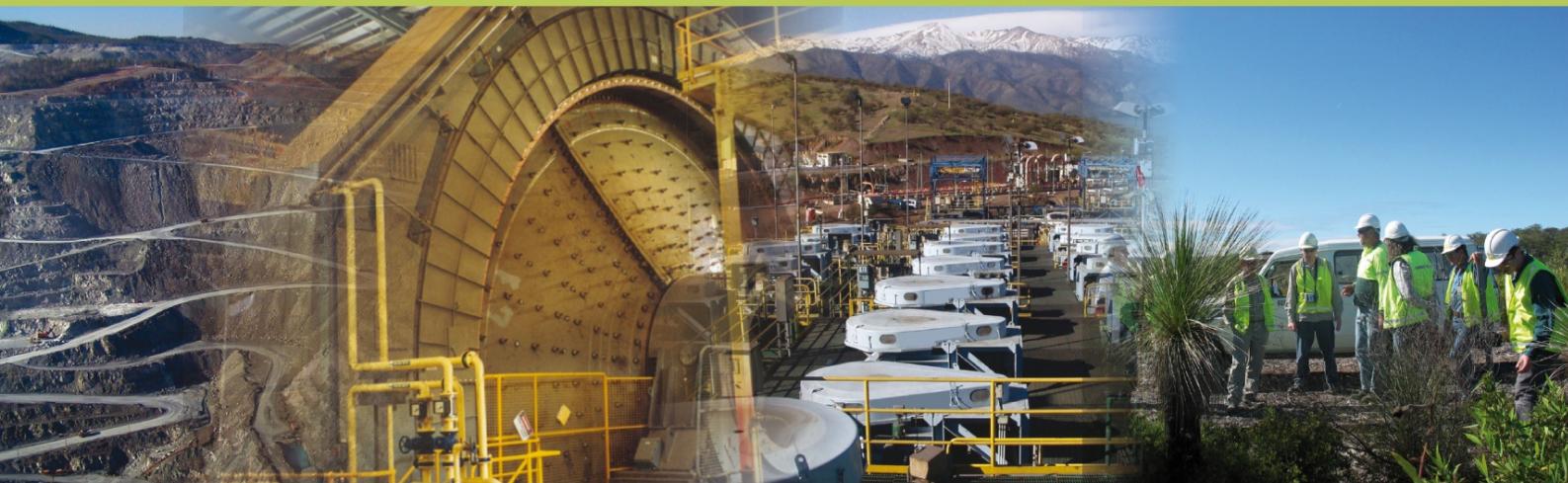


JKTech Pty Ltd



CuDECO Crushing Circuit Simulation Study

CuDECO Ltd

Prepared by: Timothy Vizcarra

JKTech Job No: 11140

Date: October 2011





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Attention: Peter Hutchison

Re: Report - JKTech Job No 11140 (Addendum)

Dear Peter

Enclosed, please find a copy of a report by Timothy Vizcarra and reviewed by Chris Bailey, titled 'CuDECO Crushing Circuit Simulation Study'. This is an addendum to the original report for this job, entitled 'CuDECO Simulation Study Report'.

If you have any queries about the report please do not hesitate to contact us.

Regards

Dr Sarah Schwarz

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JKTech Pty Ltd

CuDECO Crushing Circuit Simulation Study

Timothy Vizcarra

Submitted to

CuDECO Ltd

JKTech Job No. 11140 (Addendum) – October 2011

EXECUTIVE SUMMARY

Peter Hutchison from CuDECO Ltd. requested that JKTech conduct a simulation study to investigate the performance of a proposed crushing circuit for the CuDECO copper project. This was a follow-up request to the original scope of Job 11140, which was to simulate the performance of a single stage ball mill circuit for the CuDECO project. This report is an addendum to the original report that was issued previously.

The objective of this study was to simulate the performance of a crushing circuit consisting of primary and secondary crushers, followed by a high pressure grinding rolls (HPGR) unit. The scope of the work included investigating two different ore types – Ore1 (native Cu) and Ore 2 (average PR). JKSimMet models were used to conduct the simulations, using typical crusher model parameters from the JKTech database to simulate the crushers, and pilot-scale testwork results (obtained from Köppern) to model and simulate the HPGR. Ore breakage characterisation testwork was made available to JKTech for the simulation studies. A summary of the simulations is provided below:

- The crusher circuit feed size distribution was constructed following specifications from the client that the RoM size distribution have a 100% passing size of approximately 600 mm, with a 80% passing size of approximately 300 mm. This was assumed to be identical for both ore types;
- The circuit tonnage for both ore types was 375 tph;
- HPGR dimensions of 2.4 m diameter x 1.6 m length were assumed. These were obtained from Köppern's website. It is likely that a smaller HPGR unit could be used for this application;
- The HPGR recirculating load for Ore 1 was 162% with a 1 mm screen;
- The HPGR recirculating load for Ore 2 was 136% with a 4 mm screen.

Details of the simulations are outlined in the following report.

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1. INTRODUCTION

Peter Hutchison from CuDECO Ltd. requested that JKTech conduct a simulation study to investigate the performance of a proposed crusher/HPGR circuit for the CuDECO copper project for two ore types: Ore 1 (native Cu) and Ore 2 (average PRI). This report is issued as an addendum to the original report of Job 11140, which detailed the results of simulations of a single stage ball milling circuit for the CuDECO project. The proposed circuit configuration consists of a primary and secondary crusher circuit, the product of which is fed to a HPGR closed with either a 1 mm screen (for Ore 1) or a 4 mm screen (for Ore 2). The circuit is shown below in Figure 1.

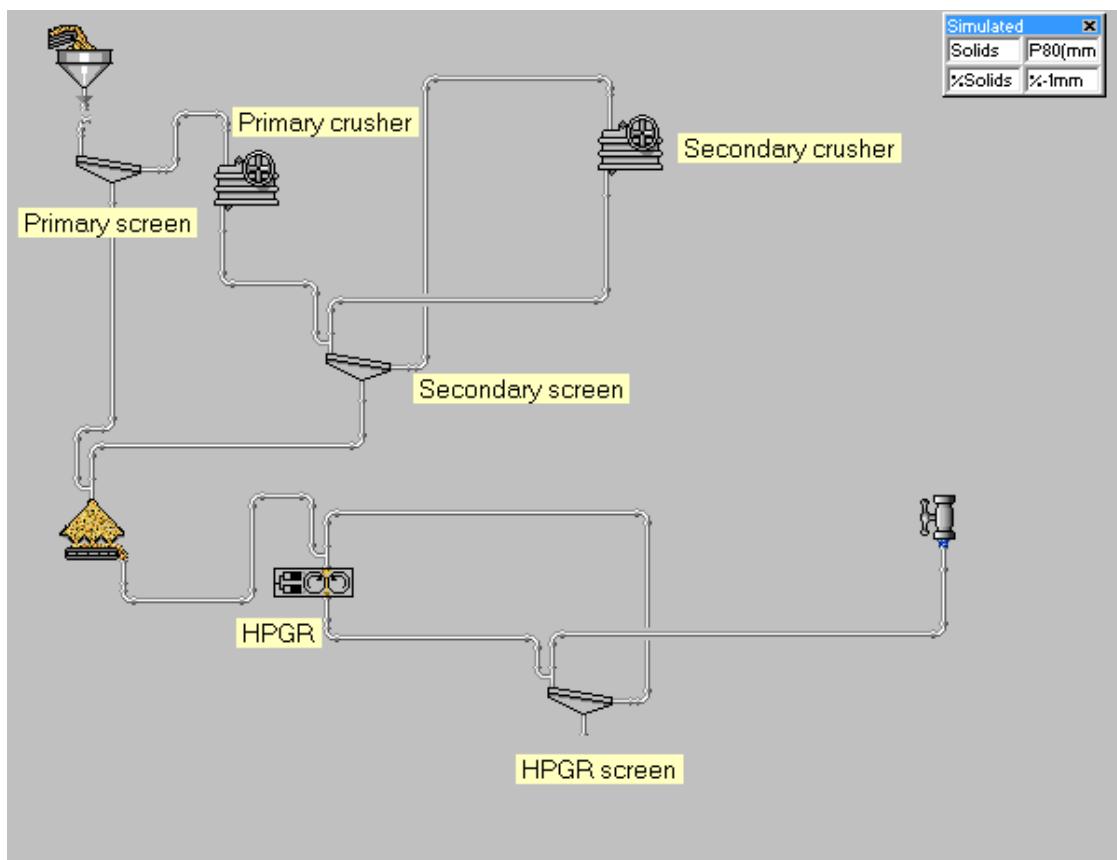


Figure 1. Proposed crushing/HPGR circuit.

