		5	5				3	8.6	53.6
		2							3		
Ni 2nd Cleaner		2		2	2				4	8.5	66.3
Ni 3rd Cleaner									3	8.2	22.6
Total	0	106	0	22	22	12	72	2	45		

*As needed

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

PSA on Ni regrind
Assay for Cu, Ni, S
To Sherbrooke

Metallurgical Balance

Product	Weight g	Weight %	Assays, % Cu	Ni	S	% Distribution Cu	Ni	S
Bulk 2nd Clnr Conc.	102	5.19	7.91	8.75	28.5	79.2	55.3	21.3
Bulk 2nd Clnr Tail	48.6	2.46	0.23	1.07	16.8	1.1	3.2	6.0
Bulk 1st Clnr Tail	162	8.23	0.09	0.45	13.1	1.4	4.5	15.5
Ni 3rd Clnr Conc	14.8	0.75	**4.04**	**3.73**	24.0	5.9	3.4	2.6
Ni 3rd Clnr Tail	14.9	0.76	0.47	1.90	20.1	0.7	1.7	2.2
Ni 2nd Clnr Tail	32.2	1.63	0.55	2.29	9.96	1.7	4.6	2.3
Ni 1st Clnr Tail	100	5.07	0.27	1.86	13.6	2.6	11.5	9.9
Ni Scav Tail	1498	75.9	0.05	0.17	3.67	7.3	15.7	40.1
Head (calc.)	1973	100.0	0.52	0.82	6.94	100.0	100.0	100.0
(direct)			0.52	0.83	6.45			
Combined Products								
Bulk 2nd Clnr Conc	102	5.19	**7.91**	**8.75**	28.5	**79.2**	**55.3**	21.3
Bulk 1st Clnr Conc	151	7.65	5.44	6.28	24.7	80.3	58.5	27.3
Bulk Rougher Conc	**313**	**15.9**	**2.67**	**3.26**	**18.7**	**81.8**	**63.1**	**42.8**
Ni 3rd Clnr Conc	15	0.75	**4.04**	**3.73**	24.0	**5.9**	**3.4**	2.59
Ni 2nd Clnr Conc	30	1.51	2.25	2.81	22.0	6.5	5.2	4.78
Ni 1st Clnr Conc	62	3.14	1.37	2.54	15.8	8.3	9.7	7.13
Ni Scav Conc	162	8.21	0.69	2.12	14.4	10.9	21.2	17.1
Bulk Rghr+Scav Conc	475	**24.1**	**1.99**	**2.87**	17.25	**92.7**	**84.3**	59.9

Metallurgical Balance

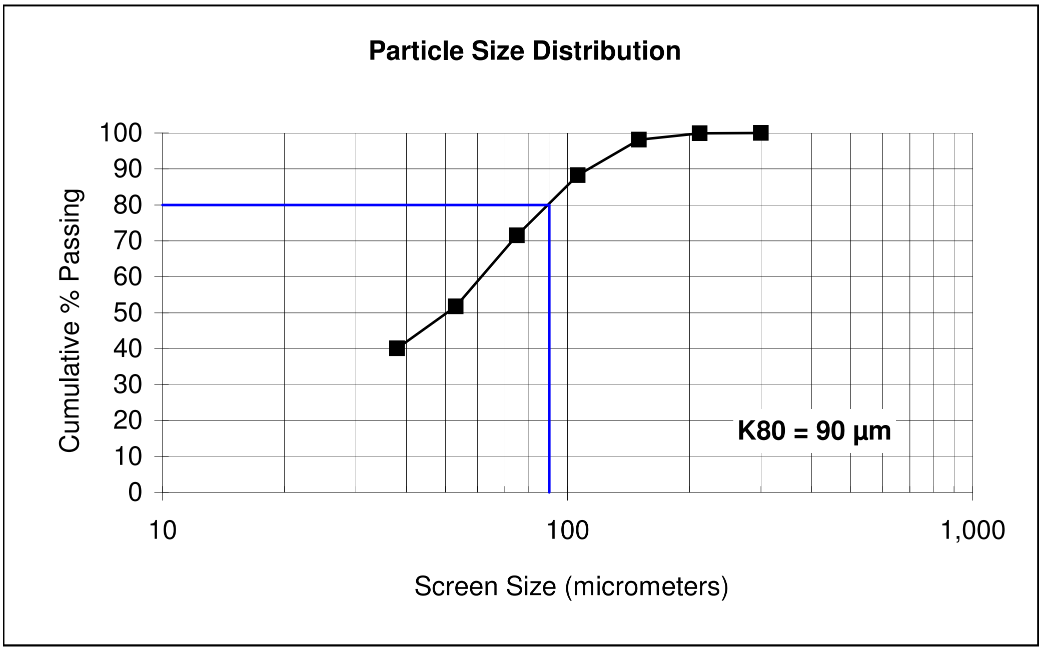
Product	Weight g	Weight %	Assays, % Cu	Ni	S	other	Cp	Pn	Po	Ga	% Distribution Cu	Ni	S	Cp	Pn	Po	Ga
Bulk 2nd Clnr Conc.	102.3	5.19	7.91	8.75	28.5	54.8	22.9	25.1	31.6	20.4	79.2	55.3	21.3	79.2	64.3	11.0	1.3
Bulk 2nd Clnr Tail	48.6	2.46	0.23	1.07	16.8	81.9	0.7	2.3	40.9	56.1	1.1	3.2	6.0	1.1	2.8	6.8	1.7
Bulk 1st Clnr Tail	162.3	8.23	0.09	0.45	13.1	86.4	0.3	0.6	33.2	65.9	1.4	4.5	15.5	1.4	2.6	18.3	6.7
Ni 3rd Clnr Conc	14.8	0.75	**4.04**	**3.73**	24.0	68.2	11.7	10.2	42.9	35.3	5.9	3.4	2.6	5.9	3.8	2.2	0.3
Ni 3rd Clnr Tail	14.9	0.76	0.47	1.90	20.1	77.5	1.4	4.7	46.8	47.1	0.7	1.7	2.2	0.7	1.7	2.4	0.4
Ni 2nd Clnr Tail	32.2	1.63	0.55	2.29	10.0	87.2	1.6	6.3	19.0	73.1	1.7	4.6	2.3	1.7	5.1	2.1	1.5
Ni 1st Clnr Tail	100.0	5.07	0.27	1.86	13.6	84.3	0.8	4.8	30.4	64.0	2.6	11.5	9.9	2.6	12.1	10.3	4.0
Ni Scav Tail	1498	75.9	0.05	0.17	3.67	96.1	0.1	0.2	9.2	90.4	7.3	15.7	40.1	7.3	7.7	46.9	84.2
Head (calc.)	1973	100.0	0.52	0.82	6.94	91.7	1.50	2.03	14.9	81.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	6.45												
Combined Products																	
Bulk 2nd Clnr Conc	102	5.19	7.9	8.8	28.5	54.8	22.9	25.1	31.6	20.4	79.2	55.3	21.3	79.2	64.3	11.0	1.3
Bulk 1st Clnr Conc	151	7.65	5.44	6.28	24.7	63.6	15.7	17.8	34.6	31.9	80.3	58.5	27.3	80.3	67.1	17.8	3.0
Bulk Rougher Conc	313	15.9	2.67	3.26	18.7	75.4	7.7	8.9	33.9	49.5	81.8	63.1	42.8	81.8	69.7	36.1	9.6
Ni 3rd Clnr Conc	14.8	0.75	4.04	3.73	24.0	68.2	11.7	10.2	42.9	35.3	5.9	3.4	2.6	5.9	3.8	2.2	0.3
Ni 2nd Clnr Conc	29.7	1.51	2.25	2.81	22.0	72.9	6.50	7.42	44.9	41.2	6.5	5.2	4.8	6.5	5.5	4.5	0.8
Ni 1st Clnr Conc	62	3.14	1.37	2.54	15.8	80.3	3.95	6.83	31.4	57.8	8.3	9.7	7.1	8.3	10.6	6.6	2.2
Ni Scav Conc	162	8.2	0.69	2.12	14.4	82.8	1.99	5.60	30.8	61.6	10.9	21.2	17.1	10.9	22.7	17.0	6.2
Bulk Rghr+Scav Conc	475	**24.1**	**1.99**	**2.87**	17.2	77.9	5.76	7.78	32.8	53.7	**92.7**	**84.3**	59.9	92.7	92.3	53.1	15.8

SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ro Tail** Test No.: **F1**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.2	0.1	0.1	99.9
100	150	2.6	1.7	1.8	98.2
150	106	15.0	9.9	11.7	88.3
200	75	25.5	16.8	28.5	71.5
270	53	30.0	19.7	48.2	51.8
400	38	17.8	11.7	59.9	40.1
Pan	-38	60.9	40.1	100.0	0.0
Total	**-**	**152.0**	100.0	**-**	**-**
K80	**90**				

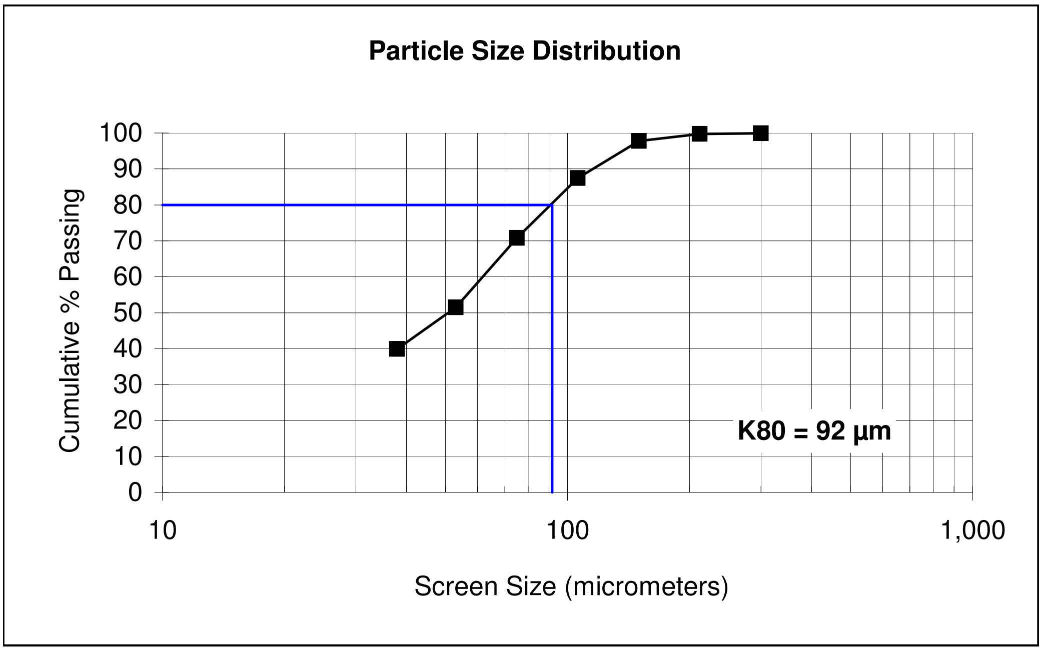


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ro Tail** Test No.: **F2**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.1	0.1	0.1	99.9
65	212	0.3	0.2	0.3	99.7
100	150	3.0	1.9	2.2	97.8
150	106	16.1	10.4	12.6	87.4
200	75	25.8	16.6	29.2	70.8
270	53	29.9	19.3	48.5	51.5
400	38	17.9	11.5	60.1	39.9
Pan	-38	61.9	39.9	100.0	0.0
Total	**-**	**155.0**	100.0	**-**	**-**
K80	**92**				

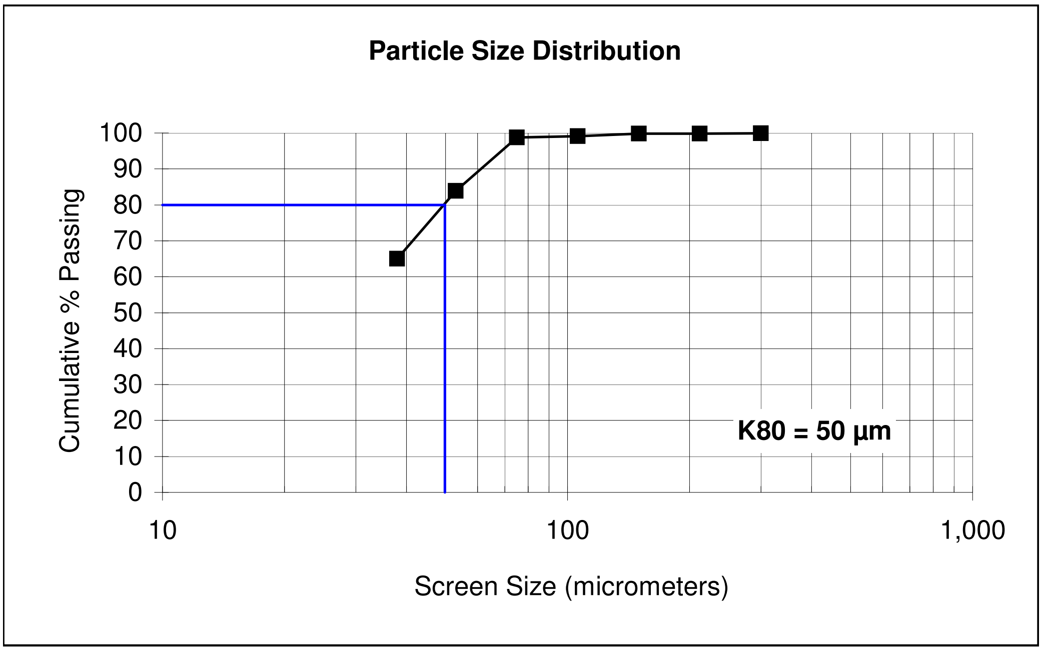


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ro Tail** Test No.: **F5**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.1	0.1	0.1	99.9
65	212	0.1	0.1	0.1	99.9
100	150	0.1	0.1	0.2	99.8
150	106	1.0	0.7	0.9	99.1
200	75	0.4	0.3	1.2	98.8
270	53	20.9	14.9	16.1	83.9
400	38	26.4	18.9	35.0	65.0
Pan	-38	91.0	65.0	100.0	0.0
Total	-	**140.0**	100.0	-	-
K80	**50**				

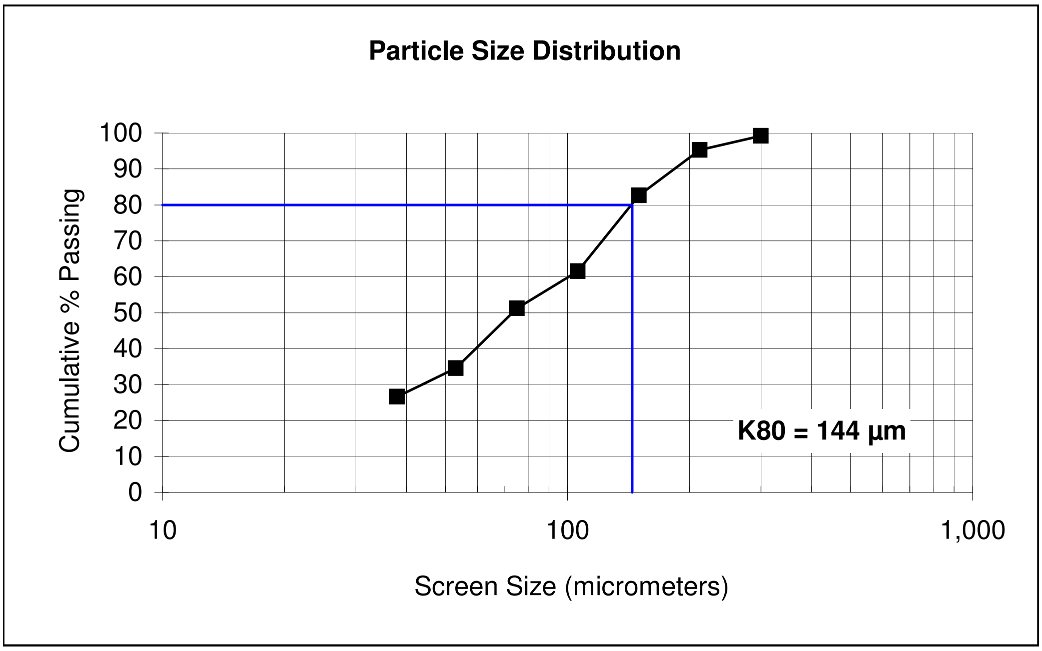


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ro Tail** Test No.: **F6**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	1.2	0.8	0.8	99.2
65	212	6.0	3.9	4.7	95.3
100	150	19.4	12.7	17.4	82.6
150	106	32.3	21.1	38.5	61.5
200	75	15.8	10.3	48.8	51.2
270	53	25.5	16.7	65.5	34.5
400	38	12.0	7.8	73.3	26.7
Pan	-38	40.8	26.7	100.0	0.0
Total	**-**	**153.0**	100.0	**-**	**-**
K80	**144**				

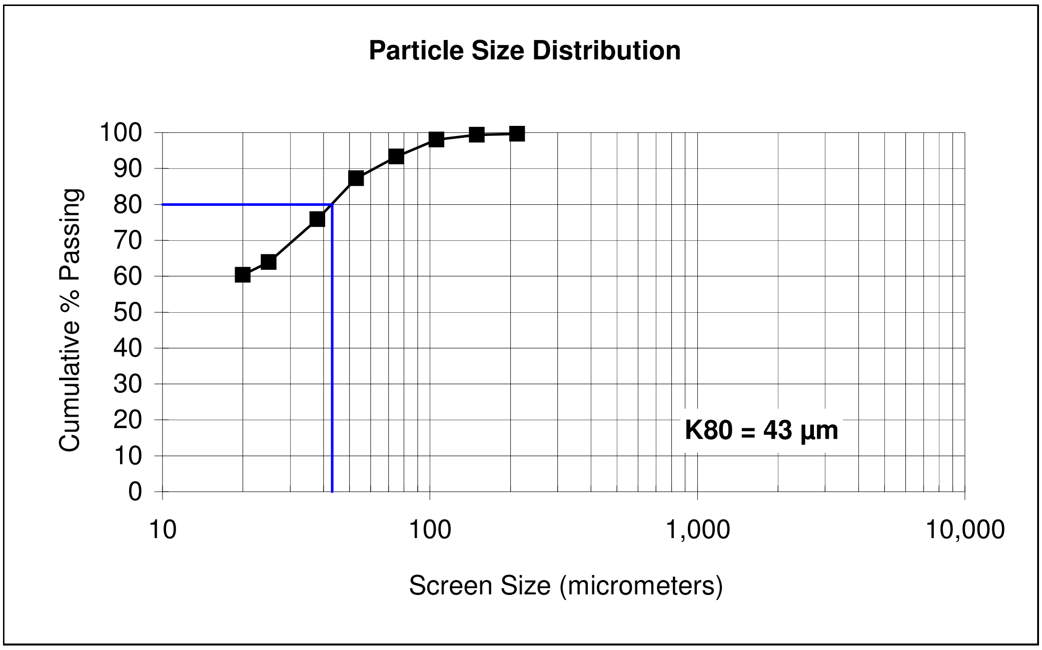


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Comb Prod.** Test No.: **F10**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	0.3	0.3	0.3	99.7
100	150	0.3	0.3	0.7	99.3
150	106	1.2	1.3	2.0	98.0
200	75	4.3	4.7	6.7	93.3
270	53	5.5	6.0	12.7	87.3
400	38	10.4	11.4	24.2	75.8
500	25	10.8	11.9	36.0	64.0
635	20	3.3	3.6	39.7	60.3
Pan	-20	54.9	60.3	100.0	0.0
Total	**-**	**91.0**	100.0	**-**	**-**
K80	**43**				



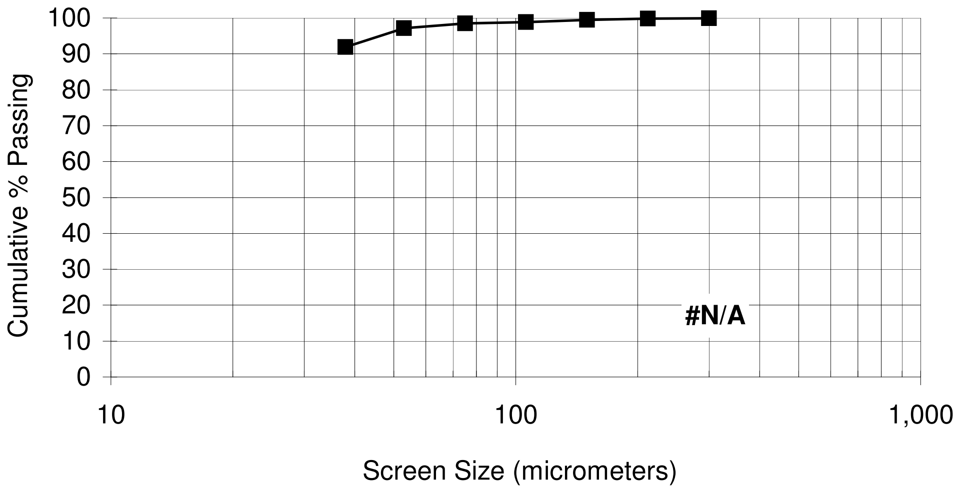
SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Comb Prod.** Test No.: **F11**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.1	0.1	0.1	99.9
65	212	0.1	0.1	0.2	99.8
100	150	0.4	0.4	0.6	99.4
150	106	0.6	0.6	1.2	98.8
200	75	0.4	0.4	1.5	98.5
270	53	1.4	1.3	2.9	97.1
400	38	5.4	5.2	8.1	91.9
Pan	-38	95.6	91.9	100.0	0.0
Total	**-**	**104.0**	100.0	**-**	**-**
K80	**#N/A**				

Particle Size Distribution

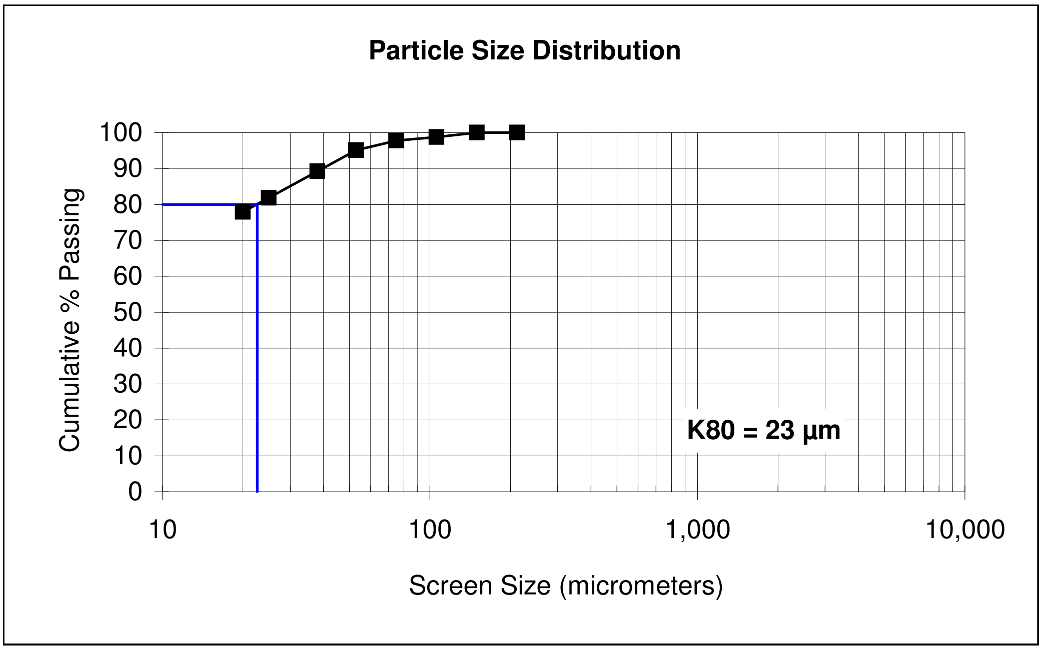


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Combined product** Test No.: **F19**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	0.0	0.0	0.0	100.0
100	150	0.0	0.0	0.0	100.0
150	106	0.8	1.2	1.3	98.7
200	75	0.6	0.9	2.2	97.8
270	53	1.8	2.7	4.9	95.1
400	38	3.8	5.9	10.8	89.2
500	25	4.8	7.4	18.2	81.8
635	20	2.5	3.9	22.1	77.9
Pan	-20	50.4	77.9	100.0	0.0
Total	**-**	**64.8**	100.0	**-**	**-**
K80	**23**				

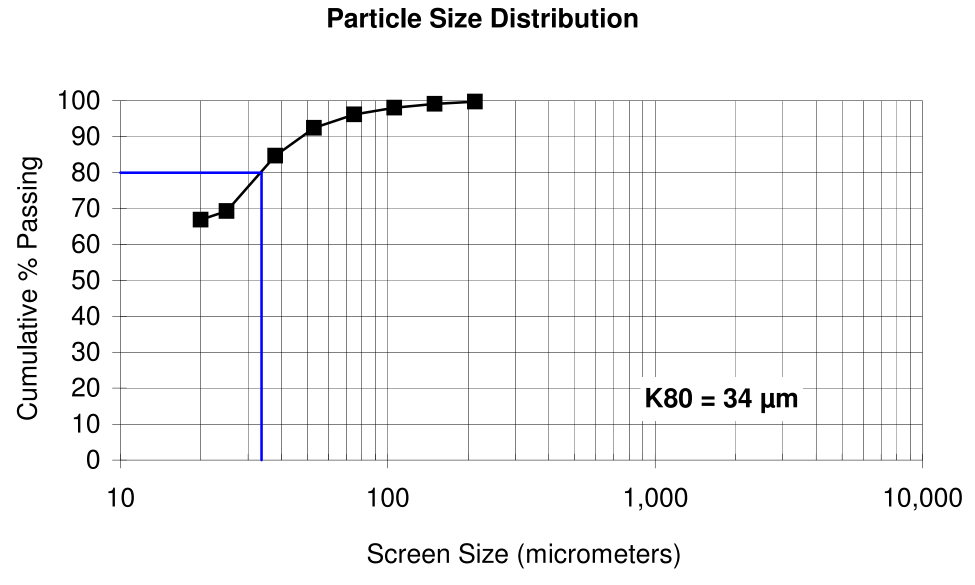


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Combined product** Test No.: **F20**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	0.2	0.3	0.3	99.7
100	150	0.5	0.6	0.9	99.1
150	106	0.8	1.0	1.9	98.1
200	75	1.5	1.9	3.8	96.2
270	53	2.9	3.7	7.6	92.4
400	38	6.0	7.7	15.3	84.7
500	25	12.0	15.4	30.7	69.3
635	20	1.9	2.4	33.1	66.9
Pan	-20	52.0	66.9	100.0	0.0
Total	**-**	**77.8**	100.0	**-**	**-**
K80	**34**				

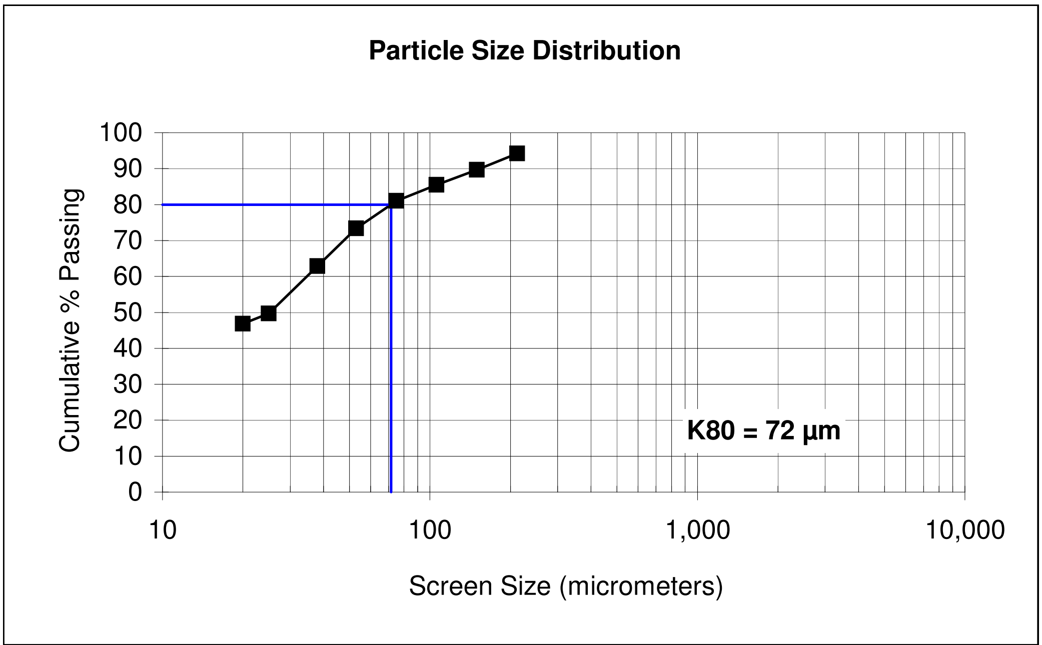


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Combined product** Test No.: **F21**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	3.8	5.8	5.8	94.2
100	150	3.0	4.5	10.3	89.7
150	106	2.8	4.2	14.5	85.5
200	75	2.9	4.4	18.9	81.1
270	53	5.1	7.7	26.7	73.3
400	38	6.9	10.5	37.1	62.9
500	25	8.7	13.2	50.3	49.7
635	20	1.9	2.9	53.2	46.8
Pan	-20	30.9	46.8	100.0	0.0
Total	**-**	**66.0**	100.0	**-**	**-**
K80	**72**				

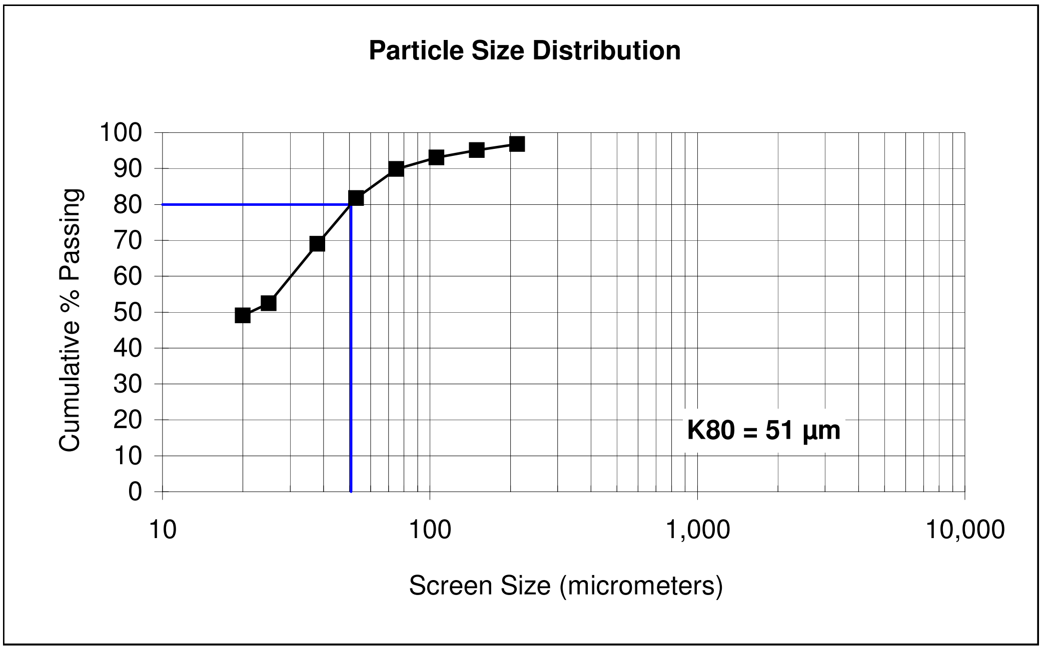


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Combined product** Test No.: **F22**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	1.5	3.2	3.2	96.8
100	150	0.8	1.7	4.9	95.1
150	106	1.0	2.0	6.9	93.1
200	75	1.5	3.2	10.1	89.9
270	53	3.8	8.1	18.2	81.8
400	38	6.0	12.8	31.0	69.0
500	25	7.8	16.6	47.6	52.4
635	20	1.6	3.4	51.0	49.0
Pan	-20	23.1	49.0	100.0	0.0
Total	**-**	**47.0**	100.0	**-**	**-**
K80	**51**				

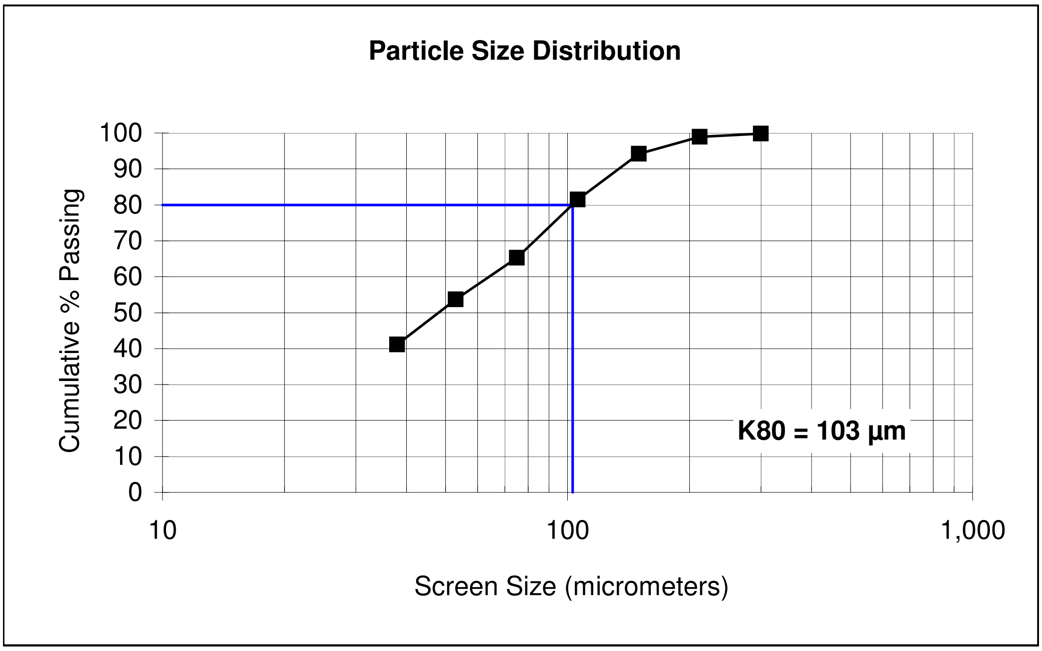


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ro Tail** Test No.: **HNI-F2**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.3	0.2	0.2	99.8
65	212	1.3	0.9	1.1	98.9
100	150	7.1	4.8	5.8	94.2
150	106	18.9	12.7	18.5	81.5
200	75	24.1	16.2	34.7	65.3
270	53	17.3	11.6	46.3	53.7
400	38	18.7	12.6	58.9	41.1
Pan	-38	61.3	41.1	100.0	0.0
Total	**-**	**149.0**	100.0	**-**	**-**
K80	**103**				

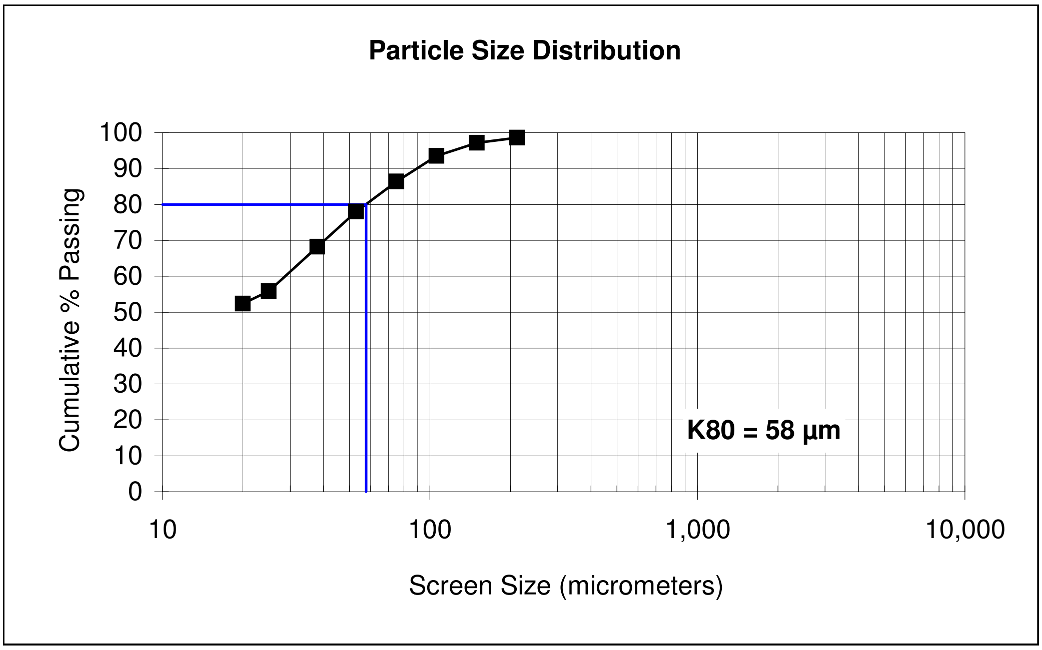


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **1+2+3+4+5 COMB** Test No.: **Hni-F2**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	1.5	1.4	1.4	98.6
100	150	1.5	1.4	2.8	97.2
150	106	3.9	3.7	6.5	93.5
200	75	7.5	7.1	13.6	86.4
270	53	8.9	8.4	22.0	78.0
400	38	10.4	9.8	31.8	68.2
500	25	13.1	12.4	44.2	55.8
635	20	3.7	3.5	47.7	52.3
Pan	-20		0.0	47.7	52.3
Total	**-**	**106.0**	47.7	**-**	**-**
K80	**58**				

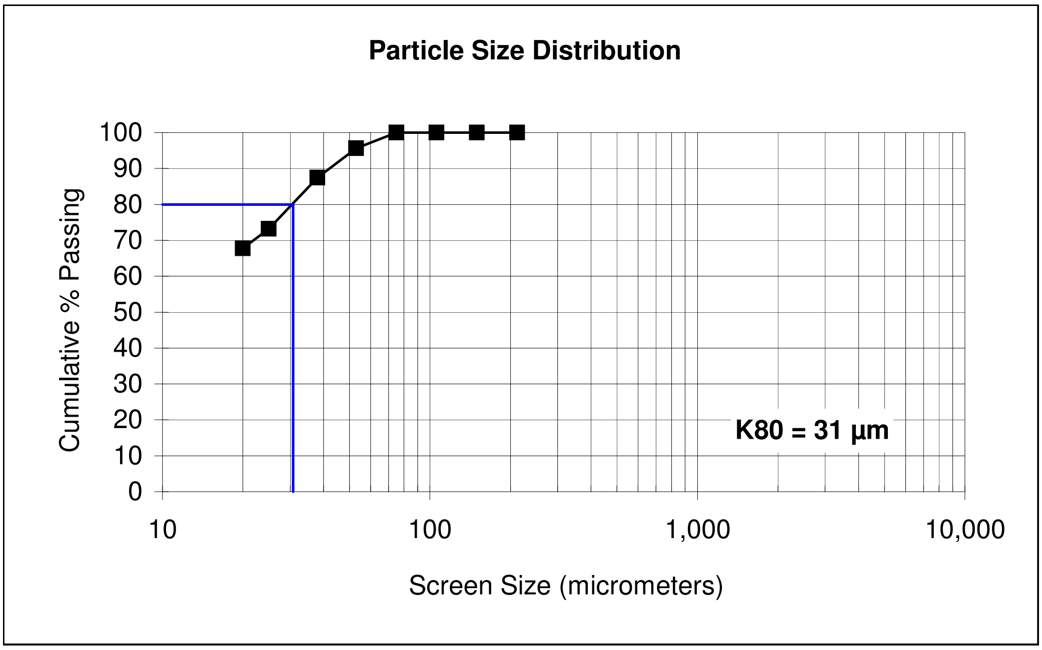


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Bulk Regrind** Test No.: **F29**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	0.0	0.0	0.0	100.0
100	150	0.0	0.0	0.0	100.0
150	106	0.0	0.0	0.0	100.0
200	75	0.0	0.0	0.0	100.0
270	53	0.8	4.4	4.4	95.6
400	38	1.5	8.2	12.6	87.4
500	25	2.6	14.2	26.8	73.2
635	20	1.0	5.5	32.2	67.8
Pan	-20		0.0	32.2	67.8
Total	**-**	**18.3**	32.2	**-**	**-**
K80	**31**				

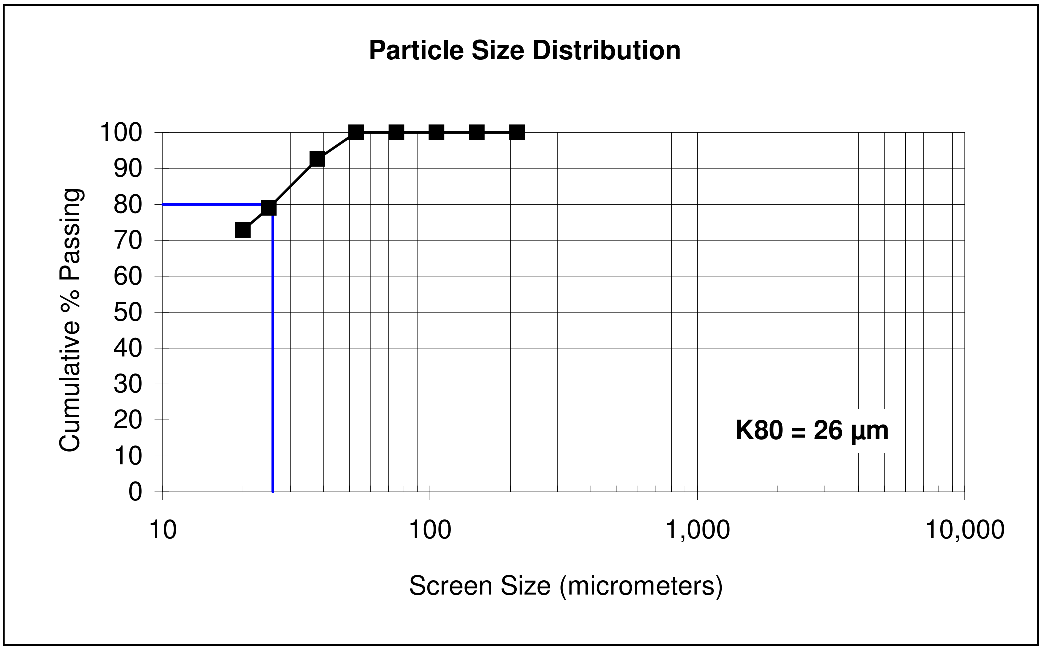


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Regrind** Test No.: **F29**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	0.0	0.0	0.0	100.0
100	150	0.0	0.0	0.0	100.0
150	106	0.0	0.0	0.0	100.0
200	75	0.0	0.0	0.0	100.0
270	53	0.0	0.0	0.0	100.0
400	38	1.2	7.4	7.4	92.6
500	25	2.2	13.6	21.0	79.0
635	20	1.0	6.2	27.2	72.8
Pan	-20		0.0	27.2	72.8
Total	**-**	**16.2**	27.2	**-**	**-**
K80	**26**				

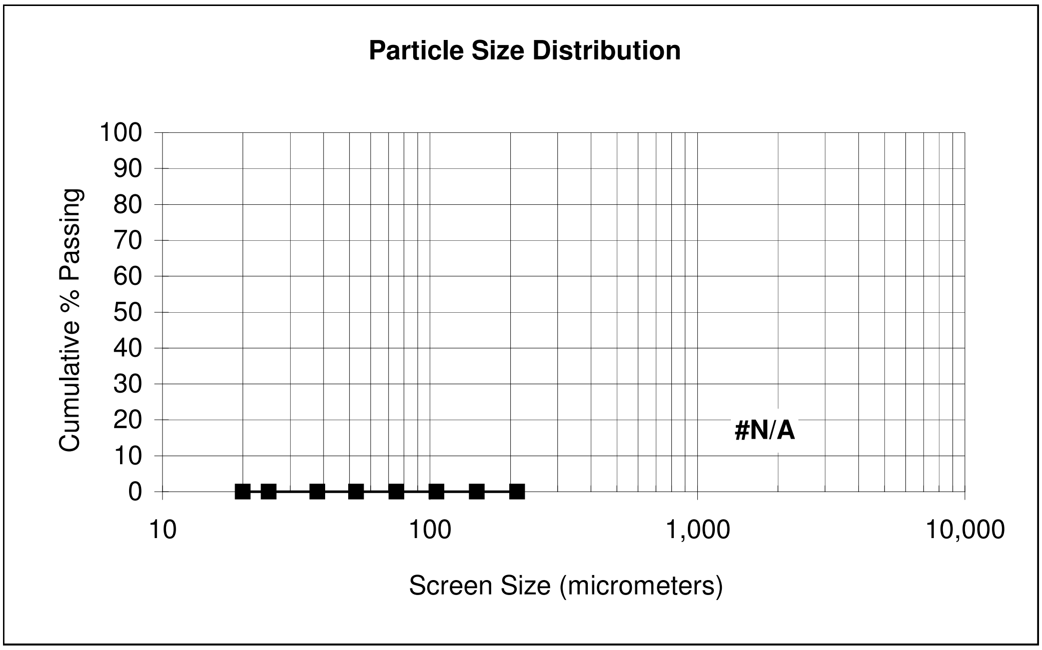


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Bulk Regrind** Test No.: **F30**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212		#DIV/0!	#DIV/0!	#DIV/0!
100	150		#DIV/0!	#DIV/0!	#DIV/0!
150	106		#DIV/0!	#DIV/0!	#DIV/0!
200	75		#DIV/0!	#DIV/0!	#DIV/0!
270	53		#DIV/0!	#DIV/0!	#DIV/0!
400	38		#DIV/0!	#DIV/0!	#DIV/0!
500	25		#DIV/0!	#DIV/0!	#DIV/0!
635	20		#DIV/0!	#DIV/0!	#DIV/0!
Pan	-20		#DIV/0!	#DIV/0!	#DIV/0!
Total	**-**		#DIV/0!	**-**	**-**
K80	**#N/A**				

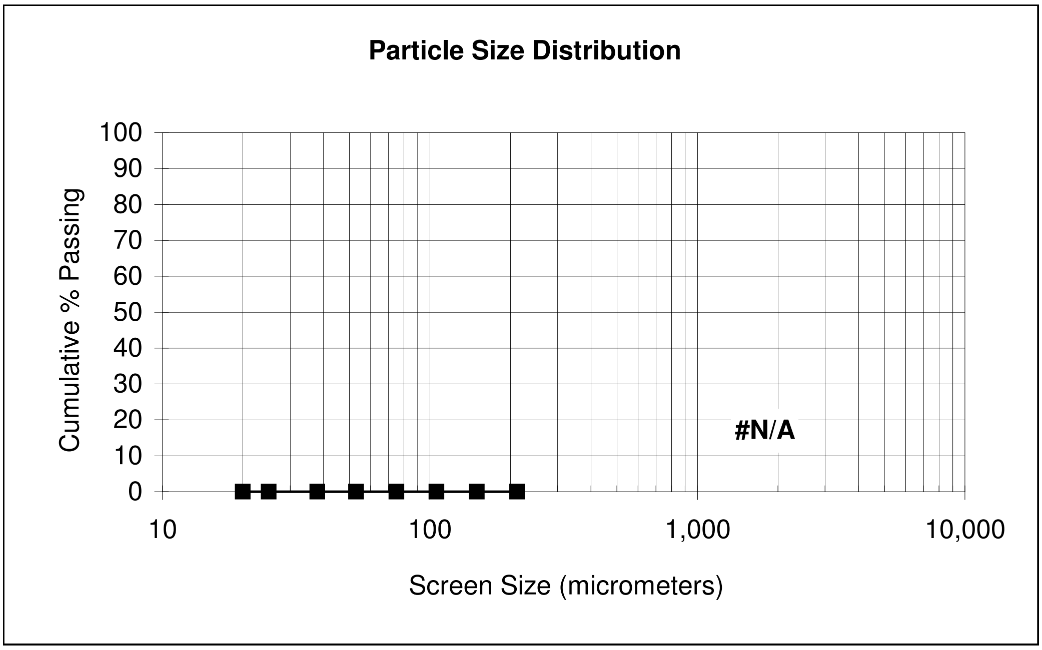


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Regrind** Test No.: **F30**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212		#DIV/0!	#DIV/0!	#DIV/0!
100	150		#DIV/0!	#DIV/0!	#DIV/0!
150	106		#DIV/0!	#DIV/0!	#DIV/0!
200	75		#DIV/0!	#DIV/0!	#DIV/0!
270	53		#DIV/0!	#DIV/0!	#DIV/0!
400	38		#DIV/0!	#DIV/0!	#DIV/0!
500	25		#DIV/0!	#DIV/0!	#DIV/0!
635	20		#DIV/0!	#DIV/0!	#DIV/0!
Pan	-20		#DIV/0!	#DIV/0!	#DIV/0!
Total	**-**		#DIV/0!	**-**	**-**
K80	**#N/A**				

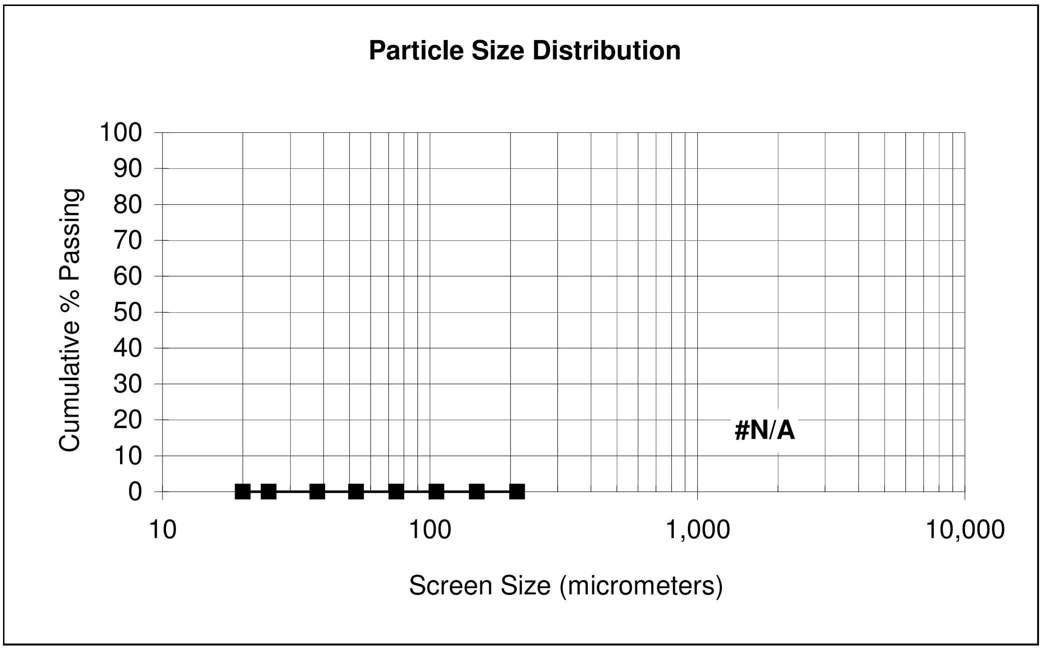


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Bulk Regrind** Test No.: **F31**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212		#DIV/0!	#DIV/0!	#DIV/0!
100	150		#DIV/0!	#DIV/0!	#DIV/0!
150	106		#DIV/0!	#DIV/0!	#DIV/0!
200	75		#DIV/0!	#DIV/0!	#DIV/0!
270	53		#DIV/0!	#DIV/0!	#DIV/0!
400	38		#DIV/0!	#DIV/0!	#DIV/0!
500	25		#DIV/0!	#DIV/0!	#DIV/0!
635	20		#DIV/0!	#DIV/0!	#DIV/0!
Pan	-20		#DIV/0!	#DIV/0!	#DIV/0!
Total	**-**		#DIV/0!	**-**	**-**
K80	**#N/A**				

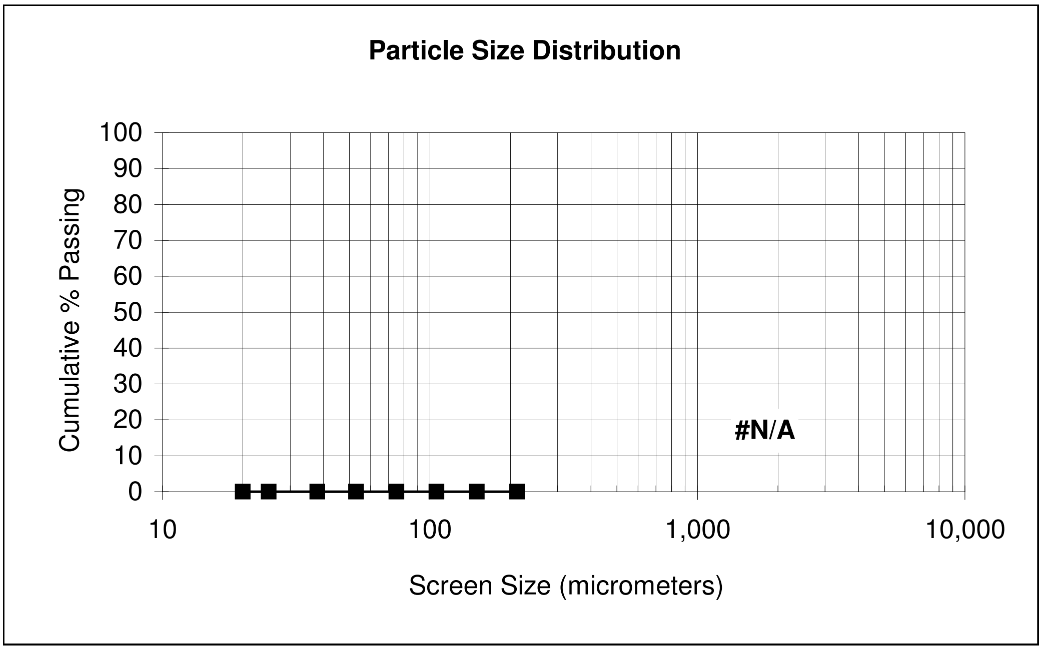


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Regrind** Test No.: **F31**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212		#DIV/0!	#DIV/0!	#DIV/0!
100	150		#DIV/0!	#DIV/0!	#DIV/0!
150	106		#DIV/0!	#DIV/0!	#DIV/0!
200	75		#DIV/0!	#DIV/0!	#DIV/0!
270	53		#DIV/0!	#DIV/0!	#DIV/0!
400	38		#DIV/0!	#DIV/0!	#DIV/0!
500	25		#DIV/0!	#DIV/0!	#DIV/0!
635	20		#DIV/0!	#DIV/0!	#DIV/0!
Pan	-20		#DIV/0!	#DIV/0!	#DIV/0!
Total	**-**		#DIV/0!	**-**	**-**
K80	**#N/A**				

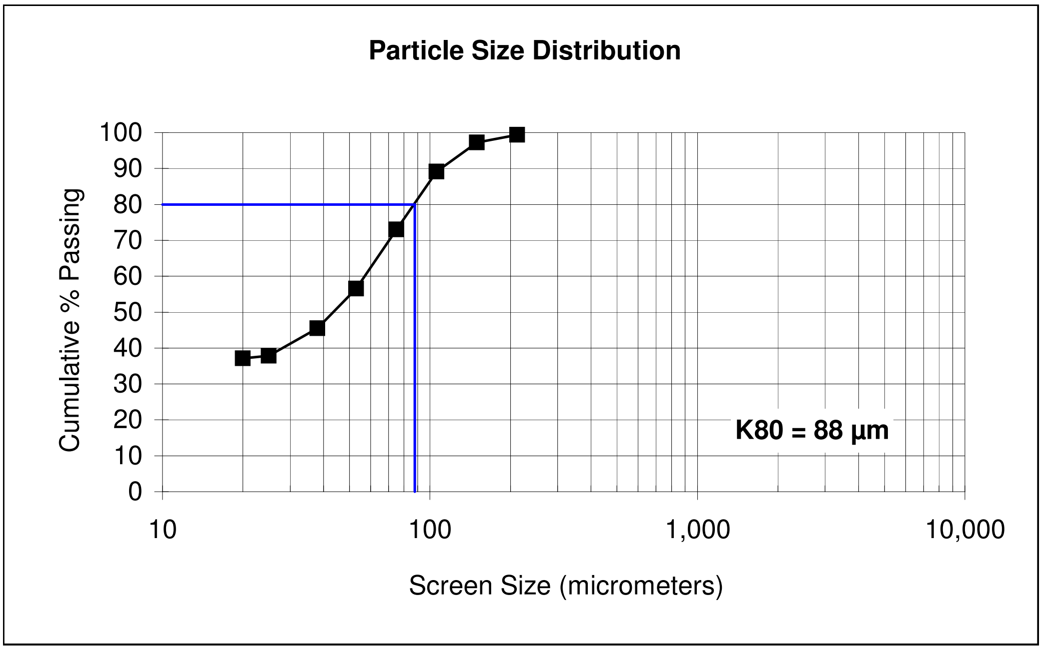


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **SEC SCAV TAIL** Test No.: **F33**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
65	212	1.0	0.7	0.7	99.3
100	150	3.2	2.1	2.8	97.2
150	106	12.3	8.1	10.9	89.1
200	75	24.5	16.1	27.0	73.0
270	53	25.1	16.5	43.5	56.5
400	38	16.7	11.0	54.5	45.5
500	25	11.7	7.7	62.2	37.8
635	20	1.0	0.7	62.8	37.2
Pan	-20		0.0	62.8	37.2
Total	**-**	**152.0**	62.8	**-**	**-**
K80	**88**				

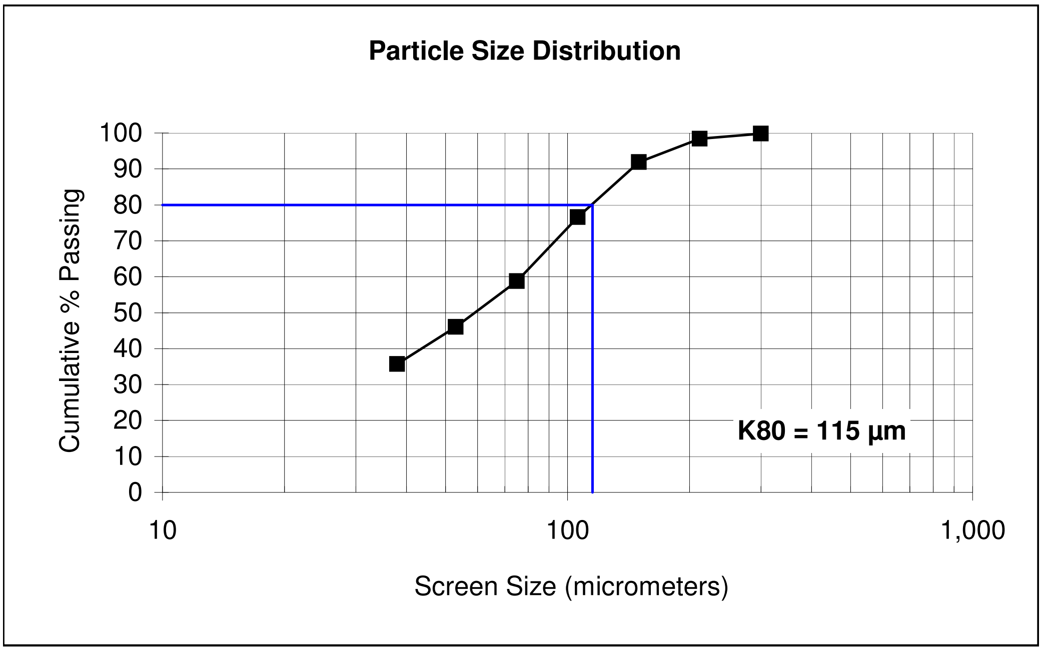


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ro Tail** Test No.: **F39**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.3	0.2	0.2	99.8
65	212	2.3	1.4	1.6	98.4
100	150	10.5	6.5	8.1	91.9
150	106	24.7	15.3	23.4	76.6
200	75	28.6	17.7	41.2	58.8
270	53	20.6	12.8	54.0	46.0
400	38	16.7	10.4	64.3	35.7
Pan	-38	57.5	35.7	100.0	0.0
Total	**-**	**161.2**	100.0	**-**	**-**
K80	**115**				

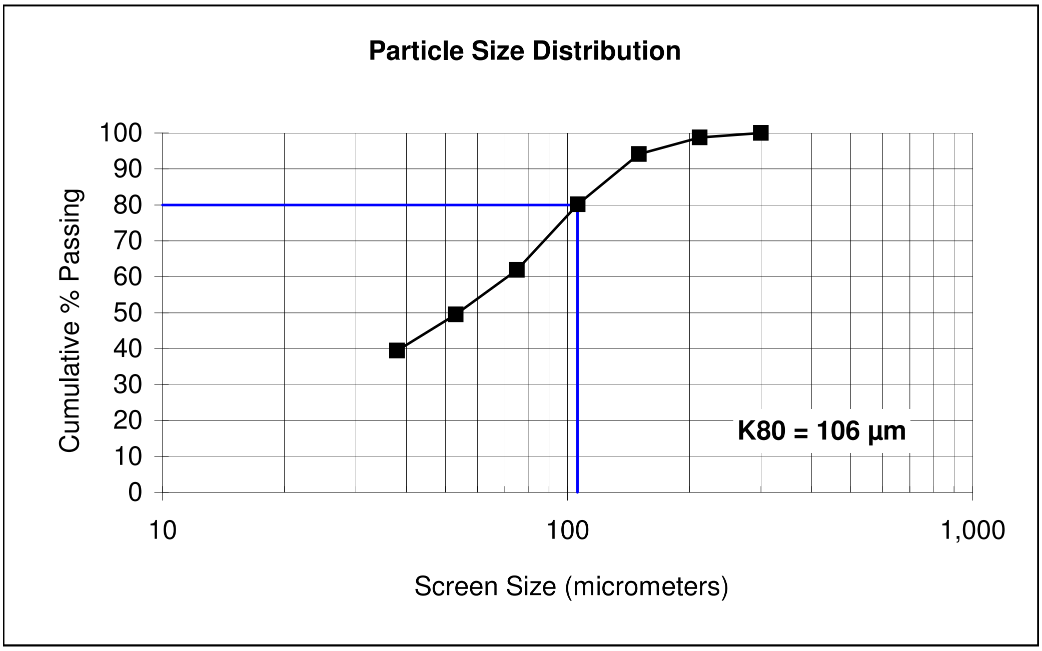


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ro Tail** Test No.: **F40**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	1.9	1.2	1.2	98.8
100	150	7.1	4.6	5.9	94.1
150	106	21.5	14.0	19.9	80.1
200	75	28.0	18.2	38.1	61.9
270	53	19.0	12.4	50.5	49.5
400	38	15.5	10.1	60.5	39.5
Pan	-38	60.6	39.5	100.0	0.0
Total	**-**	**153.6**	100.0	**-**	**-**
K80	**106**				

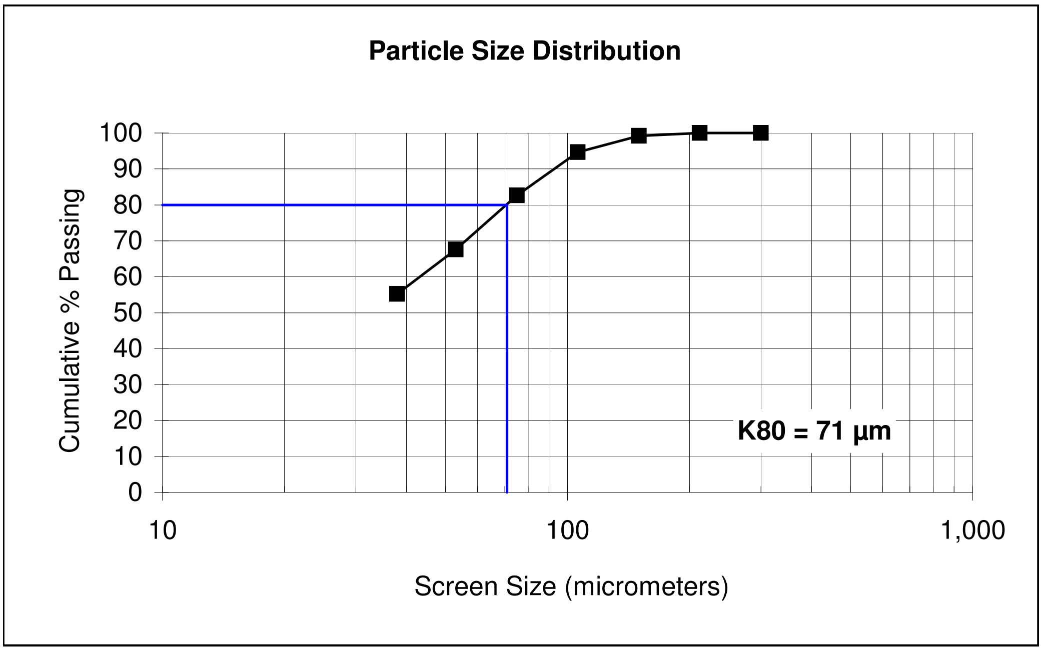


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ro Tail** Test No.: **F41**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.0	0.0	0.0	100.0
100	150	1.1	0.8	0.8	99.2
150	106	6.6	4.6	5.3	94.7
200	75	17.5	12.1	17.4	82.6
270	53	21.8	15.0	32.4	67.6
400	38	18.0	12.4	44.8	55.2
Pan	-38	80.0	55.2	100.0	0.0
Total	**-**	**145.0**	100.0	**-**	**-**
K80	**71**				

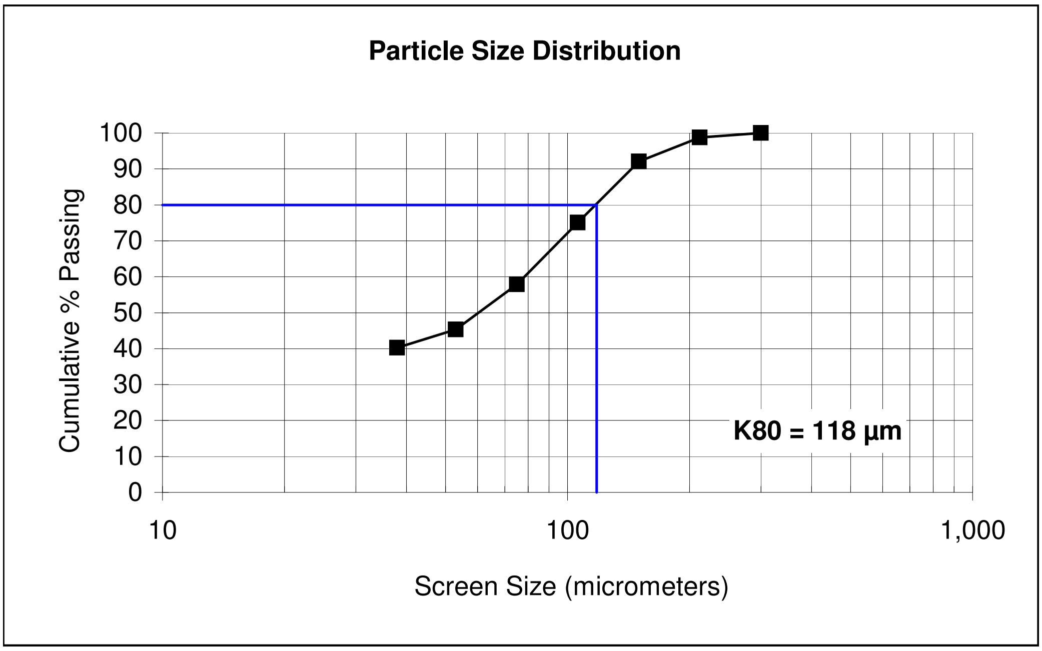


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Scav Tail F** Test No.: **LCT 1**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	1.9	1.2	1.2	98.8
100	150	10.5	6.7	7.9	92.1
150	106	26.7	17.0	24.9	75.1
200	75	27.0	17.2	42.1	57.9
270	53	19.8	12.6	54.7	45.3
400	38	7.9	5.0	59.7	40.3
Pan	-38	63.2	40.3	100.0	0.0
Total	**-**	**157.0**	100.0	**-**	**-**
K80	**118**				

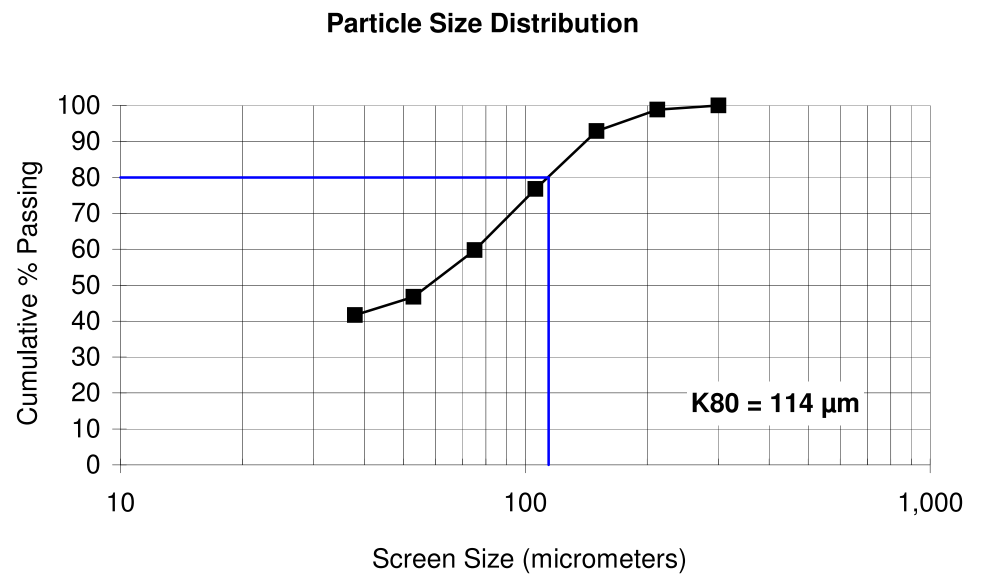


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ro Tail F** Test No.: **LCT 2**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	1.8	1.1	1.1	98.9
100	150	9.5	6.0	7.1	92.9
150	106	25.6	16.1	23.2	76.8
200	75	27.1	17.0	40.3	59.7
270	53	20.6	13.0	53.2	46.8
400	38	8.1	5.1	58.3	41.7
Pan	-38	66.3	41.7	100.0	0.0
Total	**-**	**159.0**	100.0	**-**	**-**
K80	**114**				

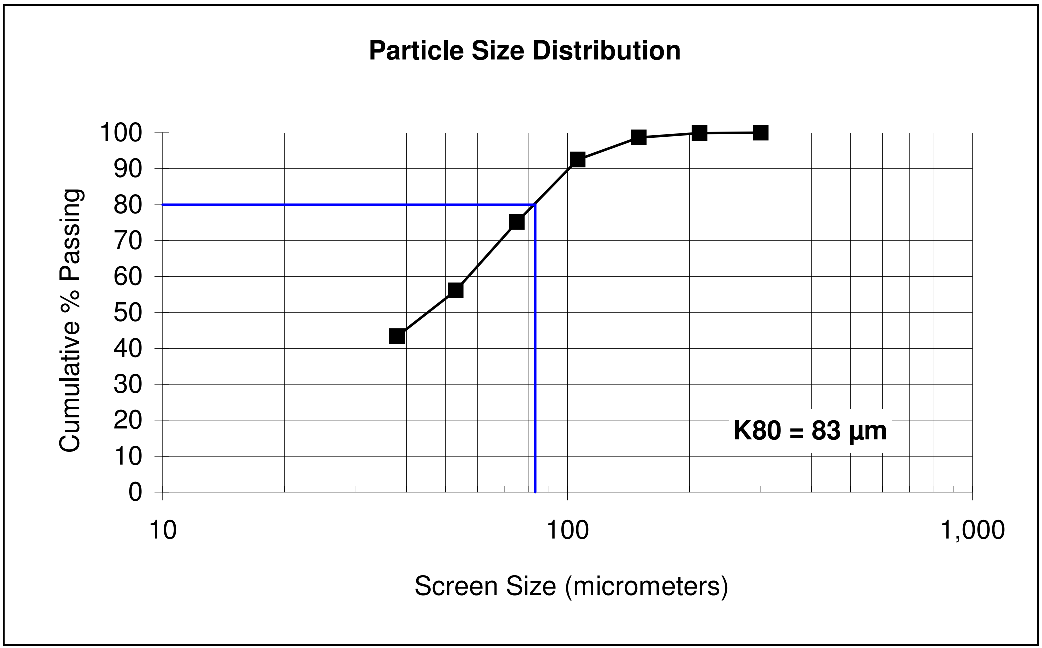


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ni SC TL C** Test No.: **LCT 3**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.2	0.1	0.1	99.9
100	150	1.8	1.2	1.3	98.7
150	106	9.6	6.2	7.5	92.5
200	75	26.9	17.4	24.9	75.1
270	53	29.4	19.0	43.9	56.1
400	38	19.7	12.7	56.6	43.4
Pan	-38	67.1	43.4	100.0	0.0
Total	**-**	**154.7**	100.0	**-**	**-**
K80	**83**				

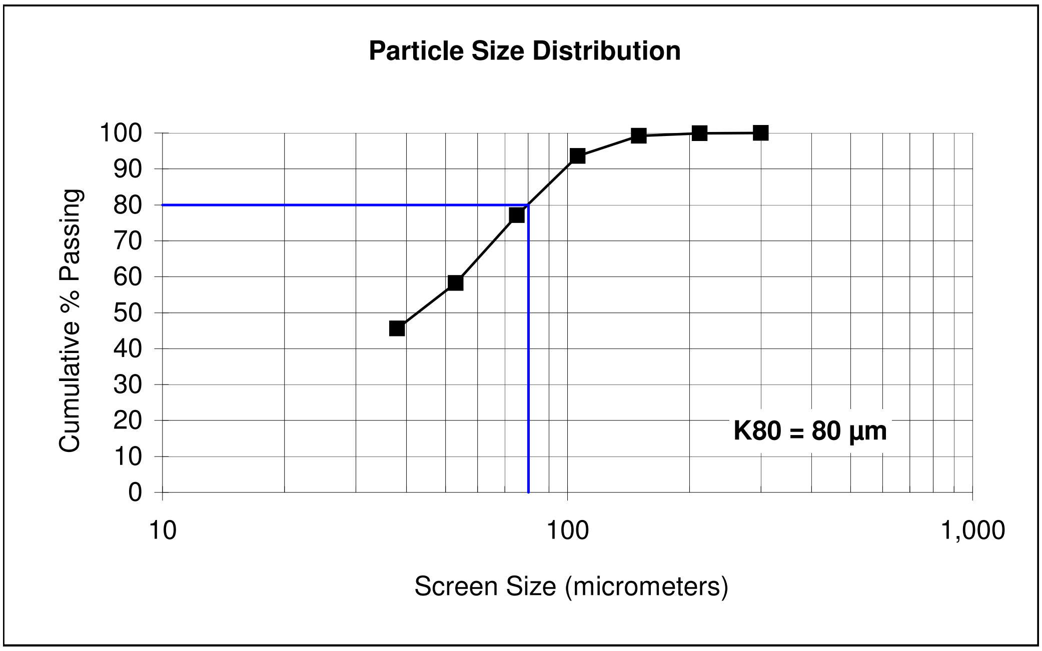


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni SC TL D** Test No.: **LCT 3**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.1	0.1	0.1	99.9
100	150	1.2	0.8	0.8	99.2
150	106	8.7	5.6	6.5	93.5
200	75	25.5	16.5	22.9	77.1
270	53	29.2	18.9	41.8	58.2
400	38	19.6	12.7	54.4	45.6
Pan	-38	70.6	45.6	100.0	0.0
Total	**-**	**154.9**	100.0	**-**	**-**
K80	**80**				



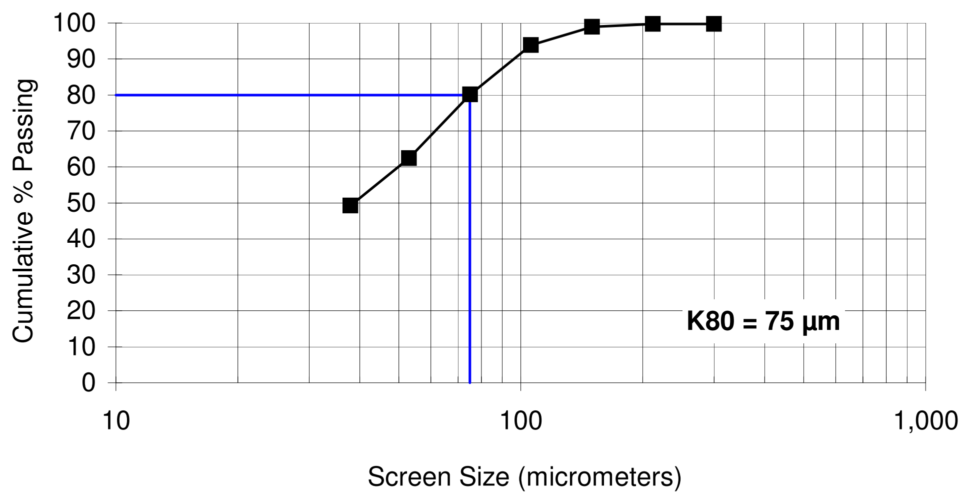
SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Scav Tail E** Test No.: **LCT4**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.5	0.3	0.3	99.7
65	212	0.0	0.0	0.3	99.7
100	150	1.3	0.8	1.1	98.9
150	106	8.3	5.1	6.2	93.8
200	75	22.5	13.7	19.9	80.1
270	53	29.1	17.7	37.6	62.4
400	38	21.5	13.1	50.7	49.3
Pan	-38	80.8	49.3	100.0	0.0
Total	-	**164.0**	100.0	-	-
K80	**75**				

Particle Size Distribution

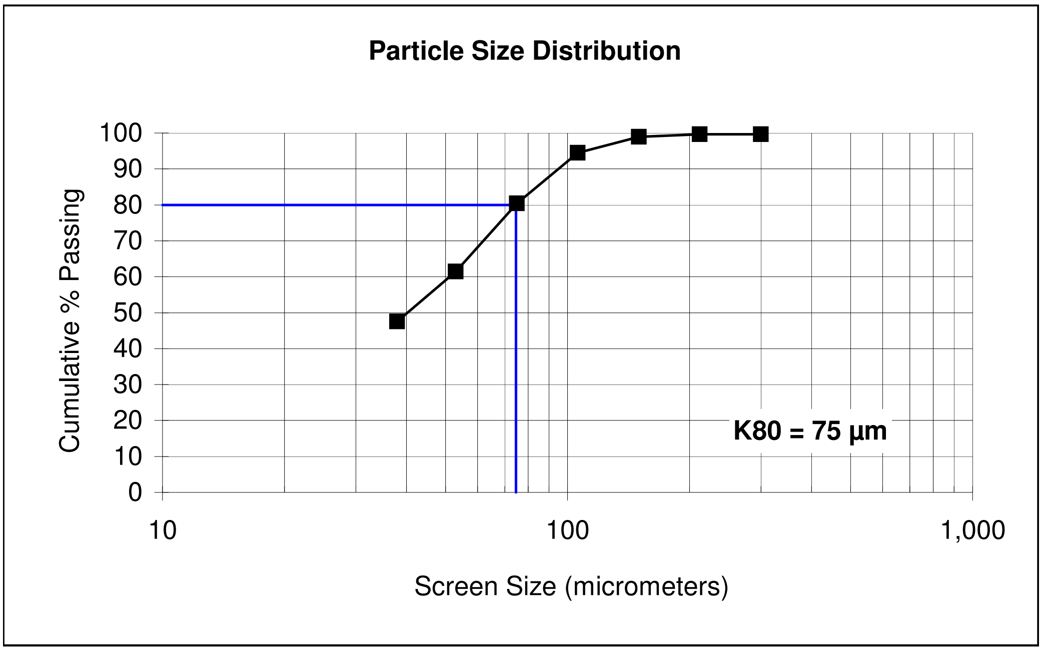


SGS Minerals Services
Size Distribution Analysis

Project No. **50149-001**

Sample: **Ni Scav Tail F** Test No.: **LCT4**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.5	0.3	0.3	99.7
65	212	0.0	0.0	0.3	99.7
100	150	1.1	0.7	1.0	99.0
150	106	7.0	4.5	5.5	94.5
200	75	21.8	14.1	19.6	80.4
270	53	29.4	19.0	38.6	61.4
400	38	21.5	13.9	52.5	47.5
Pan	-38	73.7	47.5	100.0	0.0
Total	**-**	**155.0**	100.0	**-**	**-**
K80	**75**				

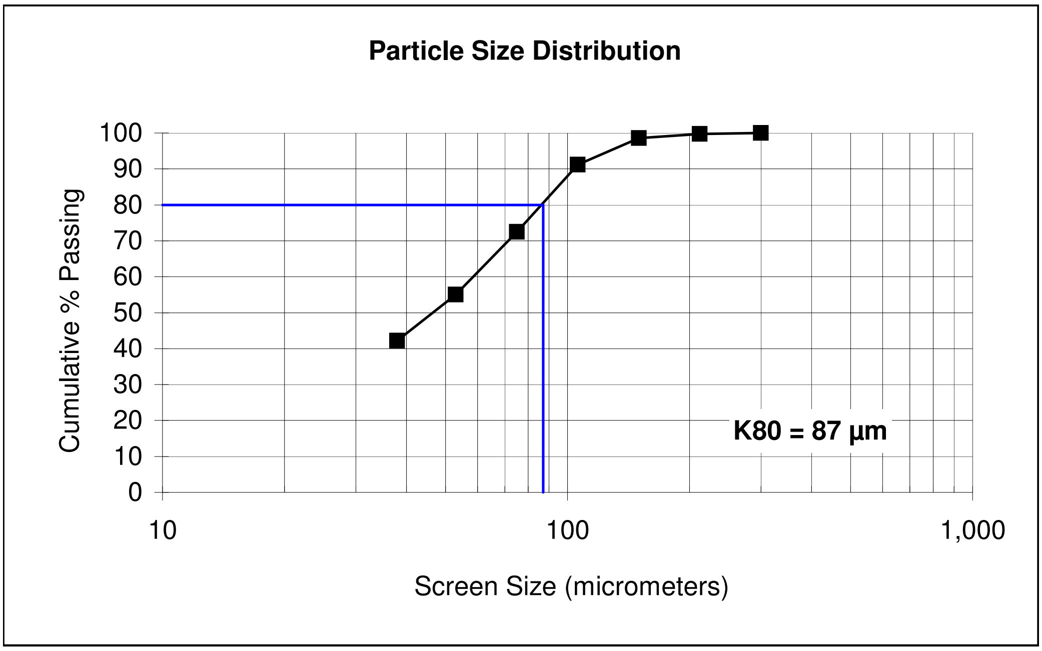


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Scav Tail D** Test No.: **LCT5**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.5	0.3	0.3	99.7
100	150	1.9	1.2	1.5	98.5
150	106	12.1	7.4	8.8	91.2
200	75	30.6	18.7	27.5	72.5
270	53	28.6	17.4	45.0	55.0
400	38	21.0	12.8	57.8	42.2
Pan	-38	69.2	42.2	100.0	0.0
Total	**-**	**163.9**	100.0	**-**	**-**
K80	**87**				

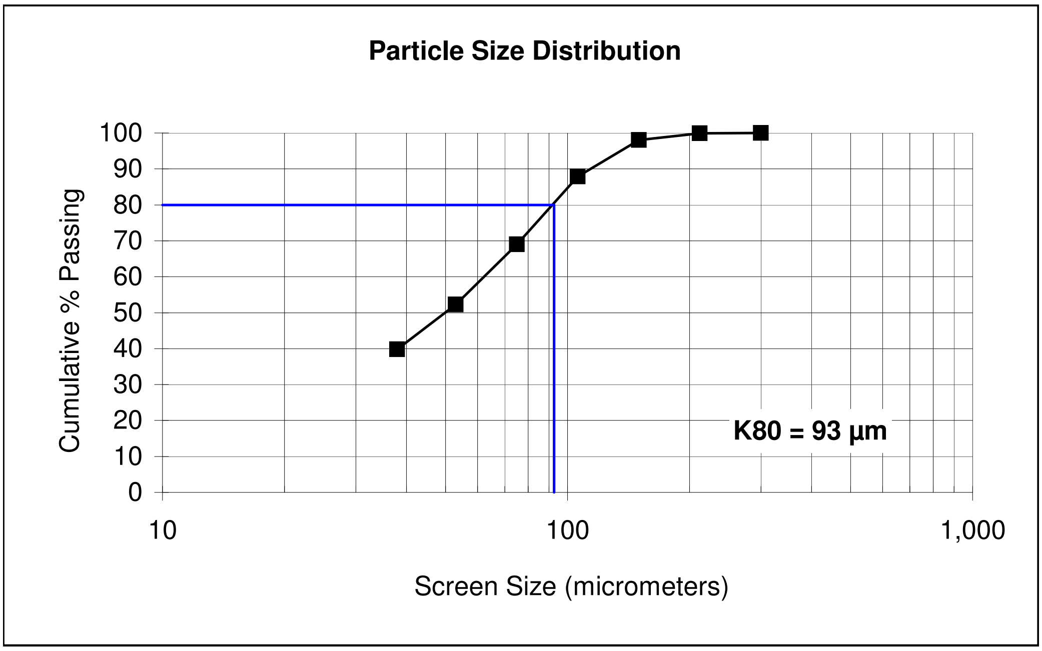


SGS Minerals Services
Size Distribution Analysis

Project No.
50149-001

Sample: **Ni Scav TailE** Test No.: **LCT5**

Size		Weight	% Retained		% Passing
Mesh	µm	grams	Individual	Cumulative	Cumulative
48	300	0.0	0.0	0.0	100.0
65	212	0.2	0.1	0.1	99.9
100	150	2.9	1.8	1.9	98.1
150	106	16.3	10.2	12.1	87.9
200	75	30.2	18.9	31.0	69.0
270	53	26.8	16.7	47.7	52.3
400	38	20.0	12.5	60.2	39.8
Pan	-38	63.7	39.8	100.0	0.0
Total	**-**	**160.1**	100.0	**-**	**-**
K80	**93**				



MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F30 Bulk PSA - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
11.56 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.191 %

Result Emulation:
Off

Concentration:
0.0201 %Vol

Span :
3.697

Uniformity:
1.13

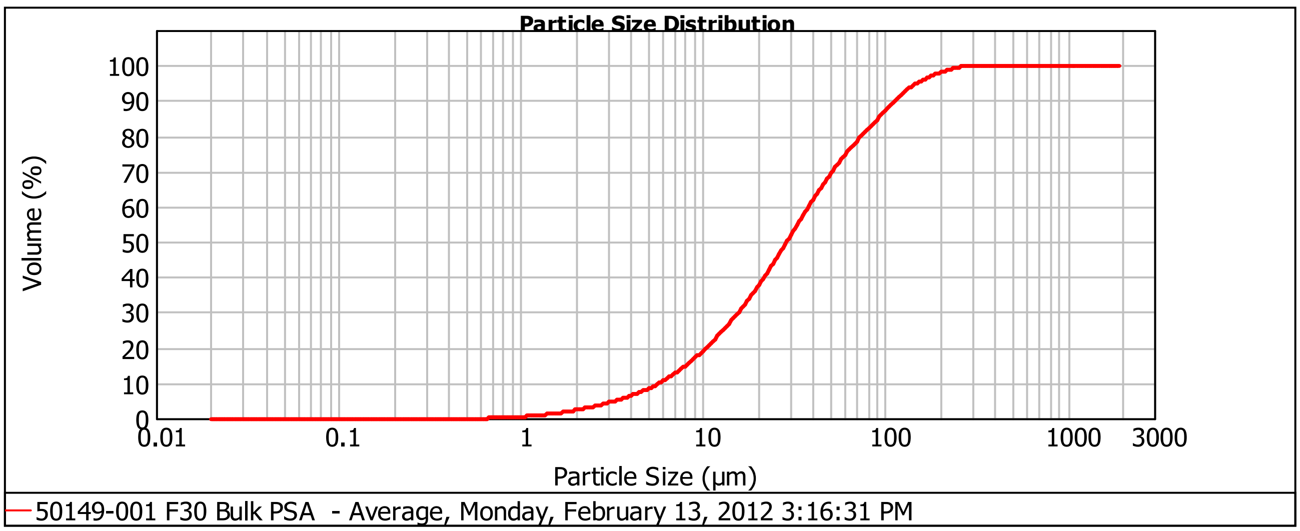
Result units:
Volume

Specific Surface Area:
0.469 m²/g

Surface Weighted Mean D[3,2]:
12.790 um

Vol. Weighted Mean D[4,3]:
46.093 um

d(0.1): 5.767 um **d(0.5): 28.744 um** **d (0.8) : 73.952 um** **d(0.9): 112.042 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.49	7.530	13.84	54.372	71.92	392.608	100.00
0.022	0.00	0.162	0.00	1.171	0.73	8.458	15.87	61.077	75.20	441.026	100.00
0.025	0.00	0.182	0.00	1.316	0.99	9.502	18.11	68.609	78.19	495.415	100.00
0.028	0.00	0.205	0.00	1.478	1.29	10.673	20.56	77.071	80.98	556.512	100.00
0.032	0.00	0.230	0.00	1.660	1.61	11.990	23.22	86.575	83.77	625.143	100.00
0.036	0.00	0.258	0.00	1.865	1.99	13.468	26.08	97.252	86.62	702.238	100.00
0.040	0.00	0.290	0.00	2.095	2.44	15.129	29.14	109.246	89.42	788.841	100.00
0.045	0.00	0.326	0.00	2.354	2.96	16.995	32.43	122.718	91.93	886.124	100.00
0.051	0.00	0.366	0.00	2.644	3.56	19.091	35.95	137.852	93.96	995.405	100.00
0.057	0.00	0.411	0.00	2.970	4.23	21.445	39.71	154.853	95.50	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	4.98	24.090	43.69	173.950	96.71	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	5.82	27.061	47.82	195.402	97.74	1410.960	100.00
0.081	0.00	0.583	0.00	4.210	6.75	30.398	52.04	219.500	98.66	1584.966	100.00
0.091	0.00	0.655	0.00	4.729	7.82	34.147	56.27	246.569	99.40	1780.430	100.00
0.102	0.00	0.736	0.06	5.312	9.03	38.358	60.44	276.977	99.83	2000.000	100.00
0.114	0.00	0.826	0.16	5.967	10.43	43.089	64.48	311.135	99.97		
0.129	0.00	0.928	0.30	6.703	12.03	48.403	68.32	349.506	100.00		

Operator notes:

MASTERSIZER 2000

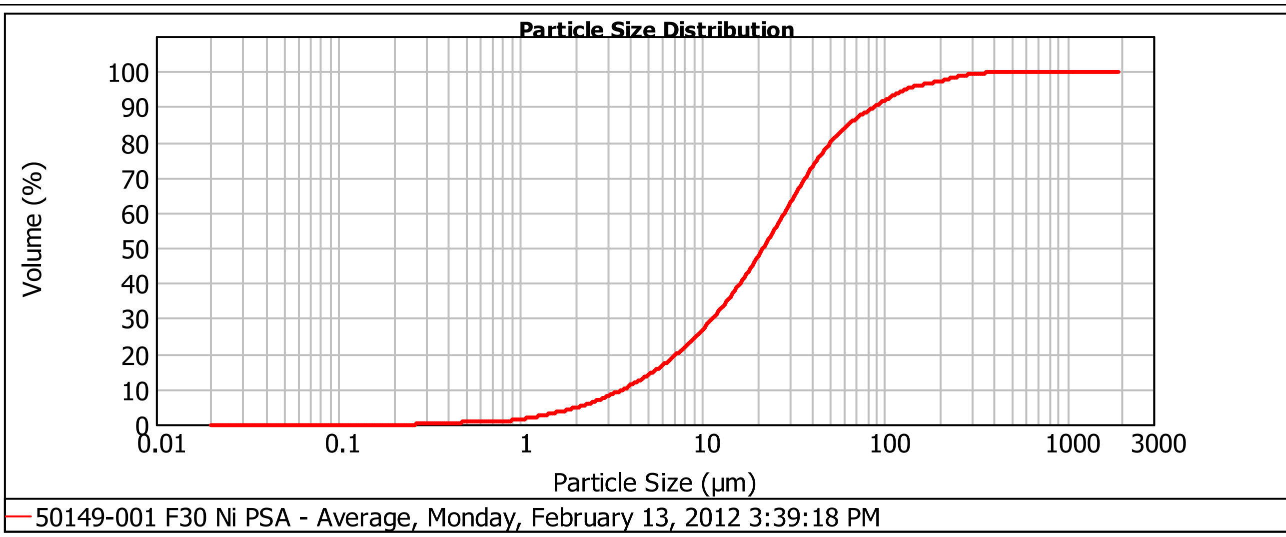
Result Analysis Report

Sample Name: 50149-001 F30 Ni PSA - Average	**SOP Name:** 50149-001 Ni	**Measured:** 12000
Sample Source & type: Prophecy	**Measured by:** Yonika_Wiputri	**Analysed:** Enhanced
Sample bulk lot ref:	**Result Source:** Averaged	

Particle Name: Nickel Oxide	**Accessory Name:** Hydro 2000G (A)	**Analysis model:** Single narrow mode (spherical)	**Sensitivity:** Enhanced
Particle RI: 2.180	**Absorption:** 1	**Size range:** 0.020 to 2000.000 um	**Obscuration:** 15.31 %
Dispersant Name: Water	**Dispersant RI:** 1.330	**Weighted Residual:** 0.242 %	**Result Emulation:** Off

Concentration: 0.0170 %Vol	**Span :** 3.908	**Uniformity:** 1.33	**Result units:** Volume
Specific Surface Area: 0.736 m^2/g	**Surface Weighted Mean D[3,2]:** 8.155 um	**Vol. Weighted Mean D[4,3]:** 38.651 um	

d(0.1): 3.685 um   d(0.5): 21.609 um   d (0.8) : 50.542 um   d(0.9): 88.135 um



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	1.51	7.530	20.68	54.372	81.85	392.608	99.63
0.022	0.00	0.162	0.00	1.171	1.94	8.458	23.09	61.077	84.39	441.026	99.69
0.025	0.00	0.182	0.00	1.316	2.44	9.502	25.68	68.609	86.45	495.415	99.76
0.028	0.00	0.205	0.00	1.478	2.97	10.673	28.46	77.071	88.16	556.512	99.84
0.032	0.00	0.230	0.00	1.660	3.54	11.990	31.43	86.575	89.75	625.143	99.92
0.036	0.00	0.258	0.00	1.865	4.17	13.468	34.63	97.252	91.37	702.238	99.99
0.040	0.00	0.290	0.04	2.095	4.90	15.129	38.06	109.246	92.98	788.841	100.00
0.045	0.00	0.326	0.13	2.354	5.76	16.995	41.71	122.718	94.37	886.124	100.00
0.051	0.00	0.366	0.27	2.644	6.72	19.091	45.61	137.852	95.39	995.405	100.00
0.057	0.00	0.411	0.41	2.970	7.78	21.445	49.72	154.853	96.05	1118.162	100.00
0.064	0.00	0.462	0.52	3.336	8.94	24.090	54.02	173.950	96.55	1256.058	100.00
0.072	0.00	0.519	0.60	3.748	10.19	27.061	58.44	195.402	97.07	1410.960	100.00
0.081	0.00	0.583	0.65	4.210	11.55	30.398	62.89	219.500	97.68	1584.966	100.00
0.091	0.00	0.655	0.69	4.729	13.03	34.147	67.27	246.569	98.33	1780.430	100.00
0.102	0.00	0.736	0.77	5.312	14.66	38.358	71.46	276.977	98.88	2000.000	100.00
0.114	0.00	0.826	0.92	5.967	16.47	43.089	75.33	311.135	99.30		
0.129	0.00	0.928	1.16	6.703	18.47	48.403	78.82	349.506	99.53		

Operator notes:

Malvern Instruments Ltd.
Malvern, UK
Tel := +[44] (0) 1684-892456 Fax +[44] (0) 1684-892789

Mastersizer 2000 Ver. 5.60
Serial Number : MAL1051060

File name: 50149-001
Record Number: 52
2/13/2012 4:08:43 PM

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F31 Bulk PSA - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
14.04 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.176 %

Result Emulation:
Off

Concentration:
0.0255 %Vol

Span :
4.073

Uniformity:
1.23

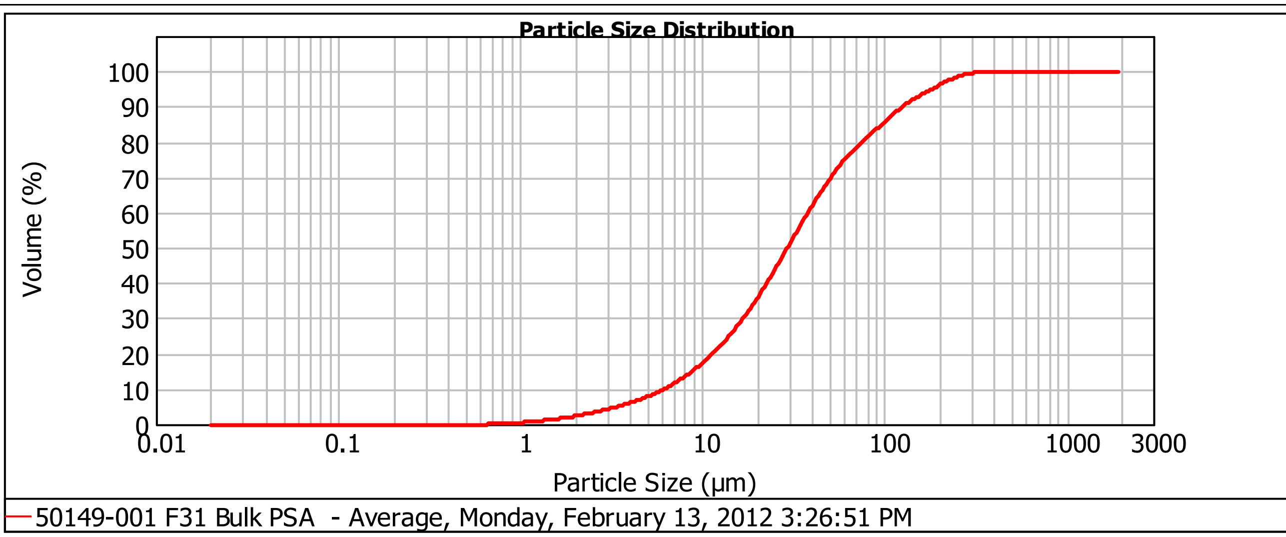
Result units:
Volume

Specific Surface Area:
0.454 m²/g

Surface Weighted Mean D[3,2]:
13.204 um

Vol. Weighted Mean D[4,3]:
50.108 um

d(0.1): 6.160 um **d(0.5): 29.217 um** **d (0.8) : 74.682 um** **d(0.9): 125.172 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.53	7.530	12.63	54.372	72.21	392.608	99.95
0.022	0.00	0.162	0.00	1.171	0.78	8.458	14.43	61.077	75.42	441.026	99.96
0.025	0.00	0.182	0.00	1.316	1.05	9.502	16.45	68.609	78.19	495.415	99.98
0.028	0.00	0.205	0.00	1.478	1.35	10.673	18.71	77.071	80.64	556.512	99.99
0.032	0.00	0.230	0.00	1.660	1.68	11.990	21.21	86.575	82.93	625.143	99.99
0.036	0.00	0.258	0.00	1.865	2.05	13.468	24.00	97.252	85.22	702.238	100.00
0.040	0.00	0.290	0.00	2.095	2.47	15.129	27.09	109.246	87.51	788.841	100.00
0.045	0.00	0.326	0.00	2.354	2.96	16.995	30.49	122.718	89.66	886.124	100.00
0.051	0.00	0.366	0.00	2.644	3.51	19.091	34.21	137.852	91.53	995.405	100.00
0.057	0.00	0.411	0.00	2.970	4.12	21.445	38.24	154.853	93.13	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	4.79	24.090	42.54	173.950	94.56	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	5.54	27.061	47.01	195.402	95.92	1410.960	100.00
0.081	0.00	0.583	0.00	4.210	6.38	30.398	51.55	219.500	97.20	1584.966	100.00
0.091	0.00	0.655	0.00	4.729	7.33	34.147	56.07	246.569	98.31	1780.430	100.00
0.102	0.00	0.736	0.07	5.312	8.41	38.358	60.46	276.977	99.11	2000.000	100.00
0.114	0.00	0.826	0.17	5.967	9.64	43.089	64.66	311.135	99.59		
0.129	0.00	0.928	0.33	6.703	11.04	48.403	68.60	349.506	99.86		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F31 Ni PSA - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
13.95 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.203 %

Result Emulation:
Off

Concentration:
0.0175 %Vol

Span :
3.042

Uniformity:
1.77

Result units:
Volume

Specific Surface Area:
0.649 m²/g

Surface Weighted Mean D[3,2]:
9.245 um

Vol. Weighted Mean D[4,3]:
54.128 um

d(0.1): 4.229 um d(0.5): 24.196 um d (0.8) : 51.502 um d(0.9): 77.827 um

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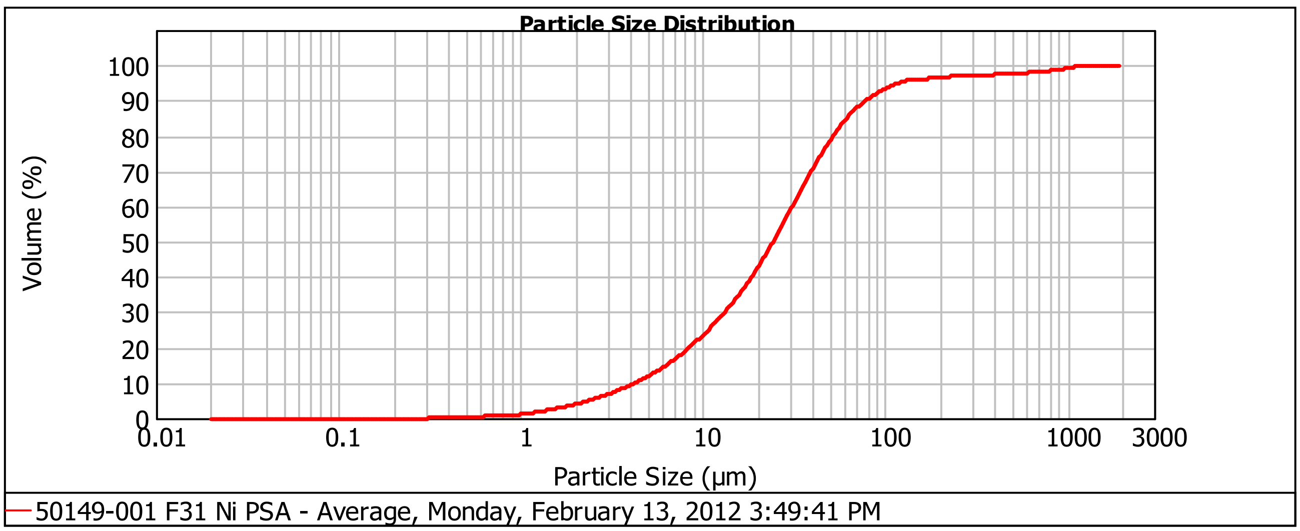


Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	1.22	7.530	18.02	54.372	81.72	392.608	97.34
0.022	0.00	0.162	0.00	1.171	1.59	8.458	20.18	61.077	85.00	441.026	97.46
0.025	0.00	0.182	0.00	1.316	2.02	9.502	22.52	68.609	87.69	495.415	97.62
0.028	0.00	0.205	0.00	1.478	2.48	10.673	25.06	77.071	89.84	556.512	97.78
0.032	0.00	0.230	0.00	1.660	2.98	11.990	27.79	86.575	91.60	625.143	97.95
0.036	0.00	0.258	0.00	1.865	3.53	13.468	30.73	97.252	93.12	702.238	98.16
0.040	0.00	0.290	0.00	2.095	4.17	15.129	33.92	109.246	94.41	788.841	98.43
0.045	0.00	0.326	0.03	2.354	4.91	16.995	37.38	122.718	95.35	886.124	98.77
0.051	0.00	0.366	0.12	2.644	5.75	19.091	41.17	137.852	95.88	995.405	99.17
0.057	0.00	0.411	0.24	2.970	6.67	21.445	45.33	154.853	96.12	1118.162	99.59
0.064	0.00	0.462	0.36	3.336	7.67	24.090	49.83	173.950	96.29	1256.058	99.90
0.072	0.00	0.519	0.46	3.748	8.76	27.061	54.58	195.402	96.50	1410.960	99.98
0.081	0.00	0.583	0.53	4.210	9.95	30.398	59.47	219.500	96.75	1584.966	100.00
0.091	0.00	0.655	0.56	4.729	11.26	34.147	64.37	246.569	96.98	1780.430	100.00
0.102	0.00	0.736	0.62	5.312	12.70	38.358	69.15	276.977	97.10	2000.000	100.00
0.114	0.00	0.826	0.74	5.967	14.29	43.089	73.69	311.135	97.17		
0.129	0.00	0.928	0.93	6.703	16.06	48.403	77.91	349.506	97.24		

Operator notes:

MASTERSIZER 2000

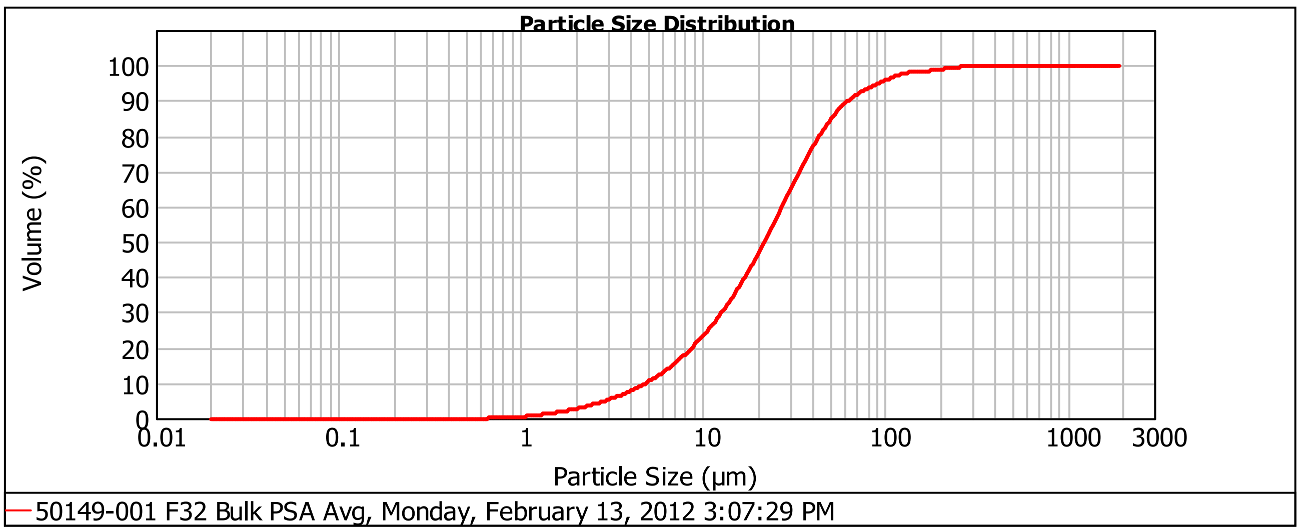
Result Analysis Report

Sample Name: 50149-001 F32 Bulk PSA Avg	**SOP Name:** 50149-001	**Measured:** 12000
Sample Source & type: Prophecy	**Measured by:** Yonika_Wiputri	**Analysed:** Enhanced
Sample bulk lot ref:	**Result Source:** Averaged	

Particle Name: Cu (II) O	**Accessory Name:** Hydro 2000G (A)	**Analysis model:** Single narrow mode (spherical)	**Sensitivity:** Enhanced
Particle RI: 2.630	**Absorption:** 1	**Size range:** 0.020 to 2000.000 um	**Obscuration:** 13.92 %
Dispersant Name: Water	**Dispersant RI:** 1.330	**Weighted Residual:** 0.194 %	**Result Emulation:** Off

Concentration: 0.0207 %Vol	**Span :** 2.651	**Uniformity:** 0.941	**Result units:** Volume
Specific Surface Area: 0.556 m²/g	**Surface Weighted Mean D[3,2]:** 10.796 um	**Vol. Weighted Mean D[4,3]:** 31.316 um	

d(0.1): 4.878 um **d(0.5):** 21.721 um **d (0.8) :** 43.319 um **d(0.9):** 62.462 um



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.49	7.530	16.98	54.372	86.99	392.608	100.00
0.022	0.00	0.162	0.00	1.171	0.77	8.458	19.42	61.077	89.58	441.026	100.00
0.025	0.00	0.182	0.00	1.316	1.09	9.502	22.12	68.609	91.52	495.415	100.00
0.028	0.00	0.205	0.00	1.478	1.45	10.673	25.10	77.071	93.00	556.512	100.00
0.032	0.00	0.230	0.00	1.660	1.84	11.990	28.37	86.575	94.28	625.143	100.00
0.036	0.00	0.258	0.00	1.865	2.30	13.468	31.94	97.252	95.52	702.238	100.00
0.040	0.00	0.290	0.00	2.095	2.85	15.129	35.82	109.246	96.66	788.841	100.00
0.045	0.00	0.326	0.00	2.354	3.49	16.995	40.02	122.718	97.52	886.124	100.00
0.051	0.00	0.366	0.00	2.644	4.24	19.091	44.56	137.852	98.00	995.405	100.00
0.057	0.00	0.411	0.00	2.970	5.08	21.445	49.44	154.853	98.24	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	6.03	24.090	54.62	173.950	98.46	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	7.08	27.061	59.98	195.402	98.78	1410.960	100.00
0.081	0.00	0.583	0.00	4.210	8.27	30.398	65.34	219.500	99.14	1584.966	100.00
0.091	0.00	0.655	0.00	4.729	9.61	34.147	70.53	246.569	99.46	1780.430	100.00
0.102	0.00	0.736	0.04	5.312	11.13	38.358	75.39	276.977	99.65	2000.000	100.00
0.114	0.00	0.826	0.12	5.967	12.85	43.089	79.81	311.135	99.80		
0.129	0.00	0.928	0.28	6.703	14.79	48.403	83.70	349.506	99.93		

Operator notes: *Average of 3 measurements from 50149-001*

MASTERSIZER 2000

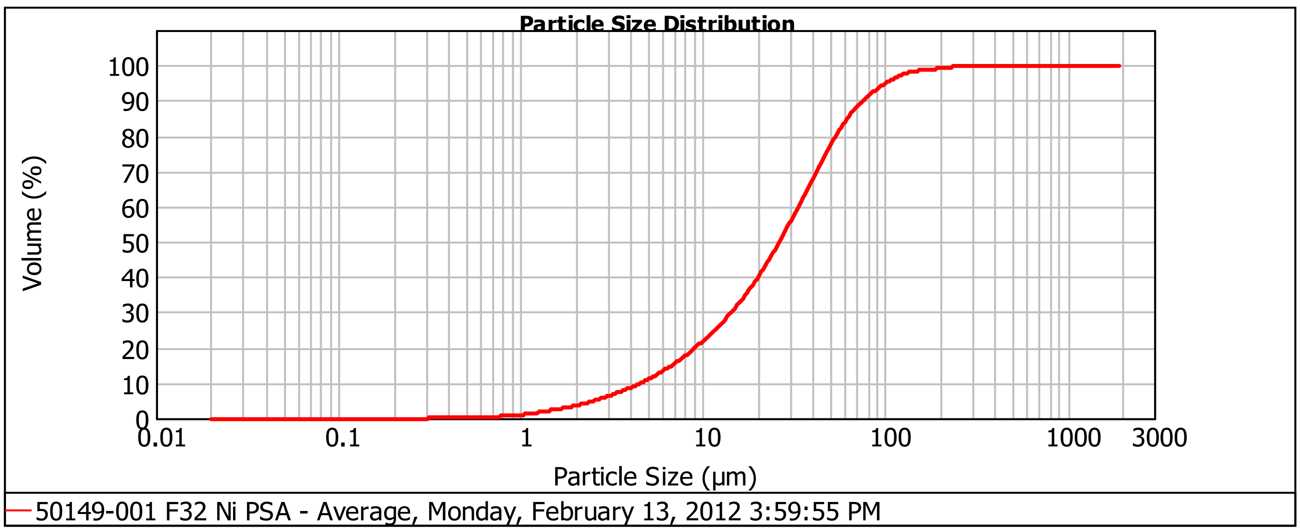
Result Analysis Report

Sample Name:	**SOP Name:**	**Measured:**
50149-001 F32 Ni PSA - Average	50149-001 Ni	12000
Sample Source & type:	**Measured by:**	**Analysed:**
Prophecy	Yonika_Wiputri	Enhanced
Sample bulk lot ref:	**Result Source:**	
	Averaged	

Particle Name:	**Accessory Name:**	**Analysis model:**	**Sensitivity:**
Nickel Oxide	Hydro 2000G (A)	Single narrow mode (spherical)	Enhanced
Particle RI:	**Absorption:**	**Size range:**	**Obscuration:**
2.180	1	0.020 to 2000.000 um	16.56 %
Dispersant Name:	**Dispersant RI:**	**Weighted Residual:**	**Result Emulation:**
Water	1.330	0.139 %	Off

Concentration:	**Span :**	**Uniformity:**	**Result units:**
0.0227 %Vol	2.695	0.893	Volume
Specific Surface Area:	**Surface Weighted Mean D[3,2]:**	**Vol. Weighted Mean D[4,3]:**	
0.604 m²/g	9.936 um	35.608 um	

d(0.1): 4.553 um **d(0.5): 26.196 um** **d (0.8) : 53.255 um** **d(0.9): 75.156 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	1.08	7.530	16.73	54.372	80.77	392.608	99.93
0.022	0.00	0.162	0.00	1.171	1.42	8.458	18.73	61.077	84.68	441.026	99.95
0.025	0.00	0.182	0.00	1.316	1.81	9.502	20.89	68.609	87.91	495.415	99.98
0.028	0.00	0.205	0.00	1.478	2.22	10.673	23.23	77.071	90.52	556.512	99.99
0.032	0.00	0.230	0.00	1.660	2.67	11.990	25.75	86.575	92.68	625.143	100.00
0.036	0.00	0.258	0.00	1.865	3.18	13.468	28.50	97.252	94.55	702.238	100.00
0.040	0.00	0.290	0.00	2.095	3.76	15.129	31.51	109.246	96.15	788.841	100.00
0.045	0.00	0.326	0.02	2.354	4.45	16.995	34.80	122.718	97.36	886.124	100.00
0.051	0.00	0.366	0.09	2.644	5.23	19.091	38.43	137.852	98.14	995.405	100.00
0.057	0.00	0.411	0.19	2.970	6.10	21.445	42.40	154.853	98.55	1118.162	100.00
0.064	0.00	0.462	0.29	3.336	7.05	24.090	46.71	173.950	98.82	1256.058	100.00
0.072	0.00	0.519	0.36	3.748	8.07	27.061	51.31	195.402	99.09	1410.960	100.00
0.081	0.00	0.583	0.41	4.210	9.19	30.398	56.15	219.500	99.41	1584.966	100.00
0.091	0.00	0.655	0.44	4.729	10.41	34.147	61.17	246.569	99.69	1780.430	100.00
0.102	0.00	0.736	0.50	5.312	11.76	38.358	66.29	276.977	99.82	2000.000	100.00
0.114	0.00	0.826	0.62	5.967	13.25	43.089	71.37	311.135	99.87		
0.129	0.00	0.928	0.81	6.703	14.90	48.403	76.26	349.506	99.90		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
LCT 4 Ni Cln Comb - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Unknown

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
12.39 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
11.562 %

Result Emulation:
Off

Concentration:
0.0126 %Vol

Span :
2.497

Uniformity:
0.797

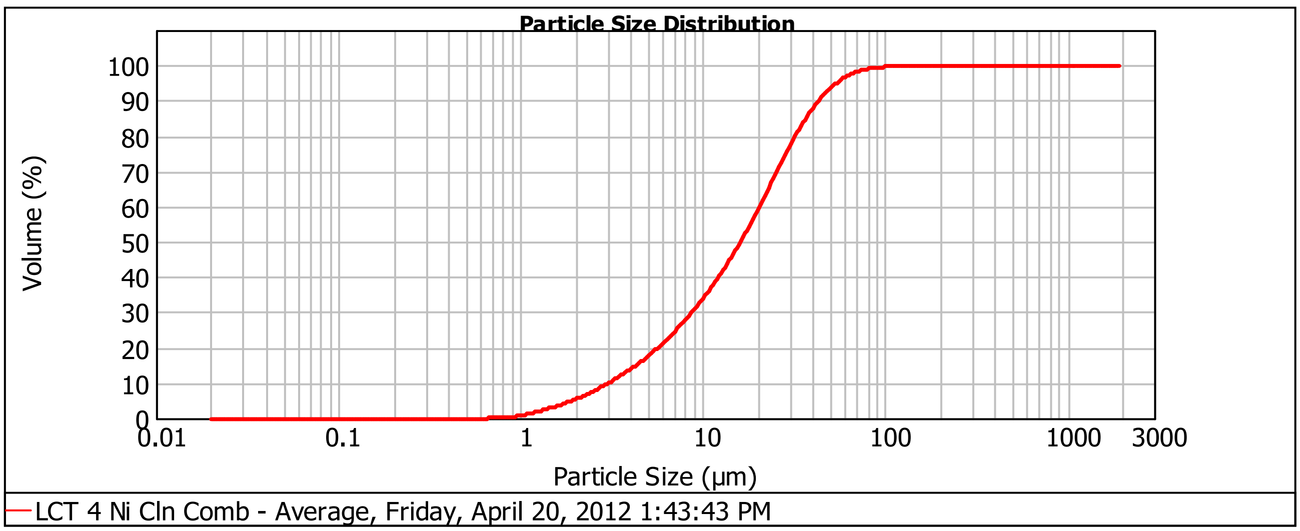
Result units:
Volume

Specific Surface Area:
0.794 m²/g

Surface Weighted Mean D[3,2]:
7.553 um

Vol. Weighted Mean D[4,3]:
20.312 um

d(0.1): 3.032 um **d(0.5): 16.027 um** **d (0.8) : 31.999 um** **d(0.9): 43.043 um**



Size (μm)	Volume In %
0.020	0.00
0.022	0.00
0.025	0.00
0.028	0.00
0.032	0.00
0.036	0.00
0.040	0.00
0.045	0.00
0.051	0.00
0.057	0.00
0.064	0.00
0.072	0.00
0.081	0.00
0.091	0.00
0.102	0.00
0.114	0.00
0.129	0.00
0.144	

Size (μm)	Volume In %
0.144	0.00
0.162	0.00
0.182	0.00
0.205	0.00
0.230	0.00
0.258	0.00
0.290	0.00
0.326	0.00
0.366	0.00
0.411	0.00
0.462	0.00
0.519	0.00
0.583	0.00
0.655	0.04
0.736	0.11
0.826	0.30
0.928	0.49
1.043	

Size (μm)	Volume In %
1.043	0.59
1.171	0.68
1.316	0.75
1.478	0.83
1.660	0.93
1.865	1.06
2.095	1.20
2.354	1.33
2.644	1.43
2.970	1.52
3.336	1.64
3.748	1.78
4.210	1.95
4.729	2.14
5.312	2.34
5.967	2.55
6.703	2.76
7.530	

Size (μm)	Volume In %
7.530	2.97
8.458	3.18
9.502	3.40
10.673	3.65
11.990	3.93
13.468	4.24
15.129	4.55
16.995	4.85
19.091	5.11
21.445	5.28
24.090	5.27
27.061	5.06
30.398	4.64
34.147	4.06
38.358	3.44
43.089	2.85
48.403	2.31
54.372	

Size (μm)	Volume In %
54.372	1.75
61.077	1.17
68.609	0.73
77.071	0.42
86.575	0.28
97.252	0.28
109.246	0.13
122.718	0.04
137.852	0.00
154.853	0.00
173.950	0.00
195.402	0.00
219.500	0.00
246.569	0.00
276.977	0.00
311.135	0.00
349.506	0.00
392.608	

Size (μm)	Volume In %
392.608	0.00
441.026	0.00
495.415	0.00
556.512	0.00
625.143	0.00
702.238	0.00
788.841	0.00
886.124	0.00
995.405	0.00
1118.162	0.00
1256.058	0.00
1410.960	0.00
1584.966	0.00
1780.430	0.00
2000.000	

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name:
LCT 3 Ni Cl Comb - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
shengmei_yang2

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
11.90 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.303 %

Result Emulation:
Off

Concentration:
0.0075 %Vol

Span :
2.811

Uniformity:
0.93

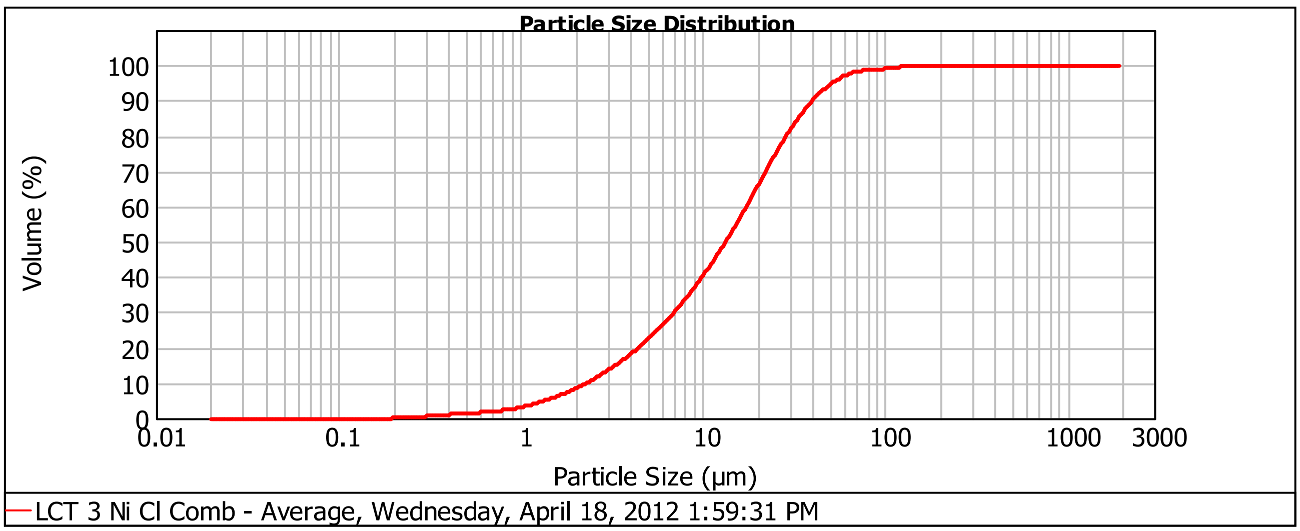
Result units:
Volume

Specific Surface Area:
1.2 m²/g

Surface Weighted Mean D[3,2]:
4.981 um

Vol. Weighted Mean D[4,3]:
18.394 um

d(0.1): 2.313 um **d(0.5): 13.294 um** **d (0.8) : 28.535 um** **d(0.9): 39.683 um**