The simulations were conducted at a throughput of 375 tph. The RoM feed size distribution was specified by the client as having a 100% passing size of approximately 600 mm, and a 80% passing size of approximately 300 mm. This was assumed to be identical for both ore types. Feed to the HPGR circuit was specified by the client to be 100% passing 40 mm, and the crusher circuit was simulated to produce HPGR feed meeting this specification.

The objectives of this simulation study were to investigate the performance of the circuit when processing each ore type, and in particular to assess the stream properties around the HPGR and HPGR screen.

2. SCOPE OF WORK

The scope of this simulation study was to:

- Use ore breakage characterisation data and the results of pilot-scale HPGR testwork (conducted by Köppern and provided to JKTech), to develop a model of the pilot-scale HPGR unit;
- Scale-up the pilot HPGR model to simulate an industrial-scale HPGR unit located downstream of the crushing circuit;
- Conduct simulations of the crushing circuit to establish the settings necessary to produce HPGR feed material with a suitable size distribution, as specified by the client (i.e. -40 mm);
- Assess the performance of the circuit when processing each ore type; and
- Prepare a short technical report summarising the results of the simulation study and all key findings including the conclusions and recommendations.

3. JKTECH METHODOLOGY

JKTech offers specialist comminution consulting particularly based on modelling and simulation of comminution circuits which utilises JKSimMet as the basis for benchmarking these circuits and identifying means of improving them.

JKSimMet is a software simulation package that includes mathematical models of various comminution and classification devices used in minerals and coal beneficiation. The models are the result of more than four decades of research at the JK Centre. More than 460 JKSimMet packages are in use around the world.

To make use of the models in JKSimMet, the general form of the model must be tailored to match the specific application required. This is achieved by adjusting the model parameters. The model parameters are either a characteristic of the ore being processed or of the specific machine being used.

In general, the ore specific parameters are determined by laboratory tests. For a design study in which the plant does not yet exist, machine specific parameters must be “borrowed” from other operations. JKTech has established a large database of these parameters suitable for use in most design situations. The model is then used to predict equipment size requirements, recirculating loads and other key operating parameters for the circuit. In this way, the model is used to compare the different circuit options.

For an existing plant, real plant survey data is used to derive the machine specific parameters applicable to that particular process. This type of project is called an optimisation study. The JKTech comminution methodology for a typical optimisation study involves conducting detailed surveys followed by mass balancing and model fitting the survey data to create a model of the comminution plant in JKSimMet. The model developed is then used for optimising plant operation.

The final stage in the JKTech optimisation process is the implementation phase. Recommendations from the previous steps in the process are either implemented independently by the client or in consultation with JKTech.

Following implementation of the suggested recommendations, JKTech is available for follow-up consultation regarding any aspect of the project outcomes, if required.

4. COMMINUTION CIRCUIT REQUIREMENTS

All available data and the specifications provided by the client are presented in the following sections.

4.1 Feed Size Distribution

A RoM size distribution was specified by the client to have a F100 of approximately 600 mm and a F80 of approximately 300 mm. A size distribution approximating these specifications was selected from the JKTech database, and was used to feed the circuit in the simulations. This is shown in Figure 2, and is tabulated in Appendix 1.

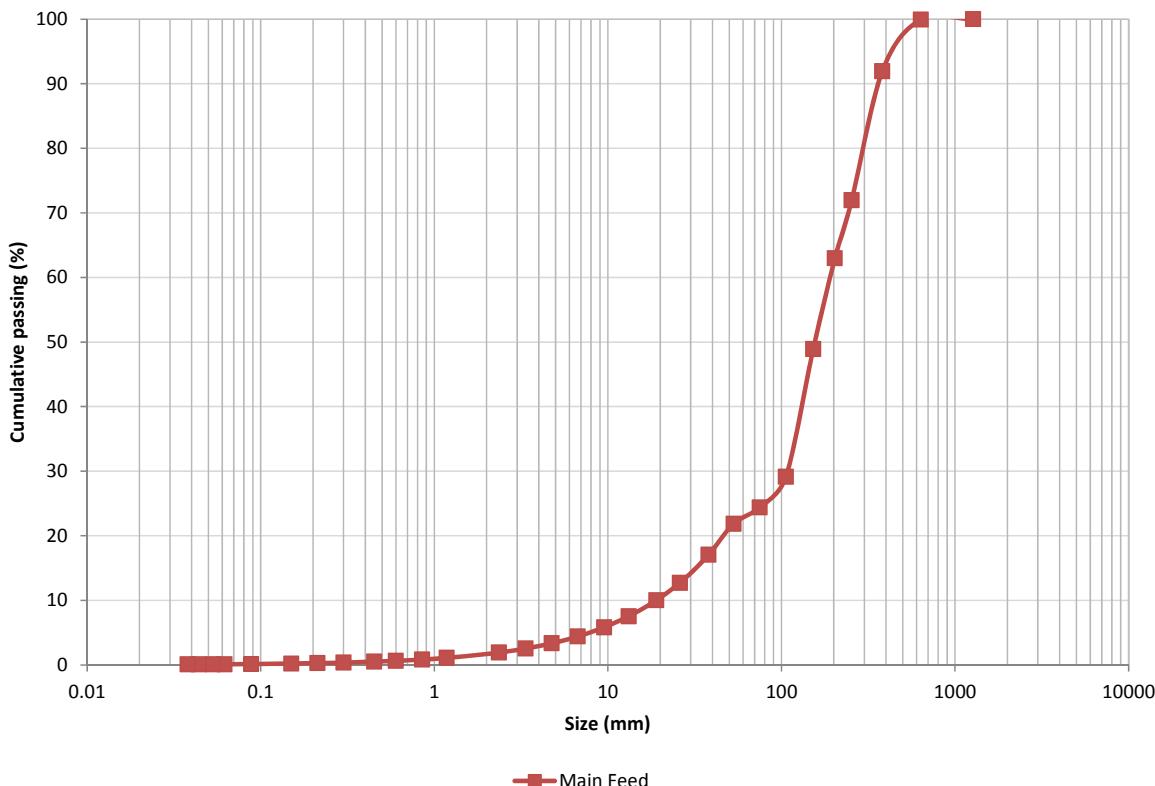


Figure 2: Feed size distribution.

This was assumed to be identical for both Ores 1 and 2, however it should be noted that the RoM size distribution will change according to blasting conditions and the properties of the ore being processed.

4.2 Throughput and Product Specifications

A tonnage of 375 tph was used in the simulations. For Ore 1, a final circuit product size of 100% passing 1 mm was specified. For Ore 2, a final circuit product size of 100% passing 4 mm was specified.

4.3 Ore Parameters

The results of the ore characterisation tests conducted on the two ore types were reported by JKTech in Job 10003/P17. It should be noted that, for Ore 2, the original testwork report detailed the results of samples designated as PRI-AMQS, PRI-CVN, PRI-DLBXHM, PRI-

HBX and PRI-SLBX. For the purposes of this simulation study, the characterisation testwork results for these samples were averaged, and reported as Ore 2 (average PRI).

Table 1. t10 vs. Ecs (kWh/t) values for Ore 1 (from SMC testing).

t10 (%)	Size		
	14.5 mm	28.9 mm	57.8 mm
10	0.12	0.09	0.07
20	0.26	0.19	0.14
30	0.43	0.31	0.22
40*	0.60	0.45	0.35
50*	0.80	0.65	0.55

*Ecs values were extrapolated at t10 = 40% and t10 = 50% for use in the HPGR model.

Table 2. t10 vs. Ecs (kWh/t) values for Ore 2 (from SMC testing).

t10 (%)	Size		
	14.5 mm	28.9 mm	57.8 mm
10	0.21	0.156	0.118
20	0.454	0.33	0.244
30	0.748	0.528	0.382
40*	1.20	0.85	0.65
50*	1.70	1.50	1.20

*Ecs values were extrapolated at t10 = 40% and t10 = 50% for use in the HPGR model.

Table 3. SG values (from SMC testing).