Size (μm)	Volume In %
0.020	0.00
0.022	0.00
0.025	0.00
0.028	0.00
0.032	0.00
0.036	0.00
0.040	0.00
0.045	0.00
0.051	0.00
0.057	0.00
0.064	0.00
0.072	0.00
0.081	0.00
0.091	0.00
0.102	0.00
0.114	0.00
0.129	0.00
0.144	

Size (μm)	Volume In %
0.144	0.00
0.162	0.00
0.182	0.02
0.205	0.09
0.230	0.14
0.258	0.19
0.290	0.22
0.326	0.22
0.366	0.21
0.411	0.18
0.462	0.17
0.519	0.17
0.583	0.19
0.655	0.23
0.736	0.29
0.826	0.39
0.928	0.53
1.043	

Size (μm)	Volume In %
1.043	0.70
1.171	0.83
1.316	0.90
1.478	0.96
1.660	1.05
1.865	1.19
2.095	1.36
2.354	1.52
2.644	1.66
2.970	1.78
3.336	1.90
3.748	2.03
4.210	2.18
4.729	2.36
5.312	2.59
5.967	2.84
6.703	3.08
7.530	

Size (μm)	Volume In %
7.530	3.29
8.458	3.46
9.502	3.64
10.673	3.85
11.990	4.09
13.468	4.33
15.129	4.54
16.995	4.72
19.091	4.79
21.445	4.72
24.090	4.49
27.061	4.14
30.398	3.71
34.147	3.24
38.358	2.74
43.089	2.26
48.403	1.80
54.372	

Size (μm)	Volume In %
54.372	1.32
61.077	0.82
68.609	0.42
77.071	0.22
86.575	0.23
97.252	0.33
109.246	0.34
122.718	0.20
137.852	0.05
154.853	0.02
173.950	0.02
195.402	0.02
219.500	0.03
246.569	0.02
276.977	0.00
311.135	0.00
349.506	0.00
392.608	

Size (μm)	Volume In %
392.608	0.00
441.026	0.00
495.415	0.00
556.512	0.00
625.143	0.00
702.238	0.00
788.841	0.00
886.124	0.00
995.405	0.00
1118.162	0.00
1256.058	0.00
1410.960	0.00
1584.966	0.00
1780.430	0.00
2000.000	

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
LCT2 1 Cln TL E - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Shengmei_Yang2

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
16.22 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.590 %

Result Emulation:
Off

Concentration:
0.0122 %Vol

Span :
4.706

Uniformity:
1.49

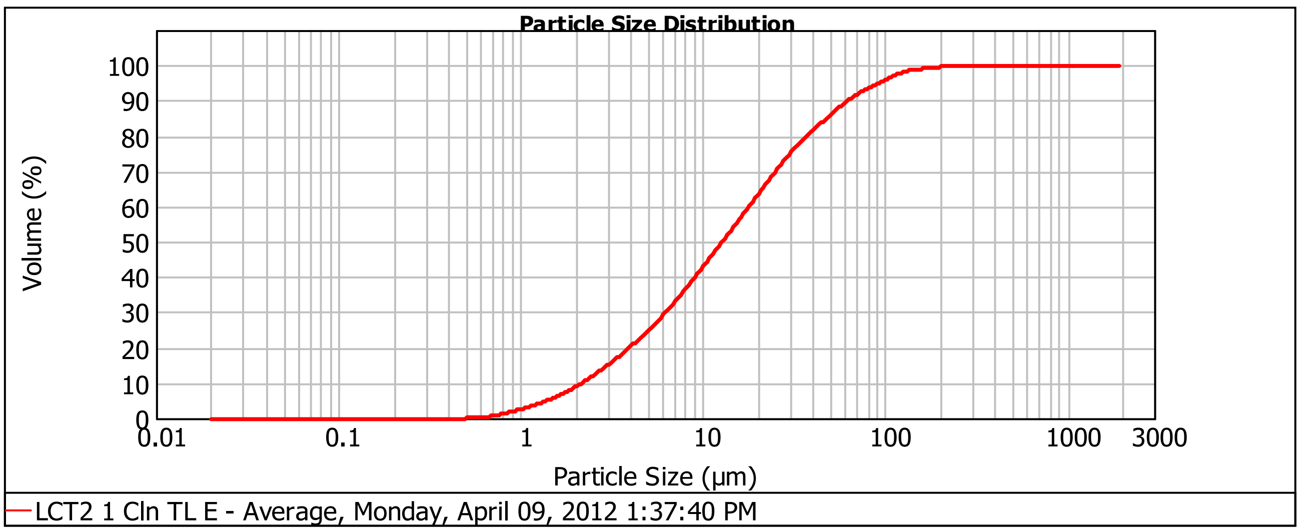
Result units:
Volume

Specific Surface Area:
1.06 m²/g

Surface Weighted Mean D[3,2]:
5.650 um

Vol. Weighted Mean D[4,3]:
24.537 um

d(0.1): 2.178 um **d(0.5): 12.705 um** **d (0.8) : 37.010 um** **d(0.9): 61.963 um**



Size (μm)	Volume In %
0.020	0.00
0.022	0.00
0.025	0.00
0.028	0.00
0.032	0.00
0.036	0.00
0.040	0.00
0.045	0.00
0.051	0.00
0.057	0.00
0.064	0.00
0.072	0.00
0.081	0.00
0.091	0.00
0.102	0.00
0.114	0.00
0.129	0.00
0.144	

Size (μm)	Volume In %
0.144	0.00
0.162	0.00
0.182	0.00
0.205	0.00
0.230	0.00
0.258	0.00
0.290	0.00
0.326	0.00
0.366	0.00
0.411	0.00
0.462	0.02
0.519	0.08
0.583	0.32
0.655	0.48
0.736	0.56
0.826	0.62
0.928	0.69
1.043	

Size (μm)	Volume In %
1.043	0.81
1.171	0.94
1.316	1.05
1.478	1.16
1.660	1.30
1.865	1.46
2.095	1.64
2.354	1.79
2.644	1.92
2.970	2.04
3.336	2.14
3.748	2.26
4.210	2.38
4.729	2.53
5.312	2.71
5.967	2.90
6.703	3.10
7.530	

Size (μm)	Volume In %
7.530	3.26
8.458	3.35
9.502	3.39
10.673	3.41
11.990	3.41
13.468	3.40
15.129	3.40
16.995	3.45
19.091	3.51
21.445	3.51
24.090	3.37
27.061	3.11
30.398	2.79
34.147	2.50
38.358	2.33
43.089	2.30
48.403	2.27
54.372	

Size (μm)	Volume In %
54.372	2.10
61.077	1.79
68.609	1.50
77.071	1.36
86.575	1.33
97.252	1.24
109.246	0.98
122.718	0.64
137.852	0.37
154.853	0.27
173.950	0.27
195.402	0.27
219.500	0.16
246.569	0.06
276.977	0.02
311.135	0.00
349.506	0.00
392.608	

Size (μm)	Volume In %
392.608	0.00
441.026	0.00
495.415	0.00
556.512	0.00
625.143	0.00
702.238	0.00
788.841	0.00
886.124	0.00
995.405	0.00
1118.162	0.00
1256.058	0.00
1410.960	0.00
1584.966	0.00
1780.430	0.00
2000.000	

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

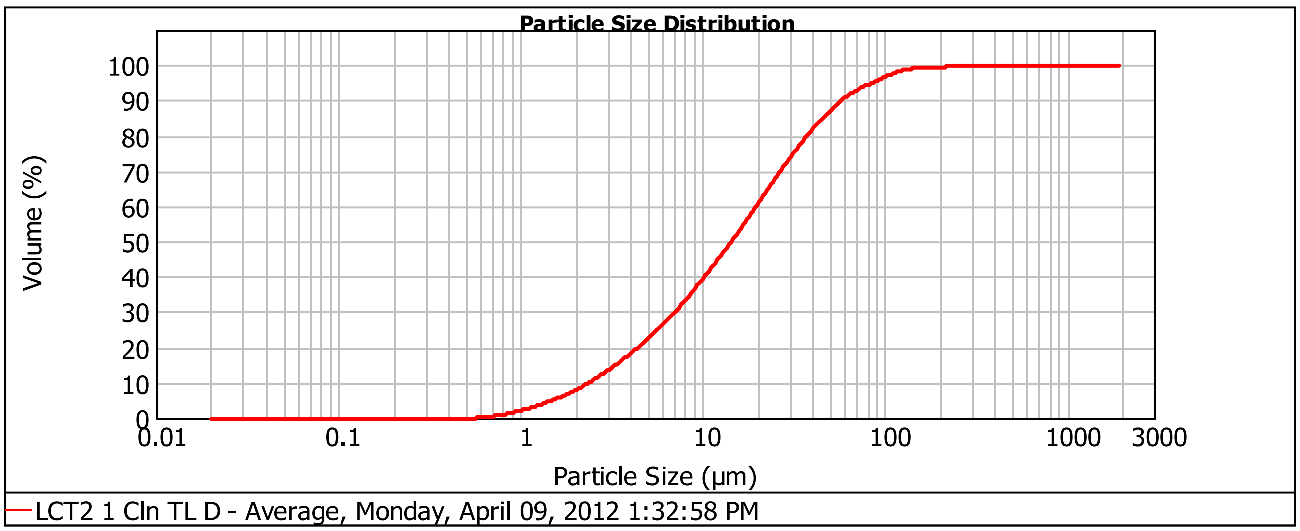
Result Analysis Report

Sample Name: LCT2 1 Cln TL D - Average	**SOP Name:** 50149-001	**Measured:** 12000
Sample Source & type: Prophecy	**Measured by:** Shengmei_Yang2	**Analysed:** Enhanced
Sample bulk lot ref:	**Result Source:** Averaged	

Particle Name: Cu (II) O	**Accessory Name:** Hydro 2000G (A)	**Analysis model:** Single narrow mode (spherical)	**Sensitivity:** Enhanced
Particle RI: 2.630	**Absorption:** 1	**Size range:** 0.020 to 2000.000 um	**Obscuration:** 17.62 %
Dispersant Name: Water	**Dispersant RI:** 1.330	**Weighted Residual:** 0.323 %	**Result Emulation:** Off

Concentration: 0.0146 %Vol	**Span :** 3.847	**Uniformity:** 1.29	**Result units:** Volume
Specific Surface Area: 0.976 m^2/g	**Surface Weighted Mean D[3,2]:** 6.147 um	**Vol. Weighted Mean D[4,3]:** 24.634 um	

d(0.1): 2.364 um **d(0.5):** 14.288 um **d (0.8) : 37.082** um **d(0.9):** 57.328 um



Size (µm)	Volume In %
0.020	0.00
0.022	0.00
0.025	0.00
0.028	0.00
0.032	0.00
0.036	0.00
0.040	0.00
0.045	0.00
0.051	0.00
0.057	0.00
0.064	0.00
0.072	0.00
0.081	0.00
0.091	0.00
0.102	0.00
0.114	0.00
0.129	0.00
0.144	

Size (µm)	Volume In %
0.144	0.00
0.162	0.00
0.182	0.00
0.205	0.00
0.230	0.00
0.258	0.00
0.290	0.00
0.326	0.00
0.366	0.00
0.411	0.00
0.462	0.00
0.519	0.02
0.583	0.23
0.655	0.38
0.736	0.48
0.826	0.56
0.928	0.65
1.043	

Size (µm)	Volume In %
1.043	0.77
1.171	0.88
1.316	0.97
1.478	1.05
1.660	1.17
1.865	1.32
2.095	1.48
2.354	1.62
2.644	1.74
2.970	1.85
3.336	1.94
3.748	2.05
4.210	2.18
4.729	2.33
5.312	2.52
5.967	2.72
6.703	2.92
7.530	

Size (µm)	Volume In %
7.530	3.08
8.458	3.19
9.502	3.28
10.673	3.37
11.990	3.47
13.468	3.55
15.129	3.63
16.995	3.72
19.091	3.81
21.445	3.84
24.090	3.79
27.061	3.66
30.398	3.47
34.147	3.23
38.358	2.96
43.089	2.71
48.403	2.43
54.372	

Size (µm)	Volume In %
54.372	2.07
61.077	1.66
68.609	1.33
77.071	1.17
86.575	1.15
97.252	1.10
109.246	0.90
122.718	0.58
137.852	0.28
154.853	0.13
173.950	0.09
195.402	0.11
219.500	0.13
246.569	0.12
276.977	0.09
311.135	0.06
349.506	0.02
392.608	

Size (µm)	Volume In %
392.608	0.00
441.026	0.00
495.415	0.00
556.512	0.00
625.143	0.00
702.238	0.00
788.841	0.00
886.124	0.00
995.405	0.00
1118.162	0.00
1256.058	0.00
1410.960	0.00
1584.966	0.00
1780.430	0.00
2000.000	

Operator notes:

MASTERSIZER 2000

MALVERN INSTRUMENTS

Result Analysis Report

Sample Name:
50149-001 HNi-F5 Ni Regrind - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
14.75 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.515 %

Result Emulation:
Off

Concentration:
0.0107 %Vol

Span :
3.392

Uniformity:
1.12

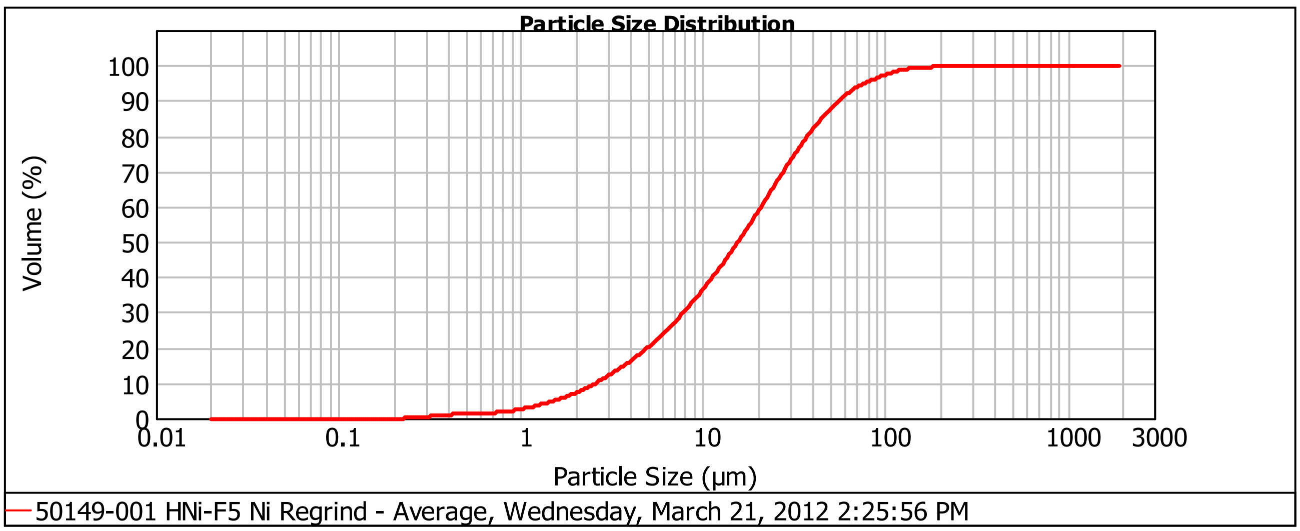
Result units:
Volume

Specific Surface Area:
1.07 m^2/g

Surface Weighted Mean D[3,2]:
5.628 um

Vol. Weighted Mean D[4,3]:
24.332 um

d(0.1): 2.594 um **d(0.5): 15.553 um** **d (0.8) : 37.400 um** **d(0.9): 55.356 um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.70	7.530	29.05	54.372	89.63	392.608	100.00
0.022	0.00	0.162	0.00	1.171	3.29	8.458	32.04	61.077	91.84	441.026	100.00
0.025	0.00	0.182	0.00	1.316	3.98	9.502	35.16	68.609	93.61	495.415	100.00
0.028	0.00	0.205	0.00	1.478	4.75	10.673	38.41	77.071	94.99	556.512	100.00
0.032	0.00	0.230	0.01	1.660	5.58	11.990	41.81	86.575	96.11	625.143	100.00
0.036	0.00	0.258	0.10	1.865	6.52	13.468	45.37	97.252	97.11	702.238	100.00
0.040	0.00	0.290	0.29	2.095	7.59	15.129	49.09	109.246	98.00	788.841	100.00
0.045	0.00	0.326	0.59	2.354	8.84	16.995	52.96	122.718	98.67	886.124	100.00
0.051	0.00	0.366	0.86	2.644	10.24	19.091	56.95	137.852	99.09	995.405	100.00
0.057	0.00	0.411	1.07	2.970	11.78	21.445	61.05	154.853	99.32	1118.162	100.00
0.064	0.00	0.462	1.22	3.336	13.42	24.090	65.20	173.950	99.51	1256.058	100.00
0.072	0.00	0.519	1.31	3.748	15.18	27.061	69.32	195.402	99.73	1410.960	100.00
0.081	0.00	0.583	1.39	4.210	17.05	30.398	73.33	219.500	99.89	1584.966	100.00
0.091	0.00	0.655	1.50	4.729	19.07	34.147	77.16	246.569	99.98	1780.430	100.00
0.102	0.00	0.736	1.67	5.312	21.25	38.358	80.76	276.977	99.99	2000.000	100.00
0.114	0.00	0.826	1.91	5.967	23.64	43.089	84.05	311.135	100.00		
0.129	0.00	0.928	2.24	6.703	26.24	48.403	87.02	349.506	100.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 HNi-F3 Bulk Regrind - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
14.85 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.681 %

Result Emulation:
Off

Concentration:
0.0114 %Vol

Span :
3.642

Uniformity:
1.19

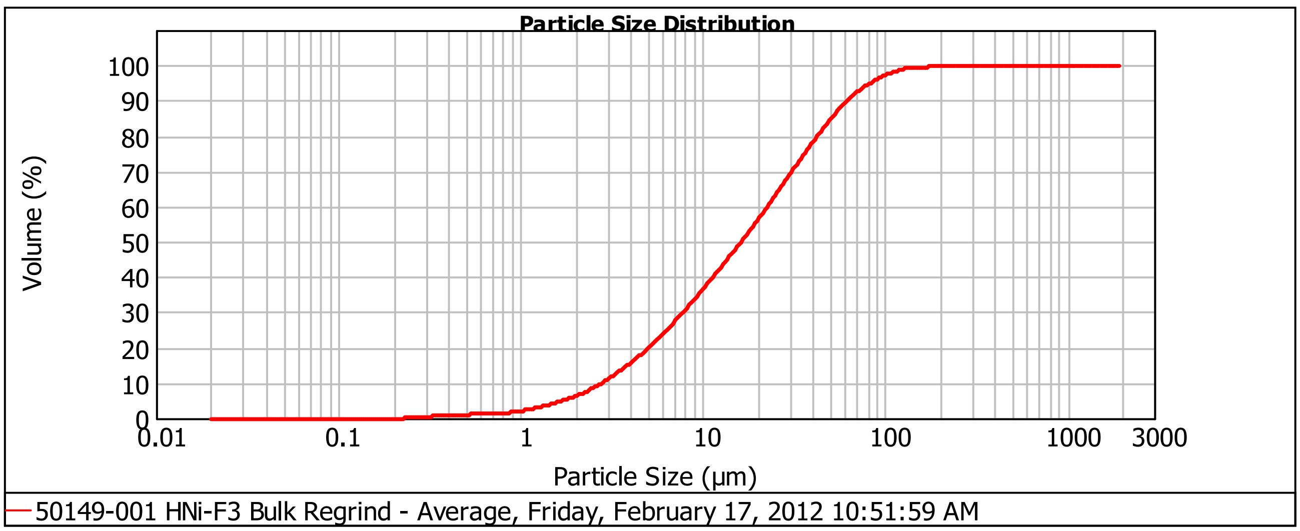
Result units:
Volume

Specific Surface Area:
0.995 m^2/g

Surface Weighted Mean D[3,2]:
6.029 um

Vol. Weighted Mean D[4,3]:
26.125 um

d(0.1): 2.791 um **d(0.5): 16.151 um** **d (0.8) : 42.370 um** **d(0.9): 61.613 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.20	7.530	29.22	54.372	86.99	392.608	100.00
0.022	0.00	0.162	0.00	1.171	2.71	8.458	32.18	61.077	89.80	441.026	100.00
0.025	0.00	0.182	0.00	1.316	3.33	9.502	35.24	68.609	92.15	495.415	100.00
0.028	0.00	0.205	0.00	1.478	4.01	10.673	38.38	77.071	94.04	556.512	100.00
0.032	0.00	0.230	0.01	1.660	4.77	11.990	41.58	86.575	95.58	625.143	100.00
0.036	0.00	0.258	0.11	1.865	5.64	13.468	44.84	97.252	96.89	702.238	100.00
0.040	0.00	0.290	0.29	2.095	6.66	15.129	48.13	109.246	98.00	788.841	100.00
0.045	0.00	0.326	0.53	2.354	7.88	16.995	51.46	122.718	98.81	886.124	100.00
0.051	0.00	0.366	0.74	2.644	9.28	19.091	54.87	137.852	99.29	995.405	100.00
0.057	0.00	0.411	0.91	2.970	10.87	21.445	58.39	154.853	99.48	1118.162	100.00
0.064	0.00	0.462	1.01	3.336	12.62	24.090	62.06	173.950	99.56	1256.058	100.00
0.072	0.00	0.519	1.09	3.748	14.52	27.061	65.84	195.402	99.65	1410.960	100.00
0.081	0.00	0.583	1.15	4.210	16.58	30.398	69.63	219.500	99.78	1584.966	100.00
0.091	0.00	0.655	1.24	4.729	18.79	34.147	73.38	246.569	99.90	1780.430	100.00
0.102	0.00	0.736	1.36	5.312	21.16	38.358	77.00	276.977	99.96	2000.000	100.00
0.114	0.00	0.826	1.55	5.967	23.69	43.089	80.50	311.135	99.98		
0.129	0.00	0.928	1.82	6.703	26.38	48.403	83.85	349.506	99.99		

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F41 Ni Regrind - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
13.43 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.648 %

Result Emulation:
Off

Concentration:
0.0090 %Vol

Span :
3.786

Uniformity:
1.47

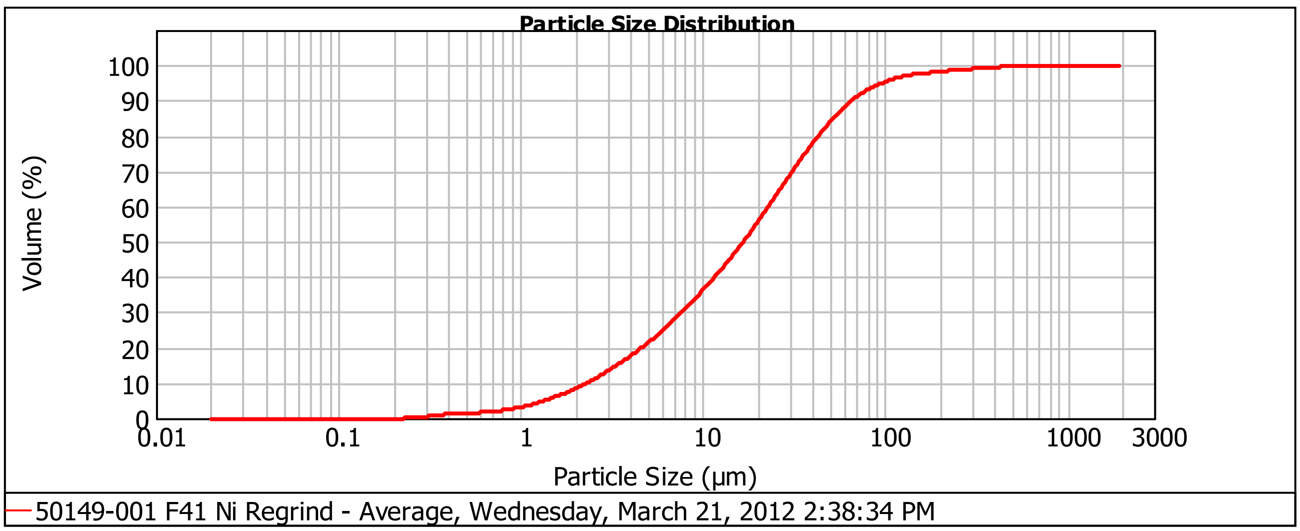
Result units:
Volume

Specific Surface Area:
1.14 m²/g

Surface Weighted Mean D[3,2]:
5.256 um

Vol. Weighted Mean D[4,3]:
31.173 um

d(0.1): 2.322 um **d(0.5): 16.591 um** **d (0.8) : 42.793 um** **d(0.9): 65.135 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	3.30	7.530	29.66	54.372	86.18	392.608	99.41
0.022	0.00	0.162	0.00	1.171	4.00	8.458	32.35	61.077	88.75	441.026	99.64
0.025	0.00	0.182	0.00	1.316	4.81	9.502	35.14	68.609	90.92	495.415	99.79
0.028	0.00	0.205	0.00	1.478	5.70	10.673	38.01	77.071	92.65	556.512	99.86
0.032	0.00	0.230	0.01	1.660	6.64	11.990	40.97	86.575	94.03	625.143	99.92
0.036	0.00	0.258	0.13	1.865	7.68	13.468	44.08	97.252	95.16	702.238	99.98
0.040	0.00	0.290	0.37	2.095	8.84	15.129	47.32	109.246	96.09	788.841	100.00
0.045	0.00	0.326	0.72	2.354	10.16	16.995	50.71	122.718	96.80	886.124	100.00
0.051	0.00	0.366	1.02	2.644	11.62	19.091	54.26	137.852	97.30	995.405	100.00
0.057	0.00	0.411	1.26	2.970	13.20	21.445	57.96	154.853	97.63	1118.162	100.00
0.064	0.00	0.462	1.40	3.336	14.87	24.090	61.77	173.950	97.88	1256.058	100.00
0.072	0.00	0.519	1.50	3.748	16.62	27.061	65.62	195.402	98.15	1410.960	100.00
0.081	0.00	0.583	1.61	4.210	18.46	30.398	69.46	219.500	98.45	1584.966	100.00
0.091	0.00	0.655	1.77	4.729	20.40	34.147	73.22	246.569	98.73	1780.430	100.00
0.102	0.00	0.736	2.00	5.312	22.46	38.358	76.82	276.977	98.90	2000.000	100.00
0.114	0.00	0.826	2.32	5.967	24.69	43.089	80.19	311.135	99.04		
0.129	0.00	0.928	2.74	6.703	27.09	48.403	83.31	349.506	99.19		

Operator notes:

MASTERSIZER 2000

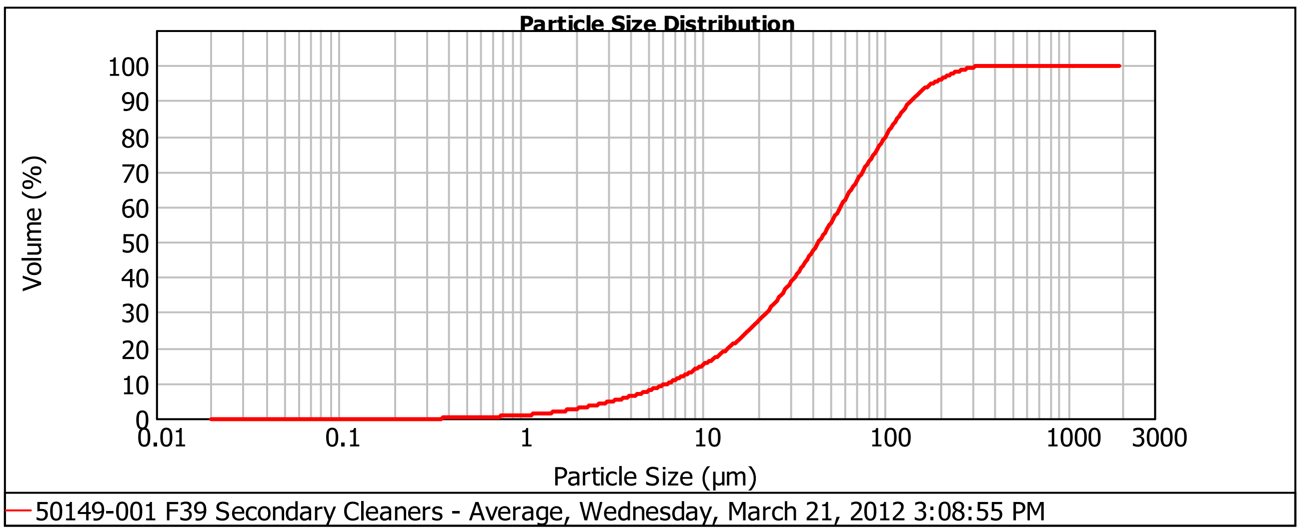
Result Analysis Report

Sample Name: 50149-001 F39 Secondary Cleaners -	**SOP Name:** 50149-001	**Measured:** 12000
Sample Source & type: Prophecy	**Measured by:** Yonika_Wiputri	**Analysed:** Enhanced
Sample bulk lot ref:	**Result Source:** Averaged	

Particle Name: Cu (II) O	**Accessory Name:** Hydro 2000G (A)	**Analysis model:** Single narrow mode (spherical)	**Sensitivity:** Enhanced
Particle RI: 2.630	**Absorption:** 1	**Size range:** 0.020 to 2000.000 um	**Obscuration:** 15.74 %
Dispersant Name: Water	**Dispersant RI:** 1.330	**Weighted Residual:** 0.100 %	**Result Emulation:** Off

Concentration: 0.0287 %Vol	**Span :** 3.051	**Uniformity:** 0.978	**Result units:** Volume
Specific Surface Area: 0.445 m^2/g	**Surface Weighted Mean D[3,2]:** 13.496 um	**Vol. Weighted Mean D[4,3]:** 61.301 um	

d(0.1): 6.460 um **d(0.5):** 43.116 um **d (0.8) :** 100.177 um **d(0.9):** 137.998 um



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.93	7.530	11.61	54.372	58.37	392.608	99.96
0.022	0.00	0.162	0.00	1.171	1.13	8.458	12.95	61.077	62.65	441.026	99.96
0.025	0.00	0.182	0.00	1.316	1.37	9.502	14.40	68.609	66.84	495.415	99.98
0.028	0.00	0.205	0.00	1.478	1.65	10.673	15.96	77.071	70.91	556.512	100.00
0.032	0.00	0.230	0.00	1.660	1.98	11.990	17.65	86.575	74.94	625.143	100.00
0.036	0.00	0.258	0.00	1.865	2.36	13.468	19.51	97.252	78.97	702.238	100.00
0.040	0.00	0.290	0.00	2.095	2.79	15.129	21.55	109.246	82.97	788.841	100.00
0.045	0.00	0.326	0.00	2.354	3.28	16.995	23.79	122.718	86.73	886.124	100.00
0.051	0.00	0.366	0.00	2.644	3.82	19.091	26.26	137.852	89.97	995.405	100.00
0.057	0.00	0.411	0.05	2.970	4.41	21.445	28.98	154.853	92.52	1118.162	100.00
0.064	0.00	0.462	0.11	3.336	5.06	24.090	31.96	173.950	94.41	1256.058	100.00
0.072	0.00	0.519	0.19	3.748	5.75	27.061	35.18	195.402	95.85	1410.960	100.00
0.081	0.00	0.583	0.28	4.210	6.51	30.398	38.61	219.500	97.10	1584.966	100.00
0.091	0.00	0.655	0.38	4.729	7.34	34.147	42.22	246.569	98.22	1780.430	100.00
0.102	0.00	0.736	0.49	5.312	8.24	38.358	46.01	276.977	99.10	2000.000	100.00
0.114	0.00	0.826	0.62	5.967	9.25	43.089	49.98	311.135	99.64		
0.129	0.00	0.928	0.76	6.703	10.37	48.403	54.12	349.506	99.90		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F39 Regrind Scavenger -

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
15.15 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.281 %

Result Emulation:
Off

Concentration:
0.0111 %Vol

Span :
4.119

Uniformity:
1.51

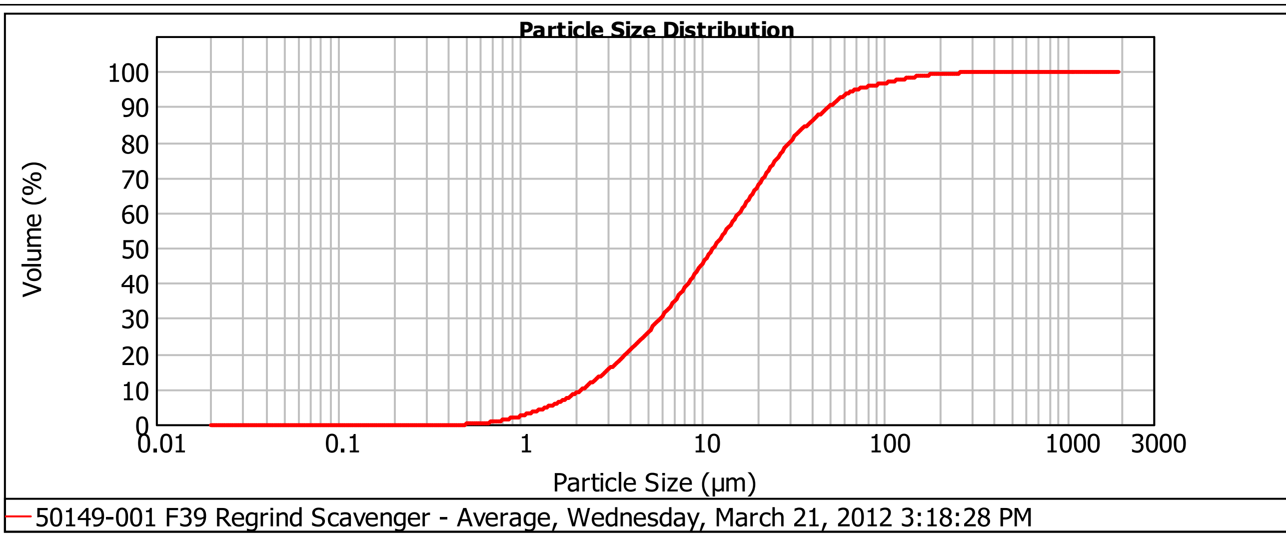
Result units:
Volume

Specific Surface Area:
1.09 m²/g

Surface Weighted Mean D[3,2]:
5.524 um

Vol. Weighted Mean D[4,3]:
22.546 um

d(0.1): 2.193 um **d(0.5): 11.494 um** **d (0.8) : 30.142 um** **d(0.9): 49.541 um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.54	7.530	36.88	54.372	91.67	392.608	99.81
0.022	0.00	0.162	0.00	1.171	3.31	8.458	40.41	61.077	93.49	441.026	99.86
0.025	0.00	0.182	0.00	1.316	4.22	9.502	44.03	68.609	94.77	495.415	99.90
0.028	0.00	0.205	0.00	1.478	5.27	10.673	47.69	77.071	95.54	556.512	99.93
0.032	0.00	0.230	0.00	1.660	6.46	11.990	51.31	86.575	96.05	625.143	99.96
0.036	0.00	0.258	0.00	1.865	7.81	13.468	54.90	97.252	96.55	702.238	99.99
0.040	0.00	0.290	0.00	2.095	9.34	15.129	58.47	109.246	97.13	788.841	100.00
0.045	0.00	0.326	0.00	2.354	11.07	16.995	62.07	122.718	97.70	886.124	100.00
0.051	0.00	0.366	0.00	2.644	12.97	19.091	65.77	137.852	98.19	995.405	100.00
0.057	0.00	0.411	0.00	2.970	15.02	21.445	69.57	154.853	98.61	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	17.23	24.090	73.39	173.950	98.97	1256.058	100.00
0.072	0.00	0.519	0.02	3.748	19.58	27.061	77.00	195.402	99.23	1410.960	100.00
0.081	0.00	0.583	0.10	4.210	22.07	30.398	80.22	219.500	99.39	1584.966	100.00
0.091	0.00	0.655	0.39	4.729	24.69	34.147	82.95	246.569	99.51	1780.430	100.00
0.102	0.00	0.736	0.83	5.312	27.46	38.358	85.28	276.977	99.60	2000.000	100.00
0.114	0.00	0.826	1.34	5.967	30.40	43.089	87.42	311.135	99.68		
0.129	0.00	0.928	1.90	6.703	33.53	48.403	89.57	349.506	99.75		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F39 Primary - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
14.80 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.136 %

Result Emulation:
Off

Concentration:
0.0180 %Vol

Span :
6.562

Uniformity:
2.29

Result units:
Volume

Specific Surface Area:
0.644 m²/g

Surface Weighted Mean D[3,2]:
9.318 um

Vol. Weighted Mean D[4,3]:
76.886 um

d(0.1): 4.219 um **d(0.5):** 28.394 um **d (0.8) : 102.006** um **d(0.9):** 190.553 um

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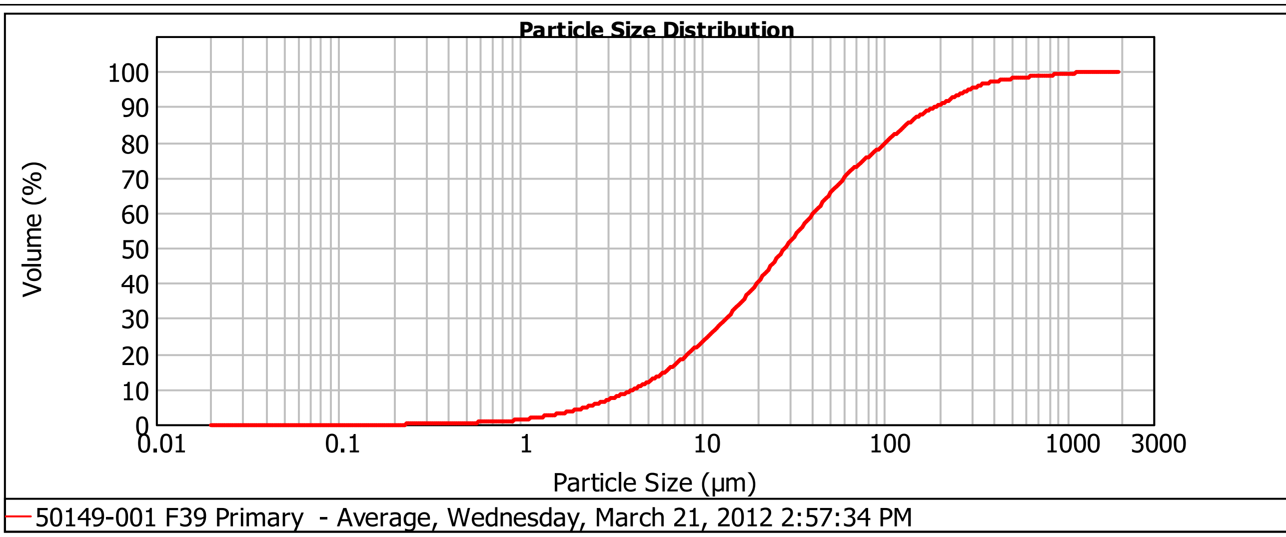


Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	1.39	7.530	18.05	54.372	67.51	392.608	97.09
0.022	0.00	0.162	0.00	1.171	1.73	8.458	20.20	61.077	70.31	441.026	97.53
0.025	0.00	0.182	0.00	1.316	2.11	9.502	22.49	68.609	72.77	495.415	97.89
0.028	0.00	0.205	0.00	1.478	2.54	10.673	24.88	77.071	74.93	556.512	98.20
0.032	0.00	0.230	0.00	1.660	3.02	11.990	27.39	86.575	76.96	625.143	98.46
0.036	0.00	0.258	0.04	1.865	3.57	13.468	30.02	97.252	79.08	702.238	98.69
0.040	0.00	0.290	0.11	2.095	4.21	15.129	32.80	109.246	81.37	788.841	98.89
0.045	0.00	0.326	0.20	2.354	4.95	16.995	35.72	122.718	83.68	886.124	99.09
0.051	0.00	0.366	0.29	2.644	5.78	19.091	38.79	137.852	85.78	995.405	99.31
0.057	0.00	0.411	0.37	2.970	6.70	21.445	42.01	154.853	87.53	1118.162	99.54
0.064	0.00	0.462	0.44	3.336	7.71	24.090	45.32	173.950	88.97	1256.058	99.72
0.072	0.00	0.519	0.49	3.748	8.80	27.061	48.64	195.402	90.28	1410.960	99.87
0.081	0.00	0.583	0.55	4.210	9.98	30.398	51.91	219.500	91.62	1584.966	99.95
0.091	0.00	0.655	0.62	4.729	11.26	34.147	55.10	246.569	93.02	1780.430	99.99
0.102	0.00	0.736	0.73	5.312	12.69	38.358	58.24	276.977	94.37	2000.000	100.00
0.114	0.00	0.826	0.89	5.967	14.28	43.089	61.37	311.135	95.53		
0.129	0.00	0.928	1.11	6.703	16.07	48.403	64.48	349.506	96.45		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F38 Ni Regrind - Avg

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
19.94 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.217 %

Result Emulation:
Off

Concentration:
0.0156 %Vol

Span :
3.153

Uniformity:
1.11

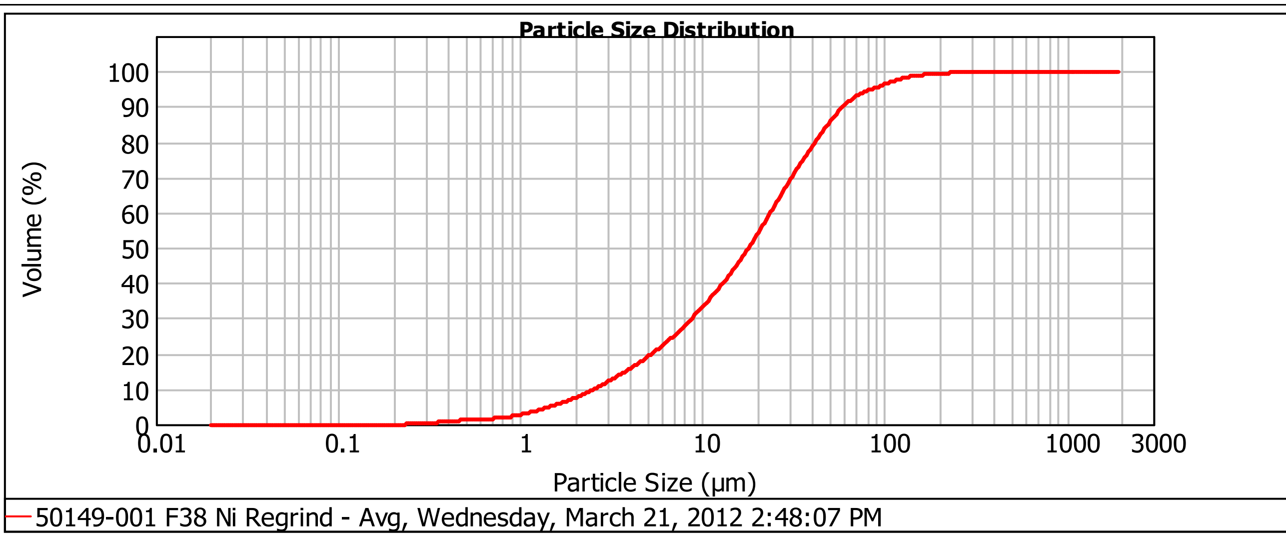
Result units:
Volume

Specific Surface Area:
1.02 m²/g

Surface Weighted Mean D[3,2]:
5.880 um

Vol. Weighted Mean D[4,3]:
27.605 um

d(0.1): **2.560** **um** **d(0.5):** **17.935** **um** **d (0.8) : 41.524** **um** **d(0.9):** **59.108** **um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.81	7.530	26.71	54.372	87.99	392.608	99.93
0.022	0.00	0.162	0.00	1.171	3.46	8.458	29.29	61.077	90.70	441.026	99.94
0.025	0.00	0.182	0.00	1.316	4.21	9.502	32.01	68.609	92.72	495.415	99.94
0.028	0.00	0.205	0.00	1.478	5.01	10.673	34.88	77.071	94.12	556.512	99.95
0.032	0.00	0.230	0.00	1.660	5.87	11.990	37.90	86.575	95.16	625.143	99.96
0.036	0.00	0.258	0.04	1.865	6.82	13.468	41.11	97.252	96.10	702.238	99.98
0.040	0.00	0.290	0.16	2.095	7.87	15.129	44.53	109.246	97.04	788.841	100.00
0.045	0.00	0.326	0.39	2.354	9.06	16.995	48.20	122.718	97.87	886.124	100.00
0.051	0.00	0.366	0.65	2.644	10.37	19.091	52.16	137.852	98.50	995.405	100.00
0.057	0.00	0.411	0.89	2.970	11.79	21.445	56.38	154.853	98.90	1118.162	100.00
0.064	0.00	0.462	1.09	3.336	13.29	24.090	60.77	173.950	99.15	1256.058	100.00
0.072	0.00	0.519	1.24	3.748	14.86	27.061	65.16	195.402	99.33	1410.960	100.00
0.081	0.00	0.583	1.37	4.210	16.51	30.398	69.43	219.500	99.51	1584.966	100.00
0.091	0.00	0.655	1.50	4.729	18.25	34.147	73.52	246.569	99.68	1780.430	100.00
0.102	0.00	0.736	1.68	5.312	20.11	38.358	77.42	276.977	99.79	2000.000	100.00
0.114	0.00	0.826	1.93	5.967	22.12	43.089	81.18	311.135	99.86		
0.129	0.00	0.928	2.31	6.703	24.32	48.403	84.74	349.506	99.90		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F35 Ni Regrind - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
17.13 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.130 %

Result Emulation:
Off

Concentration:
0.0119 %Vol

Span :
3.203

Uniformity:
1.04

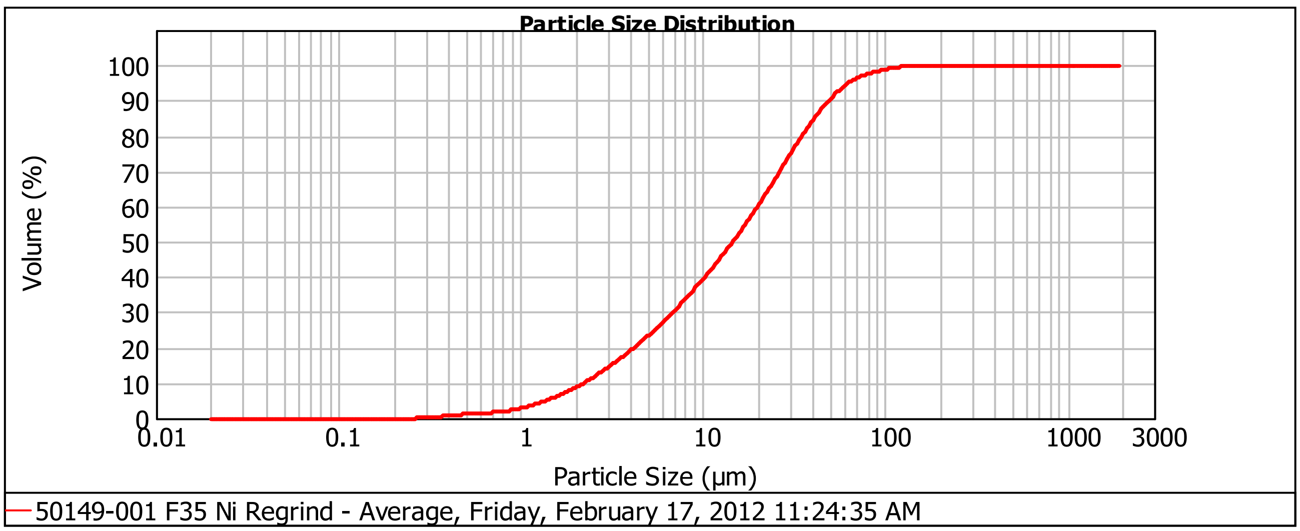
Result units:
Volume

Specific Surface Area:
1.14 m²/g

Surface Weighted Mean D[3,2]:
5.274 um

Vol. Weighted Mean D[4,3]:
21.298 um

d(0.1): 2.236 um **d(0.5): 14.550 um** **d (0.8) : 34.774 um** **d(0.9): 48.838 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.97	7.530	32.33	54.372	92.46	392.608	100.00
0.022	0.00	0.162	0.00	1.171	3.73	8.458	35.18	61.077	94.65	441.026	100.00
0.025	0.00	0.182	0.00	1.316	4.63	9.502	38.14	68.609	96.25	495.415	100.00
0.028	0.00	0.205	0.00	1.478	5.61	10.673	41.20	77.071	97.33	556.512	100.00
0.032	0.00	0.230	0.00	1.660	6.67	11.990	44.38	86.575	98.07	625.143	100.00
0.036	0.00	0.258	0.00	1.865	7.84	13.468	47.71	97.252	98.67	702.238	100.00
0.040	0.00	0.290	0.10	2.095	9.18	15.129	51.19	109.246	99.20	788.841	100.00
0.045	0.00	0.326	0.29	2.354	10.69	16.995	54.81	122.718	99.61	886.124	100.00
0.051	0.00	0.366	0.54	2.644	12.37	19.091	58.61	137.852	99.86	995.405	100.00
0.057	0.00	0.411	0.81	2.970	14.18	21.445	62.60	154.853	99.94	1118.162	100.00
0.064	0.00	0.462	1.05	3.336	16.07	24.090	66.76	173.950	99.96	1256.058	100.00
0.072	0.00	0.519	1.25	3.748	18.05	27.061	71.02	195.402	99.98	1410.960	100.00
0.081	0.00	0.583	1.41	4.210	20.12	30.398	75.28	219.500	99.99	1584.966	100.00
0.091	0.00	0.655	1.56	4.729	22.29	34.147	79.38	246.569	100.00	1780.430	100.00
0.102	0.00	0.736	1.74	5.312	24.58	38.358	83.21	276.977	100.00	2000.000	100.00
0.114	0.00	0.826	2.00	5.967	27.02	43.089	86.68	311.135	100.00		
0.129	0.00	0.928	2.39	6.703	29.60	48.403	89.78	349.506	100.00		

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F35 Bulk Regrind - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
21.56 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
4.320 %

Result Emulation:
Off

Concentration:
0.0185 %Vol

Span :
3.168

Uniformity:
1.04

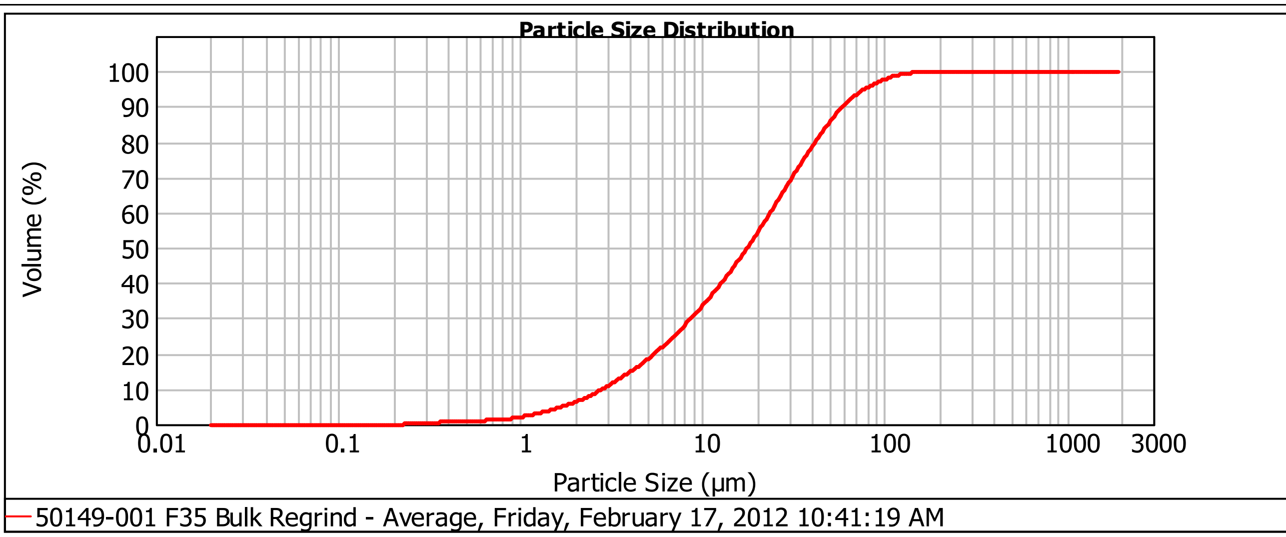
Result units:
Volume

Specific Surface Area:
0.943 m²/g

Surface Weighted Mean D[3,2]:
6.362 um

Vol. Weighted Mean D[4,3]:
25.924 um

d(0.1): 2.838 um **d(0.5): 17.608 um** **d (0.8) : 41.448 um** **d(0.9): 58.626 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.16	7.530	26.73	54.372	88.11	392.608	100.00
0.022	0.00	0.162	0.00	1.171	2.70	8.458	29.46	61.077	90.93	441.026	100.00
0.025	0.00	0.182	0.00	1.316	3.34	9.502	32.32	68.609	93.19	495.415	100.00
0.028	0.00	0.205	0.00	1.478	4.04	10.673	35.31	77.071	94.93	556.512	100.00
0.032	0.00	0.230	0.00	1.660	4.81	11.990	38.44	86.575	96.29	625.143	100.00
0.036	0.00	0.258	0.08	1.865	5.67	13.468	41.74	97.252	97.45	702.238	100.00
0.040	0.00	0.290	0.21	2.095	6.66	15.129	45.20	109.246	98.42	788.841	100.00
0.045	0.00	0.326	0.39	2.354	7.82	16.995	48.85	122.718	99.13	886.124	100.00
0.051	0.00	0.366	0.57	2.644	9.13	19.091	52.69	137.852	99.51	995.405	100.00
0.057	0.00	0.411	0.72	2.970	10.58	21.445	56.70	154.853	99.63	1118.162	100.00
0.064	0.00	0.462	0.84	3.336	12.14	24.090	60.84	173.950	99.67	1256.058	100.00
0.072	0.00	0.519	0.93	3.748	13.80	27.061	65.05	195.402	99.71	1410.960	100.00
0.081	0.00	0.583	1.02	4.210	15.57	30.398	69.25	219.500	99.79	1584.966	100.00
0.091	0.00	0.655	1.11	4.729	17.47	34.147	73.40	246.569	99.87	1780.430	100.00
0.102	0.00	0.736	1.24	5.312	19.52	38.358	77.42	276.977	99.93	2000.000	100.00
0.114	0.00	0.826	1.44	5.967	21.75	43.089	81.26	311.135	99.97		
0.129	0.00	0.928	1.74	6.703	24.15	48.403	84.85	349.506	99.99		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F34 Ni Regrind - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
13.68 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.188 %

Result Emulation:
Off

Concentration:
0.0125 %Vol

Span :
2.744

Uniformity:
0.946

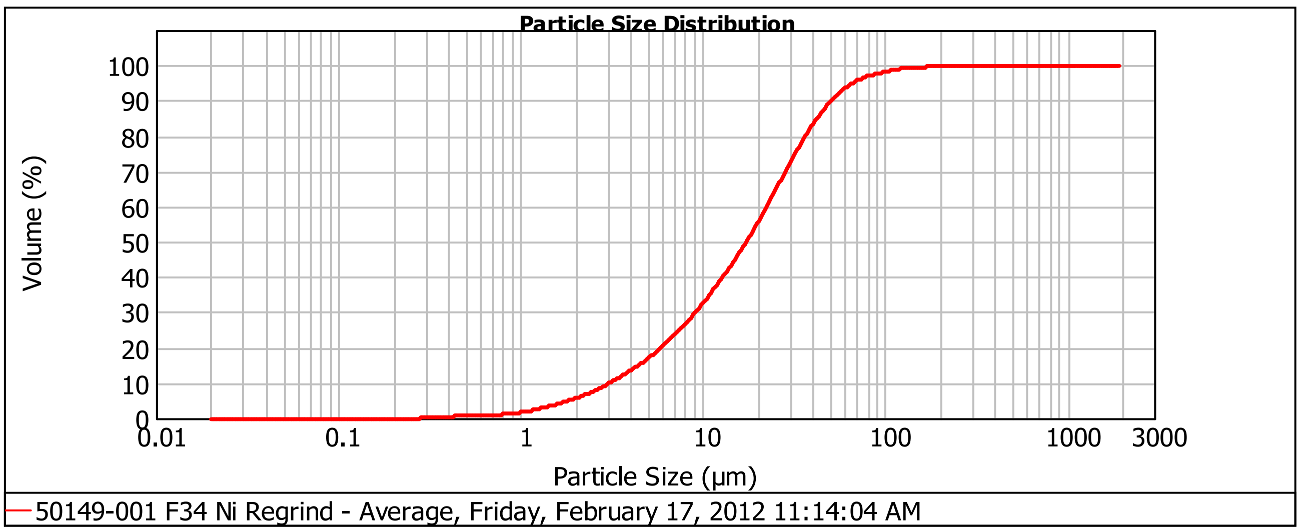
Result units:
Volume

Specific Surface Area:
0.871 m²/g

Surface Weighted Mean D[3,2]:
6.892 um

Vol. Weighted Mean D[4,3]:
24.233 um

d(0.1): 3.080 um **d(0.5): 17.251 um** **d (0.8) : 36.352 um** **d(0.9): 50.418 um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	1.80	7.530	25.33	54.372	91.73	392.608	99.91
0.022	0.00	0.162	0.00	1.171	2.32	8.458	28.18	61.077	93.92	441.026	99.93
0.025	0.00	0.182	0.00	1.316	2.92	9.502	31.25	68.609	95.52	495.415	99.96
0.028	0.00	0.205	0.00	1.478	3.57	10.673	34.51	77.071	96.60	556.512	99.98
0.032	0.00	0.230	0.00	1.660	4.28	11.990	37.97	86.575	97.38	625.143	99.99
0.036	0.00	0.258	0.00	1.865	5.06	13.468	41.60	97.252	98.04	702.238	100.00
0.040	0.00	0.290	0.01	2.095	5.97	15.129	45.42	109.246	98.63	788.841	100.00
0.045	0.00	0.326	0.07	2.354	7.03	16.995	49.46	122.718	99.10	886.124	100.00
0.051	0.00	0.366	0.24	2.644	8.24	19.091	53.77	137.852	99.38	995.405	100.00
0.057	0.00	0.411	0.45	2.970	9.56	21.445	58.36	154.853	99.49	1118.162	100.00
0.064	0.00	0.462	0.64	3.336	11.00	24.090	63.19	173.950	99.57	1256.058	100.00
0.072	0.00	0.519	0.80	3.748	12.55	27.061	68.13	195.402	99.64	1410.960	100.00
0.081	0.00	0.583	0.89	4.210	14.23	30.398	73.01	219.500	99.72	1584.966	100.00
0.091	0.00	0.655	0.95	4.729	16.07	34.147	77.65	246.569	99.79	1780.430	100.00
0.102	0.00	0.736	1.03	5.312	18.09	38.358	81.91	276.977	99.83	2000.000	100.00
0.114	0.00	0.826	1.16	5.967	20.29	43.089	85.69	311.135	99.86		
0.129	0.00	0.928	1.41	6.703	22.70	48.403	88.97	349.506	99.88		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F34 Bulk Regrind - Average

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
14.47 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.194 %

Result Emulation:
Off

Concentration:
0.0171 %Vol

Span :
2.761

Uniformity:
0.924

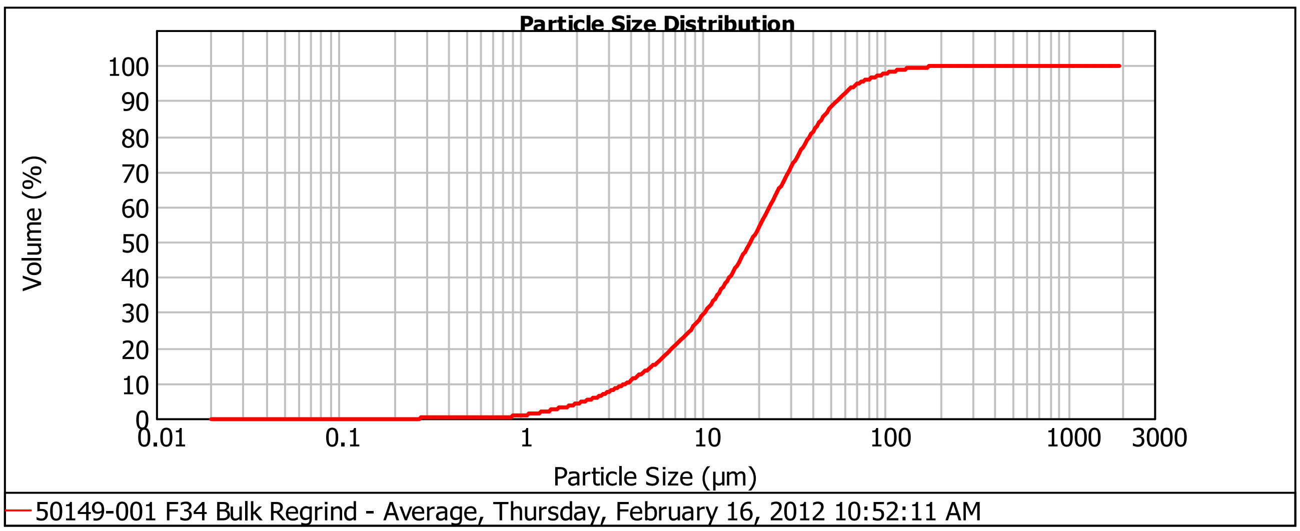
Result units:
Volume

Specific Surface Area:
0.693 m²/g

Surface Weighted Mean D[3,2]:
8.662 um

Vol. Weighted Mean D[4,3]:
25.691 um

d(0.1): 3.796 um **d(0.5): 18.233 um** **d (0.8) : 38.481 um** **d(0.9): 54.130 um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.92	7.530	21.98	54.372	90.10	392.608	99.99
0.022	0.00	0.162	0.00	1.171	1.32	8.458	24.84	61.077	92.54	441.026	99.99
0.025	0.00	0.182	0.00	1.316	1.79	9.502	27.93	68.609	94.38	495.415	100.00
0.028	0.00	0.205	0.00	1.478	2.30	10.673	31.26	77.071	95.70	556.512	100.00
0.032	0.00	0.230	0.00	1.660	2.86	11.990	34.85	86.575	96.67	625.143	100.00
0.036	0.00	0.258	0.00	1.865	3.50	13.468	38.70	97.252	97.48	702.238	100.00
0.040	0.00	0.290	0.01	2.095	4.24	15.129	42.83	109.246	98.21	788.841	100.00
0.045	0.00	0.326	0.02	2.354	5.11	16.995	47.22	122.718	98.80	886.124	100.00
0.051	0.00	0.366	0.04	2.644	6.11	19.091	51.86	137.852	99.19	995.405	100.00
0.057	0.00	0.411	0.06	2.970	7.23	21.445	56.68	154.853	99.42	1118.162	100.00
0.064	0.00	0.462	0.07	3.336	8.47	24.090	61.58	173.950	99.58	1256.058	100.00
0.072	0.00	0.519	0.08	3.748	9.84	27.061	66.46	195.402	99.69	1410.960	100.00
0.081	0.00	0.583	0.09	4.210	11.36	30.398	71.19	219.500	99.80	1584.966	100.00
0.091	0.00	0.655	0.15	4.729	13.04	34.147	75.70	246.569	99.89	1780.430	100.00
0.102	0.00	0.736	0.24	5.312	14.92	38.358	79.89	276.977	99.94	2000.000	100.00
0.114	0.00	0.826	0.39	5.967	17.03	43.089	83.71	311.135	99.96		
0.129	0.00	0.928	0.61	6.703	19.38	48.403	87.13	349.506	99.98		