Ore 1	2.42
Ore 2	2.93

These parameters were obtained via SMC testing, which characterises the energy requirements to break particles under impact conditions, and are conventionally used for crusher and SAG mill modelling. Ideally, the particle-bed breakage behaviour of the different ore types would have also been characterised with piston-die testing, so that similar information could have been used in the JKSimMet HPGR model. In the absence of this information, the bed-breakage energy requirements of the ores were assumed to be identical to their respective impact-breakage energy requirements. Additionally, the HPGR model requires knowledge of the Ecs values required to reduce particle size to t10 = 40% and 50% under bed-breakage conditions. Again, this is typically determined with piston-die testing, and since this was not performed, these values were extrapolated from the SMC test results for use in the HPGR model.

A final assumption used in the simulations was that the appearance function of the two ore types following particle bed-breakage was identical to the standard appearance function used in the JKSimMet crusher model. For the purposes of the HPGR model, this appearance function was extrapolated to t10 = 40% and 50%, as shown in Table 4. This information would have typically been obtained from piston-die testing.

Table 4. Standard JKSimMet crusher appearance function.

t10 (%)	t75 (%)	t50 (%)	t25 (%)	t4 (%)	t2 (%)
10	2.8	4	5.5	22.2	51.4
20	5.6	7.2	10.7	43.4	80.8
30	8.9	11.3	16.4	60.7	93
40*	12.3	15.0	22.0	76.3	99.0
50*	16.0	18.7	27.7	89.5	100.0

* t_n values were extrapolated at $t10 = 40\%$ and $t10 = 50\%$ for use in the HPGR model.

The feed bulk density and material flake density following bed-breakage are required for the HPGR model, and these were obtained for Ore 1 from the Köppern report on the pilot-scale HPGR testwork. Additionally, the applied energy (pressure) above which little additional breakage occurs, the Energy Saturation Point (ESP), was also required for the study. These properties are shown in Table 5.

Table 5. Ore 1 bed-breakage saturation Ecs, flake density and feed bulk density (from the Köppern pilot-scale HPGR testwork report).

ESP (kWh/t)	1.63
Flake Density (t/m ³)	2.4
Feed Bulk Density (t/m ³)	1.33

It should be noted that the flake density in Table 5 and the SG of Ore 1 measured during the SMC test (Table 3) are reportedly very similar. This is unlikely as it implies that the rock structure was reconstituted following high-pressure bed-breakage and suggests that, during either testwork program, errors were made in the density measurements or that density measurements were not carried out on representative samples.

It should also be noted that only Ore 1 was tested during the pilot-scale tests. For the purposes of the simulation study, the ore parameters shown in Table 5 were assumed to be identical for both ore types.

5. SELECTION OF BASE CASE MODEL PARAMETERS

Prior to conducting the circuit simulations, it was first necessary to set up suitable base case models using appropriate model parameters for each equipment unit.

Suitable base case parameters for the crushers were either available from ore testing or selected from the extensive JKTech database. The HPGR model parameters were determined from fitting the Köppern testwork data to the HPGR model. Parameters for all other pieces of equipment, including screens, were assumed to be typical values.

The equipment model parameters for all items of equipment are presented and discussed in more detail in Section 5.1.

5.1 Equipment Model Parameters

Crushers

The crushers were modelled in JKSimMet using model parameters from the JKTech database that are typical of primary and secondary crushers. These are summarised in Table 6.

Table 6. Crusher model parameters.

Parameter	Primary crusher	Secondary crusher
K1	150	28
K2	200	87.5
K3	2.3	2.3
T10	5	15

Screens

The screen classification processes throughout the circuit were modelled in JKSimMet using the Simple Efficiency Curve Model. The parameters for each screen are shown in Table 7 and are typical of classification screens of these apertures.

Table 7. Screen model parameters.

Parameter	Primary screen	Secondary screen	HPGR screen (Ore 1)	HPGR screen (Ore 2)
Sharpness of Efficiency Curve - Alpha	10	10	6	6
Water Split to Fine Product (%)	100	100	90	95
Corrected D50 - d50c (mm)	40*	30	1	4

*In practice, this would need to be a double-deck screen with a protective top deck to prevent coarse RoM material from damaging the 40 mm screen. This has no effect on the simulation results.

HPGR

The approach for simulating the HPGR was to initially develop a model of the pilot-scale unit that was tested by Köppern. This was then scaled up in JKSimMet to simulate an industrial scale unit, (2.4 m diameter x 1.6 m length). These dimensions were assumed from Köppern's website. The model parameters are summarised in Table 8, and the experimental and model-predicted size distributions are shown in Figure 3. The model was found to fit the experimental data reasonably well.

However, it should be noted that the model is in an extrapolative regime as the pilot-scale HPGR testwork was performed in an open-circuit configuration, while the HPGR used in the simulations was closed with screens.

Furthermore, as mentioned previously, only Ore 1 was tested during the pilot-scale tests. If Ore 2 was also tested, then it is likely that different model parameters would have been obtained. For the purposes of the simulation study, the HPGR model parameters were assumed to be identical for both ore types.

Table 8. HPGR fitted model parameters.

T10H	37.91
Power Coeff. HPGR	1.397
K1H	-54.81
SpFact	1.8

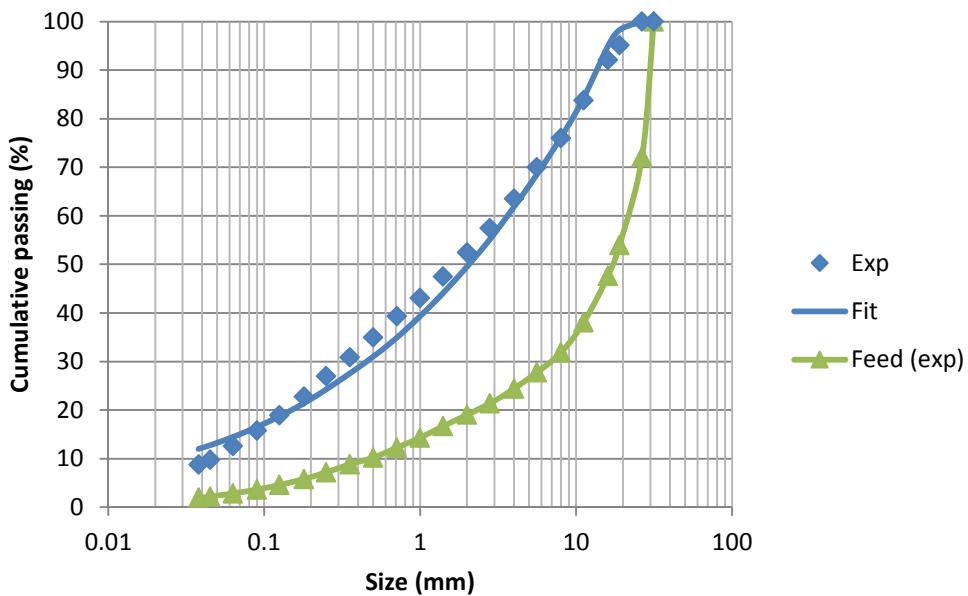


Figure 3. Experimental and model-fitted particle size distributions from the pilot-scale HPGR testwork.

6. SIMULATIONS

6.1 Introduction

The ore characterisation tests provided ore specific model parameters which were used in conjunction with the machine specific parameters defined in Section 5.1 to develop models of the proposed circuit configuration in JKSimMet. Simulations were conducted using these models to predict the performance of the proposed circuit configuration when processing the two CuDECO ore types at the nominal fresh feed rate of 375 dry tph. The product specifications were 100 % passing 1 mm for Ore 1 and 100% passing 4 mm for Ore 2. The results are discussed in detail below. To simulate the effect of wet screening the HPGR product (as fairly fine screens are to be used in both scenarios), water was added at a rate to produce 80% solids at the screen combiner port (approximately 200 tph of fresh water addition for each ore type).

6.2 Simulation Results

A summary of results for each simulation is presented in Table 9. The full set of simulated size distributions is included in Appendix 1. It should be noted that the predicted power requirements for the primary and secondary crushing stages are estimates only, and will depend on the number of crushers required for each stage as well as the no-load powers. This information should be obtained from the manufacturer once the crusher type and model is selected.

Table 9: Summary of Results.