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F33 Secondary Cleaners

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
15.86 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.211 %

Result Emulation:
Off

Concentration:
0.0240 %Vol

Span :
3.857

Uniformity:
1.18

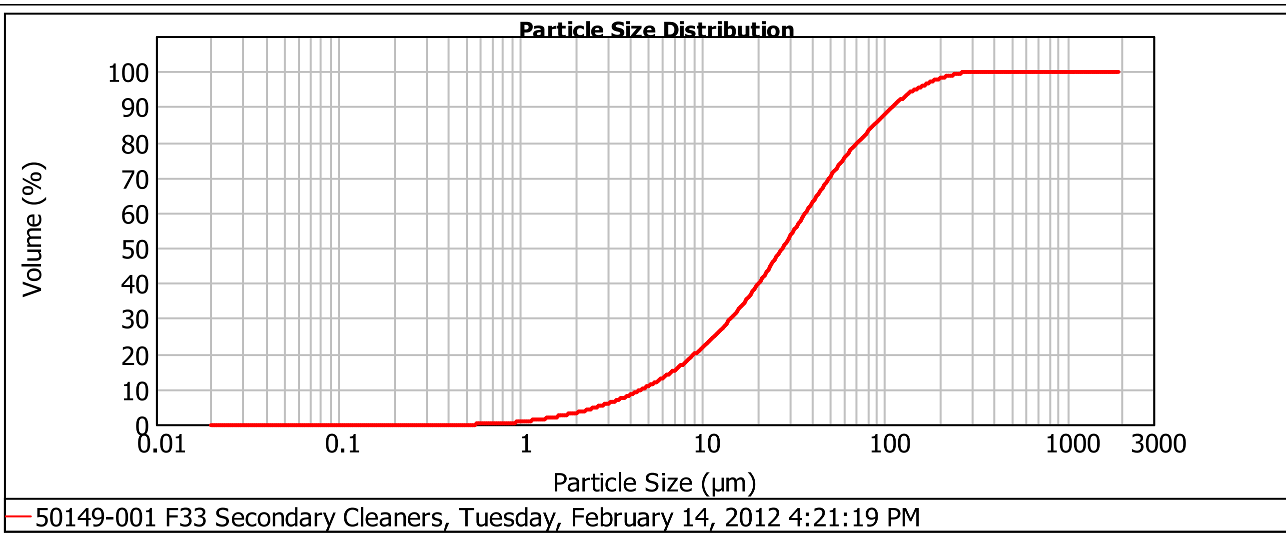
Result units:
Volume

Specific Surface Area:
0.543 m²/g

Surface Weighted Mean D[3,2]:
11.045 um

Vol. Weighted Mean D[4,3]:
44.954 um

d(0.1): 4.716 um **d(0.5): 27.468 um** **d (0.8) : 71.218 um** **d(0.9): 110.664 um**



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.81	7.530	16.49	54.372	72.62	392.608	100.00
0.022	0.00	0.162	0.00	1.171	1.14	8.458	18.55	61.077	76.02	441.026	100.00
0.025	0.00	0.182	0.00	1.316	1.50	9.502	20.78	68.609	79.08	495.415	100.00
0.028	0.00	0.205	0.00	1.478	1.90	10.673	23.16	77.071	81.87	556.512	100.00
0.032	0.00	0.230	0.00	1.660	2.33	11.990	25.72	86.575	84.52	625.143	100.00
0.036	0.00	0.258	0.00	1.865	2.83	13.468	28.46	97.252	87.15	702.238	100.00
0.040	0.00	0.290	0.00	2.095	3.42	15.129	31.41	109.246	89.72	788.841	100.00
0.045	0.00	0.326	0.00	2.354	4.10	16.995	34.59	122.718	92.08	886.124	100.00
0.051	0.00	0.366	0.00	2.644	4.87	19.091	38.01	137.852	94.05	995.405	100.00
0.057	0.00	0.411	0.00	2.970	5.72	21.445	41.68	154.853	95.57	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	6.66	24.090	45.53	173.950	96.75	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	7.68	27.061	49.49	195.402	97.71	1410.960	100.00
0.081	0.00	0.583	0.01	4.210	8.80	30.398	53.47	219.500	98.55	1584.966	100.00
0.091	0.00	0.655	0.07	4.729	10.03	34.147	57.43	246.569	99.25	1780.430	100.00
0.102	0.00	0.736	0.17	5.312	11.40	38.358	61.33	276.977	99.71	2000.000	100.00
0.114	0.00	0.826	0.32	5.967	12.92	43.089	65.19	311.135	99.95		
0.129	0.00	0.928	0.54	6.703	14.61	48.403	68.97	349.506	100.00		

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
50149-001 F33 Scavenger Regrind

SOP Name:
50149-001

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Yonika_Wiputri

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Cu (II) O

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.630

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
18.59 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.445 %

Result Emulation:
Off

Concentration:
0.0141 %Vol

Span :
3.588

Uniformity:
1.24

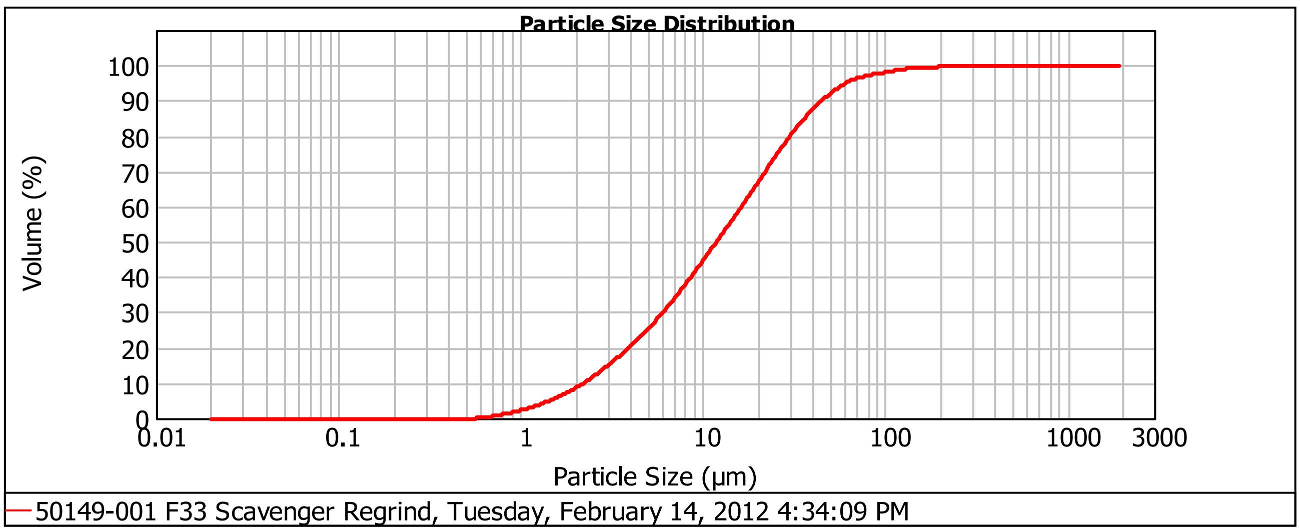
Result units:
Volume

Specific Surface Area:
1.07 m²/g

Surface Weighted Mean D[3,2]:
5.610 um

Vol. Weighted Mean D[4,3]:
20.065 um

d(0.1): 2.222 um **d(0.5): 11.851 um** **d (0.8) : 29.967 um** **d(0.9): 44.748 um**



Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	2.49	7.530	36.19	54.372	93.53	392.608	100.00
0.022	0.00	0.162	0.00	1.171	3.26	8.458	39.65	61.077	95.10	441.026	100.00
0.025	0.00	0.182	0.00	1.316	4.17	9.502	43.20	68.609	96.20	495.415	100.00
0.028	0.00	0.205	0.00	1.478	5.21	10.673	46.77	77.071	96.92	556.512	100.00
0.032	0.00	0.230	0.00	1.660	6.37	11.990	50.36	86.575	97.42	625.143	100.00
0.036	0.00	0.258	0.00	1.865	7.68	13.468	53.99	97.252	97.90	702.238	100.00
0.040	0.00	0.290	0.00	2.095	9.17	15.129	57.68	109.246	98.39	788.841	100.00
0.045	0.00	0.326	0.00	2.354	10.86	16.995	61.44	122.718	98.82	886.124	100.00
0.051	0.00	0.366	0.00	2.644	12.72	19.091	65.28	137.852	99.11	995.405	100.00
0.057	0.00	0.411	0.00	2.970	14.73	21.445	69.19	154.853	99.27	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	16.87	24.090	73.09	173.950	99.42	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	19.14	27.061	76.87	195.402	99.57	1410.960	100.00
0.081	0.00	0.583	0.03	4.210	21.55	30.398	80.42	219.500	99.74	1584.966	100.00
0.091	0.00	0.655	0.30	4.729	24.11	34.147	83.67	246.569	99.88	1780.430	100.00
0.102	0.00	0.736	0.74	5.312	26.84	38.358	86.60	276.977	99.95	2000.000	100.00
0.114	0.00	0.826	1.25	5.967	29.76	43.089	89.22	311.135	99.98		
0.129	0.00	0.928	1.83	6.703	32.88	48.403	91.53	349.506	99.99		

Operator notes:

MALVERN INSTRUMENTS

MASTERSIZER 2000

Result Analysis Report

Sample Name: 50149-001 F33 Primary Cleaners
SOP Name: 50149-001
Measured: 12000
Sample Source & type: Prophecy
Measured by: Yonika_Wiputri
Analysed: Enhanced
Sample bulk lot ref:
Result Source: Averaged

Particle Name: Cu (II) O
Accessory Name: Hydro 2000G (A)
Analysis model: Single narrow mode (spherical)
Sensitivity: Enhanced
Particle RI: 2.630
Absorption: 1
Size range: 0.020 to 2000.000 um
Obscuration: 14.50 %
Dispersant Name: Water
Dispersant RI: 1.330
Weighted Residual: 8.752 %
Result Emulation: Off

Concentration: 0.0225 %Vol
Span : 3.312
Uniformity: 1.05
Result units: Volume
Specific Surface Area: 0.536 m²/g
Surface Weighted Mean D[3,2]: 11.184 um
Vol. Weighted Mean D[4,3]: 35.591 um

d(0.1): 5.015 um **d(0.5):** 22.953 um **d (0.8) : 52.220** um **d(0.9):** 81.031 um

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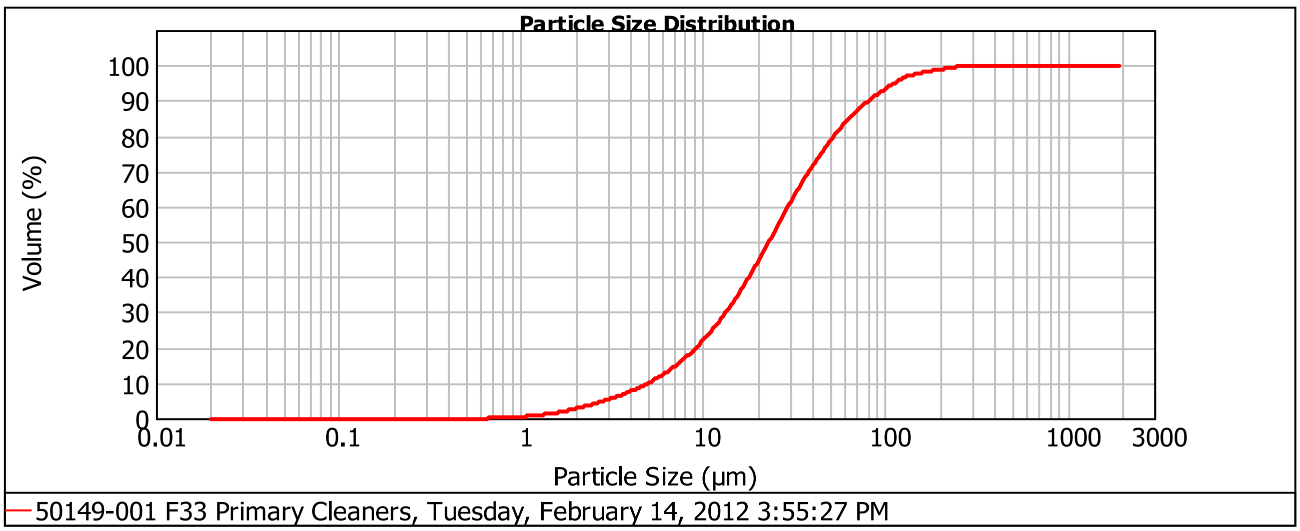


Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %	Size (μm)	Vol Under %
0.020	0.00	0.144	0.00	1.043	0.50	7.530	16.03	54.372	81.14	392.608	99.97
0.022	0.00	0.162	0.00	1.171	0.75	8.458	18.32	61.077	84.20	441.026	99.98
0.025	0.00	0.182	0.00	1.316	1.07	9.502	20.88	68.609	86.84	495.415	100.00
0.028	0.00	0.205	0.00	1.478	1.41	10.673	23.74	77.071	89.11	556.512	100.00
0.032	0.00	0.230	0.00	1.660	1.81	11.990	26.90	86.575	91.12	625.143	100.00
0.036	0.00	0.258	0.00	1.865	2.32	13.468	30.36	97.252	92.99	702.238	100.00
0.040	0.00	0.290	0.00	2.095	2.91	15.129	34.13	109.246	94.71	788.841	100.00
0.045	0.00	0.326	0.00	2.354	3.58	16.995	38.20	122.718	96.16	886.124	100.00
0.051	0.00	0.366	0.00	2.644	4.33	19.091	42.57	137.852	97.18	995.405	100.00
0.057	0.00	0.411	0.00	2.970	5.16	21.445	47.20	154.853	97.81	1118.162	100.00
0.064	0.00	0.462	0.00	3.336	6.05	24.090	52.01	173.950	98.30	1256.058	100.00
0.072	0.00	0.519	0.00	3.748	7.03	27.061	56.85	195.402	98.75	1410.960	100.00
0.081	0.00	0.583	0.00	4.210	8.12	30.398	61.58	219.500	99.19	1584.966	100.00
0.091	0.00	0.655	0.00	4.729	9.33	34.147	66.06	246.569	99.59	1780.430	100.00
0.102	0.00	0.736	0.04	5.312	10.70	38.358	70.24	276.977	99.80	2000.000	100.00
0.114	0.00	0.826	0.13	5.967	12.25	43.089	74.13	311.135	99.89		
0.129	0.00	0.928	0.30	6.703	14.01	48.403	77.76	349.506	99.94		

Operator notes:

MASTERSIZER 2000

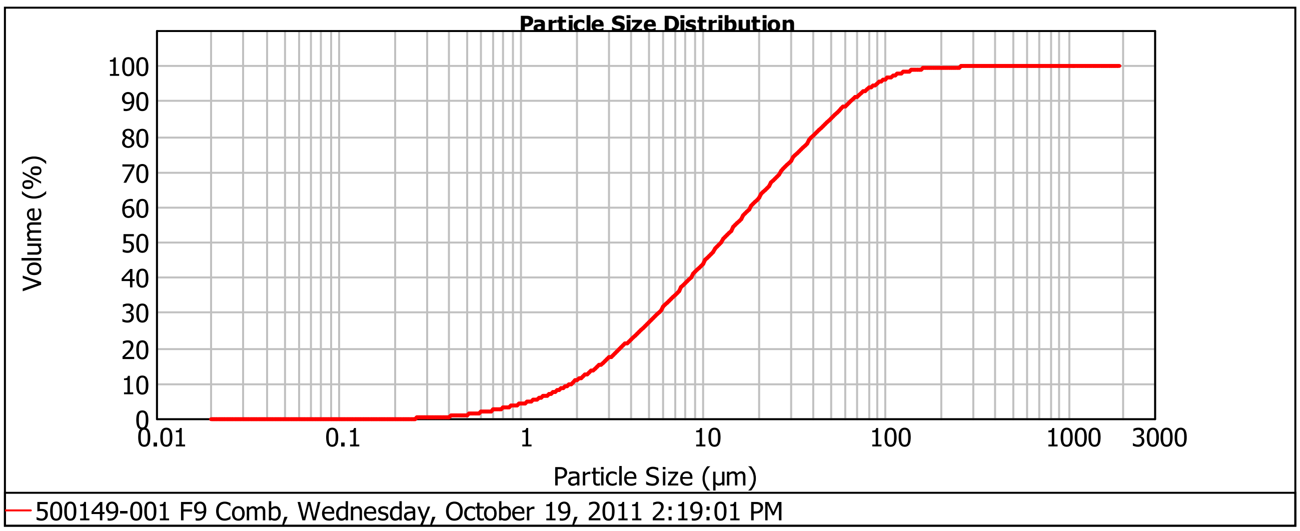
Result Analysis Report

Sample Name: 500149-001 F9 Comb	**SOP Name:** 50149-001	**Measured:** 12000
Sample Source & type:	**Measured by:** Shengmei_Yang2	**Analysed:** Enhanced
Sample bulk lot ref:	**Result Source:** Averaged	

Particle Name: Cu (II) O	**Accessory Name:** Hydro 2000G (A)	**Analysis model:** General purpose	**Sensitivity:** Enhanced
Particle RI: 2.630	**Absorption:** 1	**Size range:** 0.020 to 2000.000 um	**Obscuration:** 19.30 %
Dispersant Name: Water	**Dispersant RI:** 1.330	**Weighted Residual:** 0.275 %	**Result Emulation:** Off

Concentration: 0.0119 %Vol	**Span :** 5.011	**Uniformity:** 1.66	**Result units:** Volume
Specific Surface Area: 1.27 m^2/g	**Surface Weighted Mean D[3,2]:** 4.728 um	**Vol. Weighted Mean D[4,3]:** 26.106 um	

d(0.1): 1.921 um **d(0.5):** 12.580 um **d (0.8) : 40.278** um **d(0.9):** 64.965 um



Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.144	0.00	1.043	0.80	7.530	2.93	54.372	2.28	392.608	0.07
0.022	0.00	0.162	0.00	1.171	0.93	8.458	2.99	61.077	2.09	441.026	0.07
0.025	0.00	0.182	0.00	1.316	1.06	9.502	3.03	68.609	1.87	495.415	0.05
0.028	0.00	0.205	0.00	1.478	1.21	10.673	3.05	77.071	1.63	556.512	0.04
0.032	0.00	0.230	0.00	1.660	1.37	11.990	3.07	86.575	1.38	625.143	0.02
0.036	0.00	0.258	0.05	1.865	1.53	13.468	3.08	97.252	1.12	702.238	0.00
0.040	0.00	0.290	0.10	2.095	1.68	15.129	3.09	109.246	0.87	788.841	0.00
0.045	0.00	0.326	0.17	2.354	1.83	16.995	3.09	122.718	0.64	886.124	0.00
0.051	0.00	0.366	0.22	2.644	1.97	19.091	3.07	137.852	0.44	995.405	0.00
0.057	0.00	0.411	0.28	2.970	2.11	21.445	3.05	154.853	0.29	1118.162	0.00
0.064	0.00	0.462	0.33	3.336	2.23	24.090	3.01	173.950	0.18	1256.058	0.00
0.072	0.00	0.519	0.37	3.748	2.36	27.061	2.96	195.402	0.11	1410.960	0.00
0.081	0.00	0.583	0.42	4.210	2.47	30.398	2.89	219.500	0.06	1584.966	0.00
0.091	0.00	0.655	0.47	4.729	2.59	34.147	2.81	246.569	0.04	1780.430	0.00
0.102	0.00	0.736	0.54	5.312	2.69	38.358	2.71	276.977	0.05	2000.000	
0.114	0.00	0.826	0.61	5.967	2.78	43.089	2.59	311.135	0.06		
0.129	0.00	0.928	0.70	6.703	2.87	48.403	2.45	349.506	0.07		
0.144		1.043		7.530		54.372		392.608			

Operator notes:

MASTERSIZER 2000

Result Analysis Report

Sample Name:
LCT 5 Ni Regrin - Average

SOP Name:
50149-001 Ni

Measured:
12000

Sample Source & type:
Prophecy

Measured by:
Shengmei_Yang2

Analysed:
Enhanced

Sample bulk lot ref:

Result Source:
Averaged

Particle Name:
Nickel Oxide

Accessory Name:
Hydro 2000G (A)

Analysis model:
Single narrow mode (spherical)

Sensitivity:
Enhanced

Particle RI:
2.180

Absorption:
1

Size range:
0.020 to 2000.000 um

Obscuration:
11.85 %

Dispersant Name:
Water

Dispersant RI:
1.330

Weighted Residual:
0.354 %

Result Emulation:
Off

Concentration:
0.0089 %Vol

Span :
2.887

Uniformity:
0.932

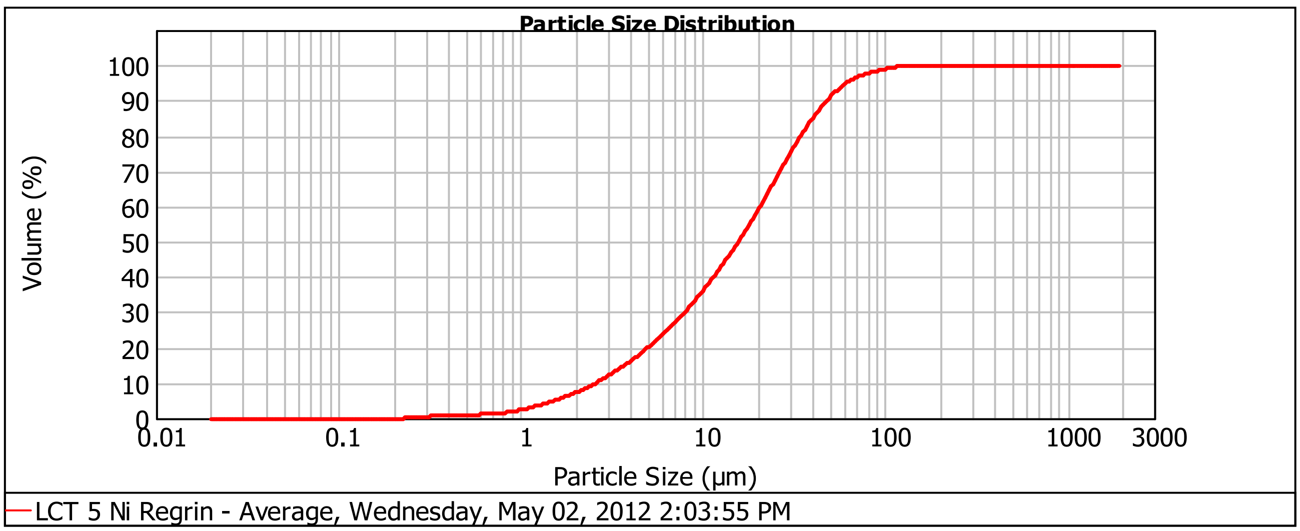
Result units:
Volume

Specific Surface Area:
1.04 m²/g

Surface Weighted Mean D[3,2]:
5.744 um

Vol. Weighted Mean D[4,3]:
21.464 um

d(0.1): 2.585 um **d(0.5): 15.600 um** **d (0.8) : 34.227 um** **d(0.9): 47.621 um**



Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %
0.020	0.00	0.144	0.00	1.043	0.65	7.530	2.90	54.372	2.05	392.608	0.00
0.022	0.00	0.162	0.00	1.171	0.76	8.458	3.12	61.077	1.45	441.026	0.00
0.025	0.00	0.182	0.00	1.316	0.82	9.502	3.32	68.609	0.97	495.415	0.00
0.028	0.00	0.205	0.01	1.478	0.87	10.673	3.48	77.071	0.71	556.512	0.00
0.032	0.00	0.230	0.12	1.660	0.95	11.990	3.62	86.575	0.63	625.143	0.00
0.036	0.00	0.258	0.20	1.865	1.08	13.468	3.77	97.252	0.58	702.238	0.00
0.040	0.00	0.290	0.25	2.095	1.24	15.129	3.97	109.246	0.43	788.841	0.00
0.045	0.00	0.326	0.20	2.354	1.39	16.995	4.22	122.718	0.14	886.124	0.00
0.051	0.00	0.366	0.14	2.644	1.51	19.091	4.48	137.852	0.02	995.405	0.00
0.057	0.00	0.411	0.07	2.970	1.62	21.445	4.68	154.853	0.00	1118.162	0.00
0.064	0.00	0.462	0.04	3.336	1.74	24.090	4.72	173.950	0.00	1256.058	0.00
0.072	0.00	0.519	0.05	3.748	1.88	27.061	4.58	195.402	0.00	1410.960	0.00
0.081	0.00	0.583	0.11	4.210	2.03	30.398	4.30	219.500	0.00	1584.966	0.00
0.091	0.00	0.655	0.19	4.729	2.19	34.147	3.92	246.569	0.00	1780.430	0.00
0.102	0.00	0.736	0.27	5.312	2.34	38.358	3.50	276.977	0.00	2000.000	
0.114	0.00	0.826	0.37	5.967	2.50	43.089	3.07	311.135	0.00		
0.129	0.00	0.928	0.51	6.703	2.69	48.403	2.60	349.506	0.00		
0.144		1.043		7.530		54.372		392.608			

Operator notes:

Appendix F – Locke Cycle Tests

Test: LCT-1 **Project:** 50149-001 **Date:** March 14 2012 **Operator:** YW/Wei

Purpose: Split flowsheet including Cu separation

Procedure: As below.

Feed: 7 x (2x2)-kg of -10 mesh Master Composite

Grind: 58 minutes /2 kg at 65% solids in the lab ball mill

Regrind (Ni Ro Sc) 8 minutes in the pebble mill

Ni Scav Tail G K_{80} : 118 µm

Ni regrind K80: 35 µm

Conditions:

Stage	*Reagents added, grams per tonne*						Time, minutes					
Stage	**Lime**	**SIPX**	**CuSO4**	**CMC**	**Guar**	**MIBC***	**Grind**	**Cond.**	**Froth**	**pH**	**Eh**	
Grind	-	-	-	-	-	-	58					
Bulk Rougher 1	-	15	-	-	-	12		1	3	8.4	89.3	
Bulk Rougher 2	-	20	-	-	-	6		1	3	8.4	37.8	
Ni Scav 1	-	30	-	-	-	2		1	4	8.4	37.0	
Ni Scav 2	-	30	-	-	-	2		1	4	8.4	39.0	
Ni Scav 3	-	30	-	-	-	1		1	4	8.3	11.0	
Bulk Cleaner *(Combine Ro Conc 1-2)*												
Bulk 1st Cleaner 1	-	-	-	12	12	-			2	8.8	89.1	
Bulk 1st Cleaner 2	-	10	-	-	-	-			2			
Bulk 2nd Cleaner 1	-	-		7	7	-			2	8.9	82.7	
Bulk 2nd Cleaner 2	-	5	-	-	-	-			2			
Cu / Ni Separation												
Conditioner 1	375	-	-	-	-	-		5				
Cu Rougher	-	-	-	-	-	-		1	2	12.0		
Cu Cleaner 1	50	-	-	-	-	-		1	2	12.0		
Ni Cleaner *(Combine Scav Conc 1-3)*												
Ni 1st Cleaner 1	-	20		20	20	-		1	3	8.5	74.0	1st cycle: 15; from 2nd cycle: 20g/t
Ni 1st Cleaner 2	-	10	-	-	-	-		1	3	8.4	21.0	
			-	-	-	-						
Regrind (PM)	-	-	-	-	-	-	8					
Ni 2nd Cleaner	-	5	-	7.5	7.5	-		1	4	8.4	68.0	1st cycle: 5; from 2nd cycle: 7.5g/t
Ni 3rd Cleaner	-	1	-	5	5	-		1	3	7.9	88.0	1st cycle: 2.5; from 2nd cycle: 5g/t
Total	425	176	0	51.5	51.5	23	66	16	43			

*As needed

Stage	Rougher	2nd clnr	3rd clnr & sep
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

PSA On Ni Regrind
PSA Tails F
PSA Tails G

Test: LCT-1

Metallurgical Prediction (Using Cycles E,F,G)

Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %)					% Distribution				
	g	%	Cu	Ni	S	Fe	MgO	Cu	Ni	S	Fe	MgO
Cu Conc	39.2	1.00	23.2	0.88	28.3	28.5	2.83	68.2	1.8	9.5	2.3	0.1
Cu Rougher Tail (Ni Conc.)	70.3	1.78	2.55	14.4	26.7	32.5	4.55	13.4	53.9	16.1	4.7	0.4
Ni 3rd Clnr Conc	18.9	0.48	3.24	7.03	27.2	41.8	5.04	4.6	7.0	4.4	1.6	0.1
Ni 1st Clnr Tail	592.3	15.0	0.13	0.48	7.48	18.5	20.4	5.8	15.0	38.0	22.5	13.5
Ni Scav Tail	3221	81.7	0.03	0.13	1.15	10.4	23.8	8.0	22.2	31.9	68.9	85.9
Total Ni Conc.	89.2	2.26	2.69	12.9	26.8	34.5	4.66	18.0	60.9	20.5	6.3	0.5
Head (calc.)	3941.7	100	0.34	0.48	2.95	12.3	22.7	100	100	100	100	100

Metallurgical Balance

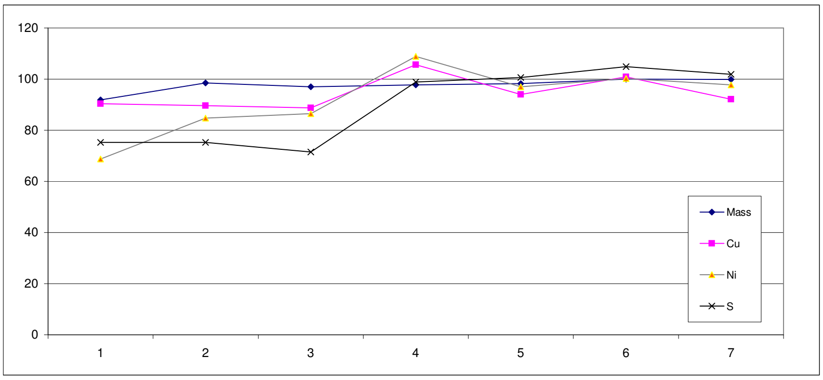
Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %)					% Distribution				
	g	%	Cu	Ni	S	Fe	MgO	Cu	Ni	S	Fe	MgO
Bulk Clnr 2 Conc A	62.5	0.23	15.5	7.75	29.0	–	–	9.9	3.6	2.3		
Bulk Clnr 2 Conc B	59.0	0.21	15.4	8.04	29.1	–	–	9.3	3.5	2.2		
Bulk Clnr 2 Conc C	83.6	0.30	11.7	9.46	27.6	–	–	10.0	5.9	2.9		
Bulk Clnr 2 Conc D	129.8	0.47	9.21	8.64	27.1	–	–	12.2	8.4	4.4		
Cu Clnr 1 Conc E	37.4	0.13	23.1	0.85	27.8	28.9	2.98	8.8	0.2	1.3		
Cu Clnr 1 Conc F	45.9	0.17	21.3	1.03	27.5	28.2	3.27	10.0	0.4	1.6		
Cu Clnr 1 Conc G	34.4	0.12	25.9	0.71	30.0	28.5	2.09	9.1	0.2	1.3		
Cu Clnr 1 Tail G	46.8	0.17	8.05	3.78	19.6			3.9	1.3	1.2		
Cu Rghr Tail E	75.5	0.27	2.69	12.9	26.4	32.8	4.91	2.1	7.3	2.5		
Cu Rghr Tail F	66.8	0.24	2.55	15.5	27.1	32.6	4.18	1.7	7.7	2.3		
Cu Rghr Tail G	68.6	0.25	2.39	15.1	26.5	32.2	4.52	1.7	7.7	2.3		
Bulk 2nd Clnr Tail G	46.8	0.17	0.59	3.56	11.4	–	–	0.3	1.2	0.7		
Bulk 1st Clnr Tail G	203.3	0.73	0.23	1.04	6.16	–	–	0.5	1.6	1.6		
Ni 3rd Clnr Conc A	19.5	0.07	5.28	14.9	28.8	–	–	1.1	2.2	0.7		
Ni 3rd Clnr Conc B	35.4	0.13	3.72	13.8	26.9	–	–	1.3	3.6	1.2		
Ni 3rd Clnr Conc C	16.7	0.06	4.76	11.6	26.6	–	–	0.8	1.4	0.6		
Ni 3rd Clnr Conc D	23.9	0.09	3.27	10.7	27.7	–	–	0.8	1.9	0.8		
Ni 3rd Clnr Conc E	22.8	0.08	3.37	8.05	27.2	45.7	5.49	0.8	1.4	0.8		
Ni 3rd Clnr Conc F	22.5	0.08	2.52	6.24	27.8	40.7	4.45	0.6	1.0	0.8		
Ni 3rd Clnr Conc G	11.3	0.04	4.41	6.53	26.2	36.2	5.32	0.5	0.6	0.4		
Ni 3rd Clnr Tail G	86.0	0.31	0.45	3.41	22.0	–	–	0.4	2.2	2.4		
Ni 2nd Clnr Tail G	277.1	1.00	0.18	0.82	12.9	–	–	0.5	1.7	4.5		
Ni 1st Clnr Tail A	370	1.33	0.17	0.43	6.34	–	–	0.6	1.2	2.9		
Ni 1st Clnr Tail B	533	1.92	0.15	0.44	4.95	–	–	0.8	1.8	3.3		
Ni 1st Clnr Tail C	577	2.08	0.15	0.45	5.25	–	–	0.9	1.9	3.8		
Ni 1st Clnr Tail D	571	2.06	0.13	0.41	6.29	–	–	0.8	1.7	4.5		
Ni 1st Clnr Tail E	558	2.01	0.13	0.45	7.51	18.3	19.7	0.7	1.9	5.3		
Ni 1st Clnr Tail F	625	2.25	0.12	0.45	6.99	18.5	21.4	0.8	2.1	5.5		
Ni 1st Clnr Tail G	594	2.14	0.14	0.53	7.96	18.7	20.0	0.9	2.3	5.9		
Ni Scav Tail A	3192	11.50	0.04	0.12	1.20	–	–	1.3	2.9	4.8		
Ni Scav Tail B	3282	11.82	0.04	0.13	0.99	–	–	1.3	3.2	4.1		
Ni Scav Tail C	3171	11.42	0.03	0.13	0.74	–	–	1.0	3.1	2.9		
Ni Scav Tail D	3154	11.36	0.04	0.15	1.10	–	–	1.3	3.5	4.4		
Ni Scav Tail E	3205	11.54	0.03	0.13	1.12	10.3	23.5	1.0	3.1	4.5		
Ni Scav Tail F	3206	11.55	0.04	0.13	1.20	10.5	24.1	1.3	3.1	4.8		
Ni Scav Tail G	3252	11.71	0.03	0.13	1.14	10.4	23.9	1.0	3.2	4.7		
Head (calc.)	27765	100.0	0.35	0.48	2.87			100.0	100.0	100.0		
(direct)			0.33	0.42	2.53	11.9	22.8					

Test: LCT-1

Overall Stability

Total Products Out Per Cycle		Weight Wt %	Units out as a % of Units in/Cycle Cu	Ni	S
Cycle A	1	91.9	90.4	68.8	75.2
Cycle B	2	98.6	89.6	84.8	75.3
Cycle C	3	97.0	88.8	86.5	71.5
Cycle D	4	97.8	105.6	108.8	98.9
Cycle E	5	98.3	94.0	97.0	100.6
Cycle F	6	100.0	100.8	100.3	104.8
Cycle G	7	99.8	92.1	97.7	101.9

Average of F - G	99.9	96.5	99.0	103.3	
Average of E - G*	99.4	95.6	98.3	102.4	** chosen for prediction*
Average of D - G	99.0	98.1	101.0	101.5	



Metallurgical Balance

Product	Weight g	%	Assays, % Cu	Ni	S	other	Cp	Pn	Po	Ga	% Distribution Cu	Ni	S	Cp	Pn	Po	Ga
Cu Conc	274.6	1.00	**23.2**	**0.88**	28.3	47.6	67.1	2.4	10.5	20.0	57.8	1.1	7.9	57.8	1.2	1.6	0.2
Cu Rougher Tail (Ni Conc.)	492.1	1.78	2.55	14.4	26.7	56.4	7.4	42.0	26.5	24.2	11.4	33.5	13.4	11.4	37.2	7.3	0.5
Ni 3rd Clnr Conc	132.1	0.48	**3.24**	**7.03**	27.2	62.5	9.4	19.8	45.1	25.7	3.9	4.4	3.7	3.9	4.7	3.3	0.1
Ni 1st Clnr Tail	4146	15.0	0.13	0.48	7.48	91.9	0.4	1.0	18.2	80.5	4.9	9.3	31.6	4.9	7.2	42.4	13.0
Ni Scav Tail	22547	81.7	0.03	0.13	1.15	98.7	0.1	0.2	2.74	97.0	6.8	13.8	26.5	6.8	7.8	34.7	85.5
Total Ni Conc.	624.2	2.26	**2.69**	**12.9**	26.8	57.7	7.8	37.3	30.4	24.5	15.2	37.9	17.0	15.2	41.9	10.7	0.6
Head (calc.)	27592	100.0	0.40	0.77	3.56	95.3	1.2	2.0	6.45	92.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												

Test: LCT-2 **Project No.**:50149-001 **Operator**: YW & Max **Date**: 05-Apr-12

Purpose: To conduct a Locked Cycle Test on **Master composite**

Procedure: As outlined below.

Feed: 6 x 2 kg of minus 10 mesh master composite.

Grind: 57 minutes / 2 kg @ 65% solids in laboratory Ball Mill Rghr Tail F K_{80} = 114 µm

Regrind: N/A Cln 1 Tail K_{80} = 38 µm

Conditions: Cycle A and B:

	Reagents added, g/t						Time, minutes					
Stage	**3477**	**SIPX**	**MIBC***	**CMC**	**Guar Gum**	**DF 250**	**4037**	**Grind**	**Cond.**	**Froth**	**pH**	**Eh**
Grind	10	-	-	-	-	-		57				
Condition	-	-	-	-	-	-			1		9.3	190.0
Rougher 1	-	-	10	-	-	-			1	2	9.3	182.0
Rougher 2	-	5	5	-	-	-			1	2	9.2	158.0
Rougher 3	-	10	5	-	-	-			1	4	9.2	150.0
Rougher 4	-	20	5	-	-	-			1	6	9.1	134.0
Use Rghr Tail F												
Magnetic separation(Cycle F)												
Regrind Mag. Conc.							20	20				
Mag. Rougher float									1	4		
1st Cleaner	-	5		24	24				1	8	8.8	68.2
2nd Cleaner	-	-	5	12	12				1	6	8.6	85.1
3rd Cleaner	-	-	5	2.5	2.5				1	4	8.4	89.2
Use 1st Clnr Tail (CycleF)												
Regrind							20	20				
1st Clnr Regrind Float									1	4		
Total	10	40	35	39	39		40	97	10	40	.	.
		240	210	231	231							

Stage	Roughers	1stClnr and Scav.	2nd, 3rd Cleaner
Flotation Cell	1000g-D12	500-g D12	250-g D12
Speed: rpm	1800	1600	1100

Assay for: Cu, Ni,S, Pt, Pd, Au, Fe, MgO

PSA Tails F

Test: LCT-2

Metallurgical Prediction (Using Cycles C, D, E, F)

Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	Mgo	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Clnr Concentrate	85.25	4.36	6.99	7.13	19.4	2.44	6.80	0.54	25.4	9.82	84.9	63.4	29.2	26.4	64.4	62.9	—	—
Cleaner Tail	249.5	12.8	0.11	0.44	3.59	0.70	0.41	0.03	—	—	3.9	11.3	15.8	22.2	11.5	9.3	—	—
Rougher Tail	1619.6	82.9	0.05	0.15	1.93	0.25	0.13	0.01	—	—	11.2	25.3	55.0	51.4	24.1	27.8	—	—
1st Cleaner Regrind Con F	27.4	0.23	0.51	1.40	4.55	2.17	1.73	0.20	—	—	0.3	0.7	0.4	1.2	0.9	1.2	—	—
Magnetic Con F	37.6	0.32	0.28	0.45	3.33	1.40	1.38	0.21	—	—	0.2	0.3	0.4	1.1	1.0	1.8	—	—
Head (calc.)	1954.3	100.0	0.36	0.49	2.90	0.40	0.46	0.04	—	—	100	100	100	100	100	100	—	—
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Metallurgical Balance

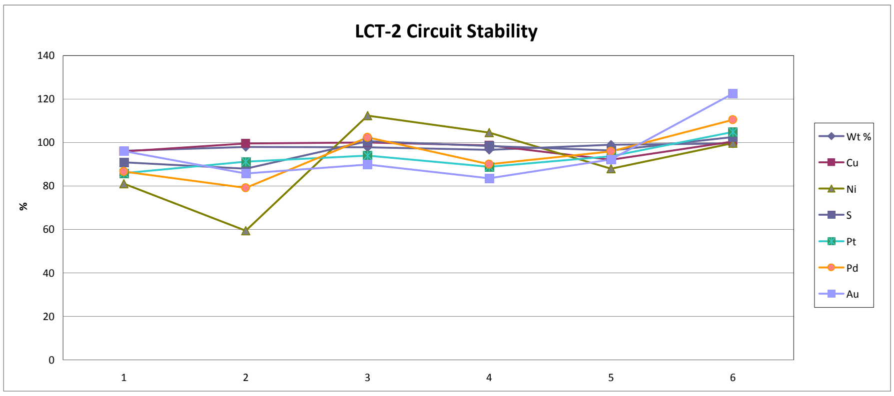
Product	Weight		Assays, (Pt, Pd, Au g/t), (Cu, Ni, Fe, MgO %)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	Mgo	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
3rd Cleaner Conc. A	57.7	0.48	10.1	8.02	23.2	2.74	8.30	0.81	28.4	5.73	13.5	8.1	3.9	3.2	8.8	10.4	14.2	8.3
3rd Cleaner Conc. B	45.6	0.38	13.1	3.83	21.2	2.82	8.03	0.85	26.9	6.81	13.9	3.1	2.8	2.6	6.8	8.6	10.6	7.8
3rd Cleaner Conc. C	71.8	0.60	8.39	9.82	24.0	2.66	7.99	0.62	29.7	5.93	14.0	12.4	5.0	3.9	10.6	9.9	18.5	10.7
3rd Cleaner Conc. D	87.6	0.73	6.91	7.72	20.3	2.18	5.94	0.41	27.1	8.47	14.1	11.9	5.2	3.8	9.6	7.9	20.6	18.6
3rd Cleaner Conc. E	75.9	0.64	7.28	6.48	19.6	2.54	7.28	0.61	25.0	9.92	12.8	8.6	4.3	3.9	10.2	10.2	16.5	18.9
3rd Cleaner Conc. F	105.7	0.89	5.90	5.28	15.5	2.43	6.36	0.54	21.4	13.5	14.5	9.8	4.8	5.2	12.4	12.7	19.6	35.8
3rd Cleaner Tail F	74.0	0.62	0.68	3.46	7.50	2.08	2.29	0.14			1.2	4.5	1.6	3.1	3.1	2.3	0.0	0.0
2nd Cleaner Tail F	183.1	1.53	0.25	1.46	4.26	1.04	0.82	0.07			1.1	4.7	2.3	3.8	2.8	2.7	0.0	0.0
1st Cleanr Tails A	199.6	1.67	0.11	0.37	3.04	0.69	0.39	0.03			0.5	1.3	1.8	2.8	1.4	1.2	0.0	0.0
1st Cleanr Tails B	248.8	2.08	0.14	0.50	3.13	0.72	0.45	0.02			0.8	2.2	2.3	3.6	2.1	1.3	0.0	0.0
1st Cleanr Tails C	235.3	1.97	0.14	0.49	3.57	0.75	0.55	0.03			0.8	2.0	2.5	3.6	2.4	1.5	0.0	0.0
1st Cleanr Tails D	222.9	1.87	0.10	0.33	3.11	0.63	0.34	0.02			0.5	1.3	2.0	2.8	1.4	1.0	0.0	0.0
1st Cleanr Tails E	278.0	2.33	0.10	0.36	3.38	0.64	0.35	0.02			0.6	1.8	2.7	3.6	1.8	1.2	0.0	0.0
1st Cleanr Tails F (Calc)	261.8	2.19	0.10	0.56	4.24	0.78	0.43	0.04			0.6	2.6	3.2	4.1	2.1	2.3	0.0	0.0
1st Cleaner Regrind Con F	27.4	0.23	0.51	1.40	4.55	2.17	1.73	0.20			0.3	0.7	0.4	1.2	0.9	1.2	0.0	0.0
1st Cleaner Regrind Tail F	234.4	1.96	0.05	0.46	4.20	0.62	0.28	0.02			0.3	1.9	2.9	2.9	1.2	1.1	0.0	0.0
Rougher Tails A	1655.5	13.9	0.05	0.14	1.96	0.25	0.14	0.01			1.9	4.1	9.5	8.3	4.2	4.4	0.0	0.0
Rougher Tails B	1652.9	13.8	0.05	0.16	1.98	0.27	0.14	0.01			1.9	4.6	9.6	9.0	4.4	4.4	0.0	0.0
Rougher Tails C	1637.8	13.7	0.05	0.15	1.94	0.25	0.14	0.01			1.9	4.3	9.3	8.3	4.1	3.6	0.0	0.0
Rougher Tails D	1612.3	13.5	0.05	0.15	1.95	0.25	0.14	0.01			1.9	4.2	9.2	8.1	4.0	5.0	0.0	0.0
Rougher Tails E	1614.9	13.5	0.05	0.15	1.90	0.25	0.13	0.01			1.9	4.3	9.0	8.1	4.0	3.9	0.0	0.0
Rougher Tails F(Calc)	1613.2	13.5	0.04	0.15	1.92	0.25	0.13	0.02			1.7	4.2	9.1	8.2	3.9	5.4	0.0	0.0
Magnetic Con F	37.6	0.32	0.28	0.45	3.33	1.40	1.38	0.21			0.2	0.3	0.4	1.1	1.0	1.8	0.0	0.0
Magnetic Tail F	241.6	2.02	0.03	0.21	4.49	0.41	0.28	0.02			0.2	0.9	3.2	2.0	1.2	1.0	0.0	0.0
Rougher Tails F	1334.0	11.2	0.04	0.13	1.42	0.19	0.07	0.01			1.2	3.0	5.5	5.1	1.7	2.7	0.0	0.0
Head (calc.)	11934	100.0	0.36	0.48	2.87	0.42	0.45	0.04			100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Overall Stability

Total Products Out Per Cycle	Weight		Units out as a % of Units in/Cycle							
		Wt %	Cu	Ni	S	Pt	Pd	Au	Fe	Mgo
Cycle A	1	96.2	95.8	81.0	90.9	85.8	86.6	96.0	85.3	49.7
Cycle B	2	97.9	99.6	59.4	87.9	91.2	79.1	85.7	63.8	46.7
Cycle C	3	97.8	100.0	112.4	100.6	94.0	102.3	89.8	111.0	64.0
Cycle D	4	96.7	98.7	104.5	98.4	88.8	90.1	83.5	123.5	111.6
Cycle E	5	99.0	92.1	87.9	96.3	93.7	95.9	92.2	98.7	113.3
Cycle F	6	99.6	100.4	99.6	102.5	104.8	110.5	122.5	117.7	214.6

Average of E - F	99.3	96.3	93.8	99.4	99.3	103.2	107.4	108.2	164.0
Average of D - F	98.4	97.1	97.4	99.1	95.8	98.8	99.4	113.3	146.5
Average of C - F*	98.3	97.8	101.1	99.4	95.3	99.7	97.0	112.7	125.9

** chosen for prediction*



Test: LCT-3 **Project:** 50149-001 **Date:** 17-Apr-12 **Operator:** YW/Wei

Purpose: Split flowsheet -Repeat LCT-1, No Cu/Ni Separation

Procedure: As below.

Feed: 6 x 2-kg of -10 mesh **Master Composite**

Grind: 69 minutes /2 kg at 65% solids in the lab ball mill

Regrind 10 minutes in the pebble mill

Ni Scav Tail C K_{80} : 83 µm
Ni Scav Tail D K_{80} : 80 µm
Ni regrind K80: 29 µm

Conditions:

	Reagents added, grams per tonne						Time, minutes					
Stage	**Lime**	**SIPX**	**CuSO4**	**CMC**	**Guar**	**MIBC***	**Grind**	**Cond.**	**Froth**	**pH**	**Eh**	
Grind	-	-	-	-	-	-	69					
Bulk Rougher 1	-	15	-	-	-	12		1	3	8.6	107.8	
Bulk Rougher 2	-	20	-	-	-	6		1	3	8.6	76.4	
Ni Scav 1	-	30	-	-	-	2		1	4	8.7	75.0	
Ni Scav 2	-	30	-	-	-	2		1	4	8.7	30.0	
Ni Scav 3	-	30	-	-	-	1		1	4	8.7	25.0	
		4037										
Magnetic Separation on Ni Scav Tail												
Regrind Magnetic Concentrate		20		2	2		20					
Rougher - Magnetic		20		2	2			1	3			
Cleaner - Magnetic									2			
Bulk Cleaner *(Combine Ro Conc 1-2)*		**SIPX**										
Bulk 1st Cleaner 1	-	-	-	12	12	-			2	8.5	78.1	
Bulk 1st Cleaner 2	-	10	-	-	-	-			2	8.4	9.8	
Bulk 2nd Cleaner 1	-	-		7	7	-			2	8.4	44.0	
Bulk 2nd Cleaner 2	-	5	-	-	-	-			2	8.4	50.0	
Ni Cleaner *(Combine Scav Conc 1-3)*			CuSO4									
Ni 1st Cleaner 1	-	20		15	15	-		1	3	8.7	85.0	1st cycle: 20 CMC / 20 Guar
Ni 1st Cleaner 2	-	10	-	-	-	-		1	3	8.7	55.0	
			-	-	-	-						
Regrind (PM)	-	-	-	-	-	-	10					1st cycle: 20min
Ni 2nd Cleaner	-	40+20	100	5	5	-		1	2+2	8.1	150.0	1st cycle: 50 SIPX / 40 A4037
Ni 3rd Cleaner	-	20+40	0+100	2	2	2		1	3+2	8.3	125.0	1st cycle: 20 SIPX / 50 CuSO4; 2nd cycle: 20 SIPX / 2 CMC / 2 Guar .
Total	0	4247	100	45	45	25	99	10	37			

*As needed

Stage	Rougher	2nd clnr	3rd clnr
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

PSA On Ni Regrind
PSA Tails E
PSA Tails F

Test: LCT-3

Metallurgical Prediction (Using Cycles D, E, F)

Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Bulk Clnr 2 Conc.	55.3	2.78	11.0	9.28	27.2	3.39	10.3	0.80	31.6	4.13	83.5	57.6	25.9	22.7	62.9	50.3	–	–
Ni 3rd Clnr Conc.	46.9	2.36	0.59	1.78	12.8	3.55	1.45	0.11	22.4	17.9	3.8	9.4	10.3	20.2	7.5	6.1	–	–
Ni 1st Clnr Tail	312.4	15.7	0.10	0.34	4.41	0.66	0.41	0.03	–	–	4.3	12.1	23.8	24.9	14.1	12.1	–	–
Ni Scav Tail	1388.1	69.9	0.04	0.11	1.06	0.14	0.06	0.02	–	–	7.6	16.6	25.4	24.1	9.5	25.4	–	–
Magnetic Clnr Conc.	4.2	0.21	0.85	1.22	8.93	6.19	5.41	0.52	24.4	18.4	0.5	0.6	0.7	3.2	2.5	2.5	–	–
Magnetic Rghr Tail	178.6	9.00	0.01	0.19	4.50	0.23	0.18	0.02	–	–	0.2	3.7	13.8	4.9	3.5	3.6	–	–
Combined Conc.	106.4	5.36	6.01	5.66	20.1	3.57	6.22	0.48	–	–	87.8	67.6	36.9	46.0	72.9	58.9	–	–
Head (calc.)	1985.5	100	0.37	0.45	2.92	0.42	0.46	0.04	–	–	100	100	100	100	100	100	–	–

Metallurgical Balance

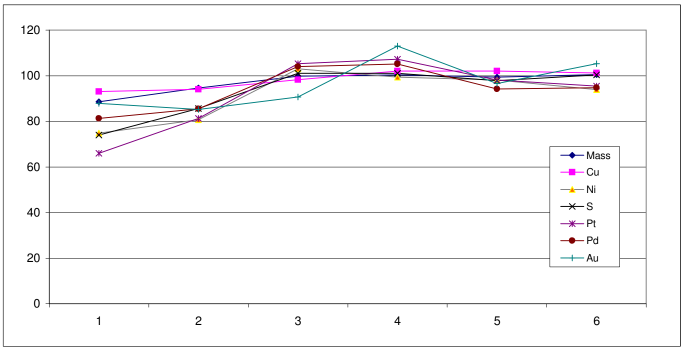
Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Bulk Clnr 2 Conc A	54.5	0.46	10.8	8.54	25.9	3.26	10.6	0.80	30.4	4.89	13.7	8.5	4.0	3.6	10.4	8.8	10.9	5.15
Bulk Clnr 2 Conc B	51.6	0.43	11.3	8.56	27.2	3.40	10.6	0.74	31.5	4.11	13.6	8.0	4.0	3.6	9.8	7.6	10.7	4.10
Bulk Clnr 2 Conc C	61.3	0.51	9.54	9.55	26.6	3.30	10.3	0.60	31.4	4.63	13.6	10.6	4.7	4.1	11.4	7.3	12.7	5.49
Bulk Clnr 2 Conc D	56.5	0.47	10.7	9.50	27.4	3.65	10.9	0.80	31.9	4.03	14.1	9.8	4.4	4.2	11.1	9.0	11.9	4.40
Bulk Clnr 2 Conc E	56.6	0.48	10.9	9.30	27.2	3.25	9.69	0.72	31.7	4.39	14.4	9.6	4.4	3.7	9.9	8.1	11.8	4.80
Bulk Clnr 2 Conc F	52.7	0.44	11.4	9.03	27.1	3.25	10.4	0.88	31.2	3.95	14.0	8.6	4.1	3.5	9.9	9.3	10.8	4.02
Bulk 2nd Clnr Tail F	49.1	0.41	0.45	5.47	12.2	2.36	2.99	0.11			0.5	4.9	1.7	2.3	2.6	1.1	0.0	0.00
Bulk 1st Clnr Tail F	126	1.06	0.14	0.94	4.21	1.22	0.81	0.05			0.4	2.1	1.5	3.1	1.8	1.1	0.0	0.00
Ni 3rd Clnr Conc A	3.0	0.03	1.50	1.70	14.2	4.06	2.44	0.40	24.6	15.6	0.1	0.1	0.1	0.2	0.1	0.2	0.5	0.90
Ni 3rd Clnr Conc B	7.4	0.06	1.52	3.27	16.1	6.38	3.09	0.35	25.3	15.5	0.3	0.4	0.3	1.0	0.4	0.5	1.2	2.22
Ni 3rd Clnr Conc C	36.5	0.31	0.68	1.98	12.4	4.41	1.67	0.16	21.2	18.9	0.6	1.3	1.3	3.3	1.1	1.1	5.1	13.33
Ni 3rd Clnr Conc D	45.7	0.38	0.58	1.69	12.7	3.54	1.42	0.10	22.4	17.6	0.6	1.4	1.7	3.3	1.2	0.9	6.8	15.55
Ni 3rd Clnr Conc E	48.9	0.41	0.55	1.78	13.1	3.50	1.43	0.12	22.7	18.0	0.6	1.6	1.8	3.5	1.3	1.2	7.3	17.01
Ni 3rd Clnr Conc F	46.0	0.39	0.65	1.88	12.6	3.61	1.51	0.12	22.1	18.2	0.7	1.6	1.7	3.4	1.3	1.1	6.7	16.18
Ni 3rd Clnr Tail F	10.5	0.09	0.40	0.57	9.58	1.05	0.61	0.07			0.1	0.1	0.3	0.2	0.1	0.1	0.0	0.00
Ni 2nd Clnr Tail F	83.3	0.70	0.24	0.60	9.49	0.85	0.59	0.05			0.5	0.9	2.3	1.4	0.9	0.8	0.0	0.00
Ni 1st Clnr Tail A	188	1.58	0.08	0.27	4.57	0.70	0.32	0.03			0.4	0.9	2.5	2.7	1.1	1.2	0.0	0.00
Ni 1st Clnr Tail B	253	2.13	0.07	0.33	5.00	0.71	0.34	0.03			0.4	1.5	3.6	3.6	1.5	1.6	0.0	0.00
Ni 1st Clnr Tail C	336	2.82	0.10	0.34	4.46	0.70	0.40	0.03			0.8	2.1	4.3	4.8	2.4	2.1	0.0	0.00
Ni 1st Clnr Tail D	338	2.84	0.11	0.36	4.48	0.70	0.44	0.04			0.9	2.2	4.3	4.8	2.7	2.6	0.0	0.00
Ni 1st Clnr Tail E	287	2.41	0.09	0.33	4.14	0.66	0.41	0.03			0.6	1.7	3.4	3.8	2.1	1.7	0.0	0.00
Ni 1st Clnr Tail F	313	2.63	0.10	0.34	4.59	0.61	0.38	0.03			0.7	1.9	4.1	3.9	2.1	2.0	0.0	0.00
Ni Scav Tail A	1374	11.5	0.04	0.10	0.98	0.14	0.06	0.01			1.3	2.5	3.9	3.9	1.5	3.0	0.0	0.00
Ni Scav Tail B	1387	11.6	0.04	0.11	1.00	0.15	0.06	0.01			1.3	2.8	4.0	4.2	1.5	2.8	0.0	0.00
Ni Scav Tail C	1372	11.5	0.04	0.10	1.07	0.15	0.06	0.01			1.3	2.5	4.2	4.2	1.5	3.3	0.0	0.00
Ni Scav Tail D	1381	11.6	0.04	0.10	1.04	0.15	0.06	0.02			1.3	2.5	4.1	4.2	1.6	5.0	0.0	0.00
Ni Scav Tail E	1377	11.6	0.04	0.11	1.04	0.14	0.06	0.02			1.3	2.8	4.1	3.9	1.4	4.1	0.0	0.00
Ni Scav Tail F	1406	11.8	0.04	0.11	1.11	0.14	0.07	0.02			1.3	2.8	4.5	4.0	1.6	4.2	0.0	0.00
Magnetic Clnr Conc. A	1.1	0.01	0.74	1.24	11.1	4.63	5.14	2.92	30.4	14.8	0.0	0.0	0.0	0.1	0.1	0.6	0.2	0.31
Magnetic Clnr Conc. B	2.0	0.02	0.78	1.28	10.3	5.46	5.11	1.22	29.1	15.5	0.0	0.0	0.1	0.2	0.2	0.5	0.4	0.60
Magnetic Clnr Conc. C	4.4	0.04	0.72	1.18	9.43	5.60	4.80	0.65	27.8	16.8	0.1	0.1	0.1	0.5	0.4	0.6	0.8	1.43
Magnetic Clnr Conc. D	3.6	0.03	1.10	1.48	10.5	7.92	7.03	0.80	26.8	17.1	0.1	0.1	0.1	0.6	0.5	0.6	0.6	1.19
Magnetic Clnr Conc. E	4.3	0.04	0.78	1.22	8.91	6.08	5.17	0.46	23.2	18.9	0.1	0.1	0.1	0.5	0.4	0.4	0.7	1.57
Magnetic Clnr Conc. F	4.8	0.04	0.73	1.03	7.77	4.98	4.42	0.37	23.8	18.8	0.1	0.1	0.1	0.5	0.4	0.4	0.8	1.74
Magnetic Clnr Tail F	68	0.57	0.04	0.26	4.66	0.50	0.34	0.03			0.1	0.3	0.9	0.7	0.4	0.4	0.0	0.00
Magnetic Rghr Tail A	135	1.13	<0.01	0.19	4.69	0.18	0.15	0.03			0.0	0.5	1.8	0.5	0.4	0.8	0.0	0.00
Magnetic Rghr Tail B	175	1.47	0.02	0.20	4.49	0.27	0.23	0.04			0.1	0.6	2.2	1.0	0.7	1.2	0.0	0.00
Magnetic Rghr Tail C	169	1.42	<0.01	0.18	4.65	0.22	0.19	0.02			0.0	0.6	2.3	0.8	0.6	0.6	0.0	0.00
Magnetic Rghr Tail D	167	1.41	0.01	0.19	4.58	0.25	0.19	0.02			0.0	0.6	2.2	0.8	0.6	0.7	0.0	0.00
Magnetic Rghr Tail E	197	1.66	<0.01	0.18	4.31	0.22	0.18	0.02			0.0	0.6	2.4	0.9	0.6	0.6	0.0	0.00
Magnetic Rghr Tail F	171	1.44	<0.01	0.19	4.63	0.21	0.17	0.02			0.0	0.6	2.3	0.7	0.5	0.7	0.0	0.00
Head (calc.)	11904	100.0	0.36	0.46	2.93	0.41	0.47	0.04	1.27	0.43	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Test: LCT-3

Overall Stability

Total Products Out Per Cycle	Weight		Units out as a % of Units in/Cycle					
		Wt %	Cu	Ni	S	Pt	Pd	Au
Cycle A	1	88.5	93.0	74.8	74.0	66.0	81.2	87.9
Cycle B	2	94.5	94.1	80.6	85.6	81.2	85.5	85.2
Cycle C	3	99.8	98.3	103.0	101.0	105.2	104.0	90.7
Cycle D	4	100.4	102.0	99.3	101.1	107.2	105.1	113.0
Cycle E	5	99.3	102.1	98.2	97.8	98.0	94.2	96.5
Cycle F	6	100.5	101.2	93.9	100.3	95.4	94.8	105.3

Average of E - F	99.9	101.6	96.0	99.0	96.7	94.5	100.9	
Average of D - F*	100.1	101.8	97.1	99.7	100.2	98.0	104.9	** chosen for prediction*
Average of C - F	100.0	100.9	98.6	100.0	101.5	99.5	101.4	



Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk Clnr 2 Conc.	55.3	2.78	**11.0**	**9.3**	**27.2**	52.5	31.8	26.9	18.7	22.6	84.1	60.2	30.3	84.1	70.9	11.3	0.7
Ni 3rd Clnr Conc.	46.9	2.36	**0.6**	**1.8**	**12.8**	84.8	1.7	4.7	27.6	66.0	3.8	9.8	12.1	3.8	10.4	14.1	1.9
Ni 1st Clnr Tail	312.4	15.7	**0.1**	**0.3**	**4.4**	95.1	0.3	0.7	10.6	88.4	4.4	12.6	27.8	4.4	10.4	36.0	16.6
Ni Scav Tail	1388	69.9	**0.0**	**0.1**	**1.1**	98.8	0.1	0.1	2.5	97.2	7.7	17.4	29.8	7.7	8.3	38.5	80.8
Magnetic Clnr Conc.	4	0.2	**0.9**	**1.2**	**8.9**	89.0	2.5	3.2	18.2	76.2	0.5	0.6	0.8	0.5	0.6	0.8	0.2
Magnetic Rghr Tail	179	9.0	**0.0**	**0.2**	**4.5**	95.3	0.0	0.2	11.4	88.3	0.2	3.9	16.2	0.2	1.8	22.3	9.4
Head (calc.)	1986	100.0	0.36	0.43	2.50	96.7	1.1	1.1	4.62	84.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												

Test: LCT-4 **Project:** 50149-001 **Date:** April 18.2012 **Operator:** Yonika\Wei

Purpose: Split flowsheet

Procedure: As below.