Circuit section	Parameter	Ore 1	Ore 2
New feed	Throughput	375	375
	F80 (mm)	292	292
Primary crushing	CSS (mm)	150	150
	P80 (mm)	138.6	138.6
	Power (kW)	62	67
Secondary crushing	CSS (mm)	35	35
	P80 (mm)	36.96	36.96
	Power (kW)	208	250
Primary screen	D50 (mm)	40	40
	Oversize (tph)	310	310
	Undersize (tph)	66	66
Secondary screen	D50 (mm)	30	30
	Oversize (tph)	504	504
	Undersize (tph)	310	310
HPGR	Number in parallel	1	1
	Feed (tph)	375	375
	F80 (mm)	25.85	25.85
	Diameter (m)	2.4	2.4
	Length (m)	1.6	1.6
	Power (kW)	1703	1543
	Rolls speed (m/s)	2.4	2.4
	Working gap (mm)	50.6	50.6
	Predicted throughput (tph)	982	886
	Max. capacity (tph)	1679*	1679*
HPGR screen	Product P80	8.2	15.2
	D50 (mm)	1	4
	Oversize (tph)	607	511
	Undersize (tph)	375	375
	Water addition (% solids)	80	80
	Recirculating load (%)	162	136
	Total power consumed (kW)	1974	1860
Circuit specific energy (kWh/t)		5.3	5.0

*This indicates that the HPGR unit is quite large for this application.

6.2.1 Ore 1

Figure 4 shows the stream properties and equipment unit settings/responses when Ore 1 is processed in the circuit. The primary and secondary crushers are predicted to draw 62 and 208 kW at CSS of 150 and 35 mm respectively. The HPGR is predicted to draw 1703 kW and have a recirculating load of 162% at a working gap of 51 mm. The HPGR screen undersize P80 is predicted to be 416 µm.

The circulating load is quite high by hard-rock HPGR standards. Furthermore, as mentioned previously, the model is in an extrapolative regime as the pilot-scale HPGR testwork was performed in an open-circuit configuration, while the simulated HPGR is closed with screens.

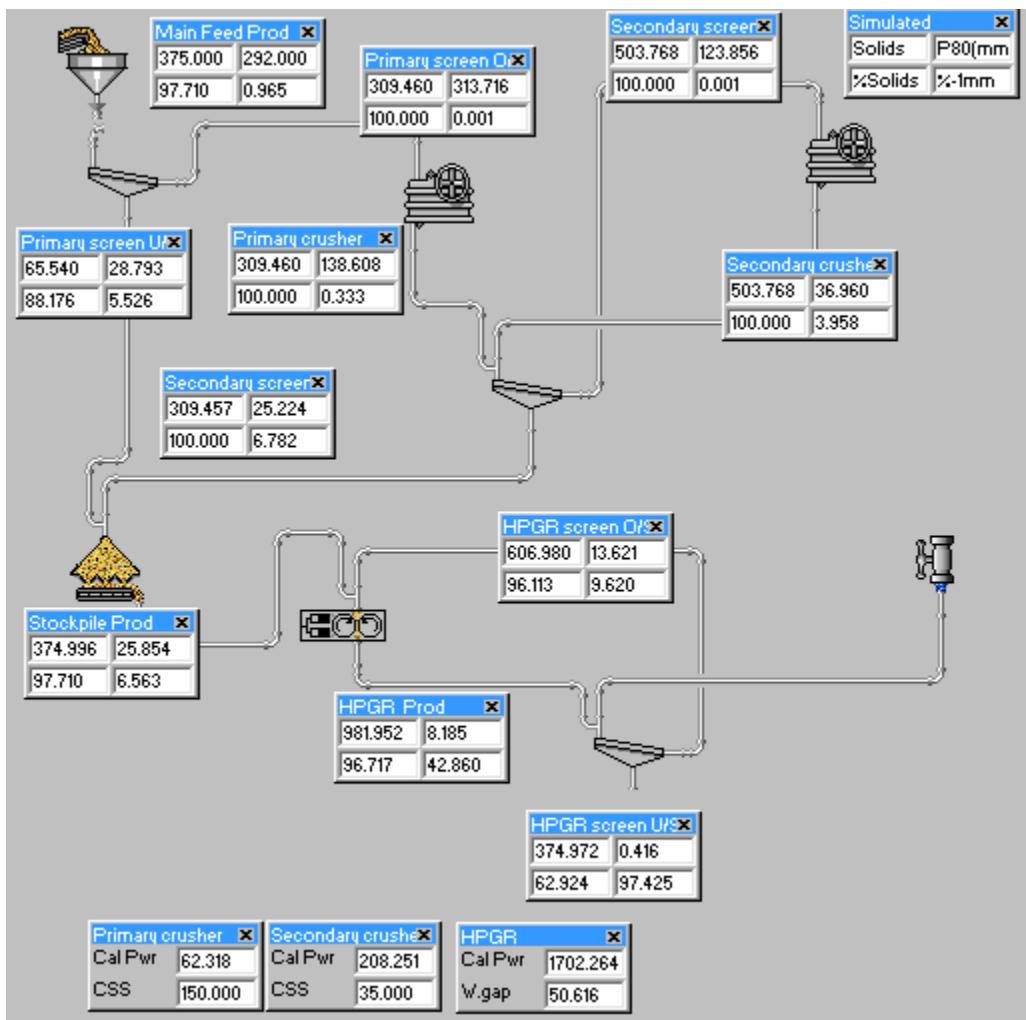


Figure 4. Circuit performance when processing Ore 1.

6.2.2 Ore 2

Figure 5 shows the stream properties and equipment unit settings/responses when Ore 2 is processed in the circuit. The primary and secondary crushers are predicted to draw 67 and 250 kW respectively at CSS of 150 and 35 mm respectively. These are slightly higher than for Ore 1, due to the more competent nature of Ore 2. However, the larger HPGR screen aperture (4 mm) used when processing Ore 2 results in a lower predicted HPGR power draw of 1543 kW and a reduced recirculating load of 136%. The working gap prediction is identical to that when Ore 1 is processed (51 mm). This is because this prediction is the result of a scale-up procedure of the working gap measured during the pilot-scale testwork, which was performed on Ore 1. The final circuit product P80 is predicted to be 2 mm.

Again, it should be noted that the circulating load is quite high by hard-rock HPGR standards. Furthermore, as mentioned previously, the model is in an extrapolative regime as the pilot-scale HPGR testwork was performed in an open-circuit configuration, while the simulated HPGR is closed with screens.

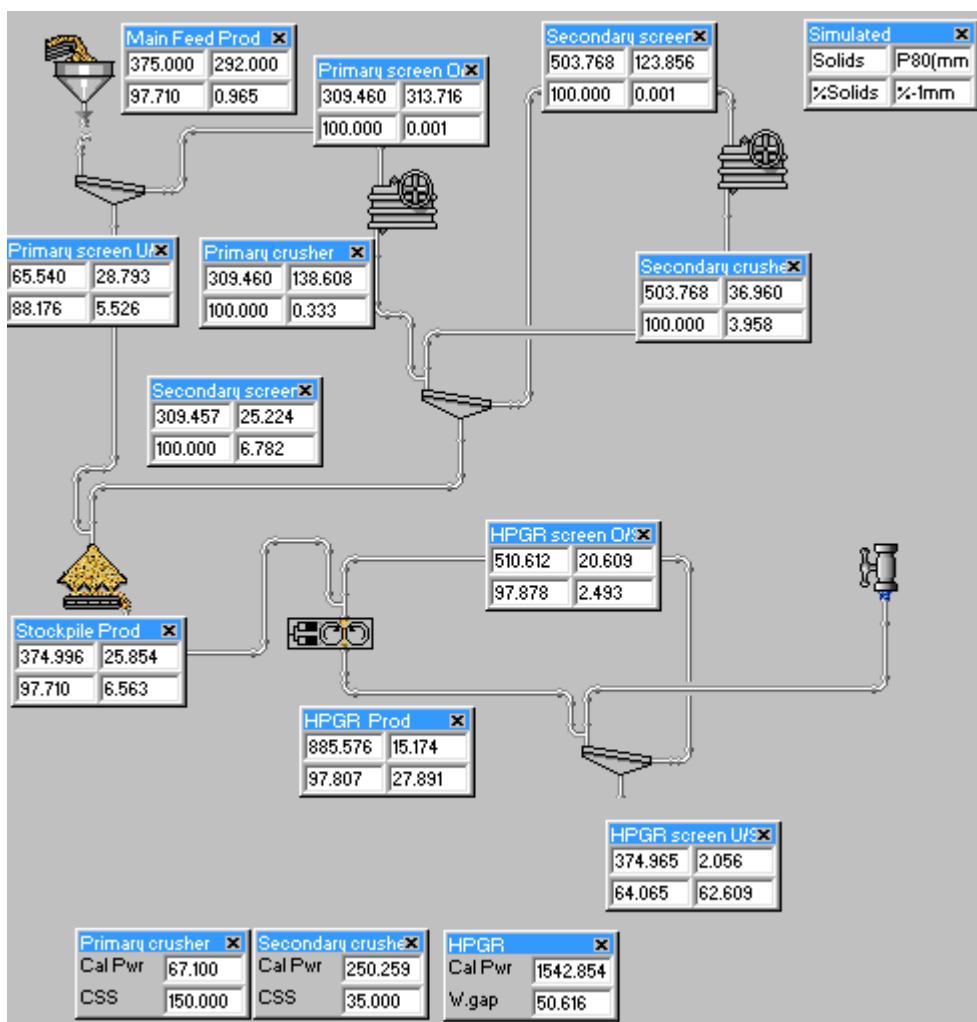


Figure 5. Circuit performance when processing Ore 2.