Feed: 6 x2kg of -10 mesh **HNI Composite**

Grind: 64 minutes /2 kg at 65% solids in the lab ball mill

Regrind (Ni Ro Sc) 10 minutes in the pebble mill

Conditions:

Ni Scav Tail E K_{80} : 75 µm

Ni Scav Tail F K_{80} : 75 µm

Ni regrind K80: 32 µm

	Reagents added, grams per tonne						Time, minutes					
Stage	**Lime**	**SIPX**	**CuSO4**	**CMC**	**Guar**	**MIBC***	**Grind**	**Cond.**	**Froth**	**pH**	**Eh**	
Grind	-	-	-	-	-	-	64					
Bulk Rougher 1	-	15	-	-	-	18		1	3	8.5	3.0	
Bulk Rougher 2	-	20	-	-	-	6		1	3	8.5	0.9	
Ni Scav 1	-	20	-	-	-	2		1	4	8.6	30.0	
Ni Scav 2	-	20	-	-	-	2		1	4	8.6	50.0	
Ni Scav 3	-	20	-	-	-	1		1	4	8.6	50.0	
		4037										
Magnetic Separation on Ni Scav Tail									12			
Regrind Magnetic Concentrate		20					20					
Rougher - Magnetic		10		5	5			1	3			
Cleaner - Magnetic									2			
Bulk Cleaner *(Combine Ro Conc 1-2)*		**SIPX**										
Bulk 1st Cleaner 1	-	-	-	15	15	2			2	8.4	-15.0	
Bulk 1st Cleaner 2	-	5	-	-	-	2			3	8.2	12.4	Cycle E and F: 10 g/t SIPX
Bulk 2nd Cleaner 1	-			7	7	4			2	8.2	61.7	
Bulk 2nd Cleaner 2	-	5	-	-	-	4			3	8.2	-24.1	
Ni Cleaner *(Combine Scav Conc 1-3)*												
Ni 1st Cleaner 1	-	10		10	10	-		1	3	8.6	100.0	1st cycle: 15 CMC / 15 Guar
Ni 1st Cleaner 2	-	10	-	-	-	-		1	3	8.6	75.0	
			-	-	-	-						
Regrind (PM)	-	-	-	-	-	-	10					
Ni 2nd Cleaner	-	5+5	-	2	2	2		1	2+2	8.7	200.0	
Ni 3rd Cleaner	-		-			-		1	3	8.2	180.0	
Total	0	4192	0	39	39	43	94	10	54			

*As needed

Stage	Rougher	2nd clnr	3rd clnr	
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12	
Speed: r.p.m.	1500	1600	1200	

PSA On Ni Regrind

PSA Tails E

PSA Tails F

Test: LCT-4

Metallurgical Prediction (Using Cycles D, E, F)

Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Bulk Clnr 2 Conc.	117.8	5.99	7.57	9.27	30.2	2.51	6.15	0.71	36.6	2.03	82.8	66.9	26.9	26.3	64.4	55.6	–	–
Ni 3rd Clnr Conc.	24.3	1.23	2.07	3.83	18.8	4.10	2.77	0.32	28.1	12.6	4.7	5.7	3.4	8.9	6.0	5.2	–	–
Ni 1st Clnr Tail	325.0	16.5	0.18	0.64	12.7	1.06	0.45	0.05	–	–	5.3	12.7	31.3	30.8	13.1	9.9	–	–
Ni Scav Tail	1338.6	68.0	0.05	0.15	3.06	0.22	0.08	0.03	–	–	6.2	12.3	31.0	26.3	10.0	25.2	–	–
Magnetic Clnr Conc.	4.0	0.2	1.26	1.22	10.9	6.94	6.39	0.55	26.5	16.4	0.5	0.3	0.3	2.5	2.3	1.5	–	–
Magnetic Rghr Tail	157.8	8.0	0.03	0.22	5.96	0.37	0.30	0.03	–	–	0.5	2.1	7.1	5.2	4.2	2.8	–	–
Combined Conc.	146.1	7.42	6.48	8.15	27.8	2.89	5.59	0.64	–	–	88.0	72.9	30.7	37.7	72.6	62.2	–	–
Head (calc.)	1967.6	100	0.55	0.83	6.73	0.57	0.57	0.08	–	–	100	100	100	100	100	100	–	–

Metallurgical Balance

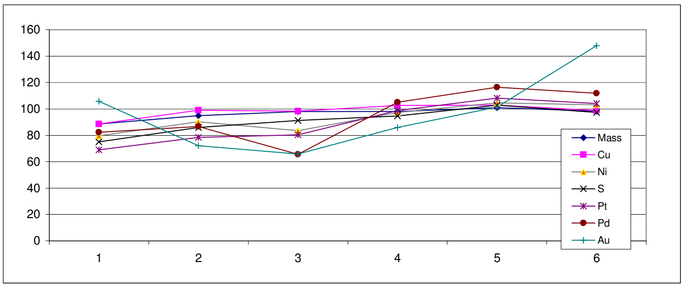
Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								% Distribution							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Bulk Clnr 2 Conc A	106.6	0.90	7.73	9.17	29.0	2.11	5.47	0.96	36.4	2.35	12.9	10.2	3.8	3.5	9.6	12.6	13.1	5.96
Bulk Clnr 2 Conc B	126.2	1.06	7.06	8.49	29.4	2.19	4.64	0.45	36.6	2.85	14.0	11.1	4.6	4.3	9.6	7.0	15.6	8.56
Bulk Clnr 2 Conc C	93.8	0.79	9.01	8.97	29.1	1.12	2.94	0.37	36.0	2.17	13.3	8.7	3.4	1.6	4.5	4.3	11.4	4.85
Bulk Clnr 2 Conc D	112.4	0.94	8.07	9.19	29.8	2.38	5.90	0.50	36.3	2.18	14.2	10.7	4.1	4.1	10.9	7.0	13.8	5.83
Bulk Clnr 2 Conc E	122.0	1.02	7.43	9.12	30.6	2.59	6.26	0.67	36.5	2.04	14.2	11.6	4.6	4.9	12.6	10.1	15.1	5.93
Bulk Clnr 2 Conc F	118.9	1.00	7.24	9.51	30.2	2.54	6.27	0.95	37.1	1.88	13.5	11.7	4.4	4.7	12.3	14.0	14.9	5.32
Bulk 2nd Clnr Tail F	61.4	0.52	0.38	3.42	22.2	2.00	1.32	0.10			0.4	2.2	1.7	1.9	1.3	0.7	0.0	0.00
Bulk 1st Clnr Tail F	118	0.99	0.26	1.29	12.3	1.31	0.66	0.06			0.5	1.6	1.8	2.4	1.3	0.8	0.0	0.00
Ni 3rd Clnr Conc A	1.0	0.01	9.16	1.56	25.1	5.66	8.23	1.13	25.3	19.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.45
Ni 3rd Clnr Conc B	8.6	0.07	4.28	2.68	17.5	5.22	3.88	0.52	25.4	13.7	0.6	0.2	0.2	0.7	0.5	0.6	0.7	2.81
Ni 3rd Clnr Conc C	19.0	0.16	2.79	3.74	18.5	4.10	2.94	0.34	27.5	12.7	0.8	0.7	0.4	1.2	0.9	0.8	1.8	5.75
Ni 3rd Clnr Conc D	24.2	0.20	2.03	3.72	19.0	4.31	2.87	0.32	28.3	12.4	0.8	0.9	0.6	1.6	1.1	1.0	2.3	7.15
Ni 3rd Clnr Conc E	24.4	0.20	1.91	4.07	19.6	3.81	2.70	0.35	29.5	12.1	0.7	1.0	0.6	1.4	1.1	1.0	2.4	7.03
Ni 3rd Clnr Conc F	24.2	0.20	2.28	3.70	17.7	4.17	2.73	0.30	26.6	13.3	0.9	0.9	0.5	1.6	1.1	0.9	2.2	7.66
Ni 3rd Clnr Tail F	49.3	0.41	0.42	2.49	17.7	2.55	1.10	0.10			0.3	1.3	1.1	1.9	0.9	0.6	0.0	0.00
Ni 2nd Clnr Tail F	146.8	1.23	0.19	1.14	18.2	1.44	0.56	0.06			0.4	1.7	3.3	3.3	1.3	1.1	0.0	0.00
Ni 1st Clnr Tail A	165.1	1.39	0.18	0.46	10.6	0.90	0.36	0.05			0.5	0.8	2.2	2.3	1.0	1.0	0.0	0.00
Ni 1st Clnr Tail B	248.0	2.08	0.18	0.52	11.2	0.62	0.26	0.03			0.7	1.3	3.4	2.4	1.1	0.8	0.0	0.00
Ni 1st Clnr Tail C	333.5	2.80	0.20	0.62	12.0	0.99	0.47	0.05			1.0	2.1	5.0	5.1	2.6	2.1	0.0	0.00
Ni 1st Clnr Tail D	303.8	2.55	0.18	0.65	12.8	1.08	0.47	0.05			0.9	2.1	4.8	5.1	2.4	1.8	0.0	0.00
Ni 1st Clnr Tail E	335.5	2.82	0.18	0.66	12.9	1.10	0.47	0.05			0.9	2.3	5.4	5.7	2.6	1.9	0.0	0.00
Ni 1st Clnr Tail F	335.8	2.82	0.17	0.60	12.5	1.01	0.43	0.04			0.9	2.1	5.2	5.2	2.4	1.8	0.0	0.00
Ni Scav Tail A	1324.8	11.1	0.05	0.14	3.17	0.21	0.08	0.02			1.0	1.9	5.2	4.3	1.8	3.1	0.0	0.00
Ni Scav Tail B	1330.3	11.2	0.05	0.14	2.94	0.21	0.08	0.02			1.0	1.9	4.8	4.3	1.8	2.8	0.0	0.00
Ni Scav Tail C	1354.0	11.4	0.05	0.14	3.16	0.21	0.08	0.02			1.1	2.0	5.3	4.4	1.9	3.2	0.0	0.00
Ni Scav Tail D	1347.1	11.3	0.05	0.15	3.05	0.21	0.08	0.02			1.1	2.1	5.1	4.4	1.8	3.8	0.0	0.00
Ni Scav Tail E	1345.3	11.3	0.05	0.15	3.15	0.22	0.09	0.02			1.1	2.1	5.2	4.6	1.9	3.0	0.0	0.00
Ni Scav Tail F	1323.5	11.1	0.05	0.15	2.99	0.23	0.08	0.04			1.0	2.1	4.9	4.7	1.8	7.2	0.0	0.00
Magnetic Clnr Conc. A	12.3	0.10	0.46	0.58	7.14	2.99	2.67	0.25	24.3	17.6	0.1	0.1	0.1	0.6	0.5	0.4	1.0	5.15
Magnetic Clnr Conc. B	7.4	0.06	0.76	0.69	7.73	4.21	3.96	0.29	24.3	17.5	0.1	0.1	0.1	0.5	0.5	0.3	0.6	3.08
Magnetic Clnr Conc. C	2.5	0.02	2.02	1.78	12.3	8.62	8.48	0.71	27.8	15.8	0.1	0.0	0.0	0.3	0.3	0.2	0.2	0.94
Magnetic Clnr Conc. D	3.1	0.03	1.41	1.14	11.2	6.63	7.16	0.65	26.9	15.6	0.1	0.0	0.0	0.3	0.4	0.2	0.3	1.15
Magnetic Clnr Conc. E	5.0	0.04	1.26	1.33	11.1	7.53	6.09	0.46	26.7	16.3	0.1	0.1	0.1	0.6	0.5	0.3	0.5	1.94
Magnetic Clnr Conc. F	4.0	0.03	1.13	1.14	10.5	6.44	6.17	0.59	26.0	17.2	0.1	0.0	0.1	0.4	0.4	0.3	0.4	1.64
Magnetic Clnr Tail F	43.6	0.37	0.10	0.30	18.1	1.00	0.75	0.06	24.7	18.1	0.1	0.1	1.0	0.7	0.5	0.3	3.6	18.79
Magnetic Rghr Tail A	146.7	1.23	0.03	0.21	6.39	0.35	0.28	0.02			0.1	0.3	1.2	0.8	0.7	0.3	0.0	0.00
Magnetic Rghr Tail B	162.6	1.37	0.04	0.20	5.91	0.38	0.32	0.03			0.1	0.3	1.2	1.0	0.9	0.5	0.0	0.00
Magnetic Rghr Tail C	143.5	1.21	0.03	0.20	6.24	0.34	0.29	0.02			0.1	0.3	1.1	0.8	0.7	0.4	0.0	0.00
Magnetic Rghr Tail D	157.0	1.32	0.04	0.22	5.85	0.41	0.34	0.03			0.1	0.4	1.1	1.0	0.9	0.5	0.0	0.00
Magnetic Rghr Tail E	170.3	1.43	0.03	0.22	5.96	0.34	0.28	0.03			0.1	0.4	1.3	0.9	0.8	0.6	0.0	0.00
Magnetic Rghr Tail F	146.2	1.23	0.03	0.21	6.07	0.36	0.29	0.03			0.1	0.3	1.1	0.8	0.7	0.5	0.0	0.00
Head (calc.)	11908	100.0	0.53	0.81	6.79	0.54	0.51	0.07			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	6.45	0.57	0.61	0.10	18.1	19.8								

Test: LCT-4

Overall Stability

Total Products Out Per Cycle	Weight		Units out as a % of Units in/Cycle					
		Wt %	Cu	Ni	S	Pt	Pd	Au
Cycle A	1	88.5	88.5	79.7	74.9	69.0	82.2	105.8
Cycle B	2	94.9	99.0	90.2	85.9	78.4	86.6	72.0
Cycle C	3	98.1	98.2	83.6	91.2	80.3	65.6	65.9
Cycle D	4	98.1	102.6	97.2	94.7	98.8	105.0	85.8
Cycle E	5	100.9	102.9	104.6	102.8	108.3	116.5	101.3
Cycle F	6	98.4	98.8	103.2	97.3	104.1	111.7	147.9

	Wt %	Cu	Ni	S	Pt	Pd	Au	
Average of E - F	99.6	100.8	103.9	100.1	106.2	114.1	124.6	
Average of D - F*	99.1	101.4	101.7	98.3	103.7	111.1	111.7	* chosen for prediction
Average of C - F	98.9	100.6	97.2	96.5	97.9	99.7	100.3	



Metallurgical Balance

Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Bulk Clnr 2 Conc.	117.8	5.99	**7.57**	**9.27**	29.9	53.2	21.9	26.6	34.9	16.5	83.6	68.6	28.8	83.6	78.1	16.2	1.3
Ni 3rd Clnr Conc.	24.3	1.23	2.07	3.83	18.8	75.3	6.0	10.6	34.1	49.3	4.7	5.8	3.7	4.7	6.4	3.3	0.8
Ni 1st Clnr Tail	325.0	16.5	**0.18**	**0.64**	12.7	86.5	0.5	1.2	31.5	66.8	5.4	13.0	33.9	5.4	9.8	40.2	14.7
Ni Scav Tail	1339	68.0	0.05	0.15	3.06	96.7	0.1	0.2	7.7	92.0	6.3	12.6	33.6	6.3	5.7	40.3	83.2
Magnetic Clnr Conc.	4	0.2	1.26	1.22	10.9	86.6	3.6	3.1	22.4	70.9	0.5	0.3	0.4	0.5	0.3	0.4	0.2
Magnetic Rghr Tail	158	8.0	0.03	0.22	5.96	93.8	0.1	0.2	15.1	84.5	0.5	2.1	7.7	0.5	1.0	9.4	9.0
Head (calc.)	1968	100.0	0.54	0.81	6.21	92.4	1.6	2.0	12.92	75.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.52	0.83	6.45												

Test: LCT-5 **Project:** 50149-001 **Date:** May 1 2012 **Operator:** YW/Wei
Purpose: Split flowsheet including Cu separation and Magnetic separation
Procedure: As below.
Feed: 6 x 2-kg of -10 mesh Master Composite
Grind: 69 minutes /2 kg at 65% solids in the lab ball mill
Regrind: 8 minutes in pebble mill

Ni Scav Tail F K_{80} : 87 µm
Ni regrind K80: 35 µm

Conditions:

Stage	*Reagents added, grams per tonne*						Time, minutes					
Stage	**Lime**	**SIPX**	**CuSO4**	**CMC**	**Guar**	**MIBC***	**Grind**	**Cond.**	**Froth**	**pH**	**Eh**	
Grind	-	-	-	-	-	-	69					
Bulk Rougher 1	-	15	-	-	-	12		1	3	8.7	2.4	
Bulk Rougher 2	-	20	-	-	-	6		1	3	8.7	2.7	
Ni Scav 1	-	30	-	-	-	2		1	4	8.7	50.0	
Ni Scav 2	-	30	-	-	-	2		1	4	8.7	100.0	
Ni Scav 3	-	30	-	-	-	1		1	4	8.7	100.0	
	4037											
Magnetic Separation on Ni Scav Tail												
Regrind Magnetic Concentrate	20			2	2		20					
Rougher - Magnetic	5			2	2			1	3			
Cleaner - Magnetic									2			
Bulk Cleaner *(Combine Ro Conc 1-2)*												
Bulk 1st Cleaner 1	-	-	-	12	12	-			2	8.6	78.9	
Bulk 1st Cleaner 2	-	10	-	-	-	-			2			
Bulk 2nd Cleaner 1	-	-		7	7	-			2	8.4	84.4	
Bulk 2nd Cleaner 2	-	5	-	-	-	-			2			
Cu / Ni Separation												
Conditioner 1	450	-	-	-	-	-		5		10.5	-58.3	
Cu Rougher		5	-	-	-	-		1	2	11.0	-94.3	
Cu Cleaner 1	50	0	-	-	-	-		1	2	11.0	-89.7	Cycle 1 to 4: 2 g/t SIPX; Cycle 5 to 6: 0 g/t SIPX
Ni Cleaner *(Combine Scav Conc 1-3)*	**4037**											
Regrind (PM)	20	-	-	-	-	-	18					
Ni 1st Cleaner 1	-	20		18	18	-		1	4	8.8	100.0	1st/2nd: 15 CMC / 15 Guar; from 3rd: 18 CMC / 18 Guar
Ni 1st Cleaner 2	-	10	-	-	-	-		1	4	8.8	100.0	
			-	-	-	-						
Ni 2nd Cleaner	-	40+20	100	6	6	-		1	4+2	7.8	200.0	1st/2nd: 5 CMC / 5 Guar; from 3rd: 6 CMC / 6 Guar
Ni 3rd Cleaner	-	10		2	2			1	2	8.1	175.0	1st/2nd: 20 SIPX; from 3rd: 10 SIPX
Total	8619	185	100	49	49	23	107	17	45			

*As needed

Stage	Rougher	2nd clnr	3rd clnr & sep
Flotation Cell	2000 g D-12	500 g D-12	250 g D-12
Speed: r.p.m.	1500	1600	1200

PSA On Ni Regrind
PSA Tails F

Test: LCT-5

Metallurgical Prediction (Using Cycles E,F,G)

Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								Distribution, %							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Cu Clnr 1 Conc	27.0	1.36	19.1	1.37	25.5	2.51	6.06	1.41	28.8	4.75	74.1	4.2	12.2	8.3	17.8	31.5	–	–
Cu Rougher Tail (Ni Conc.)	32.8	1.66	1.66	14.3	25.0	3.63	12.0	0.45	30.8	5.58	7.9	53.7	14.6	14.6	42.8	12.3	–	–
Ni 3rd Clnr Conc	25.6	1.29	0.88	2.44	17.2	5.76	2.32	0.19	28.2	14.4	3.2	7.1	7.8	18.0	6.4	3.9	–	–
Ni 1st Clnr Tail	287.2	14.5	0.12	0.36	4.21	0.59	0.43	0.03	–	–	4.8	11.7	21.5	20.7	13.4	7.7	–	–
Ni Scav Tail	1403	70.9	0.04	0.11	1.11	0.15	0.07	0.01	–	–	8.1	17.6	27.6	25.7	10.4	11.7	–	–
Magnetic Cleaner Con	3	0.2	1.68	1.88	11.6	8.04	8.58	7.46	26.5	15.9	0.7	0.6	0.6	3.0	2.8	18.6	–	–
Magnetic Cleaner Tail	65	3.3	0.06	0.25	4.82	0.68	0.45	0.16	–	–	0.6	1.9	5.6	5.4	3.2	8.7	–	–
Magnetic Rougher Tail	136	6.9	0.03	0.20	4.20	0.26	0.22	0.05	–	–	0.6	3.1	10.1	4.3	3.2	5.5	–	–
Total Ni Conc.	61.4	3.10	1.34	8.75	21.1	4.73	7.81	0.68	29.5	9.77	11.8	61.5	23.0	35.6	52.1	34.8	–	–
Head (calc.)	1979.2	100	0.35	0.44	2.85	0.41	0.47	0.06	–	–	100	100	100	100	100	100	–	–

Metallurgical Balance

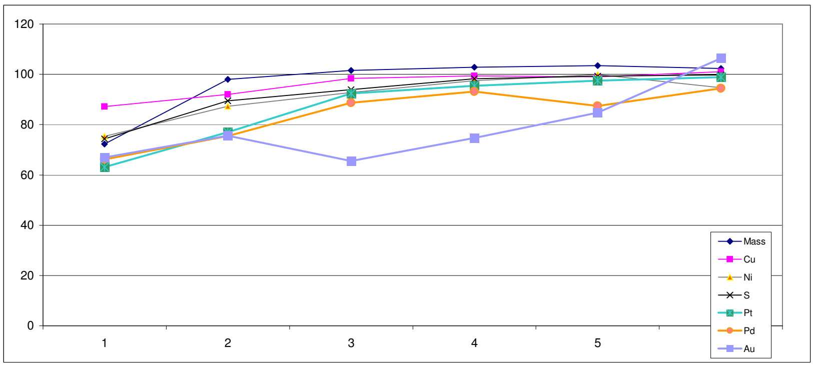
Product	Weight		Assays, (Cu, Ni, S, Fe, MgO %) (Pt, Pd, Au g/t)								Distribution, %							
	g	%	Cu	Ni	S	Pt	Pd	Au	Fe	MgO	Cu	Ni	S	Pt	Pd	Au	Fe	MgO
Cu Clnr 1 Conc A	25.5	0.22	19.1	1.15	24.8	2.59	6.62	1.61	28.0	5.30	11.7	0.5	1.9	1.3	2.8	6.1	5.1	3.29
Cu Clnr 1 Conc B	27.4	0.24	19.2	1.02	25.3	2.90	7.57	1.57	28.3	4.83	12.7	0.5	2.0	1.5	3.4	6.4	5.5	3.22
Cu Clnr 1 Conc C	28.9	0.25	18.2	1.27	23.0	2.82	6.39	1.07	28.1	4.96	12.7	0.7	2.0	1.6	3.1	4.6	5.8	3.49
Cu Clnr 1 Conc D	29.1	0.25	18.4	1.20	25.0	2.51	6.10	1.39	28.7	4.83	12.9	0.6	2.1	1.4	2.9	6.0	5.9	3.42
Cu Clnr 1 Conc E	26.4	0.23	19.0	1.25	25.3	2.38	6.25	1.29	28.5	4.55	12.1	0.6	2.0	1.2	2.7	5.0	5.4	2.93
Cu Clnr 1 Conc F	25.4	0.22	19.9	1.70	26.2	2.63	5.83	1.55	29.3	4.87	12.2	0.8	2.0	1.3	2.5	5.8	5.3	3.01
Cu Clnr 1 Tail F	11.0	0.10	5.71	3.86	17.6	3.96	10.2	0.71			1.5	0.8	0.6	0.8	1.9	1.1	0.0	0.00
Cu Rghr Tail A	28.2	0.24	1.11	14.5	24.9	3.30	10.4	0.27	28.8	6.63	0.8	7.6	2.1	1.8	4.9	1.1	5.8	4.55
Cu Rghr Tail B	30.4	0.26	0.94	15.2	25.7	2.97	9.48	0.20	30.6	5.99	0.7	8.6	2.3	1.8	4.8	0.9	6.6	4.44
Cu Rghr Tail C	30.3	0.26	1.24	15.4	25.9	3.83	12.7	0.25	31.1	5.55	0.9	8.7	2.3	2.3	6.4	1.1	6.7	4.10
Cu Rghr Tail D	32.4	0.28	1.19	15.5	26.2	3.98	13.1	0.30	31.5	4.98	0.9	9.3	2.5	2.5	7.0	1.4	7.3	3.93
Cu Rghr Tail E	33.3	0.29	1.76	14.2	24.6	3.15	10.1	0.71	30.6	6.19	1.4	8.8	2.4	2.0	5.6	3.5	7.2	5.02
Cu Rghr Tail F	32.8	0.28	2.02	13.2	24.2	3.77	12.9	0.34	30.3	5.54	1.6	8.0	2.3	2.4	7.0	1.6	7.1	4.43
Bulk 2nd Clnr Tail F	63.0	0.54	0.35	2.66	7.18	1.83	2.39	0.09			0.5	3.1	1.3	2.2	2.5	0.8	0.0	0.00
Bulk 1st Clnr Tail F	121.1	1.05	0.14	0.60	2.79	1.93	4.53	0.97			0.4	1.3	1.0	4.5	9.1	17.3	0.0	0.00
Ni 3rd Clnr Conc A	18.6	0.16	0.85	1.35	12.4	2.85	1.63	0.19	22.7	17.6	0.4	0.5	0.7	1.0	0.5	0.5	3.0	7.97
Ni 3rd Clnr Conc B	20.1	0.17	0.75	1.89	14.0	4.36	1.92	0.16	23.9	16.7	0.4	0.7	0.8	1.7	0.6	0.5	3.4	8.18
Ni 3rd Clnr Conc C	23.7	0.20	0.97	2.47	14.0	5.06	2.03	0.14	23.8	17.1	0.6	1.1	1.0	2.3	0.8	0.5	4.0	9.87
Ni 3rd Clnr Conc D	24.0	0.21	0.69	2.06	16.6	4.90	2.00	0.15	28.1	14.8	0.4	0.9	1.2	2.3	0.8	0.5	4.8	8.65
Ni 3rd Clnr Conc E	27.2	0.24	0.97	2.88	16.9	6.06	2.37	0.17	28.0	14.9	0.6	1.5	1.4	3.2	1.1	0.7	5.4	9.87
Ni 3rd Clnr Conc F	25.5	0.22	0.96	2.34	18.0	6.26	2.56	0.24	28.5	13.6	0.6	1.1	1.3	3.1	1.1	0.9	5.2	8.45
Ni 3rd Clnr Tail F	92.3	0.80	0.36	1.46	11.3	1.92	0.96	0.08			0.8	2.5	3.1	3.4	1.5	1.1	0.0	0.00
Ni 2nd Clnr Tail F	88.4	0.76	0.27	0.62	6.08	0.89	0.61	0.05			0.6	1.0	1.6	1.5	0.9	0.6	0.0	0.00
Ni 1st Clnr Tail A	161.1	1.39	0.07	0.31	5.76	0.60	0.27	0.03			0.3	0.9	2.7	1.9	0.7	0.7	0.0	0.00
Ni 1st Clnr Tail B	253.0	2.19	0.08	0.27	4.29	0.48	0.26	0.03			0.5	1.3	3.2	2.4	1.1	1.2	0.0	0.00
Ni 1st Clnr Tail C	266.3	2.30	0.11	0.29	3.75	0.51	0.32	0.03			0.7	1.4	2.9	2.6	1.4	1.1	0.0	0.00
Ni 1st Clnr Tail D	304.2	2.63	0.11	0.32	3.90	0.54	0.38	0.03			0.8	1.8	3.5	3.2	1.9	1.4	0.0	0.00
Ni 1st Clnr Tail E	276.0	2.39	0.12	0.36	4.27	0.58	0.44	0.03			0.8	1.8	3.5	3.1	2.0	1.3	0.0	0.00
Ni 1st Clnr Tail F	281.5	2.43	0.12	0.39	4.48	0.65	0.48	0.03			0.8	2.0	3.7	3.6	2.2	1.4	0.0	0.00
Ni Scav Tail A	1160.6	10.0	0.05	0.14	1.48	0.20	0.11	0.02			1.4	3.0	5.1	4.5	2.2	2.8	0.0	0.00
Ni Scav Tail B	1557.7	13.5	0.03	0.12	1.43	0.18	0.10	0.02			1.1	3.5	6.5	5.5	2.6	3.7	0.0	0.00
Ni Scav Tail C	1608.1	13.9	0.04	0.12	1.58	0.21	0.12	0.02			1.5	3.6	7.5	6.6	3.1	3.6	0.0	0.00
Ni Scav Tail D	1592.2	13.8	0.04	0.12	1.51	0.21	0.11	0.01			1.5	3.5	7.1	6.5	2.8	3.1	0.0	0.00
Ni Scav Tail E	1632.2	14.1	0.04	0.13	1.53	0.21	0.12	0.02			1.6	3.9	7.3	6.7	3.2	3.6	0.0	0.00
Ni Scav Tail F (calc.)	1606.6	13.9	0.04	0.13	1.54	0.20	0.11	0.03			1.7	3.8	7.3	6.1	3.0	7.9	0.6	1.16
Ni Scav Tail F (after magsep)	1402.6	12.1	0.04	0.11	1.11	0.15	0.07	0.01			1.4	2.9	4.6	4.1	1.6	2.1	0.0	0.00
Magnetic Clnr Conc. F	3.0	0.03	1.68	1.88	11.6	8.04	8.58	7.46	26.2	15.9	0.1	0.1	0.1	0.5	0.4	3.3	0.6	1.16
Magnetic Clnr Tail F	65.4	0.57	0.06	0.25	4.82	0.68	0.45	0.16			0.1	0.3	0.9	0.9	0.5	1.6	0.0	0.00
Magnetic Rghr Tail F	135.6	1.17	0.03	0.20	4.20	0.26	0.22	0.05			0.1	0.5	1.7	0.7	0.5	1.0	0.0	0.00
Head (calc.)	11565	100.0	0.36	0.47	2.94	0.44	0.52	0.06			100	100	100	100	100	100	100	100
(direct)			0.33	0.42	2.53	0.41	0.45	0.04	11.9	22.8								

Test: LCT-5

Overall Stability

Total Products Out Per Cycle	Weight		Units out as % of Units in/Cycle					
		Wt %	Cu	Ni	S	Pt	Pd	Au
Cycle A	1	72.3	87.2	75.3	74.3	63.1	66.1	66.9
Cycle B	2	98.0	92.0	87.3	89.4	76.9	75.4	75.6
Cycle C	3	101.6	98.3	92.7	93.9	92.3	88.7	65.5
Cycle D	4	102.8	99.4	97.5	98.2	95.5	93.1	74.6
Cycle E	5	103.5	99.0	99.8	99.2	97.5	87.4	84.8
Cycle F	6	102.3	101.1	94.6	99.8	98.9	94.4	106.3

Average of E - F		102.9	100.0	97.2	99.5	98.2	90.9	95.6	
Average of D - F*		102.9	99.8	97.3	99.1	97.3	91.7	88.6	** chosen for prediction*
Average of C - F		102.5	99.4	96.2	97.8	96.1	90.9	82.8	



Metallurgical Balance

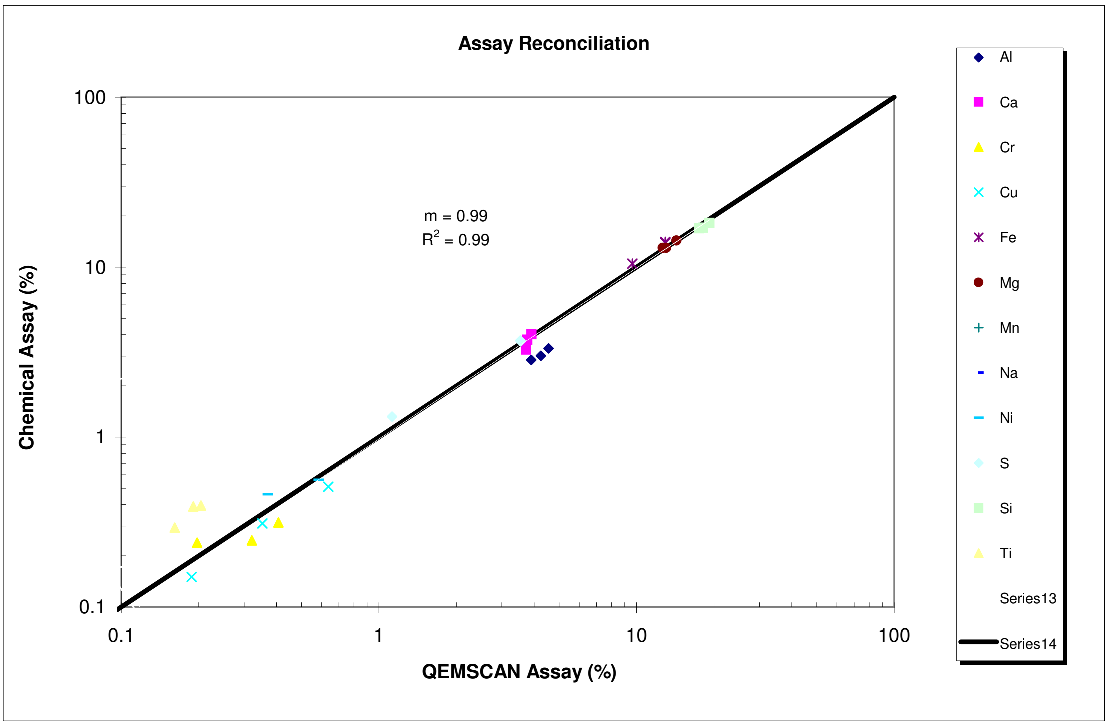
Product	Weight		Assays, %								% Distribution						
	g	%	Cu	Ni	S	other	Cp	Pn	Po	Ga	Cu	Ni	S	Cp	Pn	Po	Ga
Cu Clnr 1 Conc	27.0	1.36	**19.1**	**1.37**	25.5	54.1	55.1	3.8	12.8	28.3	74.5	4.2	12.2	74.5	4.8	3.2	0.4
Cu Rougher Tail (Ni Conc.)	32.8	1.66	1.66	14.3	25.0	59.1	4.8	41.6	24.9	28.8	7.9	53.7	14.6	7.9	64.8	7.5	0.5
Ni 3rd Clnr Conc	25.6	1.29	**0.88**	**2.44**	17.2	79.5	2.5	6.5	36.7	54.3	3.3	7.2	7.8	3.3	7.8	8.6	0.8
Ni 1st Clnr Tail	287	14.5	0.12	0.36	4.21	95.3	0.3	0.7	10.0	89.0	4.8	11.7	21.5	4.8	10.1	26.2	13.9
Ni Scav Tail	1610	81.2	0.04	0.13	1.53	98.3	0.1	0.2	3.71	96.0	9.6	23.2	43.8	9.6	12.4	54.6	84.4
Total Ni Conc.	58.4	2.95	**1.32**	**9.1**	21.6	68.0	3.8	26.2	30.0	40.0	11.1	60.9	22.4	11.1	72.6	16.0	1.3
Head (calc.)	1983	100.0	0.35	0.44	2.83	96.4	1.0	1.1	5.51	92.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(direct)			0.33	0.42	2.53												

Appendix G – QEMSCAN Analysis

Prophecy Platinum Corp
50149-101
MI7013-SEP11

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Assay Reconciliation



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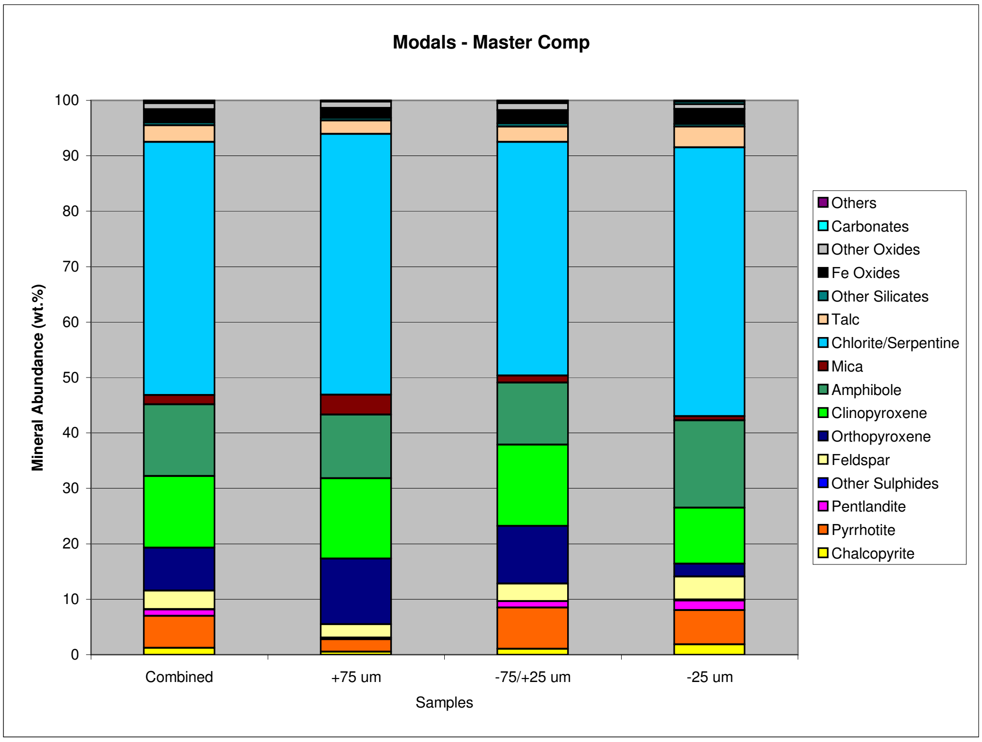
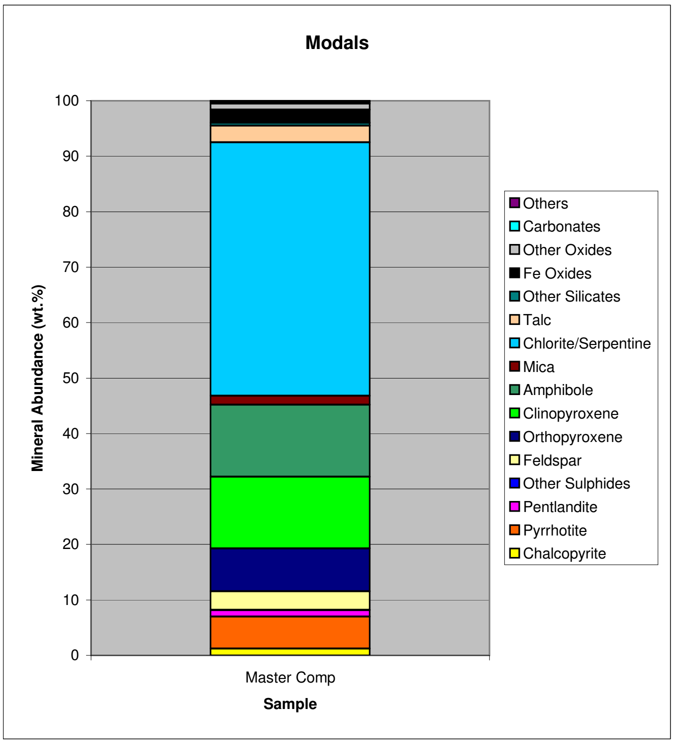
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Modals

Survey		Prophecy Platinum Corp						
Project		50149-101 / MI7013-SEP11						
Sample		Master Comp						
Fraction		Combined	+75 um		-75/+25 um		-25 um	
Mass Size Distribution (%)			23.7		39.0		37.2	
Calculated ESD Particle Size		15	75		32		7	
		Sample	Sample	Fraction	Sample	Fraction	Sample	Fraction
Mineral Mass (%)	Chalcopyrite	1.2	0.1	0.5	0.4	1.0	0.7	1.8
	Pyrrhotite	5.8	0.5	2.2	2.9	7.5	2.3	6.2
	Pentlandite	1.1	0.1	0.3	0.4	1.1	0.6	1.7
	Other Sulphides	0.1	0.0	0.0	0.0	0.0	0.1	0.2
	Feldspar	3.4	0.6	2.4	1.3	3.2	1.5	4.2
	Orthopyroxene	7.7	2.8	11.8	4.1	10.4	0.9	2.3
	Clinopyroxene	12.9	3.4	14.5	5.7	14.7	3.8	10.1
	Amphibole	13.0	2.7	11.5	4.4	11.2	5.9	15.8
	Mica	1.6	0.8	3.6	0.5	1.3	0.3	0.7
	Chlorite/Serpentine	45.7	11.2	47.1	16.5	42.2	18.1	48.5
	Talc	3.0	0.6	2.4	1.1	2.8	1.4	3.7
	Other Silicates	0.5	0.1	0.4	0.2	0.5	0.2	0.5
	Fe Oxides	2.4	0.4	1.8	0.9	2.4	1.0	2.7
	Other Oxides	1.1	0.3	1.1	0.5	1.3	0.3	0.9
	Carbonates	0.3	0.0	0.2	0.1	0.3	0.1	0.4
	Others	0.2	0.0	0.1	0.1	0.2	0.1	0.3
	Total	100.0	23.7	100.0	39.0	100.0	37.2	100.0
Mean Grain Size by Frequency (µm)	Chalcopyrite	8	17		16		6	
	Pyrrhotite	11	39		26		7	
	Pentlandite	10	19		20		8	
	Other Sulphides	9	15		6		9	
	Feldspar	8	28		18		5	
	Orthopyroxene	13	23		13		5	
	Clinopyroxene	18	51		26		9	
	Amphibole	10	29		17		6	
	Mica	13	28		12		5	
	Chlorite/Serpentine	12	39		20		7	
	Talc	8	19		11		5	
	Other Silicates	12	16		14		10	
	Fe Oxides	9	19		13		6	
	Other Oxides	12	26		20		7	
	Carbonates	13	42		26		8	
	Others	8	21		16		5	


Modals - Master Comp
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
Combined
+75 um
-75/+25 um
-25 um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
Master Comp
Sample
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite

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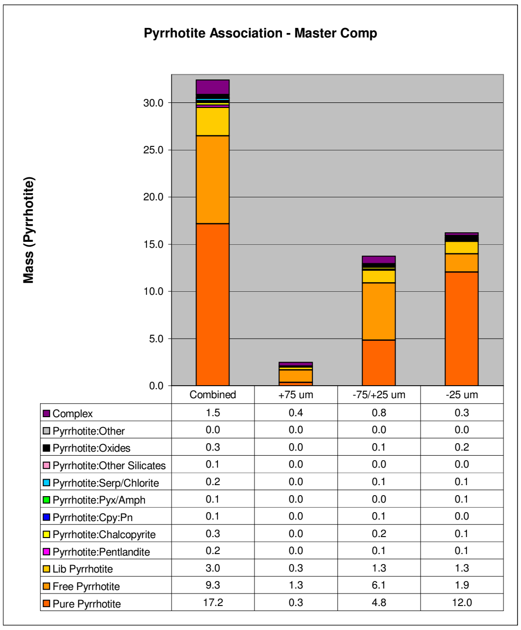
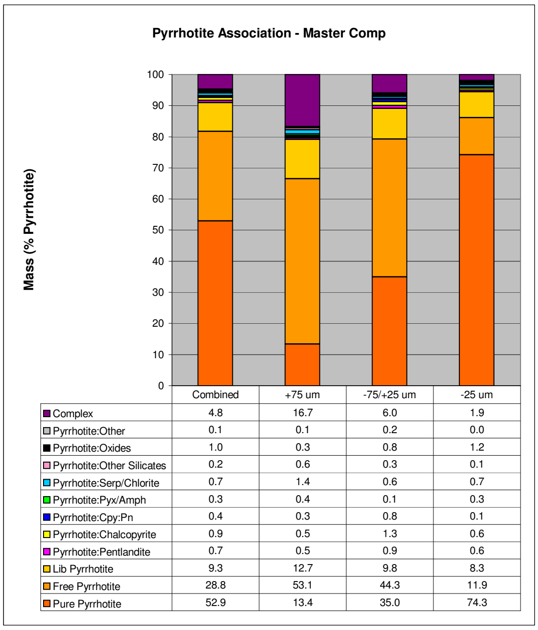
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

<u>Pyrrhotite Association</u>





<u>Absolute Mass of Pyrrhotite Across Fraction Master Comp</u>

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Pyrrhotite	17.2	0.3	4.8	12.0
Free Pyrrhotite	9.3	1.3	6.1	1.9
Lib Pyrrhotite	3.0	0.3	1.3	1.3
Pyrrhotite:Pentlandite	0.2	0.0	0.1	0.1
Pyrrhotite:Chalcopyrite	0.3	0.0	0.2	0.1
Pyrrhotite:Cpy:Pn	0.1	0.0	0.1	0.0
Pyrrhotite:Pyx/Amph	0.1	0.0	0.0	0.1
Pyrrhotite:Serp/Chlorite	0.2	0.0	0.1	0.1
Pyrrhotite:Other Silicates	0.1	0.0	0.0	0.0
Pyrrhotite:Oxides	0.3	0.0	0.1	0.2
Pyrrhotite:Other	0.0	0.0	0.0	0.0
Complex	1.5	0.4	0.8	0.3
Total	32.4	2.5	13.7	16.2
Total (% in fraction)	100.0	7.7	42.4	50.0

<u>Normalized Mass of Pyrrhotite Across Fraction Master Comp</u>

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Pyrrhotite	52.9	13.4	35.0	74.3
Free Pyrrhotite	28.8	53.1	44.3	11.9
Lib Pyrrhotite	9.3	12.7	9.8	8.3
Pyrrhotite:Pentlandite	0.7	0.5	0.9	0.6
Pyrrhotite:Chalcopyrite	0.9	0.5	1.3	0.6
Pyrrhotite:Cpy:Pn	0.4	0.3	0.8	0.1
Pyrrhotite:Pyx/Amph	0.3	0.4	0.1	0.3
Pyrrhotite:Serp/Chlorite	0.7	1.4	0.6	0.7
Pyrrhotite:Other Silicates	0.2	0.6	0.3	0.1
Pyrrhotite:Oxides	1.0	0.3	0.8	1.2
Pyrrhotite:Other	0.1	0.1	0.2	0.0
Complex	4.8	16.7	6.0	1.9
Total	100.0	100.0	100.0	100.0
Liberated	91.0	79.1	89.1	94.4

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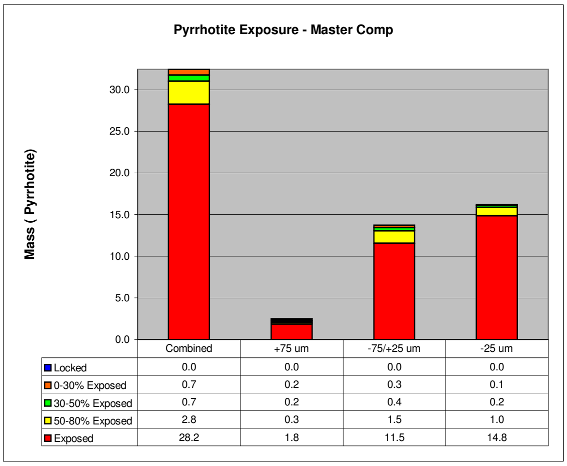
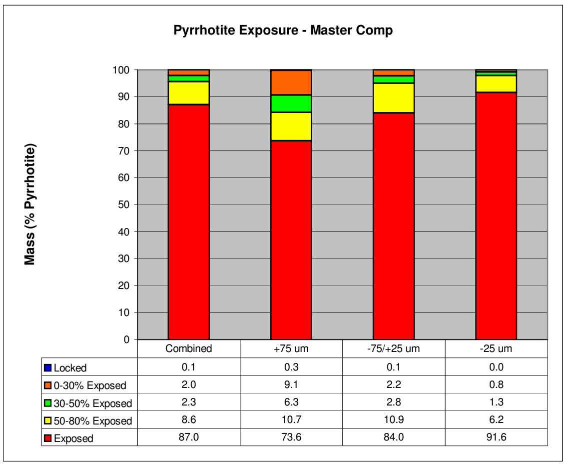
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pyrrhotite Exposure





Absolute Mass of Pyrrhotite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	28.2	1.8	11.5	14.8
50-80% Exposed	2.8	0.3	1.5	1.0
30-50% Exposed	0.7	0.2	0.4	0.2
0-30% Exposed	0.7	0.2	0.3	0.1
Locked	0.0	0.0	0.0	0.0
Total	32.4	2.5	13.7	16.2
Total (% in fraction)	100.0	7.7	42.4	50.0

Normalized Mass of Pyrrhotite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	87.0	73.6	84.0	91.6
50-80% Exposed	8.6	10.7	10.9	6.2
30-50% Exposed	2.3	6.3	2.8	1.3
0-30% Exposed	2.0	9.1	2.2	0.8
Locked	0.1	0.3	0.1	0.0
Total	100.0	100.0	100.0	100.0

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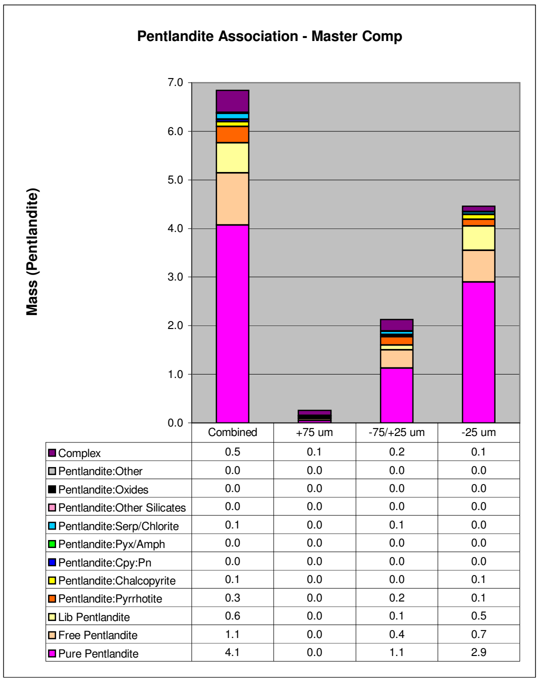
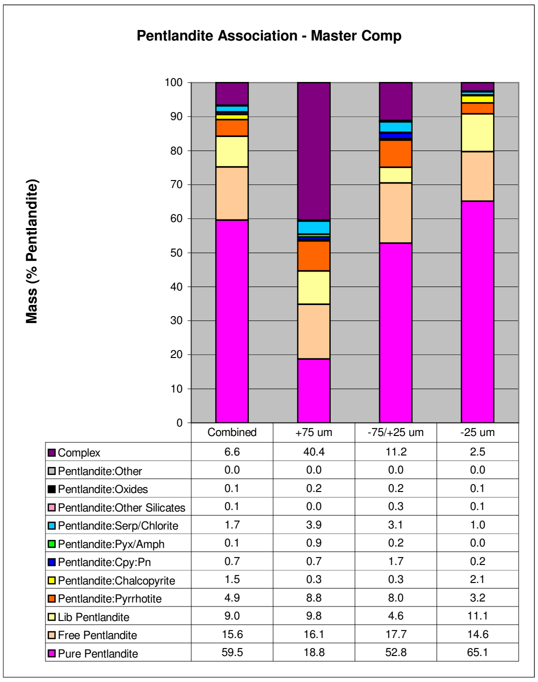
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pentlandite Association





Absolute Mass of Pentlandite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Pentlandite	4.1	0.0	1.1	2.9
Free Pentlandite	1.1	0.0	0.4	0.7
Lib Pentlandite	0.6	0.0	0.1	0.5
Pentlandite:Pyrrhotite	0.3	0.0	0.2	0.1
Pentlandite:Chalcopyrite	0.1	0.0	0.0	0.1
Pentlandite:Cpy:Pn	0.0	0.0	0.0	0.0
Pentlandite:Pyx/Amph	0.0	0.0	0.0	0.0
Pentlandite:Serp/Chlorite	0.1	0.0	0.1	0.0
Pentlandite:Other Silicates	0.0	0.0	0.0	0.0
Pentlandite:Oxides	0.0	0.0	0.0	0.0
Pentlandite:Other	0.0	0.0	0.0	0.0
Complex	0.5	0.1	0.2	0.1
Total	6.8	0.3	2.1	4.5
Total (% in fraction)	100.0	3.7	31.1	65.2

Normalized Mass of Pentlandite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Pentlandite	59.5	18.8	52.8	65.1
Free Pentlandite	15.6	16.1	17.7	14.6
Lib Pentlandite	9.0	9.8	4.6	11.1
Pentlandite:Pyrrhotite	4.9	8.8	8.0	3.2
Pentlandite:Chalcopyrite	1.5	0.3	0.3	2.1
Pentlandite:Cpy:Pn	0.7	0.7	1.7	0.2
Pentlandite:Pyx/Amph	0.1	0.9	0.2	0.0
Pentlandite:Serp/Chlorite	1.7	3.9	3.1	1.0
Pentlandite:Other Silicates	0.1	0.0	0.3	0.1
Pentlandite:Oxides	0.1	0.2	0.2	0.1
Pentlandite:Other	0.0	0.0	0.0	0.0
Complex	6.6	40.4	11.2	2.5
Total	100.0	100.0	100.0	100.0
Liberated	84.2	44.6	75.1	90.8

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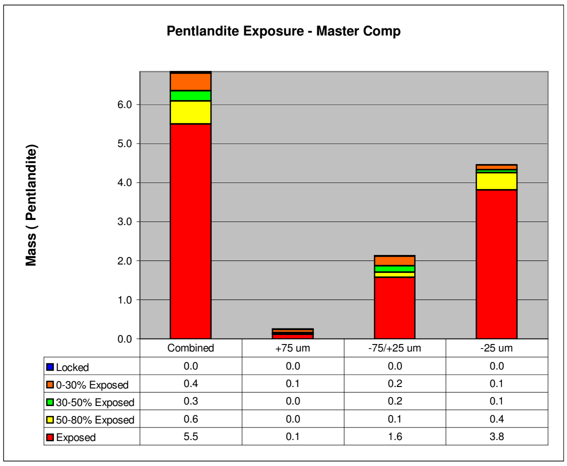
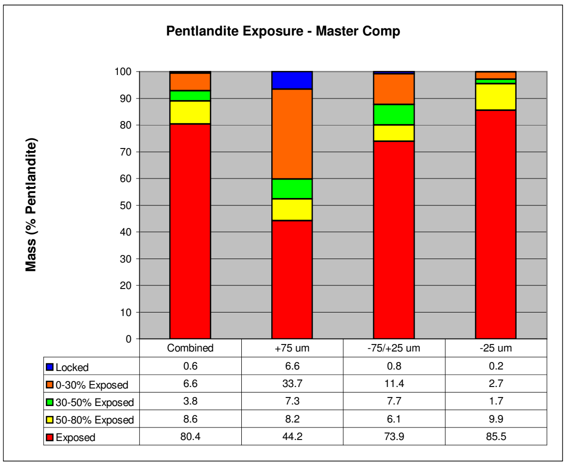
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pentlandite Exposure





Absolute Mass of Pentlandite Across Fraction Master Comp

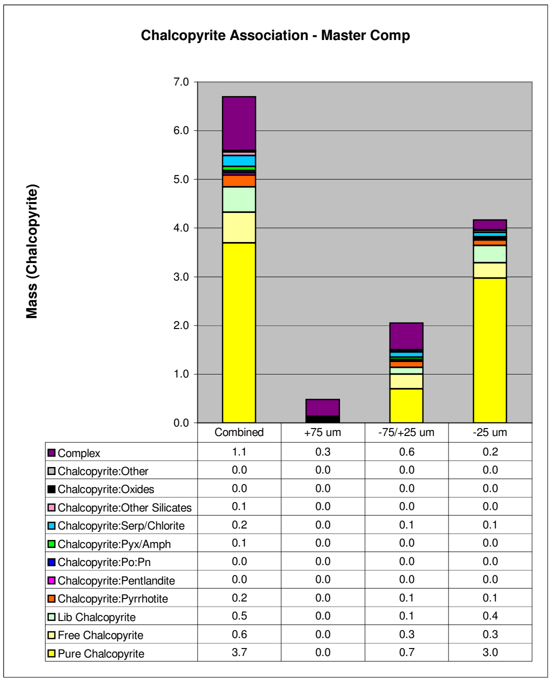
Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	5.5	0.1	1.6	3.8
50-80% Exposed	0.6	0.0	0.1	0.4
30-50% Exposed	0.3	0.0	0.2	0.1
0-30% Exposed	0.4	0.1	0.2	0.1
Locked	0.0	0.0	0.0	0.0
Total	6.8	0.3	2.1	4.5
Total (% in fraction)	100.0	3.7	31.1	65.2

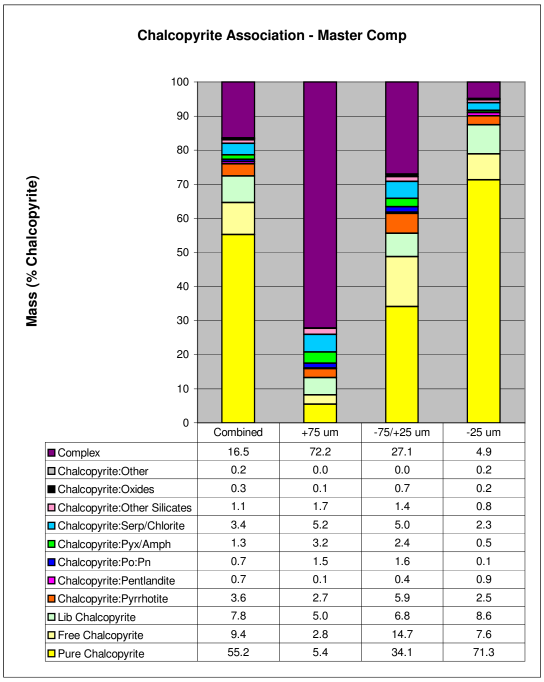
Normalized Mass of Pentlandite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	80.4	44.2	73.9	85.5
50-80% Exposed	8.6	8.2	6.1	9.9
30-50% Exposed	3.8	7.3	7.7	1.7
0-30% Exposed	6.6	33.7	11.4	2.7
Locked	0.6	6.6	0.8	0.2
Total	100.0	100.0	100.0	100.0