7. CONCLUSIONS

The proposed circuit configuration consists of a primary and secondary crushing circuit, followed by a closed-circuit HPGR. The crushing circuit power draw is expected to be slightly higher for Ore 2, since it is more competent than Ore 1. However, the HPGR power draw and recirculating load for Ore 2 are both expected to be lower compared to Ore 1, due to the fact that a larger HPGR closing screen aperture is proposed to be used when Ore 2 is processed. The circulating loads of the HPGR unit when processing both ore types was quite high by hard-rock HPGR standards. Furthermore, it is likely that a smaller HPGR unit than the one simulated in this study could potentially be employed.

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Appendix 1: Simulated Stream Data and Size Distributions

Table 10: Simulated Stream Data – Ore 1

	Main Feed Prod	Primary screen O/S	Primary crusher Prod	Secondary screen O/S	Secondary crusher Prod	Primary screen U/S	Secondary screen U/S	Stockpile Prod	HPGR Prod	HPGR screen O/S	HPGR screen U/S
Solids (t/h)	375	309.5	309.5	503.8	503.8	65.54	309.5	375	982	607	375
Solids SG (t/m³)	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42
Liquid (t/h)	8,789	0	0	0	0	8,789	0	8,789	33.34	24.55	220.9
% Solids	97.71	100	100	100	100	88.18	100	97.71	96.72	96.11	62.92
Pulp SG (t/m³)	2,344	2.42	2.42	2.42	2.42	2,072	2.42	2,344	2,312	2,293	1,585
Vol. Flow (m³/h)	163.7	127.9	127.9	208.2	208.2	35.87	127.9	163.7	439.1	275.4	375.9
% Passing 1.000mm	0.965	0.001	0.333	0.001	3.958	5.526	6.782	6.563	42.86	9.62	97.43
80.00% passes (mm)	292	313.7	138.6	123.9	36.96	28.79	25.22	25.85	8.185	13.62	0.416
Size (mm)						Cumulative Percent Passing					
1270	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
635	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
381	92.0	90.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
254	72.0	66.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
203.2	63.0	55.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
152.4	48.9	38.0	90.3	94.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
106	29.2	14.3	43.2	64.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
75	24.4	8.5	26.3	54.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
53	21.9	5.1	16.2	47.2	97.3	100.0	100.0	100.0	100.0	100.0	100.0
38	17.1	0.7	8.3	24.1	82.3	95.1	99.8	98.9	100.0	99.9	100.0
26	12.7	0.0	5.4	1.1	47.2	72.2	81.8	80.3	97.1	95.4	100.0
19	10.0	0.0	4.4	0.1	35.2	57.5	61.2	60.5	92.6	88.0	100.0
13.2	7.5	0.0	3.7	0.0	24.4	43.2	43.5	43.4	87.1	79.2	100.0
9.5	5.8	0.0	3.4	0.0	18.2	33.4	32.9	33.0	82.2	71.3	100.0
6.7	4.4	0.0	3.0	0.0	13.6	25.3	25.2	25.2	76.8	62.5	100.0
4.75	3.3	0.0	2.5	0.0	10.6	19.2	19.7	19.6	71.1	53.2	100.0
3.35	2.5	0.0	1.7	0.0	8.4	14.6	15.5	15.3	64.7	43.0	100.0
2.36	1.9	0.0	1.1	0.0	6.8	11.0	12.2	11.9	58.1	32.2	100.0
1.18	1.1	0.0	0.4	0.0	4.4	6.3	7.6	7.4	45.0	11.7	98.9
0.85	0.8	0.0	0.3	0.0	3.6	4.8	6.1	5.8	40.8	7.8	94.1
0.6	0.6	0.0	0.2	0.0	2.8	3.7	4.7	4.5	37.3	6.4	87.3
0.45	0.5	0.0	0.1	0.0	2.3	2.9	3.8	3.6	34.7	5.8	81.4
0.3	0.4	0.0	0.1	0.0	1.7	2.1	2.8	2.6	31.3	5.1	73.6
0.212	0.3	0.0	0.1	0.0	1.3	1.6	2.2	2.0	28.6	4.7	67.3
0.15	0.2	0.0	0.0	0.0	1.0	1.2	1.7	1.6	26.2	4.3	61.6
0.088	0.1	0.0	0.0	0.0	0.7	0.8	1.1	1.0	22.9	3.7	53.9
0.062	0.1	0.0	0.0	0.0	0.5	0.7	0.9	0.8	21.0	3.4	49.4
0.053	0.1	0.0	0.0	0.0	0.5	0.6	0.8	0.7	20.2	3.3	47.5
0.044	0.1	0.0	0.0	0.0	0.4	0.5	0.7	0.6	19.3	3.1	45.4
0.038	0.1	0.0	0.0	0.0	0.4	0.5	0.6	0.6	18.6	3.0	43.8
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

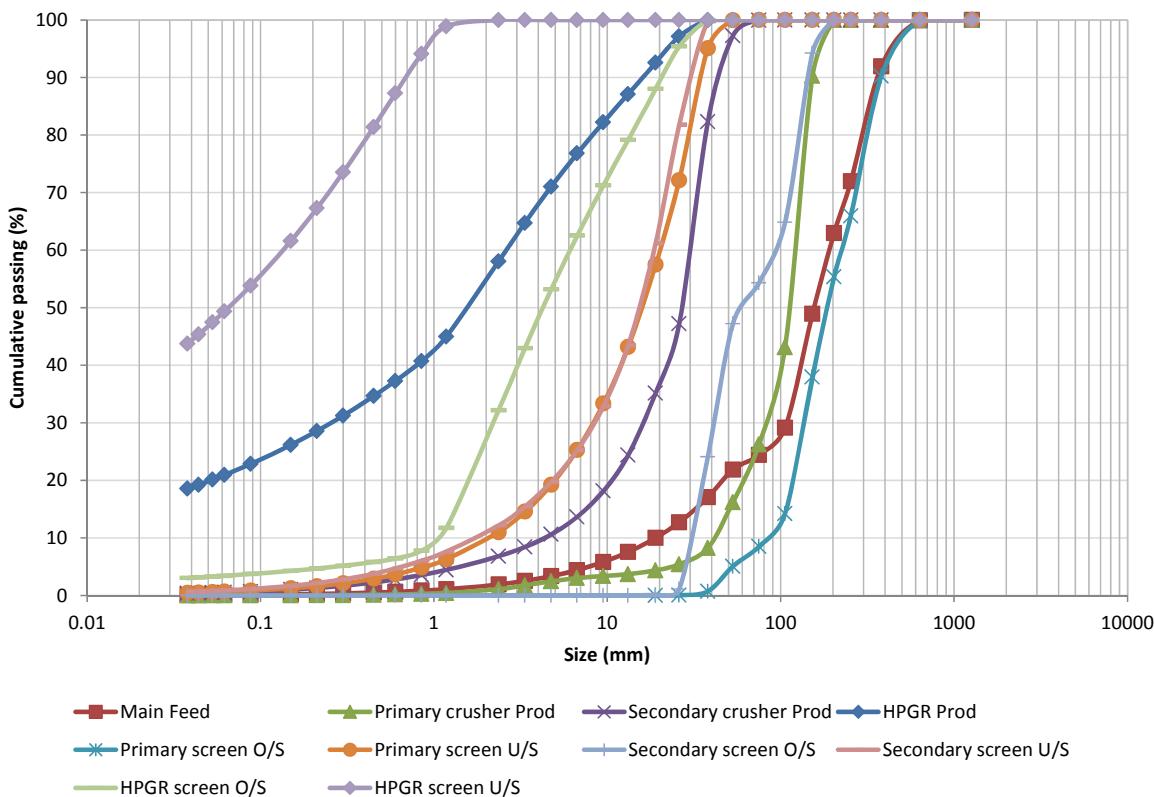
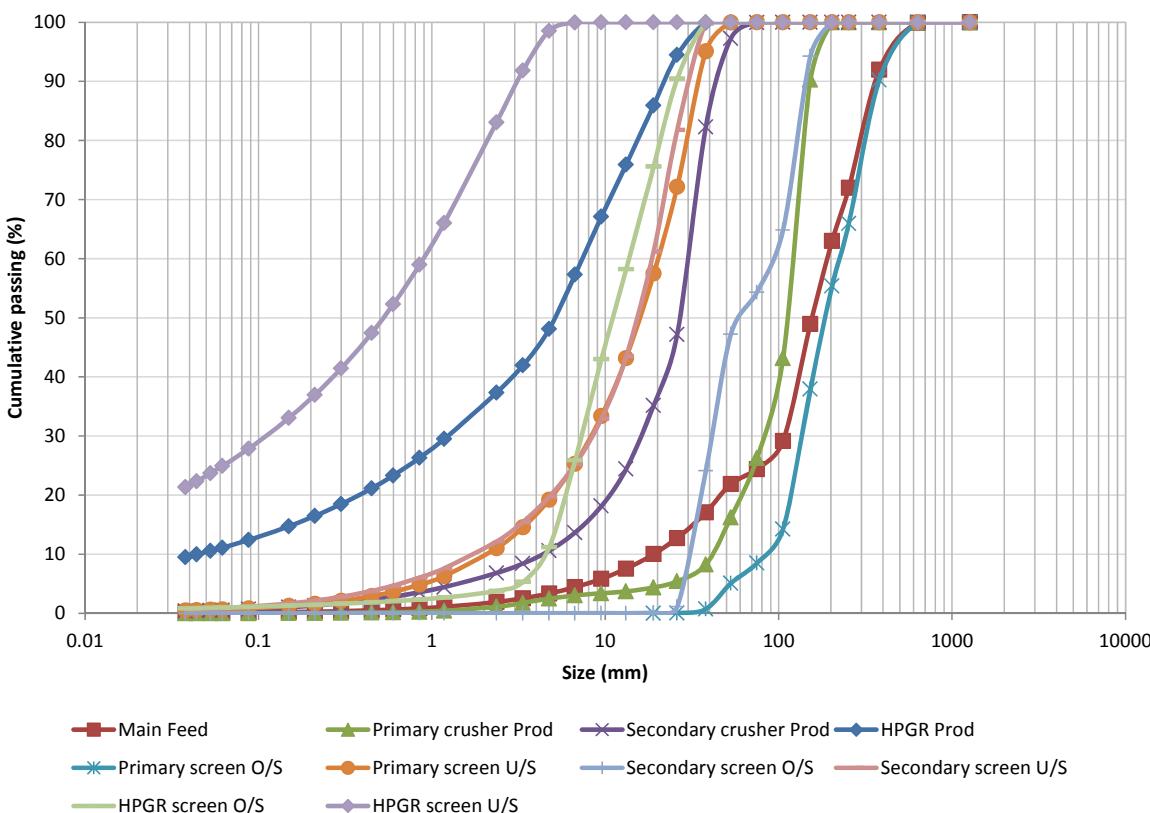

Figure 6. Simulated size distributions - Ore 1.

Table 11: Simulated Stream Data – Ore 2

	Main Feed	Primary screen O/S	Primary crusher	Secondary screen	Secondary crusher	Primary screen U/S	Secondary screen U/S	Stockpile	HPGR	HPGR screen O/S	HPGR screen U/S
Solids (t/h)	375	309.5	309.5	503.8	503.8	65.54	309.5	375	885.6	510.6	375
Solids SG (t/m³)	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.93
Liquid (t/h)	8.789	0	0	0	0	8.789	0	8.789	19.86	11.07	20.3
% Solids	97.71	100	100	100	100	88.18	100	97.71	97.81	97.88	64.06
Pulp SG (t/m³)	2.806	2.93	2.93	2.93	2.93	2.386	2.93	2.806	2.811	2.815	1.73
Vol. Flow (m³/h)	136.8	105.6	105.6	171.9	171.9	31.16	105.6	136.8	322.1	185.3	338.3
% Passing 1.000mm	0.965	0.001	0.333	0.001	3.958	5.526	6.782	6.563	27.89	2.493	62.61
80.00% passes (mm)	292	313.7	138.6	123.9	36.96	28.79	25.22	25.85	15.17	20.61	2.056
Size (mm)						Cumulative Percent Passing					
1270	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
635	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
381	92.0	90.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
254	72.0	66.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
203.2	63.0	55.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
152.4	48.9	38.0	90.3	94.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
106	29.2	14.3	43.2	64.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
75	24.4	8.5	26.3	54.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
53	21.9	5.1	16.2	47.2	97.3	100.0	100.0	100.0	100.0	100.0	100.0
38	17.1	0.7	8.3	24.1	82.3	95.1	99.8	98.9	99.9	99.8	100.0
26	12.7	0.0	5.4	1.1	47.2	72.2	81.8	80.3	94.5	90.5	100.0
19	10.0	0.0	4.4	0.1	35.2	57.5	61.2	60.5	85.9	75.6	100.0
13.2	7.5	0.0	3.7	0.0	24.4	43.2	43.5	43.4	75.9	58.2	100.0
9.5	5.8	0.0	3.4	0.0	18.2	33.4	32.9	33.0	67.1	43.0	100.0
6.7	4.4	0.0	3.0	0.0	13.6	25.3	25.2	25.2	57.3	25.9	100.0
4.75	3.3	0.0	2.5	0.0	10.6	19.2	19.7	19.6	48.1	11.2	98.5
3.35	2.5	0.0	1.7	0.0	8.4	14.6	15.5	15.3	42.0	5.3	91.8
2.36	1.9	0.0	1.1	0.0	6.8	11.0	12.2	11.9	37.3	3.8	83.1
1.18	1.1	0.0	0.4	0.0	4.4	6.3	7.6	7.4	29.5	2.7	66.1
0.85	0.8	0.0	0.3	0.0	3.6	4.8	6.1	5.8	26.3	2.3	59.0
0.6	0.6	0.0	0.2	0.0	2.8	3.7	4.7	4.5	23.3	2.1	52.3
0.45	0.5	0.0	0.1	0.0	2.3	2.9	3.8	3.6	21.2	1.9	47.4
0.3	0.4	0.0	0.1	0.0	1.7	2.1	2.8	2.6	18.5	1.6	41.4
0.212	0.3	0.0	0.1	0.0	1.3	1.6	2.2	2.0	16.5	1.4	37.0
0.15	0.2	0.0	0.0	0.0	1.0	1.2	1.7	1.6	14.7	1.3	33.1
0.088	0.1	0.0	0.0	0.0	0.7	0.8	1.1	1.0	12.4	1.1	27.9
0.062	0.1	0.0	0.0	0.0	0.5	0.7	0.9	0.8	11.1	1.0	24.9
0.053	0.1	0.0	0.0	0.0	0.5	0.6	0.8	0.7	10.6	0.9	23.7
0.044	0.1	0.0	0.0	0.0	0.4	0.5	0.7	0.6	10.0	0.9	22.4
0.038	0.1	0.0	0.0	0.0	0.4	0.5	0.6	0.6	9.5	0.8	21.3
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0


Figure 7. Simulated size distributions - Ore 2.

DISCLAIMER

Warranty by JKTech

- a. JKTech will use its best endeavours to ensure that all documentation, data, recommendations, information, advice and reports ("Material"), provided by JKTech to the client ("Recipient"), is accurate at the time of providing it.

Extent of Warranty by JKTech

- b. JKTech does not make any representations as to any matter, fact or thing that is not expressly provided for in the Material.
- c. JKTech does not give any warranty, nor accept any liability in connection with the Material, except to the extent, if any, required by law or specifically provided in writing by JKTech to the Recipient.
- d. JKTech will not be liable to the Recipient for any claims relating to Material in any language other than in English.
- e. If, apart from this Disclaimer, any warranty would be implied whether by law, custom or otherwise, that warranty is to the full extent permitted by law excluded.
- f. The Recipient will promptly advise JKTech in writing of any losses, damages, compensation, liabilities, amounts, monetary and non-monetary costs and expenses ("Losses"), incurred or likely to be incurred by the Recipient or JKTech in connection with the Material, and any claims, actions, suits, demands or proceedings ("Liabilities") which the Recipient or JKTech may become liable in connection with the Material.