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Chalcopyrite Association





Absolute Mass of Chalcopyrite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Chalcopyrite	3.7	0.0	0.7	3.0
Free Chalcopyrite	0.6	0.0	0.3	0.3
Lib Chalcopyrite	0.5	0.0	0.1	0.4
Chalcopyrite:Pyrrhotite	0.2	0.0	0.1	0.1
Chalcopyrite:Pentlandite	0.0	0.0	0.0	0.0
Chalcopyrite:Po:Pn	0.0	0.0	0.0	0.0
Chalcopyrite:Pyx/Amph	0.1	0.0	0.0	0.0
Chalcopyrite:Serp/Chlorite	0.2	0.0	0.1	0.1
Chalcopyrite:Other Silicates	0.1	0.0	0.0	0.0
Chalcopyrite:Oxides	0.0	0.0	0.0	0.0
Chalcopyrite:Other	0.0	0.0	0.0	0.0
Complex	1.1	0.3	0.6	0.2
Total	6.7	0.5	2.1	4.2
Total (% in fraction)	100.0	7.2	30.6	62.2

Normalized Mass of Chalcopyrite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Pure Chalcopyrite	55.2	5.4	34.1	71.3
Free Chalcopyrite	9.4	2.8	14.7	7.6
Lib Chalcopyrite	7.8	5.0	6.8	8.6
Chalcopyrite:Pyrrhotite	3.6	2.7	5.9	2.5
Chalcopyrite:Pentlandite	0.7	0.1	0.4	0.9
Chalcopyrite:Po:Pn	0.7	1.5	1.6	0.1
Chalcopyrite:Pyx/Amph	1.3	3.2	2.4	0.5
Chalcopyrite:Serp/Chlorite	3.4	5.2	5.0	2.3
Chalcopyrite:Other Silicates	1.1	1.7	1.4	0.8
Chalcopyrite:Oxides	0.3	0.1	0.7	0.2
Chalcopyrite:Other	0.2	0.0	0.0	0.2
Complex	16.5	72.2	27.1	4.9
Total	100.0	100.0	100.0	100.0
Liberated	72.4	13.2	55.5	87.5

Prophecy Platinum Corp
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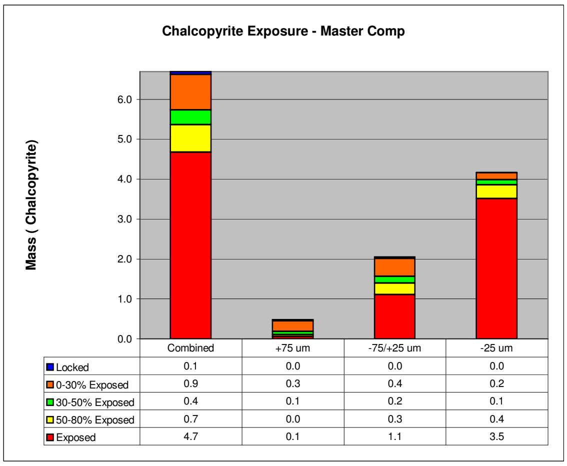
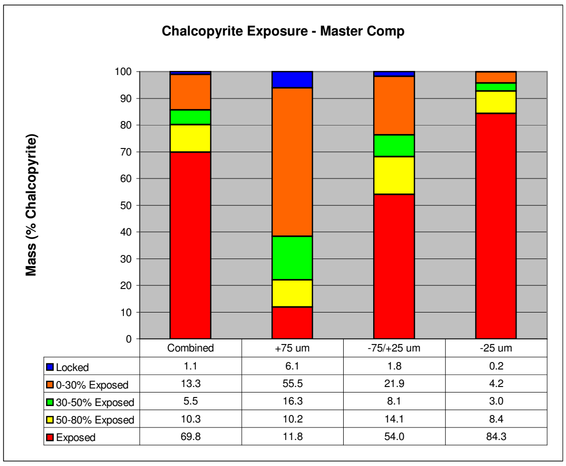
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Chalcopyrite Exposure





Absolute Mass of Chalcopyrite Across Fraction Master Comp

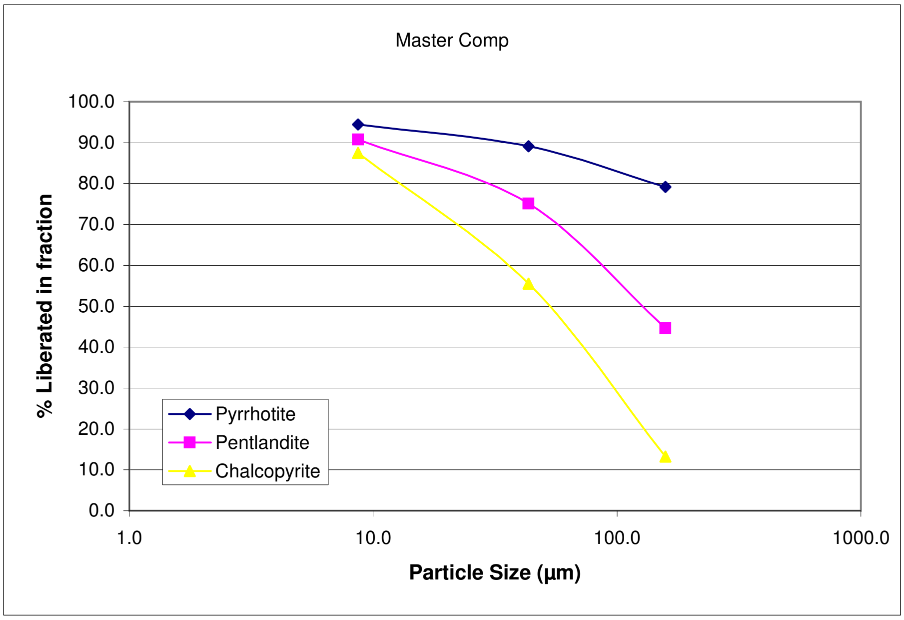
Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	4.7	0.1	1.1	3.5
50-80% Exposed	0.7	0.0	0.3	0.4
30-50% Exposed	0.4	0.1	0.2	0.1
0-30% Exposed	0.9	0.3	0.4	0.2
Locked	0.1	0.0	0.0	0.0
Total	6.7	0.5	2.1	4.2
Total (% in fraction)	100.0	7.2	30.6	62.2

Normalized Mass of Chalcopyrite Across Fraction Master Comp

Mineral Name	Combined	+75 um	-75/+25 um	-25 um
Exposed	69.8	11.8	54.0	84.3
50-80% Exposed	10.3	10.2	14.1	8.4
30-50% Exposed	5.5	16.3	8.1	3.0
0-30% Exposed	13.3	55.5	21.9	4.2
Locked	1.1	6.1	1.8	0.2
Total	100.0	100.0	100.0	100.0

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Mineral Release Curves



Sample	Master Comp		
Fraction			
Average Particle Size (µm)	158	43	9
Mineral Mass % 80% Lib			
Pyrrhotite	79.1	89.1	94.4
Pentlandite	44.6	75.1	90.8
Chalcopyrite	13.2	55.5	87.5

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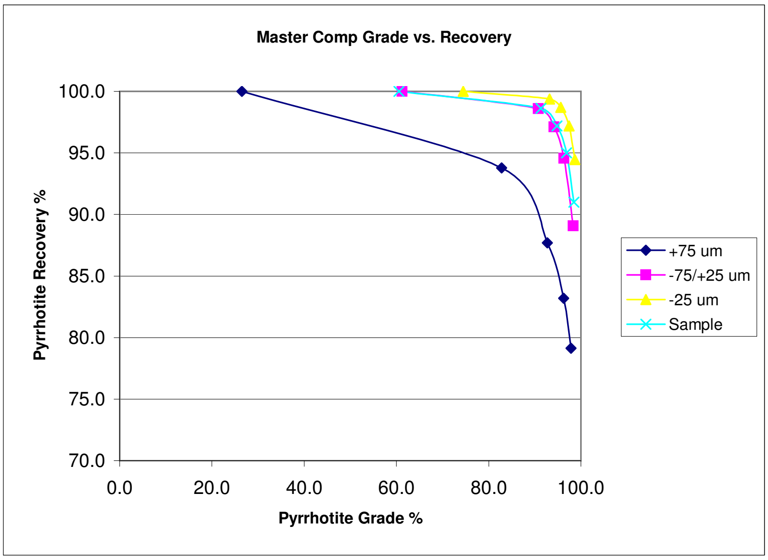
Pyrrhotite Grade vs. Recovery: Master Comp



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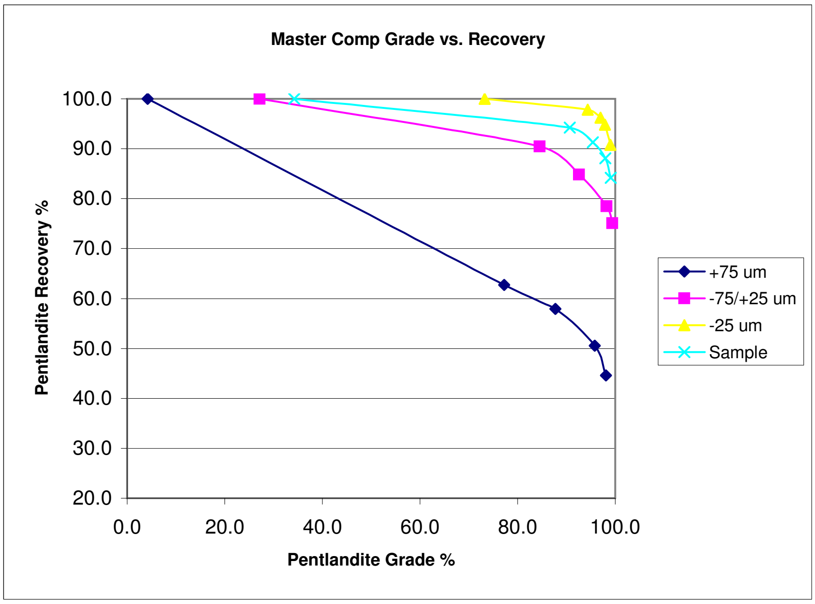
Pentlandite Grade vs. Recovery: Master Comp



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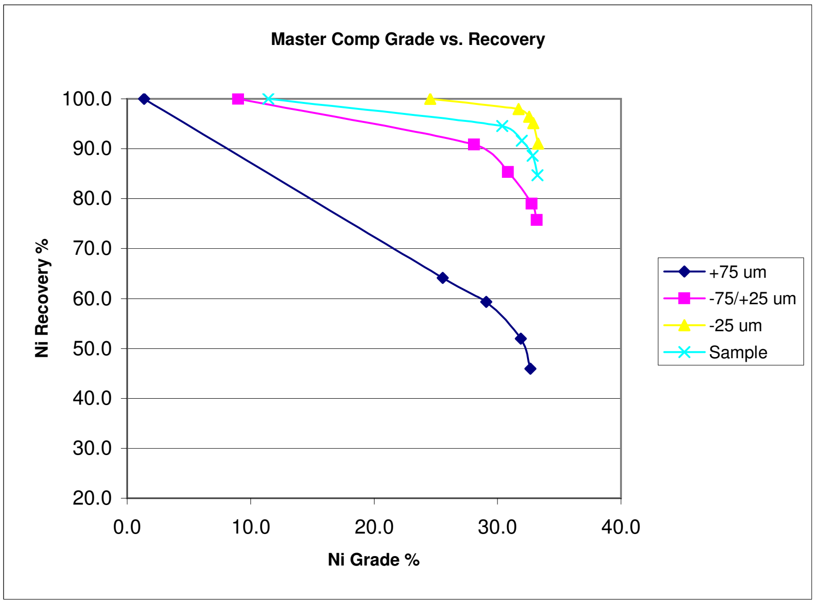
Ni Grade vs. Recovery: Master Comp



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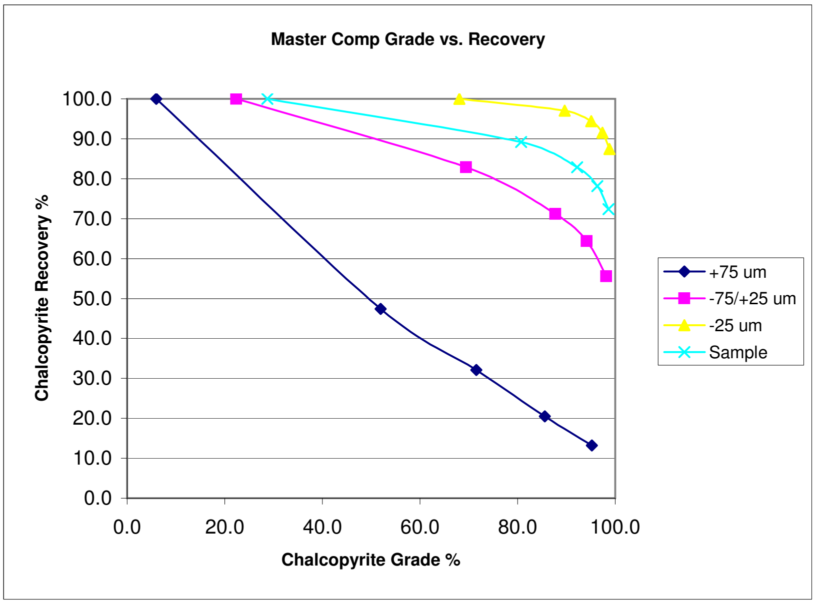
Chalcopyrite Grade vs. Recovery: Master Comp



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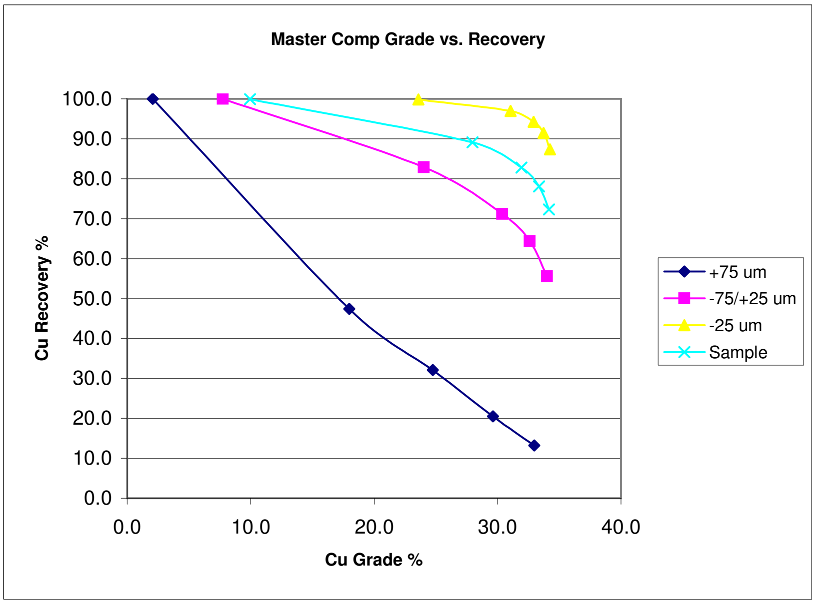
Cu Grade vs. Recovery: Master Comp



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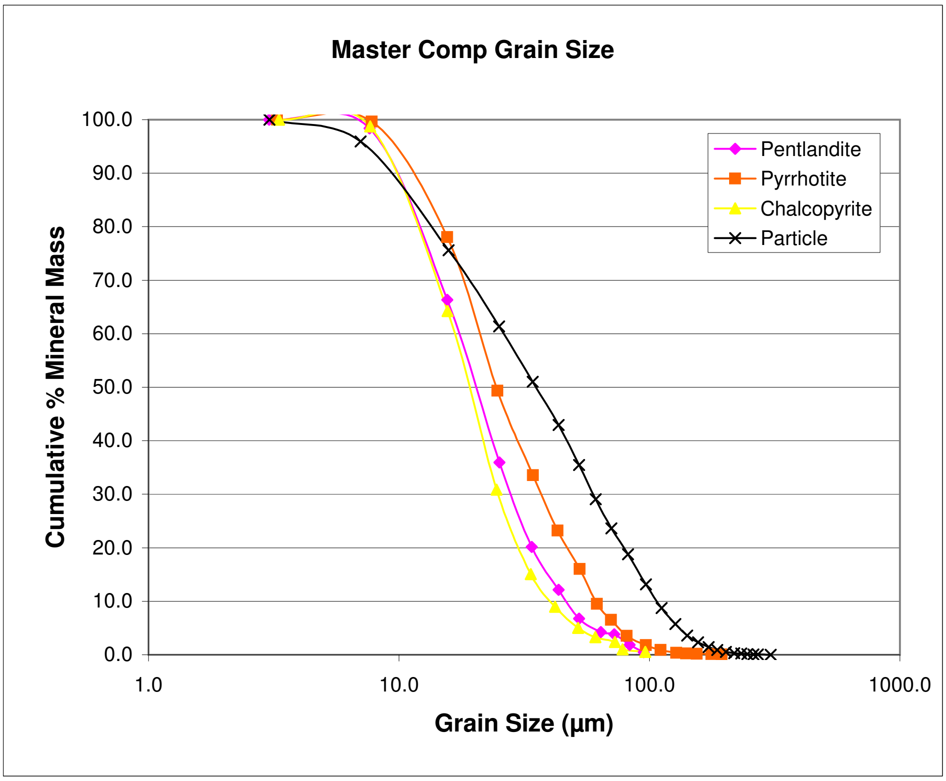
Cumulative Grain Size Distribution



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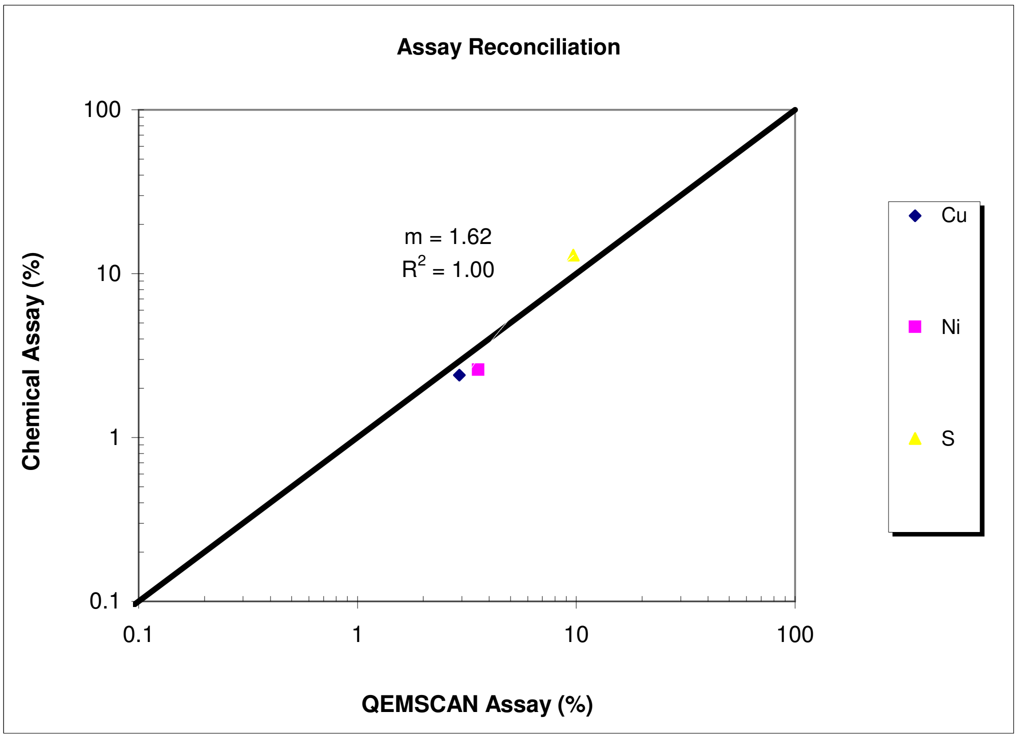
Assay Reconciliation



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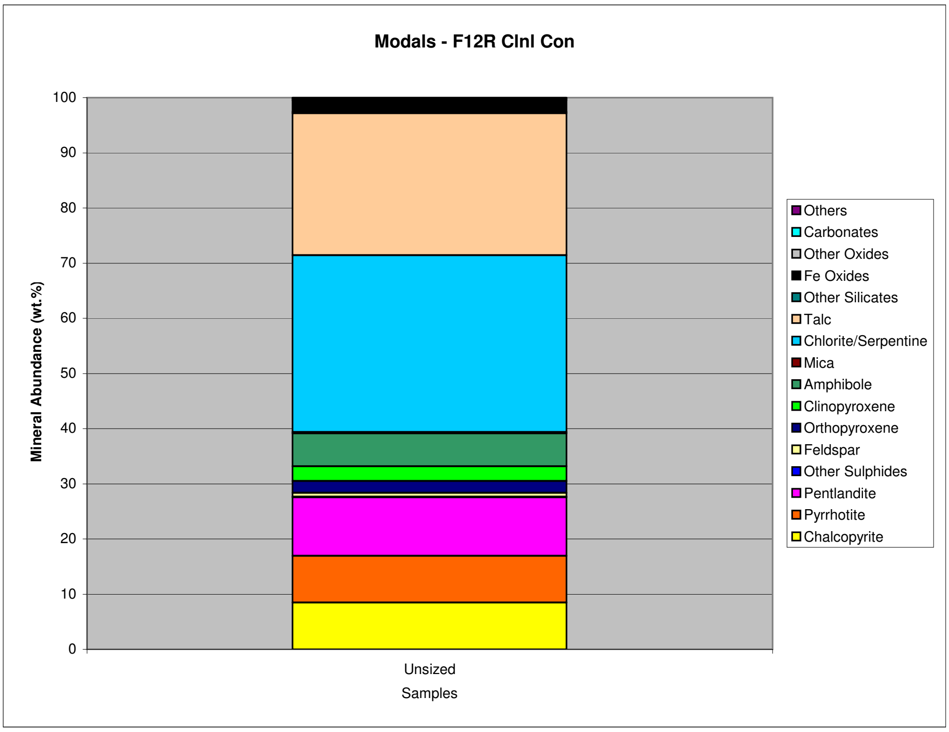
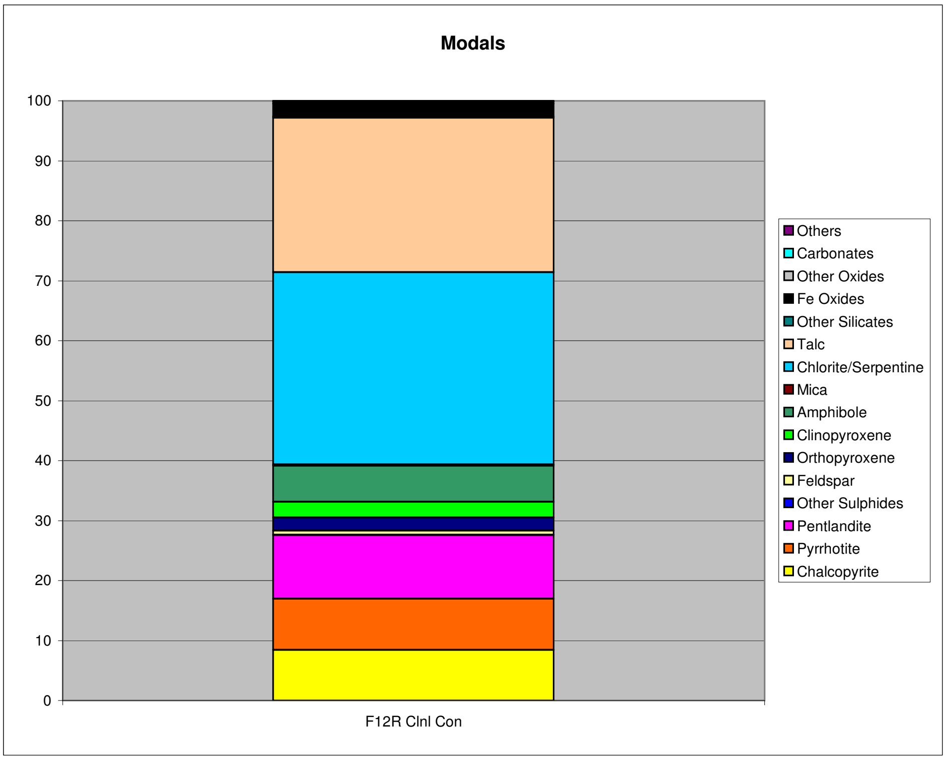
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Modals

Survey		Prophecy Platinum Corp
Project		50149-101 / MI7003-JAN12
Sample		F12R Clnl Con
Fraction		Unsized
Mass Size Distribution (%)		100.0
Calculated ESD Particle Size		10.8
		Sample
Mineral Mass (%)	Chalcopyrite	8.4
	Pyrrhotite	8.5
	Pentlandite	10.7
	Other Sulphides	0.1
	Feldspar	0.7
	Orthopyroxene	2.2
	Clinopyroxene	2.6
	Amphibole	6.0
	Mica	0.2
	Chlorite/Serpentine	32.0
	Talc	25.7
	Other Silicates	0.2
	Fe Oxides	2.2
	Other Oxides	0.3
	Carbonates	0.1
	Others	0.1
	Total	100.0
Mean Grain Size by Frequency (µm)	Chalcopyrite	8.3
	Pyrrhotite	9.9
	Pentlandite	10.5
	Other Sulphides	5.2
	Feldspar	6.4
	Orthopyroxene	5.3
	Clinopyroxene	10.5
	Amphibole	7.9
	Mica	7.1
	Chlorite/Serpentine	6.7
	Talc	7.0
	Other Silicates	9.6
	Fe Oxides	7.1
	Other Oxides	5.6
	Carbonates	6.6
	Others	4.8


Modals - F12R Clnl Con
100
90
80
70
60
50
40
30
20
10
0
Mineral Abundance (wt.%)
Unsized
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals
100
90
80
70
60
50
40
30
20
10
0
F12R Clnl Con
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite

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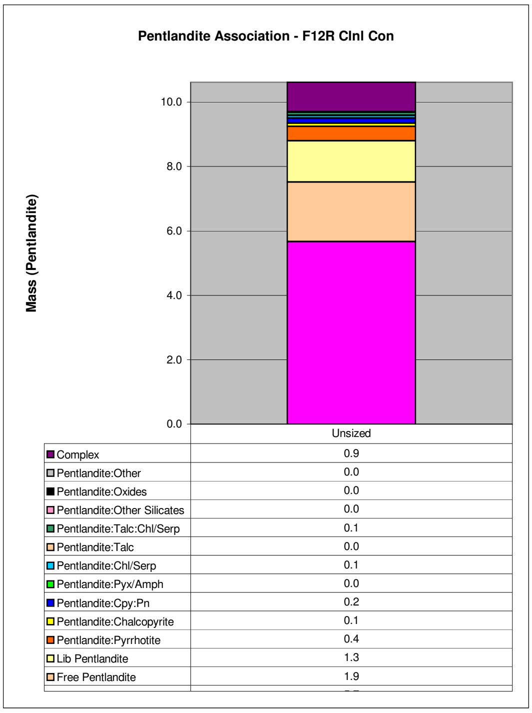
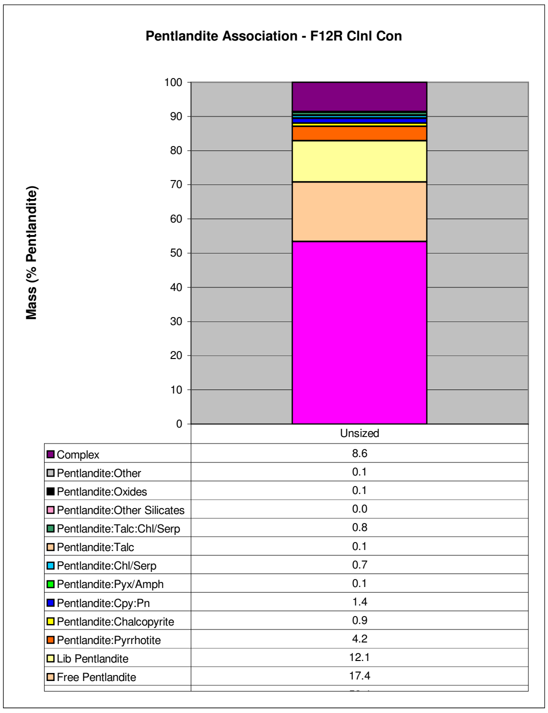
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pentlandite Association





Absolute Mass of Pentlandite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Pentlandite	5.7
Free Pentlandite	1.9
Lib Pentlandite	1.3
Pentlandite:Pyrrhotite	0.4
Pentlandite:Chalcopyrite	0.1
Pentlandite:Cpy:Pn	0.2
Pentlandite:Pyx/Amph	0.0
Pentlandite:Chl/Serp	0.1
Pentlandite:Talc	0.0
Pentlandite:Talc:Chl/Serp	0.1
Pentlandite:Other Silicates	0.0
Pentlandite:Oxides	0.0
Pentlandite:Other	0.0
Complex	0.9
Total	10.6
Total (% in fraction)	100.0

Normalized Mass of Pentlandite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Pentlandite	53.4
Free Pentlandite	17.4
Lib Pentlandite	12.1
Pentlandite:Pyrrhotite	4.2
Pentlandite:Chalcopyrite	0.9
Pentlandite:Cpy:Pn	1.4
Pentlandite:Pyx/Amph	0.1
Pentlandite:Chl/Serp	0.7
Pentlandite:Talc	0.1
Pentlandite:Talc:Chl/Serp	0.8
Pentlandite:Other Silicates	0.0
Pentlandite:Oxides	0.1
Pentlandite:Other	0.1
Complex	8.6
Total	100.0
Liberated	**82.9**

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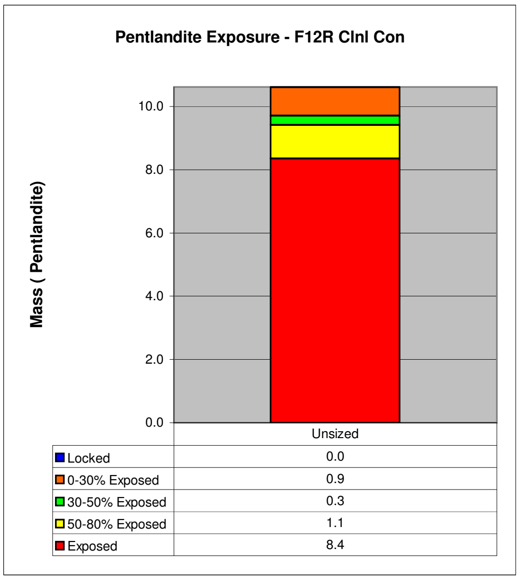
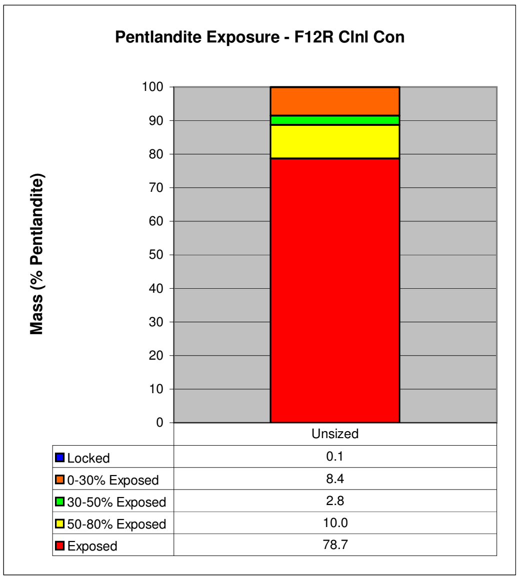
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pentlandite Exposure





Absolute Mass of Pentlandite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	8.4
50-80% Exposed	1.1
30-50% Exposed	0.3
0-30% Exposed	0.9
Locked	0.0
Total	10.6
Total (% in fraction)	100.0

Normalized Mass of Pentlandite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	78.7
50-80% Exposed	10.0
30-50% Exposed	2.8
0-30% Exposed	8.4
Locked	0.1
Total	100.0

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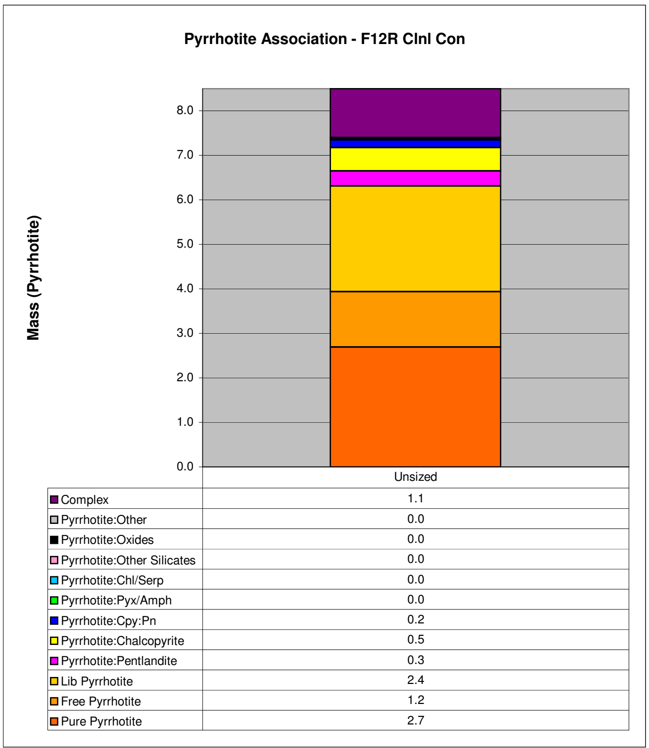
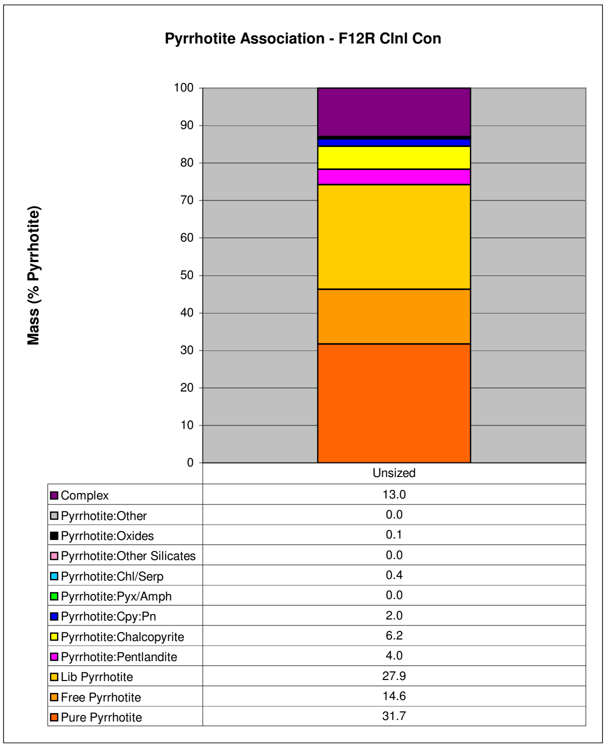
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pyrrhotite Association





Absolute Mass of Pyrrhotite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Pyrrhotite	2.7
Free Pyrrhotite	1.2
Lib Pyrrhotite	2.4
Pyrrhotite:Pentlandite	0.3
Pyrrhotite:Chalcopyrite	0.5
Pyrrhotite:Cpy:Pn	0.2
Pyrrhotite:Pyx/Amph	0.0
Pyrrhotite:Chl/Serp	0.0
Pyrrhotite:Other Silicates	0.0
Pyrrhotite:Oxides	0.0
Pyrrhotite:Other	0.0
Complex	1.1
Total	8.5
Total (% in fraction)	100.0

Normalized Mass of Pyrrhotite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Pyrrhotite	31.7
Free Pyrrhotite	14.6
Lib Pyrrhotite	27.9
Pyrrhotite:Pentlandite	4.0
Pyrrhotite:Chalcopyrite	6.2
Pyrrhotite:Cpy:Pn	2.0
Pyrrhotite:Pyx/Amph	0.0
Pyrrhotite:Chl/Serp	0.4
Pyrrhotite:Other Silicates	0.0
Pyrrhotite:Oxides	0.1
Pyrrhotite:Other	0.0
Complex	13.0
Total	100.0
Liberated	74.2

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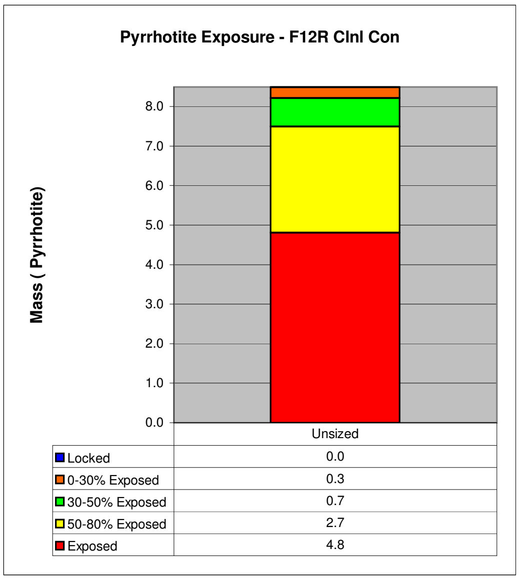
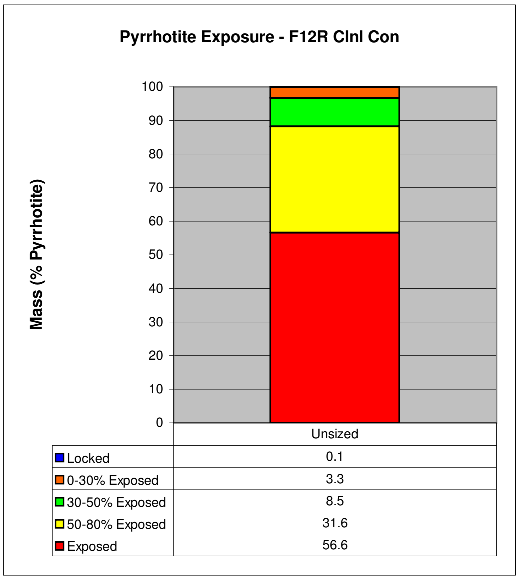
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Pyrrhotite Exposure





Absolute Mass of Pyrrhotite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	4.8
50-80% Exposed	2.7
30-50% Exposed	0.7
0-30% Exposed	0.3
Locked	0.0
Total	8.5
Total (% in fraction)	100.0

Normalized Mass of Pyrrhotite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	56.6
50-80% Exposed	31.6
30-50% Exposed	8.5
0-30% Exposed	3.3
Locked	0.1
Total	100.0

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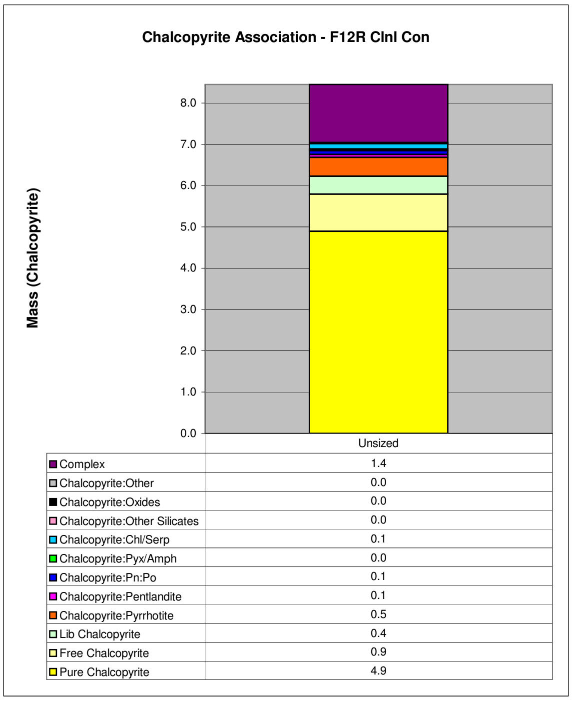
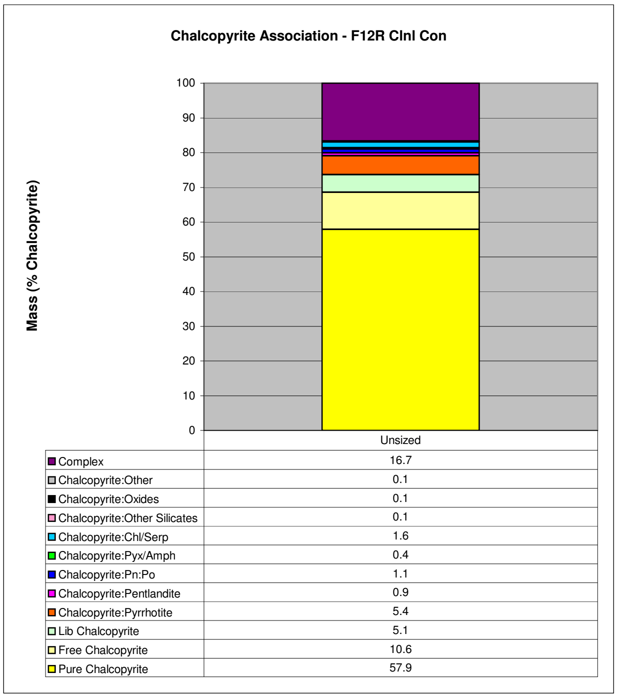
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Chalcopyrite Association





Absolute Mass of Chalcopyrite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Chalcopyrite	4.9
Free Chalcopyrite	0.9
Lib Chalcopyrite	0.4
Chalcopyrite:Pyrrhotite	0.5
Chalcopyrite:Pentlandite	0.1
Chalcopyrite:Pn:Po	0.1
Chalcopyrite:Pyx/Amph	0.0
Chalcopyrite:Chl/Serp	0.1
Chalcopyrite:Other Silicates	0.0
Chalcopyrite:Oxides	0.0
Chalcopyrite:Other	0.0
Complex	1.4
Total	8.4
Total (% in fraction)	100.0

Normalized Mass of Chalcopyrite Across Fraction F12R Clnl Con

Mineral Name	Unsized
Pure Chalcopyrite	57.9
Free Chalcopyrite	10.6
Lib Chalcopyrite	5.1
Chalcopyrite:Pyrrhotite	5.4
Chalcopyrite:Pentlandite	0.9
Chalcopyrite:Pn:Po	1.1
Chalcopyrite:Pyx/Amph	0.4
Chalcopyrite:Chl/Serp	1.6
Chalcopyrite:Other Silicates	0.1
Chalcopyrite:Oxides	0.1
Chalcopyrite:Other	0.1
Complex	16.7
Total	100.0
Liberated	73.7

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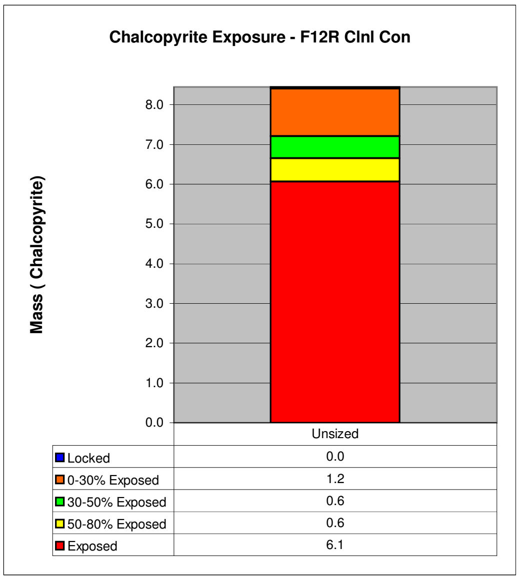
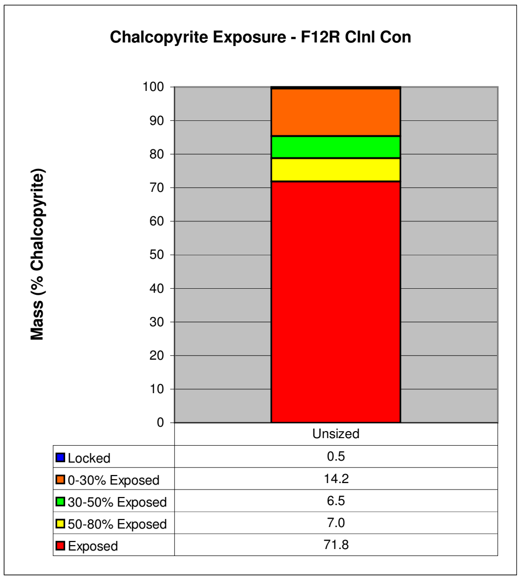
<u>Chalcopyrite Exposure</u>





<u>Absolute Mass of Chalcopyrite Across Fraction F12R Clnl Con</u>

Mineral Name	Unsized
Exposed	6.1
50-80% Exposed	0.6
30-50% Exposed	0.6
0-30% Exposed	1.2
Locked	0.0
Total	8.4
Total (% in fraction)	100.0

<u>Normalized Mass of Chalcopyrite Across Fraction F12R Clnl Con</u>

Mineral Name	Unsized
Exposed	71.8
50-80% Exposed	7.0
30-50% Exposed	6.5
0-30% Exposed	14.2
Locked	0.5
Total	100.0

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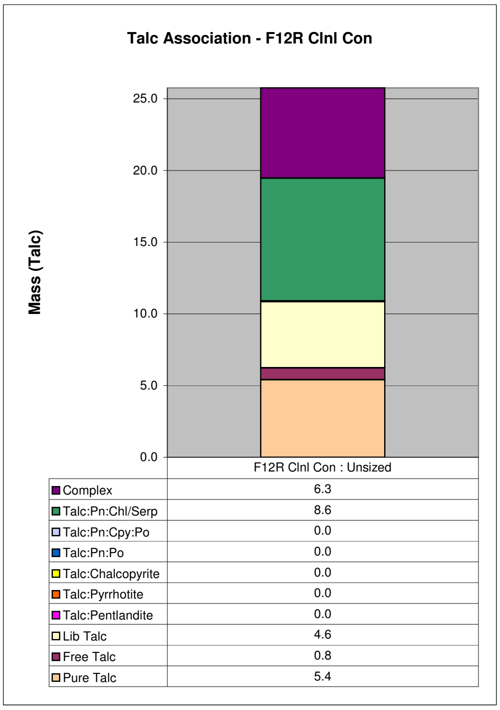
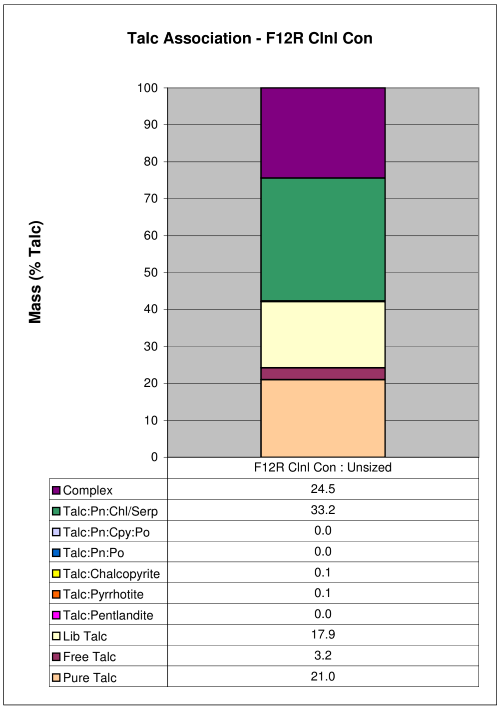
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Talc Association





Absolute Mass of Talc Across Fraction F12R Clnl Con

Mineral Name	Clnl Con : Unsized
Pure Talc	5.4
Free Talc	0.8
Lib Talc	4.6
Talc:Pentlandite	0.0
Talc:Pyrrhotite	0.0
Talc:Chalcopyrite	0.0
Talc:Pn:Po	0.0
Talc:Pn:Cpy:Po	0.0
Talc:Pn:Chl/Serp	8.6
Complex	6.3
Total	25.8
Total (% in fraction)	100.0

Normalized Mass of Talc Across Fraction F12R Clnl Con

Mineral Name	Clnl Con : Unsized
Pure Talc	21.0
Free Talc	3.2
Lib Talc	17.9
Talc:Pentlandite	0.0
Talc:Pyrrhotite	0.1
Talc:Chalcopyrite	0.1
Talc:Pn:Po	0.0
Talc:Pn:Cpy:Po	0.0
Talc:Pn:Chl/Serp	33.2
Complex	24.5
Total	100.0
Liberated	42.1

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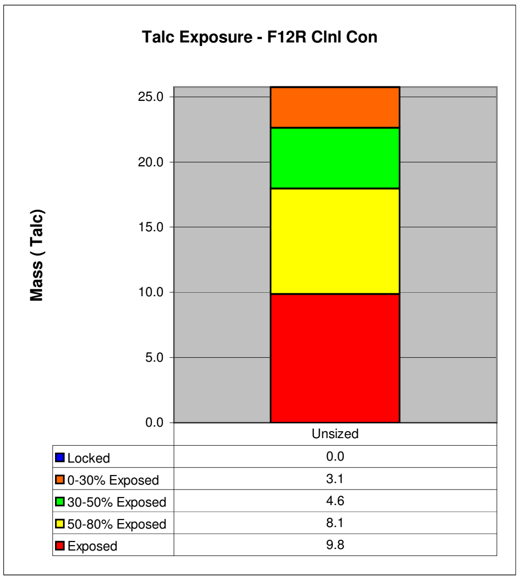
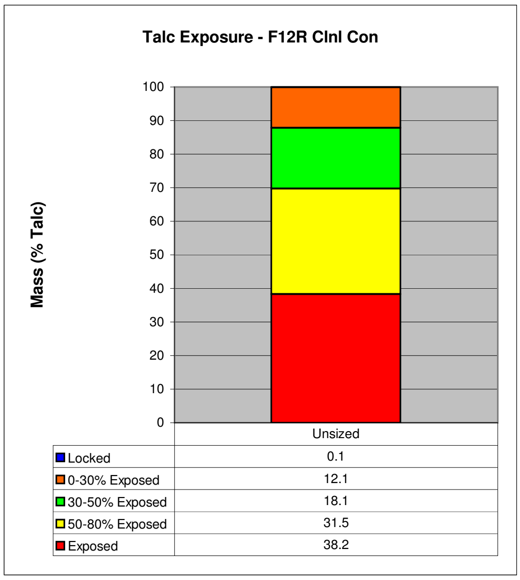
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Talc Exposure





Absolute Mass of Talc Across Fraction F12R Clnl Con

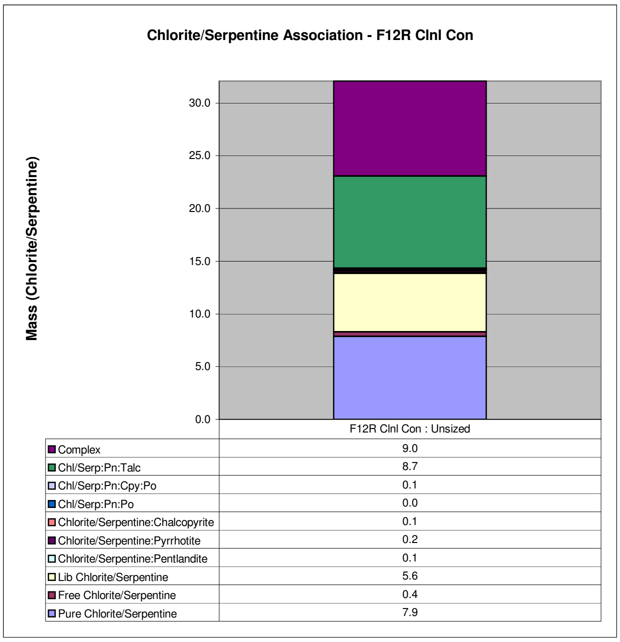
Mineral Name	Unsized
Exposed	9.8
50-80% Exposed	8.1
30-50% Exposed	4.6
0-30% Exposed	3.1
Locked	0.0
Total	25.8
Total (% in fraction)	100.0

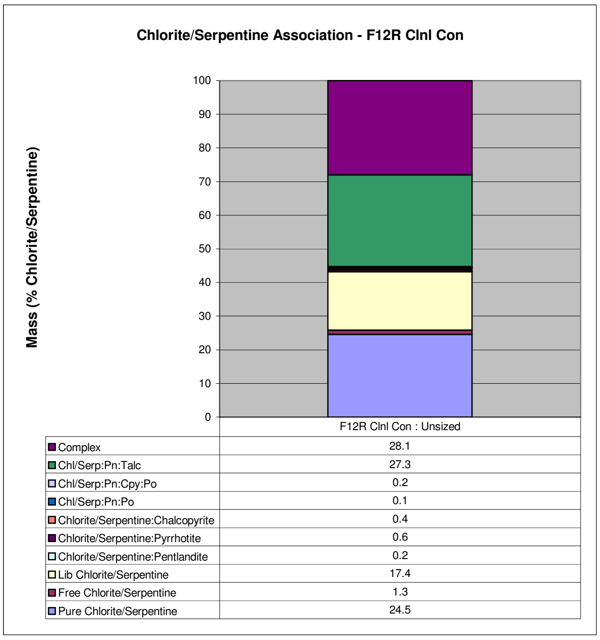
Normalized Mass of Talc Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	38.2
50-80% Exposed	31.5
30-50% Exposed	18.1
0-30% Exposed	12.1
Locked	0.1
Total	100.0

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Chlorite/Serpentine Association





Absolute Mass of Chlorite/Serpentine Across Fraction F12R Clnl Con

Mineral Name	Clnl Con : Unsized
Pure Chlorite/Serpentine	7.9
Free Chlorite/Serpentine	0.4
Lib Chlorite/Serpentine	5.6
Chlorite/Serpentine:Pentlandite	0.1
Chlorite/Serpentine:Pyrrhotite	0.2
Chlorite/Serpentine:Chalcopyrite	0.1
Chl/Serp:Pn:Po	0.0
Chl/Serp:Pn:Cpy:Po	0.1
Chl/Serp:Pn:Talc	8.7
Complex	9.0
Total	32.1
Total (% in fraction)	100.0

Normalized Mass of Chlorite/Serpentine Across Fraction F12R Clnl Con

Mineral Name	Clnl Con : Unsized
Pure Chlorite/Serpentine	24.5
Free Chlorite/Serpentine	1.3
Lib Chlorite/Serpentine	17.4
Chlorite/Serpentine:Pentlandite	0.2
Chlorite/Serpentine:Pyrrhotite	0.6
Chlorite/Serpentine:Chalcopyrite	0.4
Chl/Serp:Pn:Po	0.1
Chl/Serp:Pn:Cpy:Po	0.2
Chl/Serp:Pn:Talc	27.3
Complex	28.1
Total	100.0
Liberated	43.2

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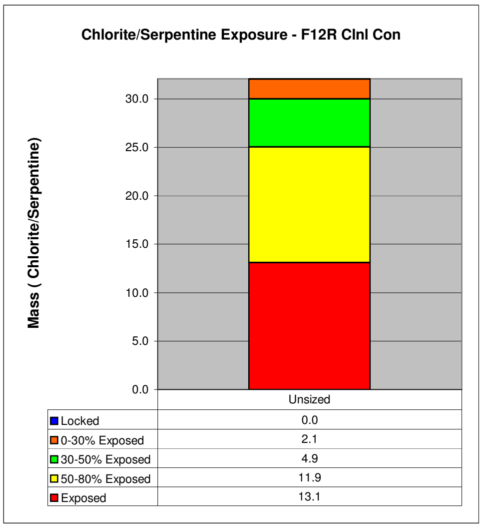
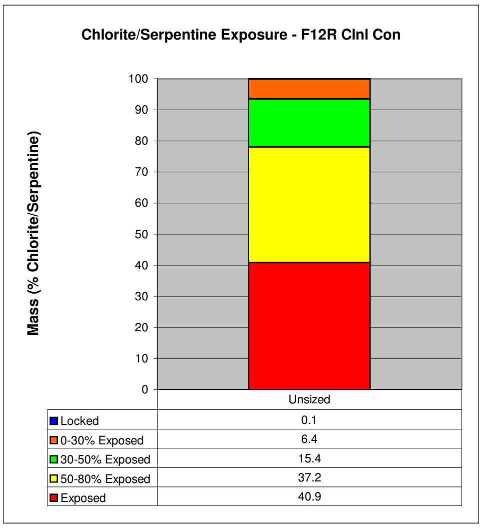
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Chlorite/Serpentine Exposure





Absolute Mass of Chlorite/Serpentine Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	13.1
50-80% Exposed	11.9
30-50% Exposed	4.9
0-30% Exposed	2.1
Locked	0.0
Total	32.1
Total (% in fraction)	

Normalized Mass of Chlorite/Serpentine Across Fraction F12R Clnl Con

Mineral Name	Unsized
Exposed	40.9
50-80% Exposed	37.2
30-50% Exposed	15.4
0-30% Exposed	6.4
Locked	0.1
Total	100.0

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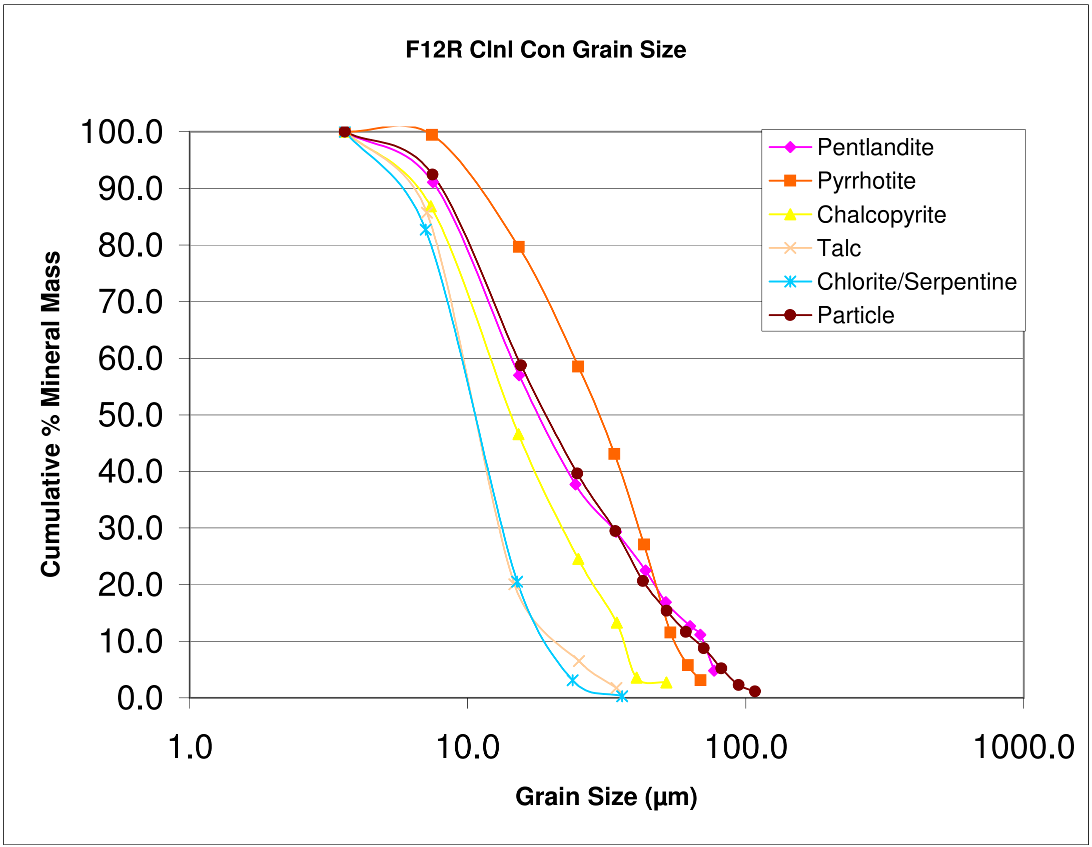
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Cumulative Grain Size Distribution



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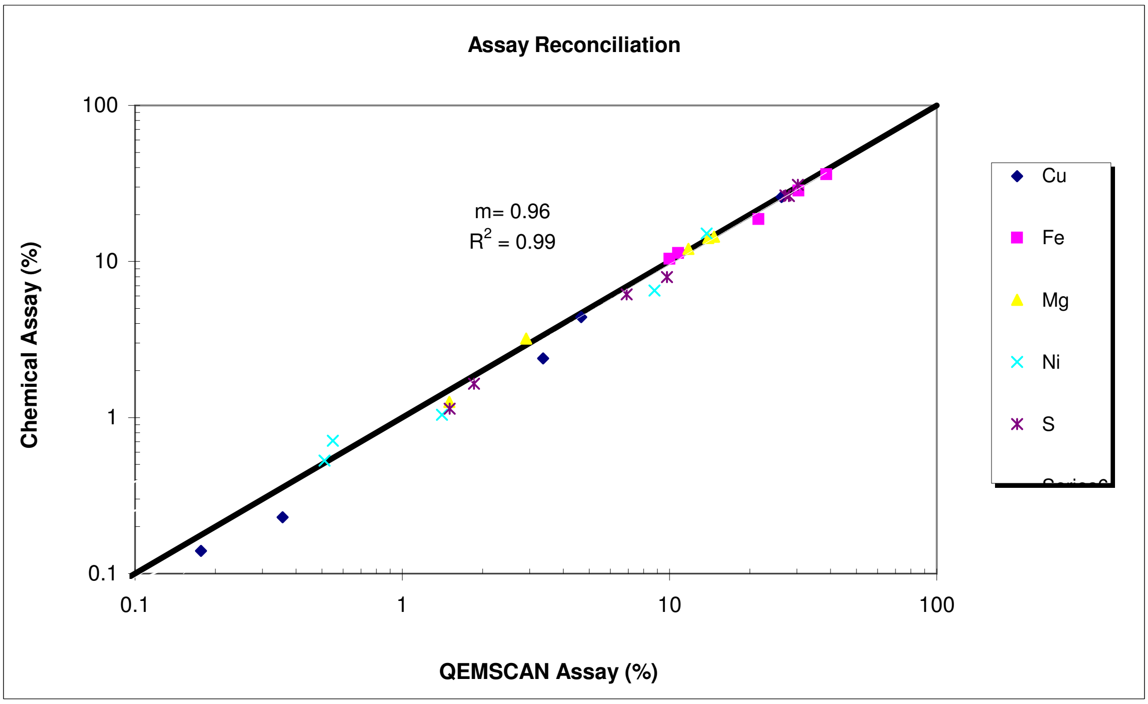
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

Assay Reconciliation

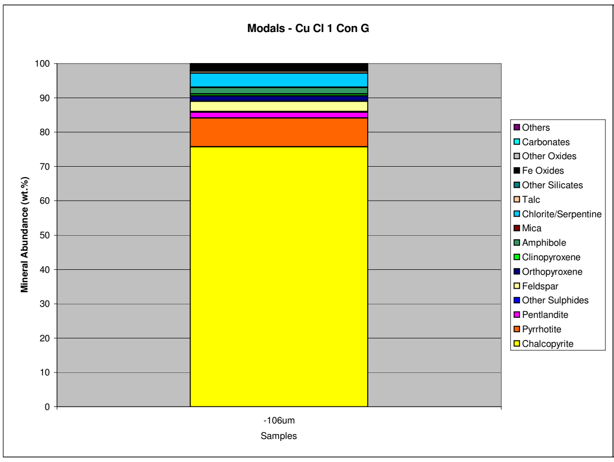


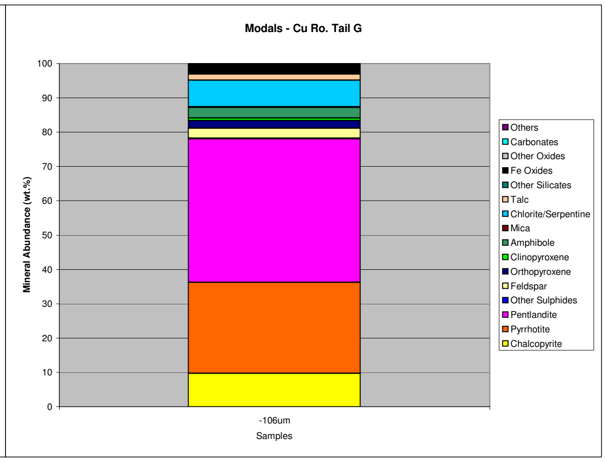
Prophecy Platinum Corp
50149-101
MI7018-MAR12

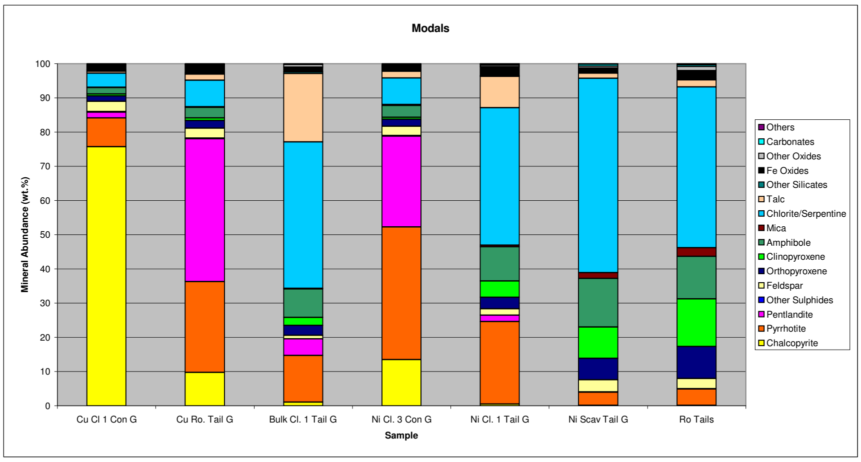
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

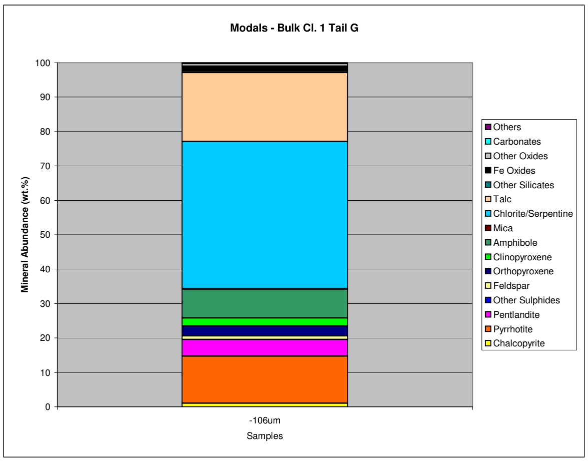
Modals

Survey		**Prophecy Platinum Corp**						
Project		**50149-101 / MI7018-MAR12**						
Sample		**Cu Cl 1 Con G**	**Cu Ro. Tail G**	**Bulk Cl. 1 Tail G**	**Ni Cl. 3 Con G**	**Ni Cl. 1 Tail G**	**Ni Scav Tail G**	**Ro Tails**
Fraction		**-106um**	**-106um**	**-106um**	**-106um**	**-106um**	**-106um**	**-106um**
Mass Size Distribution (%)		100.0	100.0	100.0	100.0	100.0	100.0	100.0
Calculated ESD Particle Size		16	16	11	15	11	10	20
		Sample	**Sample**	**Sample**	**Sample**	**Sample**	**Sample**	**Sample**
Mineral Mass (%)	Chalcopyrite	75.7	9.7	1.0	13.5	0.5	0.1	0.1
	Pyrrhotite	8.4	26.6	13.7	38.8	24.1	3.8	4.8
	Pentlandite	1.7	41.8	4.8	26.5	1.8	0.1	0.1
	Other Sulphides	0.2	0.2	0.0	0.2	0.0	0.0	0.0
	Feldspar	3.0	2.9	1.0	2.7	1.9	3.5	3.0
	Orthopyroxene	1.6	2.2	2.9	2.0	3.4	6.3	9.3
	Clinopyroxene	0.5	0.8	2.3	0.6	4.8	9.1	14.0
	Amphibole	1.9	3.1	8.4	3.5	10.1	14.2	12.5
	Mica	0.1	0.2	0.2	0.2	0.4	1.7	2.5
	Chlorite/Serpentine	4.0	7.8	42.8	7.8	40.2	56.8	46.9
	Talc	0.5	1.7	20.0	2.0	9.1	1.5	2.1
	Other Silicates	0.4	0.4	0.4	0.3	0.2	0.1	0.3
	Fe Oxides	1.7	2.3	1.4	1.8	2.6	1.3	2.4
	Other Oxides	0.1	0.2	0.7	0.1	0.5	0.6	1.2
	Carbonates	0.1	0.1	0.2	0.0	0.3	0.5	0.5
	Others	0.1	0.1	0.1	0.1	0.2	0.2	0.3
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean Grain Size by Frequency (µm)	Chalcopyrite	13	8	6	8	5	5	5
	Pyrrhotite	13	15	11	13	10	6	10
	Pentlandite	12	15	7	11	6	3	4
	Other Sulphides	9	5	5	7	5	4	4
	Feldspar	23	19	7	14	7	5	6
	Orthopyroxene	15	13	9	10	9	7	7
	Clinopyroxene	14	14	10	9	12	10	20
	Amphibole	16	14	8	13	8	6	9
	Mica	6	8	6	5	6	7	11
	Chlorite/Serpentine	15	11	8	9	8	8	11
	Talc	14	8	8	9	7	4	5
	Other Silicates	12	12	11	10	9	6	8
	Fe Oxides	11	9	7	6	7	5	7
	Other Oxides	9	10	8	8	7	6	12
	Carbonates	19	12	8	8	9	8	12
	Others	5	6	5	4	5	5	11

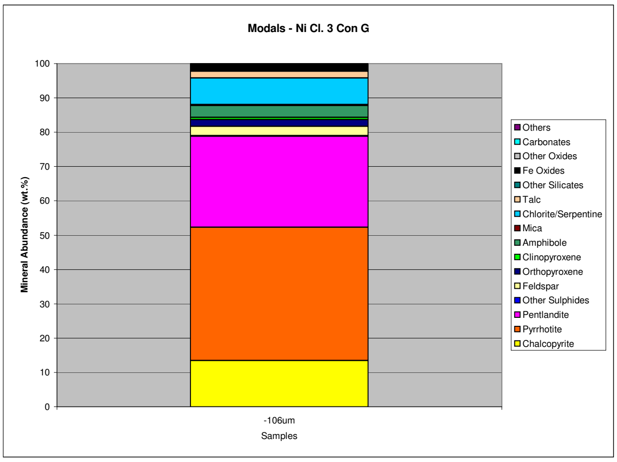

Modals - Cu Cl 1 Con G
Mineral Abundance (wt.%)
0
10
20
30
40
50
60
70
80
90
100
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals - Cu Ro. Tail G
Mineral Abundance (wt.%)
0
10
20
30
40
50
60
70
80
90
100
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite

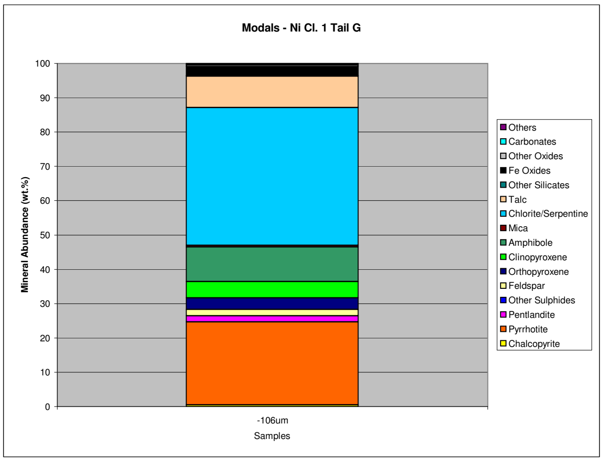

Modals
Mineral Abundance (wt.%)
0
10
20
30
40
50
60
70
80
90
100
Cu Cl 1 Con G
Cu Ro. Tail G
Bulk Cl. 1 Tail G
Ni Cl. 3 Con G
Ni Cl. 1 Tail G
Ni Scav Tail G
Ro Tails
Sample
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite

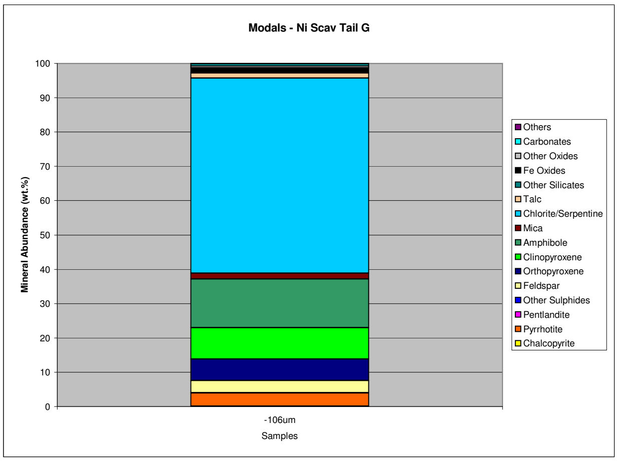


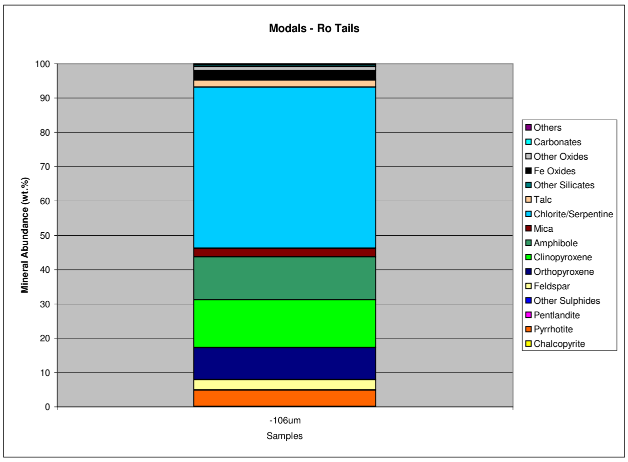
Modals - Bulk Cl. 1 Tail G
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite



Modals - Ni Cl. 3 Con G
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals - Ni Cl. 1 Tail G
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals - Ni Scav Tail G
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite


Modals - Ro Tails
Mineral Abundance (wt.%)
100
90
80
70
60
50
40
30
20
10
0
-106um
Samples
Others
Carbonates
Other Oxides
Fe Oxides
Other Silicates
Talc
Chlorite/Serpentine
Mica
Amphibole
Clinopyroxene
Orthopyroxene
Feldspar
Other Sulphides
Pentlandite
Pyrrhotite
Chalcopyrite

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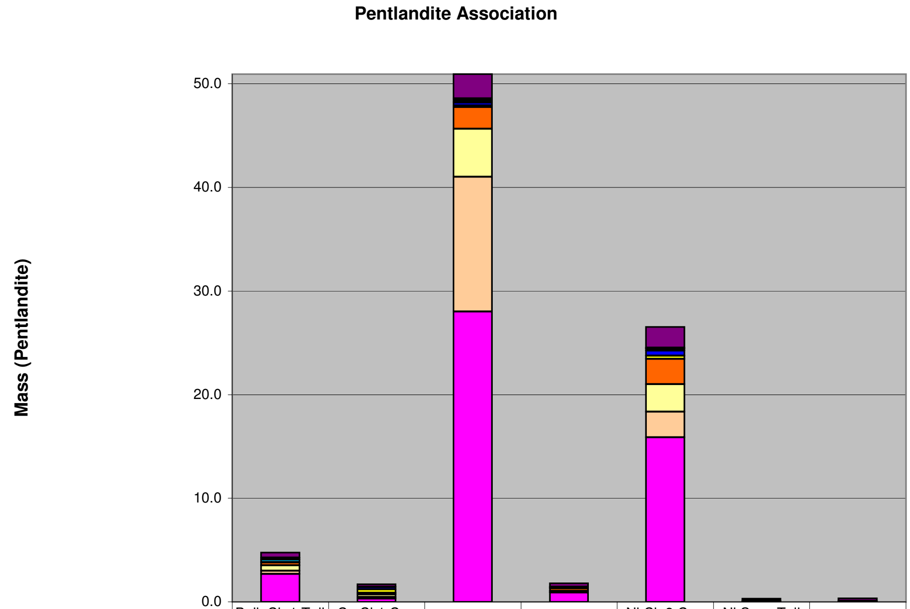
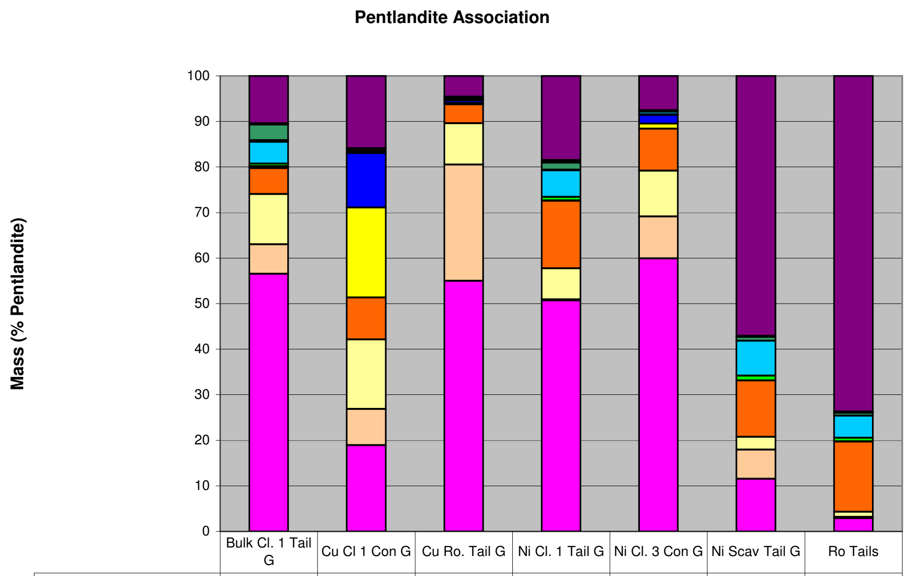
Pentlandite Association



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	0.5	0.3	2.3	0.3	2.0	0.2	0.2
Pentlandite:Other	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Pentlandite:Oxides	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Talc:Chl/Serp	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Talc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Chl/Serp	0.2	0.0	0.2	0.1	0.1	0.0	0.0
Pentlandite:Pyx/Amph	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Pentlandite:Cpy:Pn	0.0	0.2	0.3	0.0	0.5	0.0	0.0
Pentlandite:Chalcopyrite	0.0	0.3	0.1	0.0	0.3	0.0	0.0
Pentlandite:Pyrrhotite	0.3	0.2	2.1	0.3	2.4	0.0	0.1
Lib Pentlandite	0.5	0.3	4.6	0.1	2.7	0.0	0.0
Free Pentlandite	0.3	0.1	13.0	0.0	2.5	0.0	0.0
Pure Pentlandite	2.7	0.3	28.0	0.9	15.9	0.0	0.0

Absolute Mass of Pentlandite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Pentlandite	2.7	0.3	28.0	0.9	15.9	0.0	0.0
Free Pentlandite	0.3	0.1	13.0	0.0	2.5	0.0	0.0
Lib Pentlandite	0.5	0.3	4.6	0.1	2.7	0.0	0.0
Pentlandite:Pyrrhotite	0.3	0.2	2.1	0.3	2.4	0.0	0.1
Pentlandite:Chalcopyrite	0.0	0.3	0.1	0.0	0.3	0.0	0.0
Pentlandite:Cpy:Pn	0.0	0.2	0.3	0.0	0.5	0.0	0.0
Pentlandite:Pyx/Amph	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Pentlandite:Chl/Serp	0.2	0.0	0.2	0.1	0.1	0.0	0.0
Pentlandite:Talc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Talc:Chl/Serp	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Oxides	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pentlandite:Other	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Complex	0.5	0.3	2.3	0.3	2.0	0.2	0.2
Total	4.8	1.7	50.9	1.8	26.5	0.3	0.3



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	10.4	15.9	4.6	18.5	7.5	57.1	73.7
Pentlandite:Other	0.0	0.0	0.2	0.1	0.1	0.0	0.1
Pentlandite:Oxides	0.2	0.7	0.1	0.4	0.2	0.2	0.2
Pentlandite:Other Silicates	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Pentlandite:Talc:Chl/Serp	3.4	0.0	0.1	1.6	0.1	0.9	0.6
Pentlandite:Talc	0.4	0.0	0.0	0.1	0.0	0.0	0.0
Pentlandite:Chl/Serp	4.8	0.3	0.3	5.8	0.5	7.6	4.9
Pentlandite:Pyx/Amph	0.5	0.0	0.1	0.8	0.1	1.1	0.7
Pentlandite:Cpy:Pn	0.3	12.0	0.6	0.1	1.9	0.0	0.0
Pentlandite:Chalcopyrite	0.1	19.8	0.3	0.0	1.2	0.0	0.0
Pentlandite:Pyrrhotite	5.7	9.2	4.1	14.8	9.2	12.4	15.4
Lib Pentlandite	11.1	15.2	9.1	6.8	10.1	2.8	1.1
Free Pentlandite	6.5	8.0	25.5	0.2	9.2	6.4	0.3
Pure Pentlandite	56.5	18.9	55.0	50.7	59.9	11.5	2.9

Normalized Mass of Pentlandite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Pentlandite	56.5	18.9	55.0	50.7	59.9	11.5	2.9
Free Pentlandite	6.5	8.0	25.5	0.2	9.2	6.4	0.3
Lib Pentlandite	11.1	15.2	9.1	6.8	10.1	2.8	1.1
Pentlandite:Pyrrhotite	5.7	9.2	4.1	14.8	9.2	12.4	15.4
Pentlandite:Chalcopyrite	0.1	19.8	0.3	0.0	1.2	0.0	0.0
Pentlandite:Cpy:Pn	0.3	12.0	0.6	0.1	1.9	0.0	0.0
Pentlandite:Pyx/Amph	0.5	0.0	0.1	0.8	0.1	1.1	0.7
Pentlandite:Chl/Serp	4.8	0.3	0.3	5.8	0.5	7.6	4.9
Pentlandite:Talc	0.4	0.0	0.0	0.1	0.0	0.0	0.0
Pentlandite:Talc:Chl/Serp	3.4	0.0	0.1	1.6	0.1	0.9	0.6
Pentlandite:Other Silicates	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Pentlandite:Oxides	0.2	0.7	0.1	0.4	0.2	0.2	0.2
Pentlandite:Other	0.0	0.0	0.2	0.1	0.1	0.0	0.1
Complex	10.4	15.9	4.6	18.5	7.5	57.1	73.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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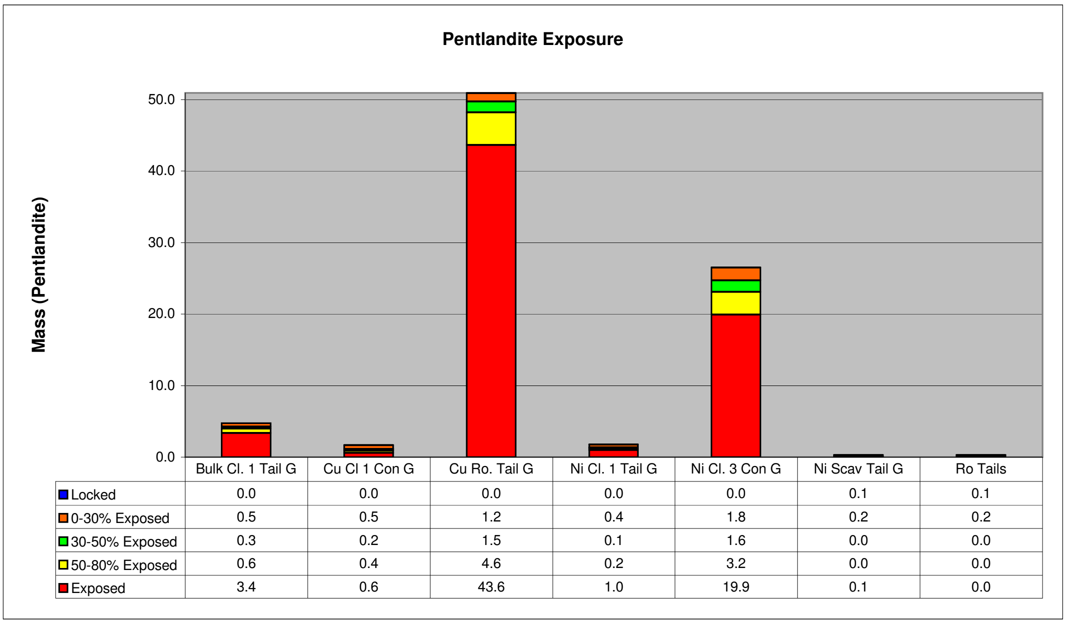
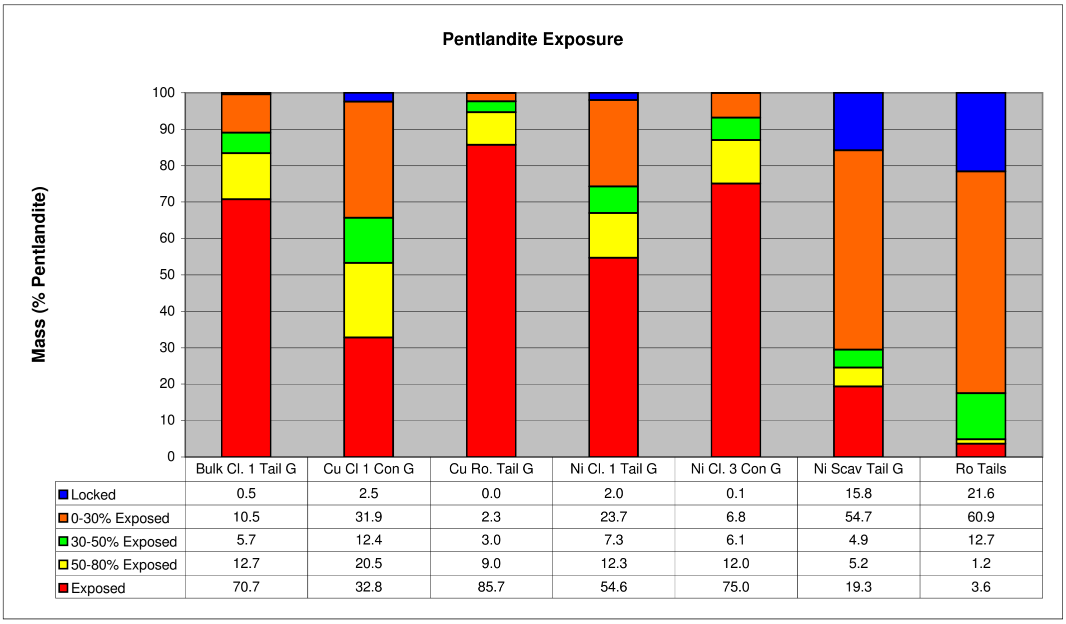
Pentlandite Exposure



Absolute Mass of Pentlandite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	3.4	0.6	43.6	1.0	19.9	0.1	0.0
50-80% Exposed	0.6	0.4	4.6	0.2	3.2	0.0	0.0
30-50% Exposed	0.3	0.2	1.5	0.1	1.6	0.0	0.0
0-30% Exposed	0.5	0.5	1.2	0.4	1.8	0.2	0.2
Locked	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total	4.8	1.7	50.9	1.8	26.5	0.3	0.3



Normalized Mass of Pentlandite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	70.7	32.8	85.7	54.6	75.0	19.3	3.6
50-80% Exposed	12.7	20.5	9.0	12.3	12.0	5.2	1.2
30-50% Exposed	5.7	12.4	3.0	7.3	6.1	4.9	12.7
0-30% Exposed	10.5	31.9	2.3	23.7	6.8	54.7	60.9
Locked	0.5	2.5	0.0	2.0	0.1	15.8	21.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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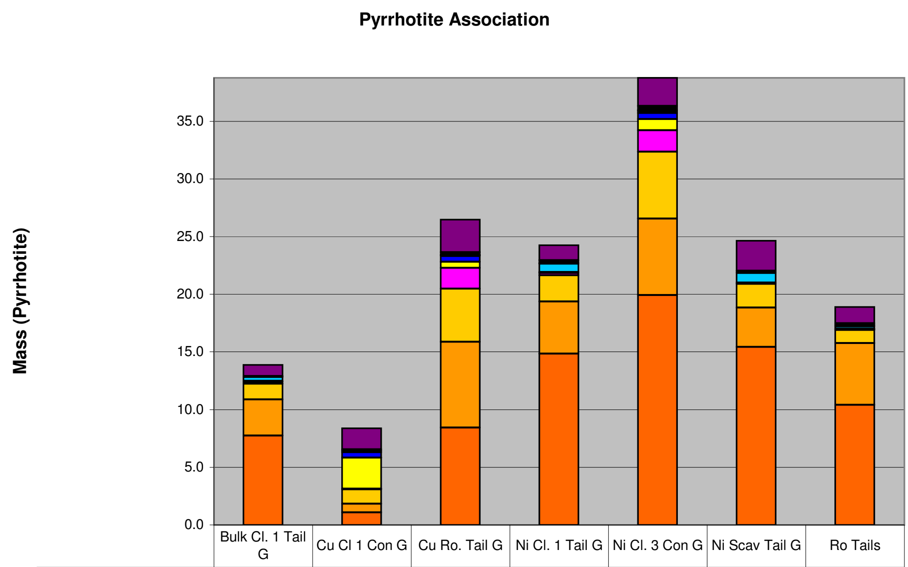
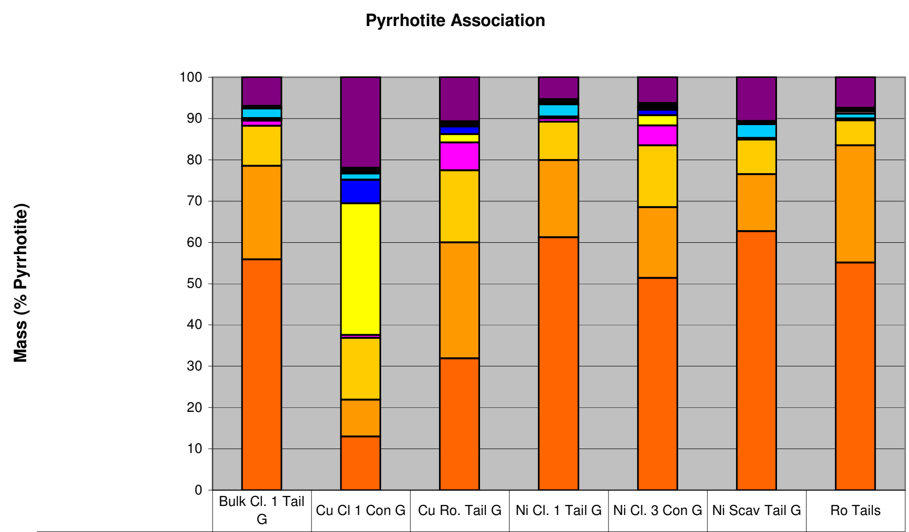
Pyrrhotite Association



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	1.0	1.8	2.8	1.3	2.4	2.6	1.4
Pyrrhotite:Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pyrrhotite:Oxides	0.1	0.1	0.2	0.3	0.4	0.1	0.2
Pyrrhotite:Other Silicates	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Pyrrhotite:Chl/Serp	0.3	0.1	0.0	0.7	0.2	0.8	0.2
Pyrrhotite:Pyx/Amph	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Pyrrhotite:Cpy:Pn	0.0	0.5	0.5	0.0	0.5	0.0	0.0
Pyrrhotite:Chalcopyrite	0.0	2.7	0.5	0.0	0.9	0.0	0.0
Pyrrhotite:Pentlandite	0.2	0.1	1.8	0.2	1.9	0.0	0.0
Lib Pyrrhotite	1.3	1.3	4.6	2.3	5.8	2.1	1.1
Free Pyrrhotite	3.1	0.7	7.4	4.5	6.7	3.4	5.4
Pure Pyrrhotite	7.7	1.1	8.4	14.8	19.9	15.4	10.4

Absolute Mass of Pyrrhotite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Pyrrhotite	7.7	1.1	8.4	14.8	19.9	15.4	10.4
Free Pyrrhotite	3.1	0.7	7.4	4.5	6.7	3.4	5.4
Lib Pyrrhotite	1.3	1.3	4.6	2.3	5.8	2.1	1.1
Pyrrhotite:Pentlandite	0.2	0.1	1.8	0.2	1.9	0.0	0.0
Pyrrhotite:Chalcopyrite	0.0	2.7	0.5	0.0	0.9	0.0	0.0
Pyrrhotite:Cpy:Pn	0.0	0.5	0.5	0.0	0.5	0.0	0.0
Pyrrhotite:Pyx/Amph	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Pyrrhotite:Chl/Serp	0.3	0.1	0.0	0.7	0.2	0.8	0.2
Pyrrhotite:Other Silicates	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Pyrrhotite:Oxides	0.1	0.1	0.2	0.3	0.4	0.1	0.2
Pyrrhotite:Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Complex	1.0	1.8	2.8	1.3	2.4	2.6	1.4
Total	13.9	8.4	26.5	24.2	38.8	24.6	18.9



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	7.0	22.0	10.7	5.3	6.3	10.6	7.4
Pyrrhotite:Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pyrrhotite:Oxides	0.6	1.2	0.8	1.1	0.9	0.6	0.9
Pyrrhotite:Other Silicates	0.0	0.1	0.2	0.2	0.2	0.2	0.5
Pyrrhotite:Chl/Serp	2.3	1.5	0.1	2.9	0.4	3.3	1.1
Pyrrhotite:Pyx/Amph	0.2	0.1	0.1	0.4	0.0	0.3	0.3
Pyrrhotite:Cpy:Pn	0.2	5.6	1.9	0.0	1.4	0.0	0.0
Pyrrhotite:Chalcopyrite	0.2	31.9	2.0	0.1	2.4	0.0	0.0
Pyrrhotite:Pentlandite	1.2	0.7	6.8	0.8	4.8	0.1	0.2
Lib Pyrrhotite	9.7	15.0	17.4	9.4	14.9	8.4	6.0
Free Pyrrhotite	22.7	8.9	28.1	18.7	17.2	13.8	28.3
Pure Pyrrhotite	55.8	12.9	31.9	61.2	51.4	62.7	55.1

Normalized Mass of Pyrrhotite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Pyrrhotite	55.8	12.9	31.9	61.2	51.4	62.7	55.1
Free Pyrrhotite	22.7	8.9	28.1	18.7	17.2	13.8	28.3
Lib Pyrrhotite	9.7	15.0	17.4	9.4	14.9	8.4	6.0
Pyrrhotite:Pentlandite	1.2	0.7	6.8	0.8	4.8	0.1	0.2
Pyrrhotite:Chalcopyrite	0.2	31.9	2.0	0.1	2.4	0.0	0.0
Pyrrhotite:Cpy:Pn	0.2	5.6	1.9	0.0	1.4	0.0	0.0
Pyrrhotite:Pyx/Amph	0.2	0.1	0.1	0.4	0.0	0.3	0.3
Pyrrhotite:Chl/Serp	2.3	1.5	0.1	2.9	0.4	3.3	1.1
Pyrrhotite:Other Silicates	0.0	0.1	0.2	0.2	0.2	0.2	0.5
Pyrrhotite:Oxides	0.6	1.2	0.8	1.1	0.9	0.6	0.9
Pyrrhotite:Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Complex	7.0	22.0	10.7	5.3	6.3	10.6	7.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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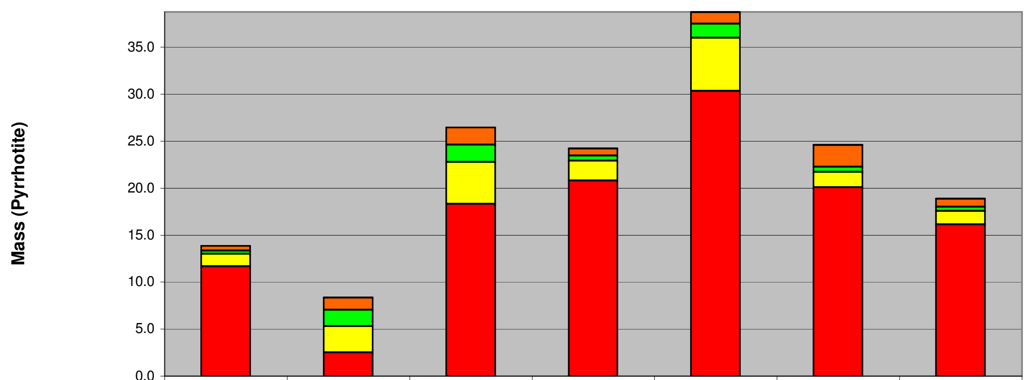
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

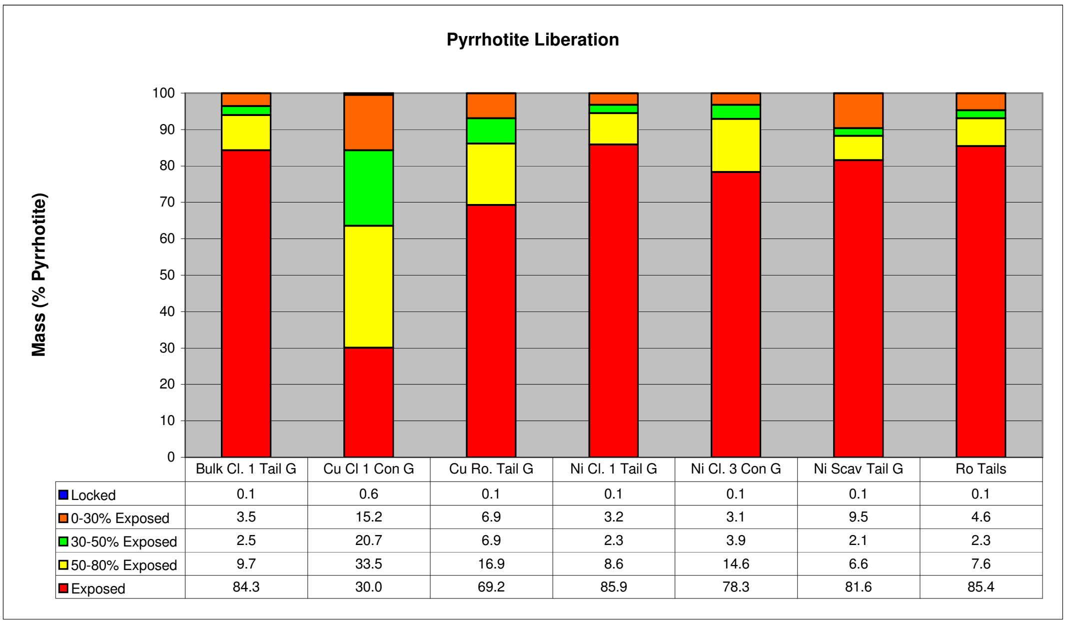
Pyrrhotite Exposure



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Locked	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0-30% Exposed	0.5	1.3	1.8	0.8	1.2	2.3	0.9
30-50% Exposed	0.3	1.7	1.8	0.6	1.5	0.5	0.4
50-80% Exposed	1.3	2.8	4.5	2.1	5.7	1.6	1.4
Exposed	11.7	2.5	18.3	20.8	30.3	20.1	16.1

Absolute Mass of Pyrrhotite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	11.7	2.5	18.3	20.8	30.3	20.1	16.1
50-80% Exposed	1.3	2.8	4.5	2.1	5.7	1.6	1.4
30-50% Exposed	0.3	1.7	1.8	0.6	1.5	0.5	0.4
0-30% Exposed	0.5	1.3	1.8	0.8	1.2	2.3	0.9
Locked	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	13.9	8.4	26.5	24.2	38.8	24.6	18.9

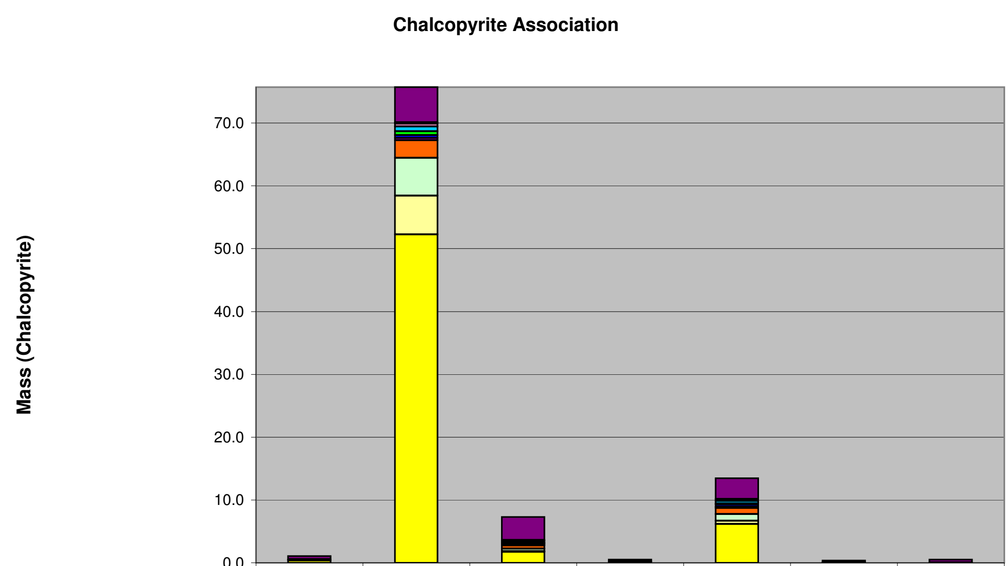


Normalized Mass of Pyrrhotite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	84.3	30.0	69.2	85.9	78.3	81.6	85.4
50-80% Exposed	9.7	33.5	16.9	8.6	14.6	6.6	7.6
30-50% Exposed	2.5	20.7	6.9	2.3	3.9	2.1	2.3
0-30% Exposed	3.5	15.2	6.9	3.2	3.1	9.5	4.6
Locked	0.1	0.6	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

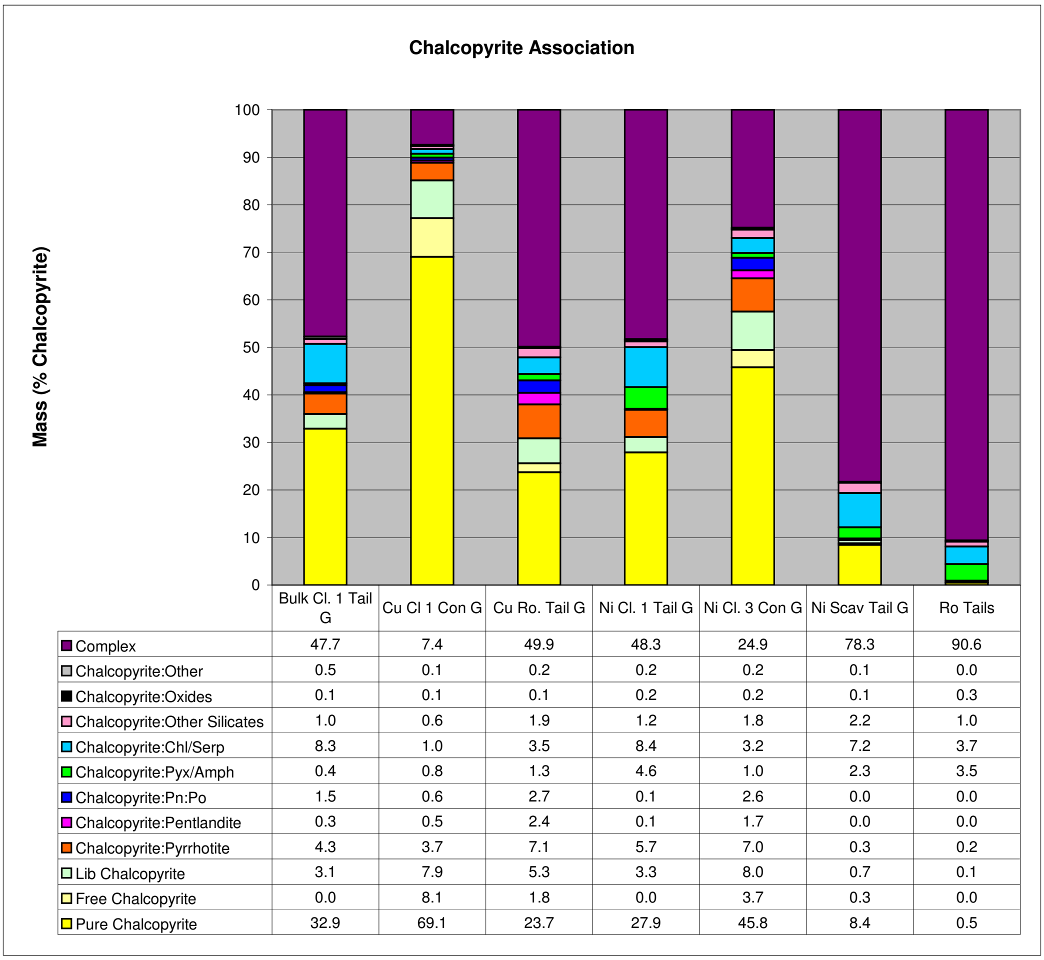
Chalcopyrite Association



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	0.5	5.6	3.6	0.2	3.4	0.3	0.5
Chalcopyrite:Other	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Chalcopyrite:Oxides	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Chalcopyrite:Other Silicates	0.0	0.5	0.1	0.0	0.2	0.0	0.0
Chalcopyrite:Chl/Serp	0.1	0.8	0.3	0.0	0.4	0.0	0.0
Chalcopyrite:Pyx/Amph	0.0	0.6	0.1	0.0	0.1	0.0	0.0
Chalcopyrite:Pn:Po	0.0	0.5	0.2	0.0	0.4	0.0	0.0
Chalcopyrite:Pentlandite	0.0	0.3	0.2	0.0	0.2	0.0	0.0
Chalcopyrite:Pyrrhotite	0.0	2.8	0.5	0.0	1.0	0.0	0.0
Lib Chalcopyrite	0.0	6.0	0.4	0.0	1.1	0.0	0.0
Free Chalcopyrite	0.0	6.2	0.1	0.0	0.5	0.0	0.0
Pure Chalcopyrite	0.3	52.3	1.7	0.1	6.2	0.0	0.0

Absolute Mass of Chalcopyrite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Chalcopyrite	0.3	52.3	1.7	0.1	6.2	0.0	0.0
Free Chalcopyrite	0.0	6.2	0.1	0.0	0.5	0.0	0.0
Lib Chalcopyrite	0.0	6.0	0.4	0.0	1.1	0.0	0.0
Chalcopyrite:Pyrrhotite	0.0	2.8	0.5	0.0	1.0	0.0	0.0
Chalcopyrite:Pentlandite	0.0	0.3	0.2	0.0	0.2	0.0	0.0
Chalcopyrite:Pn:Po	0.0	0.5	0.2	0.0	0.4	0.0	0.0
Chalcopyrite:Pyx/Amph	0.0	0.6	0.1	0.0	0.1	0.0	0.0
Chalcopyrite:Chl/Serp	0.1	0.8	0.3	0.0	0.4	0.0	0.0
Chalcopyrite:Other Silicates	0.0	0.5	0.1	0.0	0.2	0.0	0.0
Chalcopyrite:Oxides	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Chalcopyrite:Other	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Complex	0.5	5.6	3.6	0.2	3.4	0.3	0.5
Total	1.0	75.7	7.3	0.5	13.5	0.4	0.5

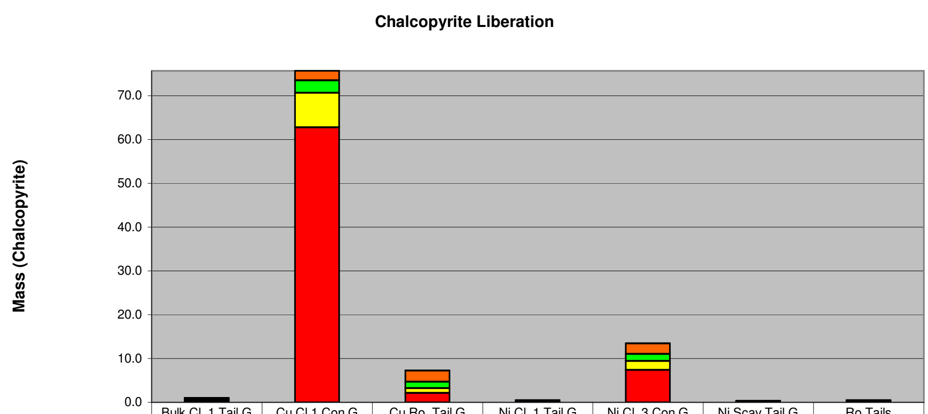


Normalized Mass of Chalcopyrite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Chalcopyrite	32.9	69.1	23.7	27.9	45.8	8.4	0.5
Free Chalcopyrite	0.0	8.1	1.8	0.0	3.7	0.3	0.0
Lib Chalcopyrite	3.1	7.9	5.3	3.3	8.0	0.7	0.1
Chalcopyrite:Pyrrhotite	4.3	3.7	7.1	5.7	7.0	0.3	0.2
Chalcopyrite:Pentlandite	0.3	0.5	2.4	0.1	1.7	0.0	0.0
Chalcopyrite:Pn:Po	1.5	0.6	2.7	0.1	2.6	0.0	0.0
Chalcopyrite:Pyx/Amph	0.4	0.8	1.3	4.6	1.0	2.3	3.5
Chalcopyrite:Chl/Serp	8.3	1.0	3.5	8.4	3.2	7.2	3.7
Chalcopyrite:Other Silicates	1.0	0.6	1.9	1.2	1.8	2.2	1.0
Chalcopyrite:Oxides	0.1	0.1	0.1	0.2	0.2	0.1	0.3
Chalcopyrite:Other	0.5	0.1	0.2	0.2	0.2	0.1	0.0
Complex	47.7	7.4	49.9	48.3	24.9	78.3	90.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

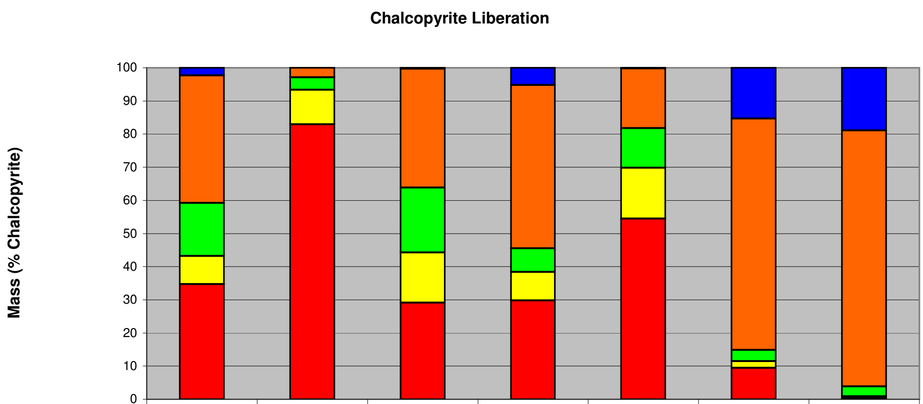
Chalcopyrite Liberation



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Locked	0.0	0.0	0.0	0.0	0.0	0.1	0.1
0-30% Exposed	0.4	2.2	2.6	0.3	2.4	0.3	0.4
30-50% Exposed	0.2	2.8	1.4	0.0	1.6	0.0	0.0
50-80% Exposed	0.1	7.9	1.1	0.0	2.1	0.0	0.0
Exposed	0.4	62.8	2.1	0.2	7.3	0.0	0.0

Absolute Mass of Chalcopyrite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	0.4	62.8	2.1	0.2	7.3	0.0	0.0
50-80% Exposed	0.1	7.9	1.1	0.0	2.1	0.0	0.0
30-50% Exposed	0.2	2.8	1.4	0.0	1.6	0.0	0.0
0-30% Exposed	0.4	2.2	2.6	0.3	2.4	0.3	0.4
Locked	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total	1.0	75.7	7.3	0.5	13.5	0.4	0.5



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Locked	2.3	0.0	0.3	5.2	0.2	15.3	18.9
0-30% Exposed	38.6	2.9	35.8	49.3	18.0	69.8	77.2
30-50% Exposed	16.0	3.7	19.6	7.1	11.9	3.4	3.0
50-80% Exposed	8.5	10.4	15.1	8.5	15.4	2.0	0.4
Exposed	34.7	82.9	29.1	29.8	54.5	9.5	0.5

Normalized Mass of Chalcopyrite Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Exposed	34.7	82.9	29.1	29.8	54.5	9.5	0.5
50-80% Exposed	8.5	10.4	15.1	8.5	15.4	2.0	0.4
30-50% Exposed	16.0	3.7	19.6	7.1	11.9	3.4	3.0
0-30% Exposed	38.6	2.9	35.8	49.3	18.0	69.8	77.2
Locked	2.3	0.0	0.3	5.2	0.2	15.3	18.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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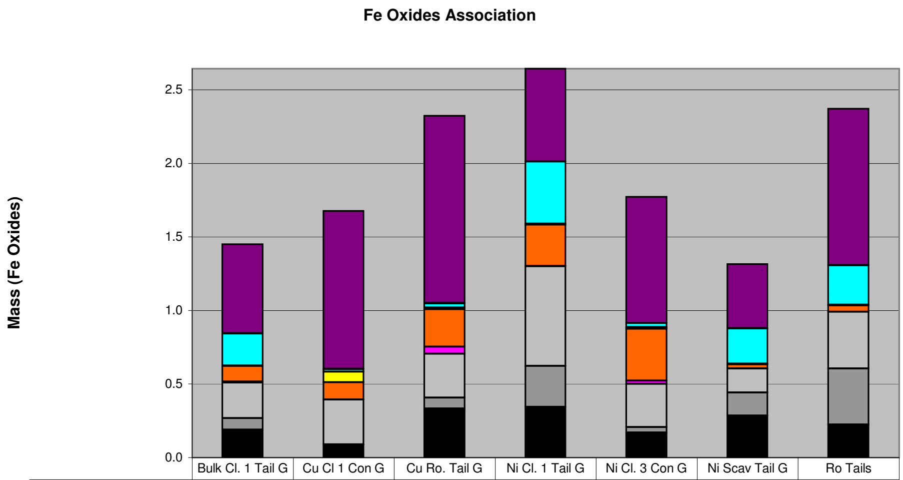
High Definition Mineralogical Analysis using QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy)

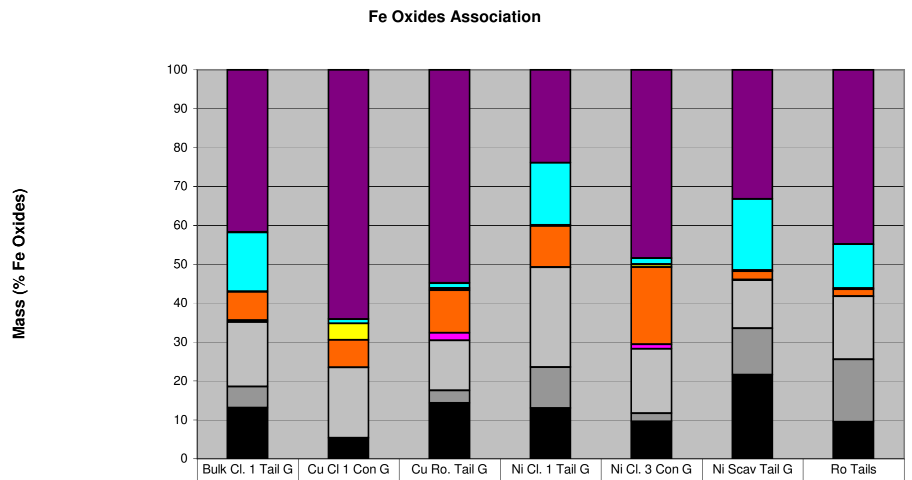
<u>Fe Oxides Association</u>



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	0.6	1.1	1.3	0.6	0.9	0.4	1.1
Fe Oxides:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Talc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Serp/Chlorite	0.2	0.0	0.0	0.4	0.0	0.2	0.3
Fe Oxides:Pyx/Amph	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Chalcopyrite	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Pyrrhotite	0.1	0.1	0.3	0.3	0.4	0.0	0.0
Fe Oxides:Pentlandite	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lib Fe Oxides	0.2	0.3	0.3	0.7	0.3	0.2	0.4
Free Fe Oxides	0.1	0.0	0.1	0.3	0.0	0.2	0.4
Pure Fe Oxides	0.2	0.1	0.3	0.3	0.2	0.3	0.2

<u>Absolute Mass of Fe Oxides Across Samples</u>

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Fe Oxides	0.2	0.1	0.3	0.3	0.2	0.3	0.2
Free Fe Oxides	0.1	0.0	0.1	0.3	0.0	0.2	0.4
Lib Fe Oxides	0.2	0.3	0.3	0.7	0.3	0.2	0.4
Fe Oxides:Pentlandite	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Pyrrhotite	0.1	0.1	0.3	0.3	0.4	0.0	0.0
Fe Oxides:Chalcopyrite	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Pyx/Amph	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Serp/Chlorite	0.2	0.0	0.0	0.4	0.0	0.2	0.3
Fe Oxides:Talc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fe Oxides:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Complex	0.6	1.1	1.3	0.6	0.9	0.4	1.1
Total	1.5	1.7	2.3	2.6	1.8	1.3	2.4



	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Complex	41.8	64.1	54.8	23.8	48.4	33.2	44.8
Fe Oxides:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Fe Oxides:Talc	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Fe Oxides:Serp/Chlorite	15.1	1.1	1.2	16.0	1.6	18.3	11.3
Fe Oxides:Pyx/Amph	0.1	0.0	0.0	0.2	0.1	0.3	0.2
Fe Oxides:Chalcopyrite	0.0	4.2	0.5	0.0	0.6	0.0	0.0
Fe Oxides:Pyrrhotite	7.3	7.0	10.9	10.6	19.9	2.1	1.8
Fe Oxides:Pentlandite	0.4	0.0	2.0	0.1	1.2	0.1	0.0
Lib Fe Oxides	16.7	18.1	12.8	25.7	16.6	12.4	16.3
Free Fe Oxides	5.4	0.0	3.2	10.6	2.1	11.9	16.0
Pure Fe Oxides	13.1	5.4	14.3	13.0	9.5	21.6	9.5

Normalized Mass of Fe Oxides Across Samples

Mineral Name	Bulk Cl. 1 Tail G	Cu Cl 1 Con G	Cu Ro. Tail G	Ni Cl. 1 Tail G	Ni Cl. 3 Con G	Ni Scav Tail G	Ro Tails
Pure Fe Oxides	13.1	5.4	14.3	13.0	9.5	21.6	9.5
Free Fe Oxides	5.4	0.0	3.2	10.6	2.1	11.9	16.0
Lib Fe Oxides	16.7	18.1	12.8	25.7	16.6	12.4	16.3
Fe Oxides:Pentlandite	0.4	0.0	2.0	0.1	1.2	0.1	0.0
Fe Oxides:Pyrrhotite	7.3	7.0	10.9	10.6	19.9	2.1	1.8
Fe Oxides:Chalcopyrite	0.0	4.2	0.5	0.0	0.6	0.0	0.0
Fe Oxides:Pyx/Amph	0.1	0.0	0.0	0.2	0.1	0.3	0.2
Fe Oxides:Serp/Chlorite	15.1	1.1	1.2	16.0	1.6	18.3	11.3
Fe Oxides:Talc	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Fe Oxides:Other Silicates	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Complex	41.8	64.1	54.8	23.8	48.4	33.2	44.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CAVM-50149-101
MI7018-MAR12
Sample Ni Cl. 3 Con G
Cameca Quantitative Analysis
Laboratoire de Microanalyse - Universite Laval
Label : asulSGS2
Wed Apr 11 08:50:31 2012
Weight %

mdl(%)	*0.027*	*0.138*	*0.109*	*0.116*	*0.121*	*0.063*	*0.044*	*0.038*	*0.032*	
Pyrrhotite	S	Pb	Co	Fe	Ni	Cu	Zn	As	Mn	Total
Conc po	39.404	0.104	0.053	58.890	0.592	0.000	0.013	0.005	0.000	99.061
Conc po	38.446	0.125	0.000	60.037	0.680	0.003	0.000	0.004	0.000	99.295
Conc po	38.301	0.090	0.046	59.759	0.631	0.242	0.007	0.034	0.000	99.110
Conc po	38.569	0.126	0.031	59.155	0.661	0.007	0.000	0.029	0.000	98.578
Conc po	38.525	0.132	0.001	59.995	0.430	0.092	0.000	0.000	0.000	99.175
Conc po	38.727	0.114	0.000	59.064	0.514	0.075	0.000	0.049	0.000	98.543
Conc po	38.203	0.123	0.026	59.683	0.510	0.116	0.068	0.036	0.000	98.765
Conc po	38.260	0.097	0.042	59.722	0.634	0.000	0.000	0.000	0.000	98.755
Conc po	38.596	0.017	0.004	60.093	0.546	0.000	0.000	0.022	0.006	99.284
Conc po	38.503	0.095	0.030	59.886	0.644	0.041	0.051	0.034	0.000	99.284
Ave	**38.553**	**0.102**	**0.023**	**59.628**	**0.584**	**0.058**	**0.014**	**0.021**	**0.001**	**98.985**
Min	**38.203**	**0.017**	**0.000**	**58.890**	**0.430**	**0.000**	**0.000**	**0.000**	**0.000**	**98.543**
Max	**39.404**	**0.132**	**0.053**	**60.093**	**0.680**	**0.242**	**0.068**	**0.049**	**0.006**	**99.295**
SD	**0.340**	**0.033**	**0.021**	**0.435**	**0.081**	**0.078**	**0.025**	**0.018**	**0.002**	**0.297**

Pentlandite	S	Pb	Co	Fe	Ni	Cu	Zn	As	Mn	Total
Conc pn	32.889	0.042	1.733	31.280	32.616	0.054	0.007	0.009	0.000	98.630
Conc pn	32.958	0.017	2.607	27.685	34.864	0.127	0.004	0.012	0.024	98.298
Conc pn	32.982	0.154	1.359	30.044	34.130	0.027	0.000	0.006	0.000	98.702
Conc pn	33.098	0.133	2.150	31.095	33.652	0.104	0.000	0.025	0.000	100.257
Conc pn	32.895	0.061	1.590	31.697	33.349	0.117	0.019	0.033	0.000	99.761
Conc pn	33.038	0.097	1.723	30.636	34.412	0.094	0.003	0.000	0.000	100.003
Conc pn	33.076	0.066	1.788	30.453	33.176	0.054	0.015	0.001	0.000	98.629
Conc pn	32.926	0.144	2.018	31.384	32.835	0.064	0.000	0.000	0.017	99.388
Conc pn	33.109	0.053	1.898	29.291	33.617	0.027	0.000	0.014	0.006	98.015
Conc pn	33.045	0.072	1.595	28.846	35.351	0.000	0.000	0.017	0.004	98.930
Conc pn	33.129	0.142	1.722	28.882	35.256	0.000	0.056	0.035	0.025	99.247
Conc pn	33.180	0.171	1.989	30.508	33.053	0.030	0.000	0.032	0.012	98.975
Conc pn	32.964	0.032	1.555	29.337	34.941	0.000	0.002	0.013	0.004	98.848
Ave	**33.022**	**0.091**	**1.825**	**30.088**	**33.942**	**0.054**	**0.008**	**0.015**	**0.007**	**99.053**
Min	**32.889**	**0.017**	**1.359**	**27.685**	**32.616**	**0.000**	**0.000**	**0.000**	**0.000**	**98.015**
Max	**33.180**	**0.171**	**2.607**	**31.697**	**35.351**	**0.127**	**0.056**	**0.035**	**0.025**	**100.257**
SD	**0.094**	**0.052**	**0.318**	**1.200**	**0.945**	**0.045**	**0.016**	**0.013**	**0.009**	**0.658**

Label : miscmc
Wed Apr 11 20:45:48 2012
Geo Analysis : miscellaneo. based on 1 Oxygens
Compound Percents

mdl(%)	*0.034*	*0.123*	*0.023*	*0.086*	*0.028*	*0.021*	*0.037*	*0.122*	*0.047*	*0.052*	*0.027*	*0.012*	
CPX-Augite	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Con cpx	53.582	0.053	0.826	0.071	13.995	17.634	0.169	10.456	0.035	0.111	0.253	0.036	97.221
Con cpx	51.429	0.544	2.392	0.537	15.940	20.261	0.219	7.125	0.000	0.038	0.381	0.000	98.866
Con cpx	51.065	0.690	2.295	0.662	15.683	20.934	0.218	6.652	0.004	0.048	0.360	0.000	98.611
Ave	**52.025**	**0.429**	**1.838**	**0.423**	**15.206**	**19.610**	**0.202**	**8.078**	**0.013**	**0.066**	**0.331**	**0.012**	**98.233**
Min	**51.065**	**0.053**	**0.826**	**0.071**	**13.995**	**17.634**	**0.169**	**6.652**	**0.000**	**0.038**	**0.253**	**0.000**	**97.221**
Max	**53.582**	**0.690**	**2.392**	**0.662**	**15.940**	**20.934**	**0.219**	**10.456**	**0.035**	**0.111**	**0.381**	**0.036**	**98.866**
SD	**1.360**	**0.334**	**0.877**	**0.311**	**1.057**	**1.744**	**0.029**	**2.073**	**0.019**	**0.040**	**0.069**	**0.021**	**0.885**

CPX-Hedenbergite	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Con cpx	51.352	0.011	2.254	0.000	7.589	21.299	0.374	14.747	0.012	0.078	1.063	0.000	98.779
Con cpx	51.291	0.000	1.017	0.000	7.283	18.901	0.407	17.982	0.030	0.074	0.514	0.027	97.526
Con cpx	51.197	0.053	0.947	0.044	7.248	20.646	0.237	17.543	0.006	0.083	0.350	0.014	98.368
Con cpx	51.098	0.021	1.015	0.003	7.851	23.026	0.212	14.593	0.000	0.038	0.503	0.006	98.366
Con cpx	50.759	0.000	1.408	0.066	7.502	19.096	0.176	19.198	0.000	0.046	0.497	0.045	98.793
Con cpx	49.529	0.000	1.143	0.031	3.711	22.191	0.501	20.722	0.015	0.003	0.514	0.000	98.360
Con cpx	49.423	0.000	0.909	0.003	3.856	22.148	0.164	21.244	0.000	0.086	0.415	0.000	98.248
Con cpx	49.408	0.000	1.276	0.028	2.860	21.877	0.091	21.930	0.000	0.000	0.584	0.000	98.054
Con cpx	47.989	0.000	0.402	0.000	0.396	22.290	0.401	26.048	0.000	0.080	0.204	0.010	97.820
Ave	**50.227**	**0.009**	**1.152**	**0.019**	**5.366**	**21.275**	**0.285**	**19.334**	**0.007**	**0.054**	**0.516**	**0.011**	**98.257**
Min	**47.989**	**0.000**	**0.402**	**0.000**	**0.396**	**18.901**	**0.091**	**14.593**	**0.000**	**0.000**	**0.204**	**0.000**	**97.526**
Max	**51.352**	**0.053**	**2.254**	**0.066**	**7.851**	**23.026**	**0.501**	**26.048**	**0.030**	**0.086**	**1.063**	**0.045**	**98.793**
SD	**1.183**	**0.018**	**0.499**	**0.024**	**2.713**	**1.451**	**0.139**	**3.639**	**0.010**	**0.034**	**0.234**	**0.016**	**0.412**

Chlorite	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Con chl	37.101	0.052	7.646	0.229	30.239	0.045	0.134	10.600	0.000	0.228	0.019	0.006	86.299
Con chl	36.363	0.021	8.290	0.000	30.601	0.025	0.177	10.597	0.000	0.078	0.001	0.012	86.165
Con chl	34.504	0.005	11.301	0.010	30.879	0.011	0.100	10.297	0.020	0.221	0.012	0.000	87.360
Con chl	33.810	0.000	12.061	0.000	30.129	0.007	0.093	10.356	0.009	0.140	0.011	0.000	86.616
Con chl	33.628	0.005	12.247	0.000	28.598	0.003	0.093	11.395	0.000	0.174	0.006	0.000	86.149
Con chl	28.688	0.000	18.691	0.034	20.016	0.003	0.100	18.748	0.014	0.165	0.009	0.004	86.472
Ave	**34.016**	**0.014**	**11.706**	**0.046**	**28.410**	**0.016**	**0.116**	**11.999**	**0.007**	**0.168**	**0.010**	**0.004**	**86.510**
Min	**28.688**	**0.000**	**7.646**	**0.000**	**20.016**	**0.003**	**0.093**	**10.297**	**0.000**	**0.078**	**0.001**	**0.000**	**86.149**
Max	**37.101**	**0.052**	**18.691**	**0.229**	**30.879**	**0.045**	**0.177**	**18.748**	**0.020**	**0.228**	**0.019**	**0.012**	**87.360**
SD	**2.961**	**0.020**	**3.938**	**0.091**	**4.188**	**0.017**	**0.034**	**3.330**	**0.009**	**0.055**	**0.006**	**0.005**	**0.454**

Amphibole (trem,Hnb)	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Con am	56.514	0.011	0.240	0.232	20.026	13.580	0.132	6.822	0.046	0.090	0.054	0.025	97.772
Con am	54.708	0.000	0.231	0.048	13.133	12.538	0.562	15.544	0.000	0.062	0.050	0.035	96.911
Con am	50.624	0.356	2.663	0.000	11.721	11.323	0.261	17.975	0.007	0.090	0.637	0.310	95.967
Ave	**53.949**	**0.122**	**1.045**	**0.093**	**14.960**	**12.480**	**0.318**	**13.447**	**0.018**	**0.081**	**0.247**	**0.123**	**96.883**
Min	**50.624**	**0.000**	**0.231**	**0.000**	**11.721**	**11.323**	**0.132**	**6.822**	**0.000**	**0.062**	**0.050**	**0.025**	**95.967**
Max	**56.514**	**0.356**	**2.663**	**0.232**	**20.026**	**13.580**	**0.562**	**17.975**	**0.046**	**0.090**	**0.637**	**0.310**	**97.772**
SD	**3.018**	**0.202**	**1.402**	**0.122**	**4.444**	**1.130**	**0.221**	**5.865**	**0.025**	**0.016**	**0.338**	**0.162**	**0.903**

Alteration phase	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Serpentine?	60.849	0.021	0.149	0.066	27.677	0.000	0.025	4.512	0.000	0.109	0.029	0.000	93.437
Con ser	44.401	0.048	1.453	0.000	33.953	0.025	0.113	8.293	0.000	0.226	0.005	0.001	88.518
Con ser	42.823	0.053	0.543	0.006	35.457	0.024	0.116	6.470	0.011	0.355	0.001	0.000	85.859
Con ser	42.762	0.032	0.522	0.000	36.714	0.052	0.081	6.235	0.002	0.337	0.018	0.000	86.755
Con ser	42.619	0.106	1.017	0.042	34.106	0.058	0.140	8.187	0.000	0.284	0.000	0.000	86.559
Con ser	42.501	0.000	1.129	0.052	36.449	0.019	0.135	7.345	0.012	0.359	0.011	0.003	88.015
Con ser	42.242	0.032	0.861	0.000	35.057	0.037	0.097	8.781	0.009	0.298	0.001	0.000	87.415
Con ser	42.218	0.000	1.312	0.058	33.748	0.065	0.133	8.692	0.012	0.336	0.007	0.003	86.584
Con ser	42.021	0.021	1.303	0.081	34.412	0.073	0.139	7.523	0.058	0.485	0.010	0.004	86.130
Con ser	41.939	0.000	0.993	0.000	30.036	0.016	0.276	12.730	0.017	0.341	0.016	0.000	86.364
Con ser	41.908	0.053	1.851	0.087	33.089	0.080	0.181	8.958	0.001	0.339	0.000	0.000	86.547
Con ser	41.891	0.016	3.522	0.470	27.857	1.324	0.274	11.459	0.000	0.111	0.001	0.014	86.939
Con ser	41.782	0.000	0.892	0.067	34.461	0.049	0.169	10.045	0.001	0.161	0.000	0.000	87.627
Con ser	41.767	0.042	0.919	0.010	35.713	0.047	0.112	8.891	0.024	0.111	0.011	0.000	87.647
Con ser	41.756	0.096	0.206	0.104	38.142	0.017	0.060	5.485	0.000	0.256	0.012	0.000	86.134
Con ser	41.727	0.032	1.092	0.071	35.183	0.022	0.116	8.384	0.024	0.174	0.015	0.000	86.840
Con ser	41.114	0.000	2.628	0.102	32.972	0.047	0.138	9.395	0.011	0.434	0.011	0.000	86.852
Con ser	40.290	0.053	2.923	0.000	31.640	0.044	0.151	10.208	0.010	0.409	0.008	0.005	85.741
Con ser	40.241	0.005	2.970	0.105	30.724	0.066	0.151	10.727	0.038	0.712	0.021	0.006	85.766
Ave	**42.992**	**0.032**	**1.383**	**0.070**	**33.547**	**0.109**	**0.137**	**8.543**	**0.012**	**0.307**	**0.009**	**0.002**	**87.144**
Min	**40.241**	**0.000**	**0.149**	**0.000**	**27.677**	**0.000**	**0.025**	**4.512**	**0.000**	**0.109**	**0.000**	**0.000**	**85.741**
Max	**60.849**	**0.106**	**3.522**	**0.470**	**38.142**	**1.324**	**0.276**	**12.730**	**0.058**	**0.712**	**0.029**	**0.014**	**93.437**
SD	**4.418**	**0.031**	**0.965**	**0.105**	**2.851**	**0.295**	**0.061**	**2.039**	**0.015**	**0.148**	**0.008**	**0.004**	**1.706**

CAVM-50149-101
MI7018-MAR12
Sample Ro Tails
Cameca Quantitative Analysis
Laboratoire de Microanalyse - Universite Laval
Label : asulSGS2
Wed Apr 11 08:50:31 2012
Weight %

mdl(%)	*0.027*	*0.138*	*0.109*	*0.116*	*0.121*	*0.063*	*0.044*	*0.038*	*0.032*	
Pyrrhotite	S	Pb	Co	Fe	Ni	Cu	Zn	As	Mn	Total
Tail po	38.794	0.079	0.073	59.746	0.641	0.000	0.001	0.000	0.029	99.363
Tail po	39.050	0.112	0.000	59.996	0.518	0.027	0.064	0.001	0.012	99.780
Tail po	38.968	0.044	0.012	60.167	0.510	0.014	0.000	0.035	0.010	99.760
Tail po	38.658	0.073	0.000	59.734	0.596	0.051	0.018	0.000	0.013	99.143
Tail po	38.862	0.161	0.018	60.472	0.535	0.072	0.000	0.013	0.000	100.133
Tail po	39.697	0.176	0.050	59.528	0.588	0.000	0.010	0.007	0.007	100.063
Tail po	39.821	0.077	0.000	59.636	0.772	0.075	0.000	0.016	0.000	100.397
Tail po	39.918	0.077	0.011	60.270	0.775	0.000	0.000	0.025	0.010	101.086
Tail po	39.639	0.125	0.047	60.244	0.702	0.195	0.007	0.043	0.006	101.008
Tail po	39.277	0.099	0.019	60.149	1.190	0.000	0.005	0.026	0.001	100.766
Tail po	39.111	0.183	0.000	60.632	0.655	0.000	0.000	0.040	0.000	100.621
Tail po	39.082	0.079	0.036	60.409	0.698	0.031	0.000	0.000	0.000	100.335
Tail po	39.039	0.187	0.005	60.448	0.580	0.051	0.008	0.026	0.000	100.344
Tail po	39.236	0.097	0.000	61.044	0.600	0.017	0.000	0.013	0.000	101.007
Ave	**39.225**	**0.112**	**0.019**	**60.177**	**0.669**	**0.038**	**0.008**	**0.018**	**0.006**	**100.272**
Min	**38.658**	**0.044**	**0.000**	**59.528**	**0.510**	**0.000**	**0.000**	**0.000**	**0.000**	**99.143**
Max	**39.918**	**0.187**	**0.073**	**61.044**	**1.190**	**0.195**	**0.064**	**0.043**	**0.029**	**101.086**
SD	**0.396**	**0.047**	**0.023**	**0.422**	**0.172**	**0.053**	**0.017**	**0.015**	**0.008**	**0.608**

Label : miscmc
Wed Apr 11 20:45:48 2012
Geo Analysis : miscellaneo. based on 1 Oxygens
Compound Percents

mdl(%)	*0.034*	*0.123*	*0.023*	*0.086*	*0.028*	*0.021*	*0.037*	*0.122*	*0.047*	*0.052*	*0.027*	*0.012*	
CPX	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Tail cpx	54.438	0.169	0.920	0.209	16.875	24.148	0.121	3.796	0.029	0.016	0.266	0.000	100.987
Tail cpx	54.248	0.022	0.323	0.200	15.261	23.488	0.268	6.505	0.002	0.007	0.228	0.000	100.552
Tail cpx	54.183	0.000	0.594	0.023	12.735	24.907	0.107	9.130	0.000	0.019	0.278	0.000	101.976
Tail cpx	53.622	0.065	2.494	0.152	15.268	24.065	0.092	4.569	0.011	0.000	0.417	0.000	100.755
Tail cpx	53.384	0.754	1.631	0.440	16.709	23.124	0.092	4.160	0.000	0.047	0.459	0.000	100.800
Tail cpx	53.247	0.022	1.042	0.000	11.417	24.551	0.100	9.869	0.006	0.000	0.367	0.009	100.630
Tail cpx	53.139	0.587	1.341	0.042	15.794	21.432	0.265	8.051	0.000	0.008	0.380	0.003	101.042
Tail cpx	52.796	0.432	3.040	0.912	17.227	21.319	0.179	5.181	0.000	0.006	0.198	0.000	101.290
Tail cpx	52.627	0.048	0.514	0.161	12.449	20.636	0.372	12.760	0.000	0.035	0.364	0.000	99.966
Tail cpx	52.595	0.389	3.046	0.880	17.298	21.451	0.165	5.015	0.006	0.017	0.207	0.003	101.072
Tail cpx	52.454	0.524	2.971	1.108	17.444	21.279	0.095	4.573	0.000	0.047	0.214	0.000	100.709
Tail cpx	52.431	0.492	2.944	1.147	17.560	21.333	0.106	4.624	0.012	0.029	0.180	0.000	100.858
Tail am	51.204	0.369	1.578	0.039	10.333	24.467	0.235	12.602	0.000	0.000	0.199	0.000	101.026
Tail cpx	50.416	0.931	4.182	0.226	14.944	21.454	0.182	7.619	0.000	0.031	0.343	0.000	100.328
Tail am	50.091	0.573	2.289	0.032	11.654	22.849	0.238	11.013	0.018	0.035	0.133	0.013	98.938
Ave	**52.603**	**0.372**	**1.999**	**0.383**	**14.721**	**22.597**	**0.178**	**7.548**	**0.004**	**0.020**	**0.283**	**0.002**	**100.710**
Min	**50.091**	**0.000**	**0.323**	**0.000**	**10.333**	**20.636**	**0.092**	**3.796**	**0.000**	**0.000**	**0.133**	**0.000**	**98.938**
Max	**54.438**	**0.931**	**4.182**	**1.147**	**17.560**	**24.907**	**0.372**	**12.760**	**0.029**	**0.047**	**0.459**	**0.013**	**101.976**
SD	**1.305**	**0.294**	**1.160**	**0.419**	**2.495**	**1.488**	**0.085**	**3.127**	**0.009**	**0.017**	**0.099**	**0.004**	**0.668**

Chlorite	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Tail chl	38.515	0.016	8.516	0.000	29.702	0.065	0.186	11.339	0.000	0.088	0.009	0.055	88.491
Tail chl	37.624	0.047	10.353	0.048	28.558	0.024	0.082	11.816	0.006	0.062	0.019	0.607	89.246
Tail chl	37.225	0.005	11.416	0.048	31.546	0.008	0.081	8.143	0.000	0.120	0.009	0.000	88.601
Tail chl	37.037	0.000	11.083	0.042	32.125	0.006	0.100	8.370	0.000	0.156	0.000	0.008	88.927
Tail chl	36.694	0.052	9.842	0.016	26.829	0.185	0.195	12.580	0.000	0.024	0.012	0.044	86.473
Tail chl	36.478	0.073	10.356	0.000	26.619	0.145	0.229	12.947	0.000	0.292	0.001	0.126	87.266
Tail chl	36.059	2.388	11.920	0.538	25.356	0.021	0.101	9.482	0.000	0.096	0.012	3.308	89.281
Tail chl	35.712	0.058	9.586	1.344	30.202	0.044	0.060	10.142	0.000	0.110	0.000	0.004	87.262
Tail chl	34.875	0.037	11.605	0.009	29.523	0.021	0.148	11.755	0.001	0.059	0.019	0.000	88.052
Tail chl	28.358	0.000	23.606	0.000	20.613	0.269	0.802	14.249	0.000	0.001	0.011	0.002	87.911
Ave	**35.858**	**0.268**	**11.828**	**0.205**	**28.107**	**0.079**	**0.198**	**11.082**	**0.001**	**0.101**	**0.009**	**0.415**	**88.151**
Min	**28.358**	**0.000**	**8.516**	**0.000**	**20.613**	**0.006**	**0.060**	**8.143**	**0.000**	**0.001**	**0.000**	**0.000**	**86.473**
Max	**38.515**	**2.388**	**23.606**	**1.344**	**32.125**	**0.269**	**0.802**	**14.249**	**0.006**	**0.292**	**0.019**	**3.308**	**89.281**
SD	**2.824**	**0.745**	**4.266**	**0.433**	**3.411**	**0.090**	**0.220**	**2.007**	**0.002**	**0.081**	**0.007**	**1.033**	**0.934**

Amphibole	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
Trem	57.999	0.000	0.042	0.066	21.361	13.646	0.089	4.836	0.015	0.032	0.014	0.017	98.117
Trem	57.823	0.000	0.885	0.000	22.520	13.185	0.119	4.047	0.000	0.000	0.136	0.030	98.745
Trem	56.328	0.016	0.286	0.023	25.473	11.214	0.110	3.530	0.008	0.061	0.022	0.022	97.093
Hnb	51.536	0.032	2.719	0.173	16.118	11.828	0.149	12.550	0.000	0.048	0.127	0.101	95.381
Hnb	50.252	0.080	6.568	0.039	20.169	10.955	0.144	7.698	0.000	0.035	0.845	0.083	96.868
Hnb	49.669	0.123	7.956	0.000	18.438	12.234	0.120	8.216	0.006	0.040	1.136	0.086	98.024
Ave	**53.935**	**0.042**	**3.076**	**0.050**	**20.680**	**12.177**	**0.122**	**6.813**	**0.005**	**0.036**	**0.380**	**0.057**	**97.371**
Min	**49.669**	**0.000**	**0.042**	**0.000**	**16.118**	**10.955**	**0.089**	**3.530**	**0.000**	**0.000**	**0.014**	**0.017**	**95.381**
Max	**57.999**	**0.123**	**7.956**	**0.173**	**25.473**	**13.646**	**0.149**	**12.550**	**0.015**	**0.061**	**1.136**	**0.101**	**98.745**
SD	**3.870**	**0.050**	**3.404**	**0.065**	**3.253**	**1.070**	**0.022**	**3.406**	**0.006**	**0.020**	**0.484**	**0.037**	**1.197**

Alteration phase	SiO2	TiO2	Al2O3	Cr2O3	MgO	CaO	MnO	FeO	CoO	NiO	Na2O	K2O	Total
serpentine?	54.979	0.011	0.802	0.033	29.483	0.064	0.089	6.791	0.000	0.083	0.024	0.004	92.363
Tail ser	42.536	0.010	3.969	0.000	29.777	0.108	0.184	11.315	0.000	0.075	0.000	0.018	87.992
Tail ser	42.104	0.000	2.749	0.000	29.920	0.111	0.296	12.637	0.008	0.050	0.010	0.048	87.933
Tail ser	41.915	0.000	0.416	0.006	37.697	0.027	0.057	7.494	0.017	0.137	0.019	0.000	87.785
Tail ser	41.732	0.021	1.851	0.118	34.299	0.085	0.186	9.870	0.010	0.075	0.004	0.000	88.251
Tail ser	41.635	0.005	1.074	0.029	37.108	0.032	0.075	8.815	0.000	0.151	0.027	0.000	88.951
Tail ser	41.611	0.000	0.506	0.000	36.505	0.013	0.060	8.807	0.000	0.152	0.000	0.006	87.660
Tail ser	41.536	0.079	3.574	0.367	28.666	0.065	0.235	11.840	0.000	0.038	0.015	0.020	86.435
Tail ser	41.500	0.037	4.372	0.117	29.218	0.135	0.218	11.607	0.000	0.092	0.013	0.015	87.324
Tail ser	41.325	0.021	3.552	0.184	30.751	0.053	0.190	11.211	0.001	0.009	0.272	0.215	87.784
Tail ser	40.883	0.058	5.761	0.025	28.034	0.130	0.194	11.590	0.012	0.443	0.009	0.031	87.170
Tail ser	40.360	0.026	2.516	0.000	32.774	0.082	0.160	10.584	0.018	0.406	0.016	0.005	86.947
Tail ser	40.089	0.000	4.928	0.010	32.758	0.201	0.133	9.838	0.001	0.109	0.020	0.005	88.092
Tail chl	40.061	0.000	6.878	0.045	30.061	0.093	0.163	10.684	0.000	0.083	0.014	0.032	88.114
Ave	**42.305**	**0.019**	**3.068**	**0.067**	**31.932**	**0.086**	**0.160**	**10.220**	**0.005**	**0.136**	**0.032**	**0.029**	**88.057**
Min	**40.061**	**0.000**	**0.416**	**0.000**	**28.034**	**0.013**	**0.057**	**6.791**	**0.000**	**0.009**	**0.000**	**0.000**	**86.435**
Max	**54.979**	**0.079**	**6.878**	**0.367**	**37.697**	**0.201**	**0.296**	**12.637**	**0.018**	**0.443**	**0.272**	**0.215**	**92.363**
SD	**3.722**	**0.024**	**2.016**	**0.103**	**3.290**	**0.050**	**0.070**	**1.715**	**0.007**	**0.129**	**0.070**	**0.056**	**1.384**

Mineralogical Services Inc.

Mineralogical Report

MINERALOGICAL INVESTIGATION OF THE DEPORTMENT OF PLATINUM AND PALLADIUM MINERALS IN TWO LOCKED CYCLE TEST TAILS FROM THE WELLGREEN METALLURGICAL TEST PROGRAM

Prepared for Mike Ounpuu and Danniel Oosterman
For:
Prophecy Platinum Corp.

By Giovanni Di Prisco

July 9, 2012

Project : TerraMS- 12JUL-001 – Wellgreen –LCT Tail Platinum-Palladium Minerals Deportment

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SUMMARY

The present document reports information concerning the deportment of Platinum- and Palladium-bearing particles encountered in two tail products (Test LCT-1) generated from the Wellgreen ore from the Prophecy Platinum Yukon project metallurgical test program. The main scope of the present mineralogy examination was to determine the PGE mineral mode of occurrence and gangue associations, with a secondary objective of outlining the broad PGE mineral families observed.

A total of ninety- four and nineteen PGE particles were identified in the Nickel 1st Cleaner tail and Nickel Scavenger Tail samples, respectively.

Two broad categories of PGE minerals were identified. Platinum was identified only in sperrylite ($PtAs_2$, abbreviation Pt-As), whereas Palladium was encountered in a series of Palladium-Antimonite and Palladium (+/- Sb, Ni) telluride. Finally one grain of auro-cuprite (?) was also observed in the Ni 1st Cleaner tail sample.

PGE minerals predominately occur as liberated particles in the Nickel 1st Cleaner tail. In contrast, only minor amounts of liberated grains (all of them sperrylite) are deported to the Nickel Scavenger tail, whereas the bulk of PGE minerals reports to this tail sample as inclusions or intergrown with gangue minerals.

Most of the non-liberated PGE minerals occurring in the Nickel 1st Cleaner Tail are intergrown with pyrrhotite and only minor amounts are associated with magnetite or silicate gangue. In the Nickel Scavenger tail, two-thirds of the PGE minerals are also intergrown with sulphide (chiefly pyrrhotite), yet approximately 21% are also associated with silicate gangue.

The entire group of identified PGE mineral grains present re-calculated diameters that can be best described as extremely fine grained. Most grains are less than 3 µm in diameter with an average diameter not exceeding 1.5 µm.

Terra Mineralogical Services Inc.
July 9, 2011

Giovanni Di Prisco, Ph.D., P.Geo.
Consulting Geologist – Mineralogist

INTRODUCTION

The present document reports information concerning the deportment of Platinum- and Palladium-bearing particles encountered in one 1st Cleaner Tail and one Scavenger Tail sample (Table 1). These tail samples were generated from Locked Cycle Test 1(LCT 01), performed March 14, 2012, to test ore mineralization originating from workings located in the East zone of the Wellgreen Copper-Nickel PGE deposit of Prophecy Platinum, located in Southwestern Yukon.

The main scope of the present mineralogy examination was to determine the PGE mineral mode of occurrence and gangue associations, with a secondary objective of outlining the broad PGE mineral families observed.

Table 1. Examined Tail Samples*

	Assays, %				Assays g/ t		
	Cu	Ni	S	Fe	Pt	Pd	Au
Ni 1st Cleaner Tail (**)	0.13	0.48	7.48	18.5	1.02	0.61	0.05
Ni Scavenger Tail(**)	0.03	0.13	1.15	10.4	0.22	0.09	0.02

*: Analyses carried out at SGS geochemistry laboratories
(**): combined cycles E, F, G

Approximately 34.7% Platinum and 21.0% Palladium are deported to the Nickel 1st Cleaner Tail of LCT1; whereas 40.7% of the Platinum and 16.9%, of the Palladium report to the Nickel Scavenger tail of LCT1. Thus, considerable amounts of these two elements are lost to these tailings streams.

METHODOLOGY

A group of five polished sections was prepared for each tail sample. The entire surface of each section was scanned to identify PGE-bearing minerals and associated gangue phases.

The sections were scanned for PGE mineral occurrences using SEM-EDX. The SEM scans were performed using the ASPEX eXplorer Scanning Electron Microscope fitted with automatic stage movement and the Automatic Feature Analysis (AFA) software set to recognize precious metal grains. The SEM-EDX recognition software collected a series of physical parameters for each particle of interest, in particular the maximum width and length of PGE particles and the total area of each precious metal grain. In addition, standard ore microscopy scans and manual SEM-EDS scans were also performed on selected areas of some sections, and additional very fine grained particles might have been detected and measured. In these instances, a normalized width and length was collected for each grain. For irregularly shaped grains, a "best fit" width and length was attributed to calculate the area of the grains.

In addition to PGE mineral grain dimensions, other information recorded includes the mode of occurrence of PGE particles, and associated minerals. Information for each identified PGE grain was reported in data tables. Codes for the different modes of occurrence of PGE-bearing particles occurring in metallurgical products are presented in Table 2, and illustrated in Figure 1. A succinct list of mineral abbreviations that might have been used is presented in Table 3.

Table 2 - Precious Metal Grains - Mode of Occurrence	Code
inclusion in	1
at grain boundaries/included in	2
along fracture/ veinlets in	3
at mineral grain boundaries	4
attached to, or exposed	5
liberated	6

Figure 1. Mode of Occurrence of Precious Metal Grains

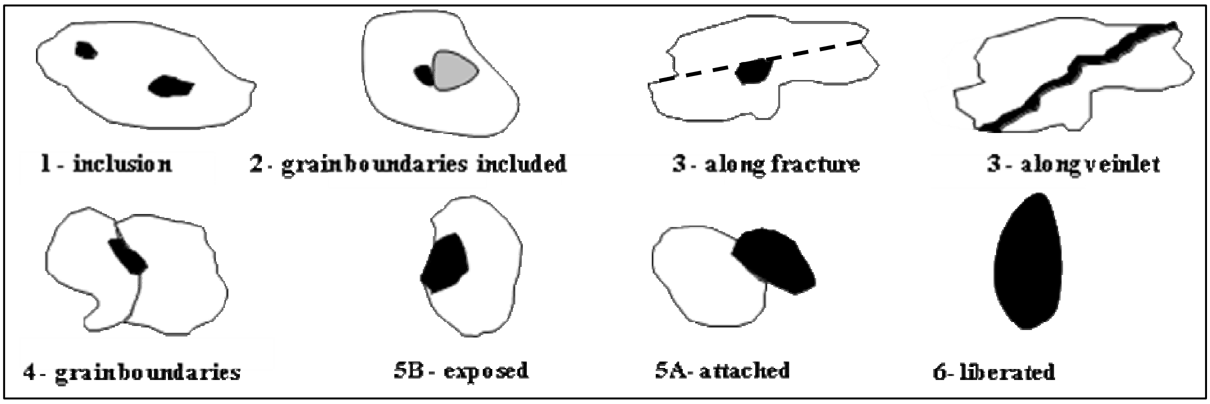


Table 3. List of Mineral Abbreviations

carbonate	:	crb	magnetite	:	mt
chalcopyrite	:	cp	pentlandite	:	ptn
chlorite	:	chl	Platinum Group Elements:		PGE
galena	:	ga	pyrite	:	py
Iron Oxide	:	Fe-Ox	pyrrhotite	:	po
Iron oxi-hydroxide	:	Fe-O-OH	quartz	:	qtz
hematite	:	hem	rutile	:	rut
non-opaque gangue	:	nop	sperrylite	:	spy
			sulphides	:	sul

SUMMARY OF OBSERVATIONS

Nickel 1st Cleaner Tail Cycle G – Locked Cycle Test 01 - Wellgreen deposit

	Assays, %				Assays g/ t		
	Cu	Ni	S	Fe	Pt	Pd	Au
Ni 1st Cleaner Tail	0.13	0.48	7.48	18.5	1.02	0.61	0.05

Data from the entire set of PGE minerals identified in the Nickel 1st Cleaner Tail-G sample are presented in Appendix 1, whereas a series of BSE images illustrating pertinent features are presented in Appendix 3. A summary of the types of PGE minerals and other precious metal particles is presented in Table 4, whereas the distribution of the mode of occurrence of these particles is presented in Table 5.

Table 4. Ni Cln 1st Tail- Type of PGE Minerals

Precious Metal	Code	Vol % Distribution
Auro-Cuprite	Au1	0.5
Paladium Antimonite	Pd-Sb	5.1
Palladium (+/-Sb+/-Ni)-Telluride	Pd-Sb(Ni)-Te	24.2
sperrylite	Pt-As	70.1

Table 5. Ni 1st Cln Tail- Mode of Occurrence of PGE Minerals

Precious Metal	Code	Vol % Distribution
inclusion	1	2.1
at grain boundaries	4	16.8
attached/ exposed	5	23.8
liberated	6	57.3

A total of ninety-four PGE particles and one gold particle were identified. Sperryllite (Pt-As) is the main PGE mineral in this tail sample (~ 70 vol %), whereas unclassified Pd phases (Pd Antimonite and Pd tellurides) account for approximately 30% of the PGE minerals observed. Finally, one occurrence of auro- cuprite (?) was also identified.

The majority of the identified PGE particles occur as minute liberated grains (~ 57 vol%), however the degree of liberation of sperrylite grains (~ 61% liberated) is markedly higher than the degree of liberation of Palladium-bearing particles (~ 48% liberated). In contrast, very few grains were entirely locked as minute inclusions. Most of the PGE minerals that are not liberated are chiefly intergrown with pyrrhotite, and a few with magnetite, or silicate gangue.

The entire group of identified particles possess a re-calculated grain size diameter of less than 4.6 µm; only five of the ninety-five identified particles present a diameter coarser than 3 µm. The overall average for these particles is 1.5 µm.

Nickel Scavenger Tail Cycle G – Locked Cycle Test 01 - Wellgreen deposit

	Assays, %				Assays g/ t		
	Cu	**Ni**	**S**	**Fe**	**Pt**	**Pd**	**Au**
Ni Scavenger Tail	0.03	0.13	1.15	10.4	0.22	0.09	0.02

Data from the entire set of PGE minerals identified in the Nickel Scavenger Tail-G sample are presented in Appendix 2, whereas a series of BSE images illustrating pertinent features are presented in Appendix 3. A summary of the types of PGE minerals and other precious metal particles is presented in Table 6, whereas the distribution of the mode of occurrence of these particles is presented in Table 7.

Table 6. Ni Scavenger Tail- Type of PGE Minerals

Precious Metal	Code	Vol % Distribution
Paladium Antimonite	Pd-Sb	0.3
Palladium (+/-Sb+/-Ni)-Telluride	Pd-Sb(Ni)-Te	56.0
sperrylite	Pt-As	43.7

Table 7. Ni Scavenger Tail- Mode of Occurrence of PGE Minerals

Precious Metal	Code	Vol % Distribution
inclusion	1	25.9
at grain boundaries	4	17.6
attached/ exposed	5	44.2
liberated	6	12.3

In this Scavenger Tail sample, a total of nineteen PGE particles were identified. Unclassified Pd phases (Pd Antimonite and Pd tellurides) account for approximately 56 vol% of the grains identified and sperryllite (Pt-As) the remaining 44 vol%.

A minor amount of particles occurs as liberated grains (~12 vol%), all of which sperrylite. In contrast, PGE minerals deported to this scavenger tail are chiefly intergrown with gangue minerals, and occur as inclusions (~ 26%), at grain boundaries (~ 17.5%), and attached to gangue minerals (~ 44%). Approximately two third of the non liberated particles (~ 66.4 vol %) are intergrown with sulphide minerals (by far mainly pyrrhotite), whereas approximately 17.2% occur intergrown with silicate gangue, and another 4.1% at silicate gangue sulphide mineral contacts.

The entire group of particles identified in this Scavenger Tail also possess re-calculated grain size diameters of less than 4 µm; only two particles present a diameter coarser than 3 µm. The overall average for these particles is 1.3 µm.

Appendix 1.

List of PGE Occurrences in Ni 1st Cleaner Tail G

Ni 1st Cleaner Tail G- LCT1

	Type	Mode Occu	Gangue	AREA	d
1	**Au1**	5	ptn	1.3	**1.3**
2	**Pd-Sb**	1	po	0.7	**1.0**
3	**Pd-Sb**	4	po	0.28	**0.6**
4	**Pd-Sb**	5	po	0.2	**0.4**
5	**Pd-Sb**	5	po	2.2	**1.7**
6	**Pd-Sb**	6		0.3	**0.6**
7	**Pd-Sb**	6		0.4	**0.7**
8	**Pd-Sb**	6		0.7	**0.9**
9	**Pd-Sb**	6		0.8	**1.0**
10	**Pd-Sb**	6		1.7	**1.5**
11	**Pd-Sb**	6		1.8	**1.5**
12	**Pd-Sb**	6		3	**2.0**
13	**Pd-Sb(Ni)-Te**	4	po	6.3	**2.8**
14	**Pd-Sb(Ni)-Te**	5	po	3.2	**2.0**
15	**Pd-Sb(Ni)-Te**	5	po	4.2	**2.3**
16	**Pd-Sb(Ni)-Te**	5	po	5.5	**2.6**
17	**Pd-Sb(Ni)-Te**	6		1.7	**1.5**
18	**Pd-Sb(Ni)-Te**	6		2.8	**1.9**
19	**Pd-SbTe**	1	po	4.1	**2.3**
20	**Pd-Sb-Te**	4	po	0.8	**1.0**
21	**Pd-Sb-Te**	4	po	6.2	**2.8**
22	**Pd-Sb-Te**	5	po	0.4	**0.7**
23	**Pd-Sb-Te**	5	po	0.8	**1.0**
24	**Pd-Sb-Te**	5	po	0.8	**1.0**
25	**Pd-Sb-Te**	6		0.3	**0.6**
26	**Pd-Sb-Te**	6		0.3	**0.6**
27	**Pd-Sb-Te**	6		0.4	**0.7**
28	**Pd-Sb-Te**	6		1.6	**1.4**
29	**Pd-Sb-Te**	6		2.4	**1.8**
30	**Pd-Sb-Te**	6		2.6	**1.8**
31	**Pd-Sb-Te**	6		3.2	**2.0**
32	**Pd-Sb-Te**	6		3.5	**2.1**
33	**Pd-Sb-Te**	6		5.8	**2.7**
34	**Pt-As**	4	po	0.6	**0.9**
35	**Pt-As**	4	sil, po	5.6	**2.7**
36	**Pt-As**	4	sil, po	9.2	**3.4**
37	**Pt-As**	4	sil, po	10.8	**3.7**
38	**Pt-As**	5	Fe-Ox	0.24	**0.6**
39	**Pt-As**	5	Fe-Ox	0.4	**0.7**
40	**Pt-As**	5	Fe-Ox	6.8	**2.9**
41	**Pt-As**	5	Fe-Ox	14.4	**4.3**
42	**Pt-As**	5	po	0.4	**0.7**
43	**Pt-As**	5	po	0.55	**0.8**
44	**Pt-As**	5	po	0.9	**1.1**
45	**Pt-As**	5	po	1.3	**1.3**
46	**Pt-As**	5	po	1.4	**1.3**
47	**Pt-As**	5	po	1.7	**1.5**
48	**Pt-As**	5	po	2.6	**1.8**

49	**Pt-As**	5	po	3.8	**2.2**
50	**Pt-As**	5	sil, po	3.1	**2.0**
51	**Pt-As**	6		0.2	**0.5**
52	**Pt-As**	6		0.2	**0.6**
53	**Pt-As**	6		0.2	**0.5**
54	**Pt-As**	6		0.2	**0.6**
55	**Pt-As**	6		0.3	**0.6**
56	**Pt-As**	6		0.3	**0.6**
57	**Pt-As**	6		0.3	**0.6**
58	**Pt-As**	6		0.3	**0.6**
59	**Pt-As**	6		0.4	**0.7**
60	**Pt-As**	6		0.5	**0.8**
61	**Pt-As**	6		0.6	**0.9**
62	**Pt-As**	6		0.6	**0.9**
63	**Pt-As**	6		0.6	**0.9**
64	**Pt-As**	6		0.7	**0.9**
65	**Pt-As**	6		0.8	**1.0**
66	**Pt-As**	6		0.8	**1.0**
67	**Pt-As**	6		0.9	**1.1**
68	**Pt-As**	6		0.9	**1.1**
69	**Pt-As**	6		1	**1.1**
70	**Pt-As**	6		1.1	**1.2**
71	**Pt-As**	6		1.2	**1.2**
72	**Pt-As**	6		1.2	**1.2**
73	**Pt-As**	6		1.2	**1.2**
74	**Pt-As**	6		1.3	**1.3**
75	**Pt-As**	6		1.3	**1.3**
76	**Pt-As**	6		1.4	**1.4**
77	**Pt-As**	6		1.5	**1.4**
78	**Pt-As**	6		1.7	**1.5**
79	**Pt-As**	6		1.9	**1.6**
80	**Pt-As**	6		1.9	**1.6**
81	**Pt-As**	6		2	**1.6**
82	**Pt-As**	6		2	**1.6**
83	**Pt-As**	6		2.3	**1.7**
84	**Pt-As**	6		2.4	**1.8**
85	**Pt-As**	6		2.6	**1.8**
86	**Pt-As**	6		3.5	**2.1**
87	**Pt-As**	6		3.7	**2.2**
88	**Pt-As**	6		4.6	**2.4**
89	**Pt-As**	6		4.9	**2.5**
90	**Pt-As**	6		5.4	**2.6**
91	**Pt-As**	6		5.7	**2.7**
92	**Pt-As**	6		6	**2.8**
93	**Pt-As**	6		6.2	**2.8**
94	**Pt-As**	6		8.4	**3.3**
95	**Pt-As**	6		16.2	**4.5**

Appendix2.

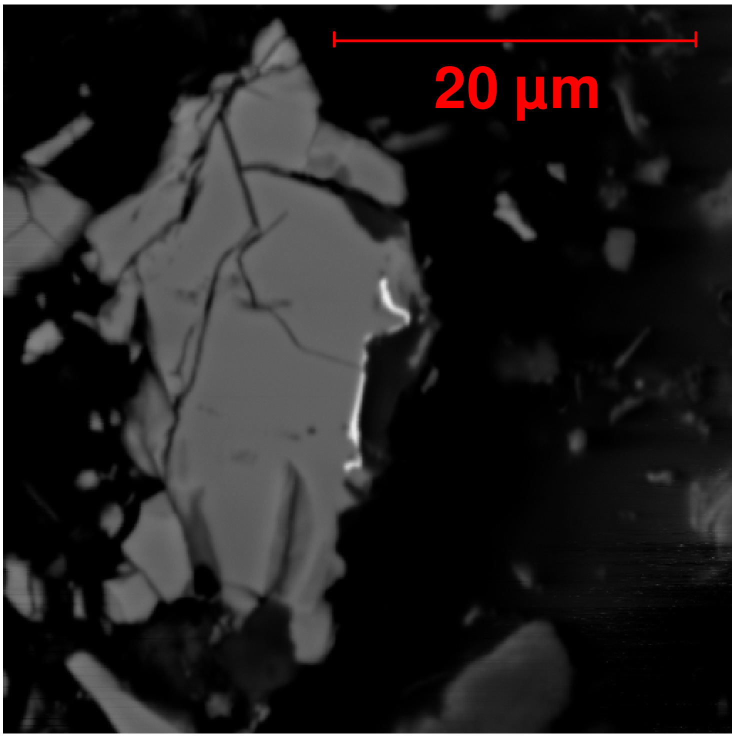
List of PGE Occurrences in Ni Scavenger Tail G

Ni Scavenger Tail G- LCT1

	Type	Mode Occu	Gangue	AREA	d
1	**Pd-Sb**	5	ptn, po, sil	0.1	**0.3**
2	**Pd-Sb(Ni)-Te**	1	po	0.4	**0.7**
3	**Pd-Sb(Ni)-Te**	1	po	7.4	**3.1**
4	**Pd-Sb(Ni)-Te**	4	sil	0.5	**0.8**
5	**Pd-Sb(Ni)-Te**	5	po	1.4	**1.3**
6	**Pd-Sb(Ni)-Te**	5	po	10.7	**3.7**
7	**Pt-As**	1	po	1.6	**1.4**
8	**Pt-As**	4	cp, po, sil	1.4	**1.3**
9	**Pt-As**	4	sil	0.1	**0.3**
10	**Pt-As**	4	sil	1	**1.1**
11	**Pt-As**	4	sil	1.4	**1.3**
12	**Pt-As**	4	sil	2	**1.6**
13	**Pt-As**	5	po	2.7	**1.9**
14	**Pt-As**	5	sil	1.3	**1.3**
15	**Pt-As**	6		0.5	**0.8**
16	**Pt-As**	6		0.8	**1**
17	**Pt-As**	6		0.9	**1.1**
18	**Pt-As**	6		1	**1.1**
19	**Pt-As**	6		1.3	**1.3**

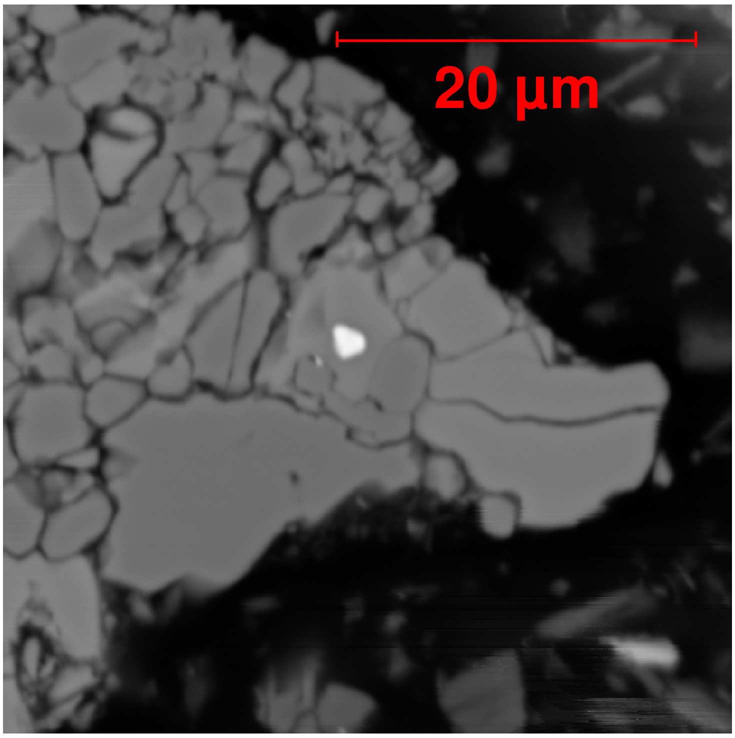
APPENDIX 3

Wellgreen Cleaner 1st Tail and Scavenger Tail
BSE Images
PGE Mineral Occurrences



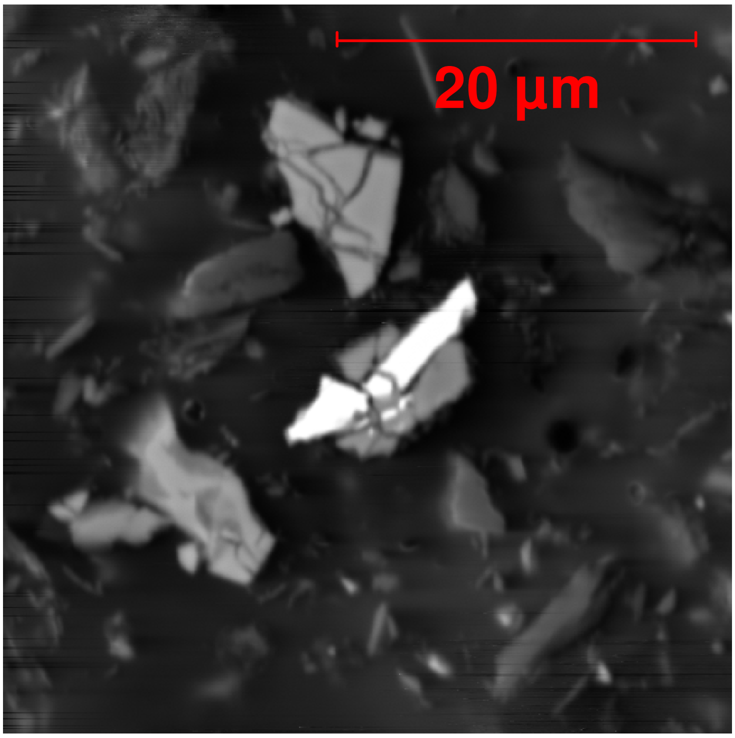
Ni Cln 1st Tail

Sperrylite (Pt-As) attached to pyrrhotite



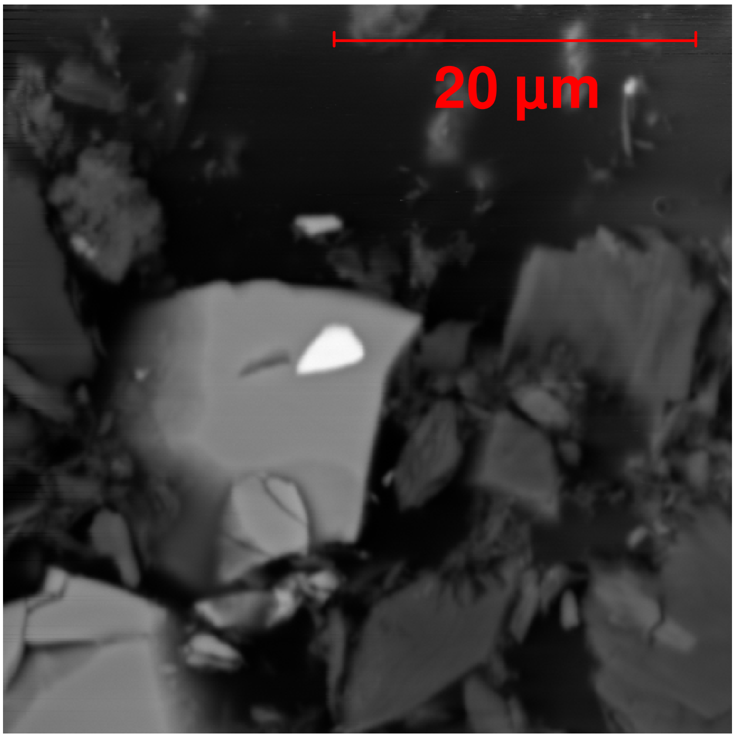
Ni Cln 1st Tail

Pd-Sb inclusion in pyrrhotite



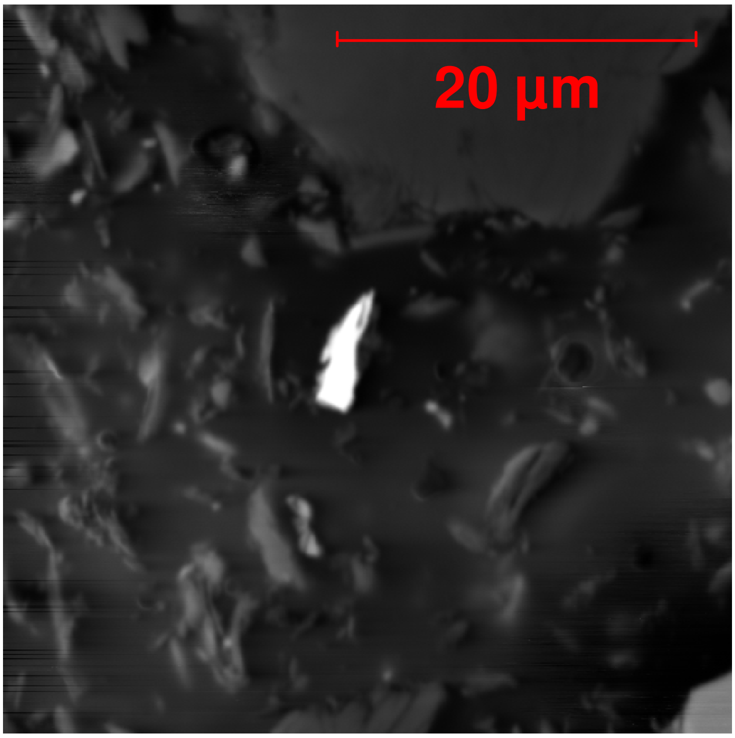
Ni Cln 1st Tail

Sperrylite (Pt-As) intergrown with magnetite



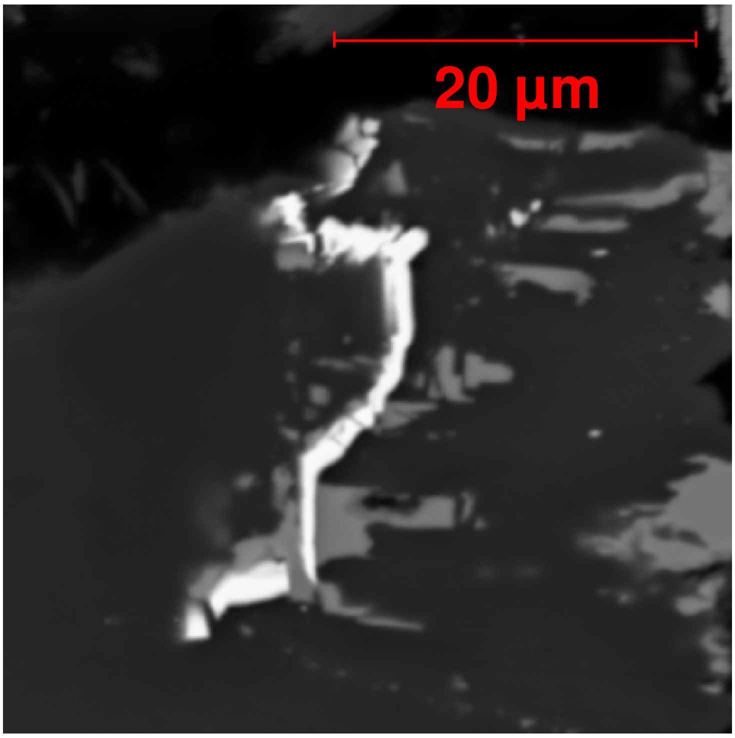
Ni Cln 1st Tail

Pd-Sb-Te inclusion in pyrrhotite



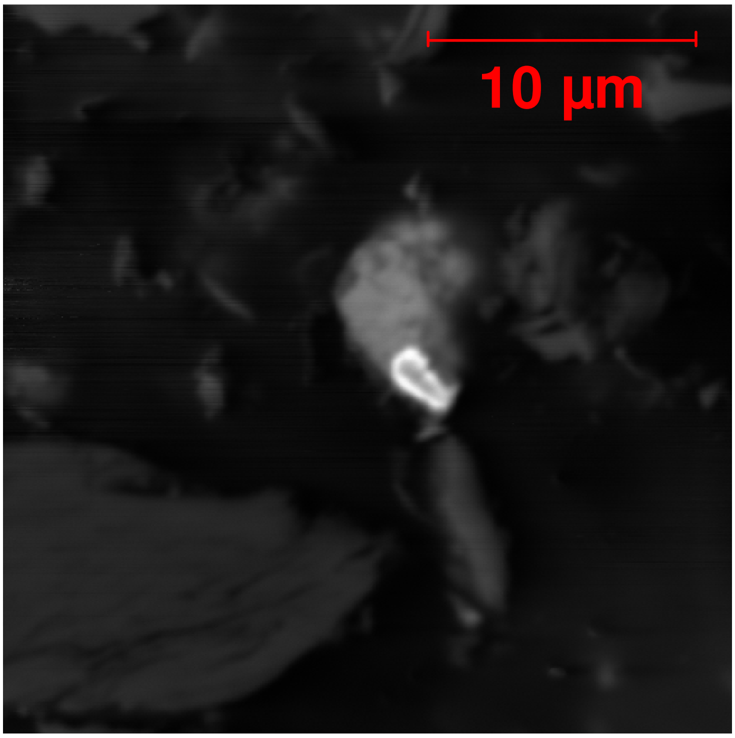
Ni Cln 1st Tail

Liberated particle of sperrylite (Pt-As)



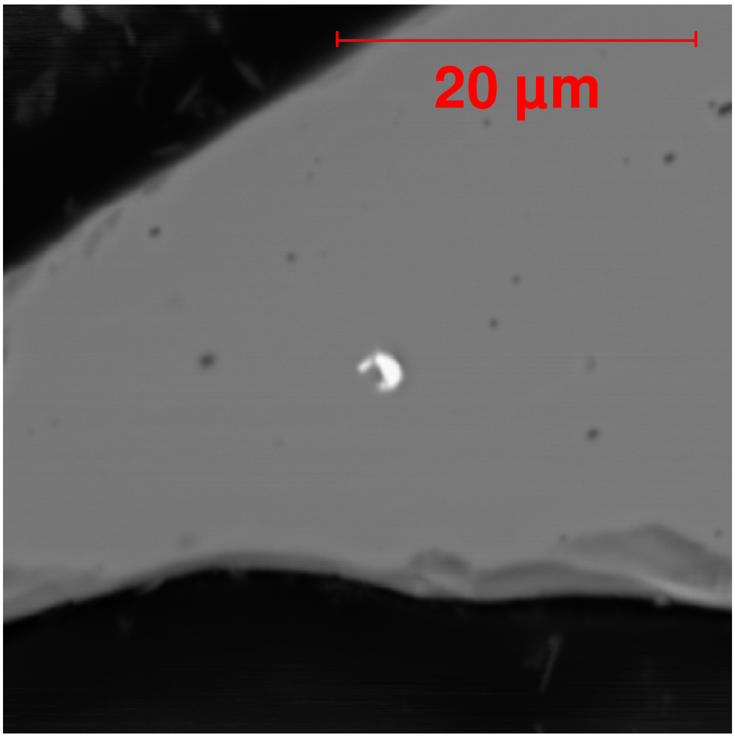
Ni Cln 1st Tail

Thin sperrylite (Pt-As) interstitial phase occurring at grain boundaries of quartz and pyrrhotite



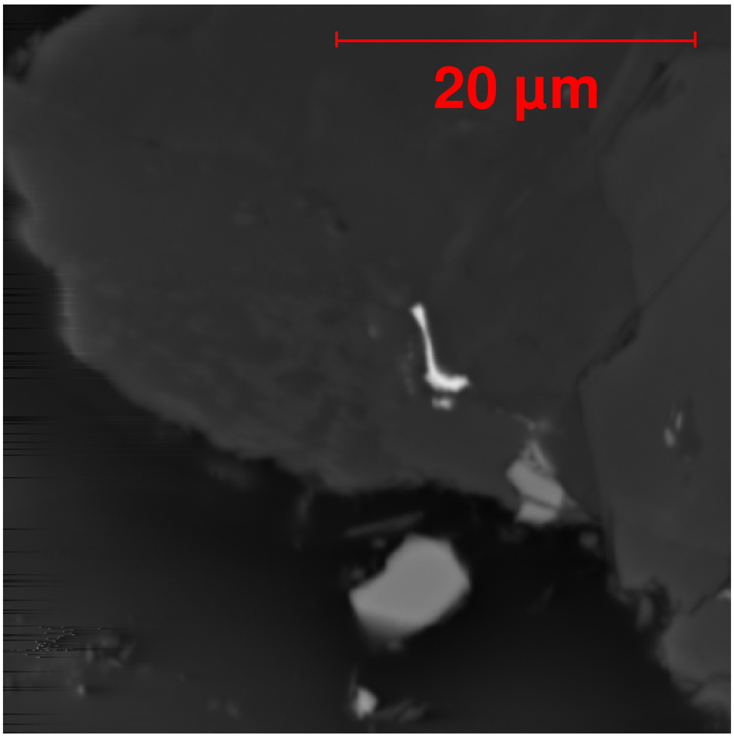
Ni Cln 1st Tail

Auro- cuprite (bright grain) attached to a particle of pentlandite



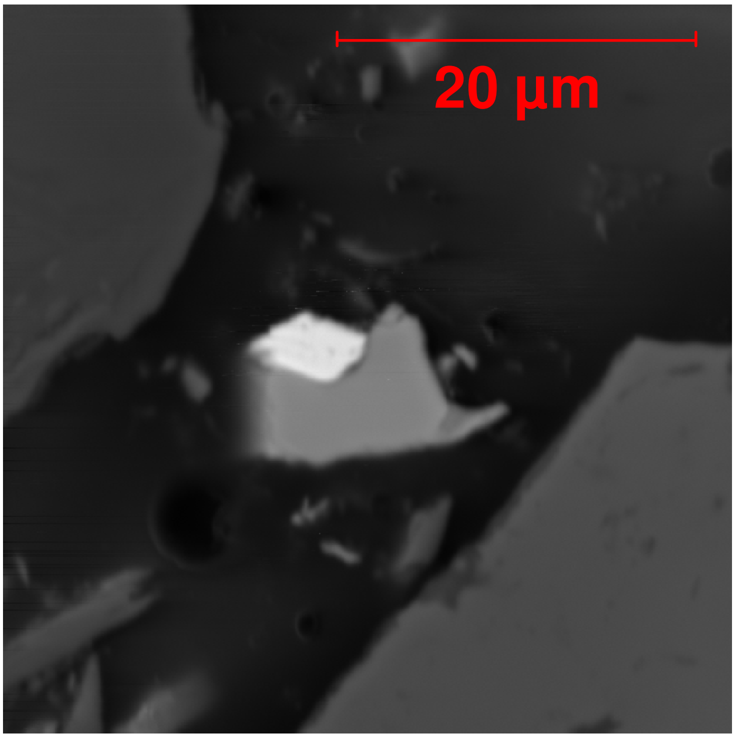
Ni Scavenger Tail G

Minute inclusion of sperrylite (Pt-As) in pyrrhotite



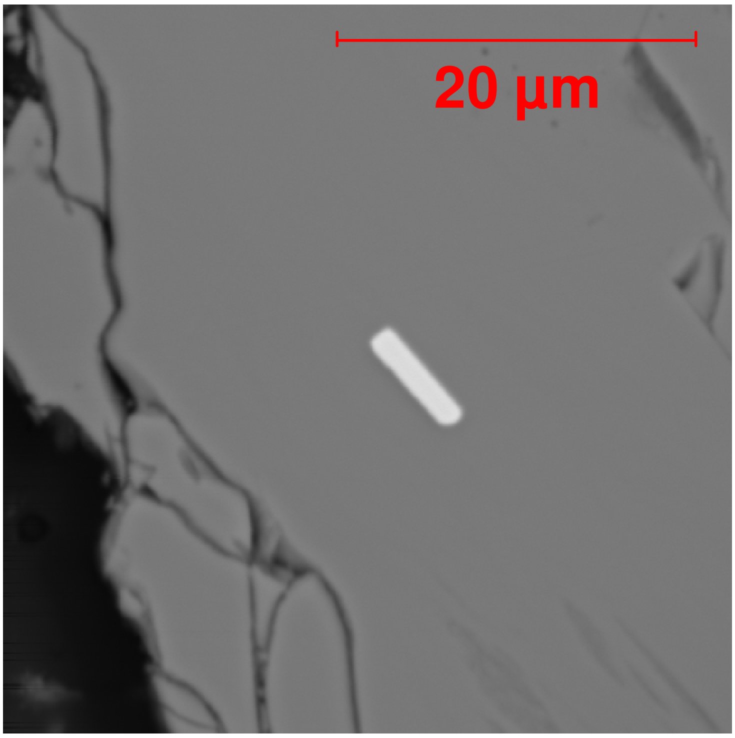
Ni Scavenger Tail G

Thin layer of interstitial sperrylite (Pt-As) at silicate grain boundaries



Ni Scavenger Tail G

Pt-Sb-Te attached to pentlandite



Ni Scavenger Tail G

Euhedral grain of Pt-Sb-Ni-Te occurring as inclusion in pyrrhotite