Indemnity and Release by the Recipient

- g. The Recipient indemnifies, releases, discharges and saves harmless, JKTech against any and all Losses and Liabilities, suffered or incurred by JKTech, whether under the law of contract, tort, statutory duty or otherwise as a result of:
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 - ii. any liability for infringement of a third party's trade secrets, proprietary or confidential information, patents, registered designs, trademarks or names, copyright or other protected rights; and
 - iii. any act or omission of JKTech, any employee, agent or permitted sub-contractor of JKTech in connection with the Material.

Limit of Liability

- h. JKTech's liability to the Recipient in connection with the Material, whether under the law of contract, tort, statutory duty or otherwise, will be limited to the lesser of:
 - i. the total cost of the job; or
 - ii. JKTech providing amended Material rectifying the defect.

Exclusion of Consequential Loss

- i. JKTech is not liable to the Recipient for any consequential, special or indirect loss (loss of revenue, loss of profits, business interruption, loss of opportunity and legal costs and disbursements), in connection with the Material whether under the law of contract, tort, statutory duty or otherwise.

Defects

- j. The Recipient must notify JKTech within seven days of becoming aware of a defect in the Material. To the extent that the defect is caused by JKTech's negligence or breach of contract, JKTech may, at its discretion, rectify the defect.

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- k. After the expiration of one year from the date of first providing the Material to the client, JKTech will be discharged from all liability in connection with the Material. The Recipient (and persons claiming through or under the Recipient) will not be entitled to commence any action, claim or proceeding of any kind whatsoever after that date, against JKTech (or any employee of JKTech) in connection with the Material.

Contribution

- l. JKTech's liability to the Recipient for any loss or damage, whether under the law of contract, tort, statutory duty or otherwise will be reduced to the extent that an act or omission of the Recipient, its employees or agents, or a third party to whom the Recipient has disclosed the Material, contributed to the loss or damage.

Severability

- m. If any provision of this Disclaimer is illegal, void, invalid or unenforceable for any reason, all other provisions which are self-sustaining and capable of separate enforcement will, to the maximum extent permitted by law, be and continue to be valid and enforceable.



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School of Science & Engineering

REPORT ON COPPER TAILINGS SAMPLE SUPPLIED BY BURNIE RESEARCH LABORATORIES

Attn: John Glen

S W McKnight
27/03/2011
S.McKnight@ballarat.edu.au

0353279262

Sample Submitted:

BRL 615028 TO3 TAIL

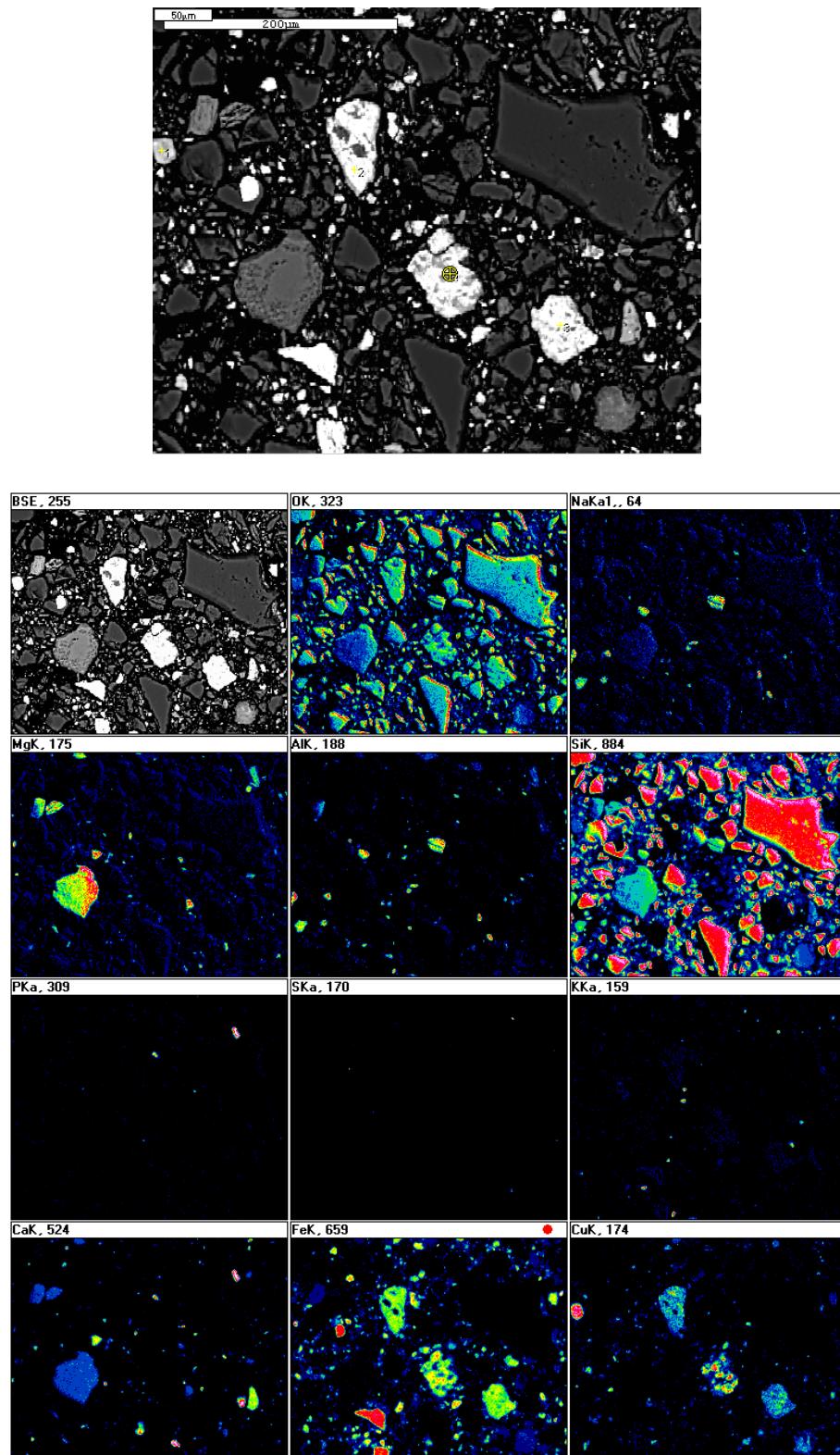
Results Summary

Copper is found in the tailing sample in order of abundance as:

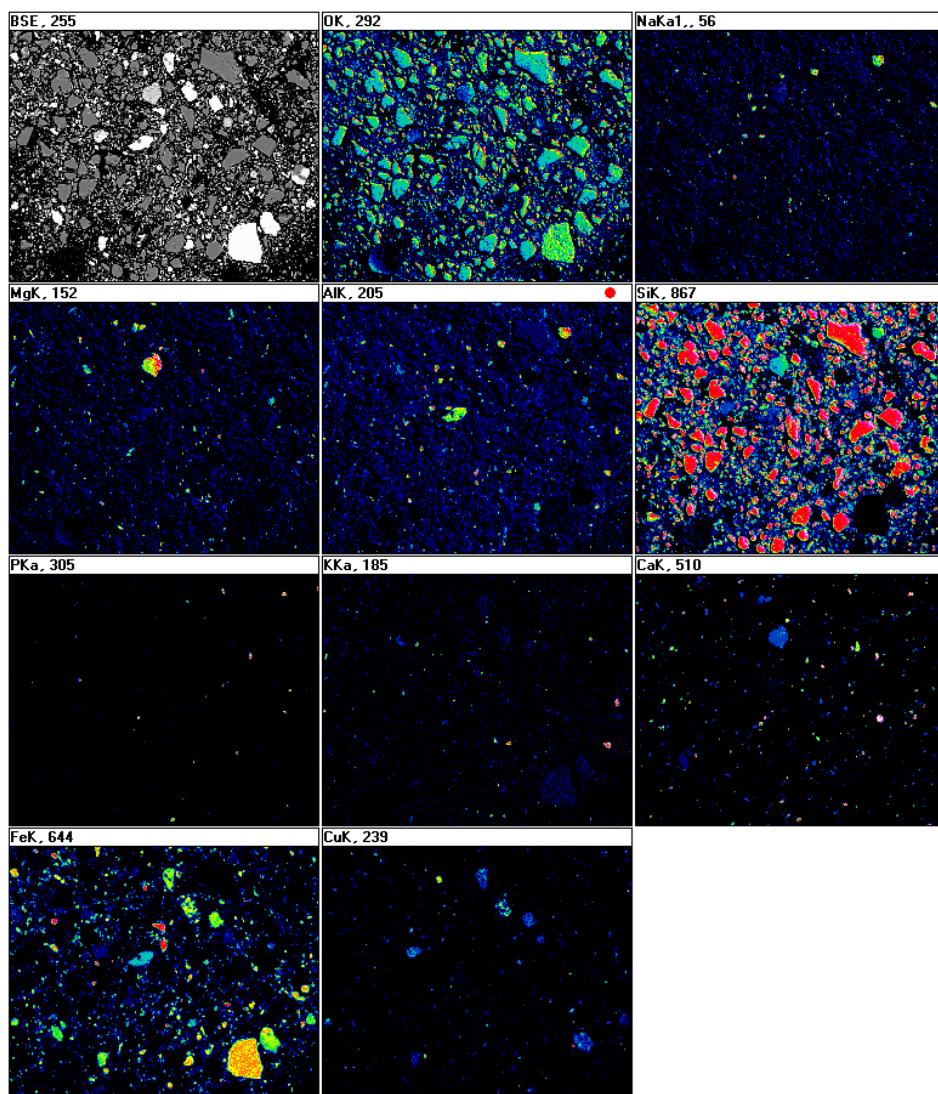
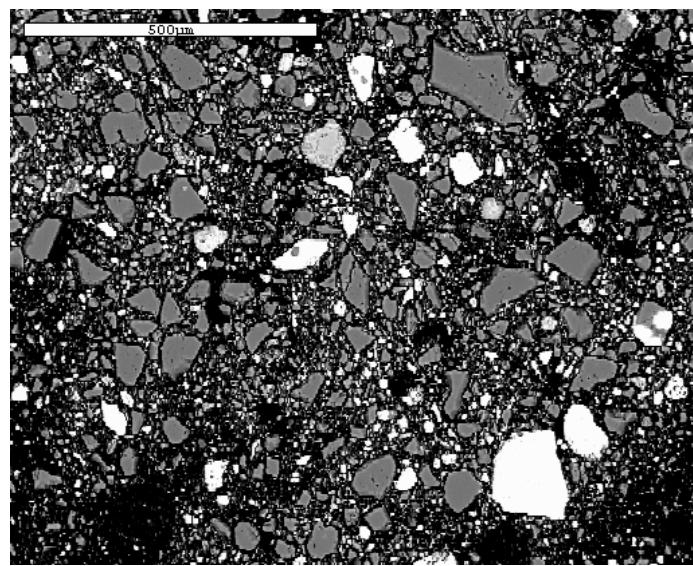
- 1. Finely dispersed phases in iron rich (goethite and haematite) particles. Amounts estimated range 2 – 12 wt% CuO of the discrete grains. These phases could be oxides, carbonates and silicates.**
- 2. Copper oxide or carbonate grains (cuprite, malachite etc).**
- 3. Copper silicates as discrete grains and in ferruginous composites (chrysocolla?).**
- 4. XRD analysis has not identified any specific copper bearing minerals which is likely due to low abundances and poorly crystalline character.**
- 5. Characteristic peaks of a smectite clay (nontronite?) appear on the XRD trace. This clay is estimated to be present at ~13wt% and could contain minor amounts of copper.**

Inspection of the X-ray maps and BSE images shown on the following pages will give some further idea on the copper occurrences. Scale bar is at top left of BSE images.

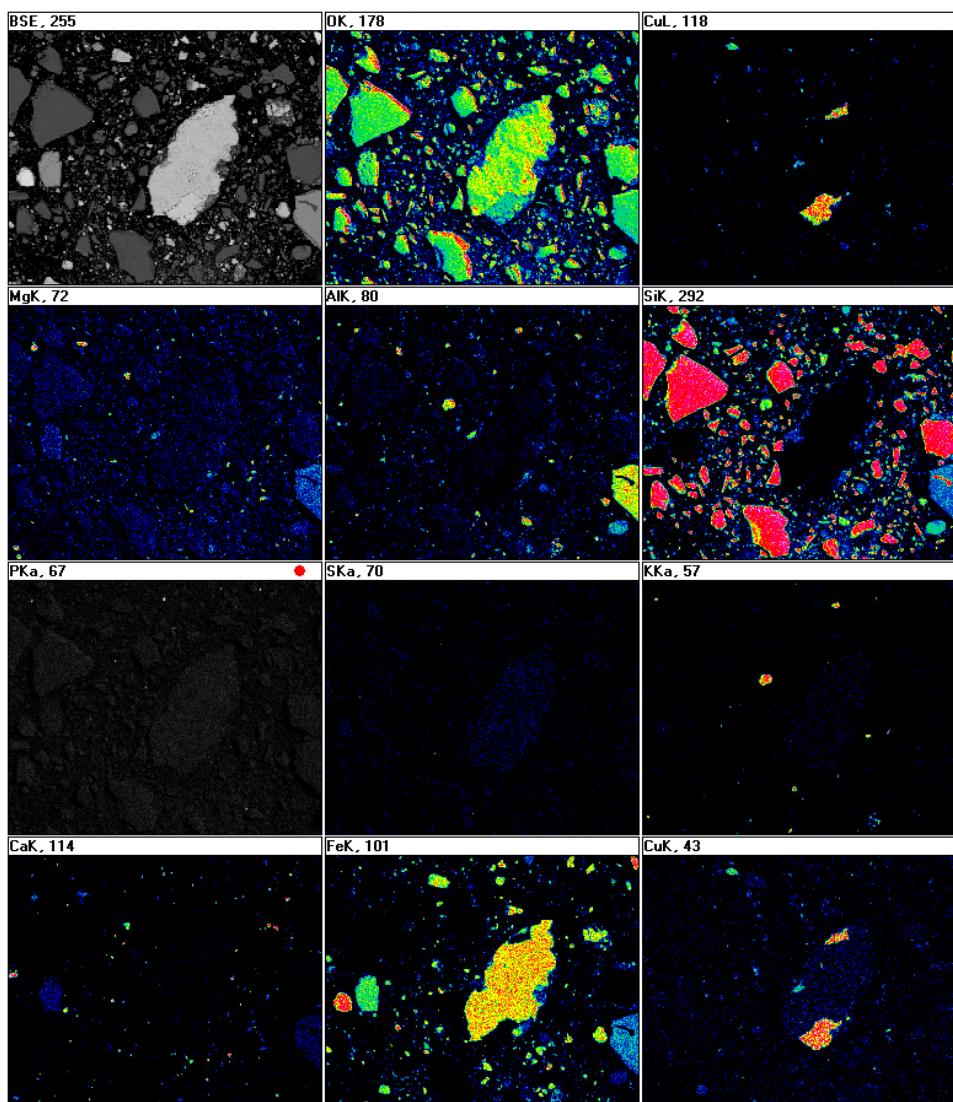
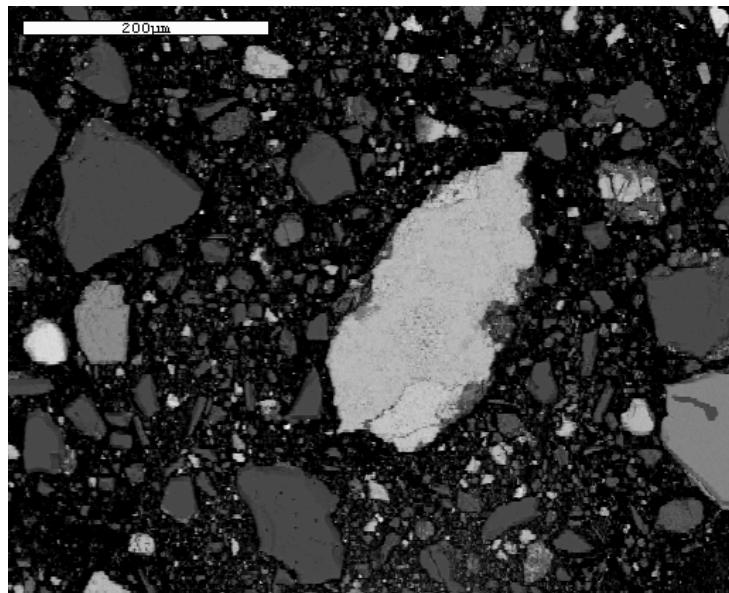
Scanning Electron Microscopy



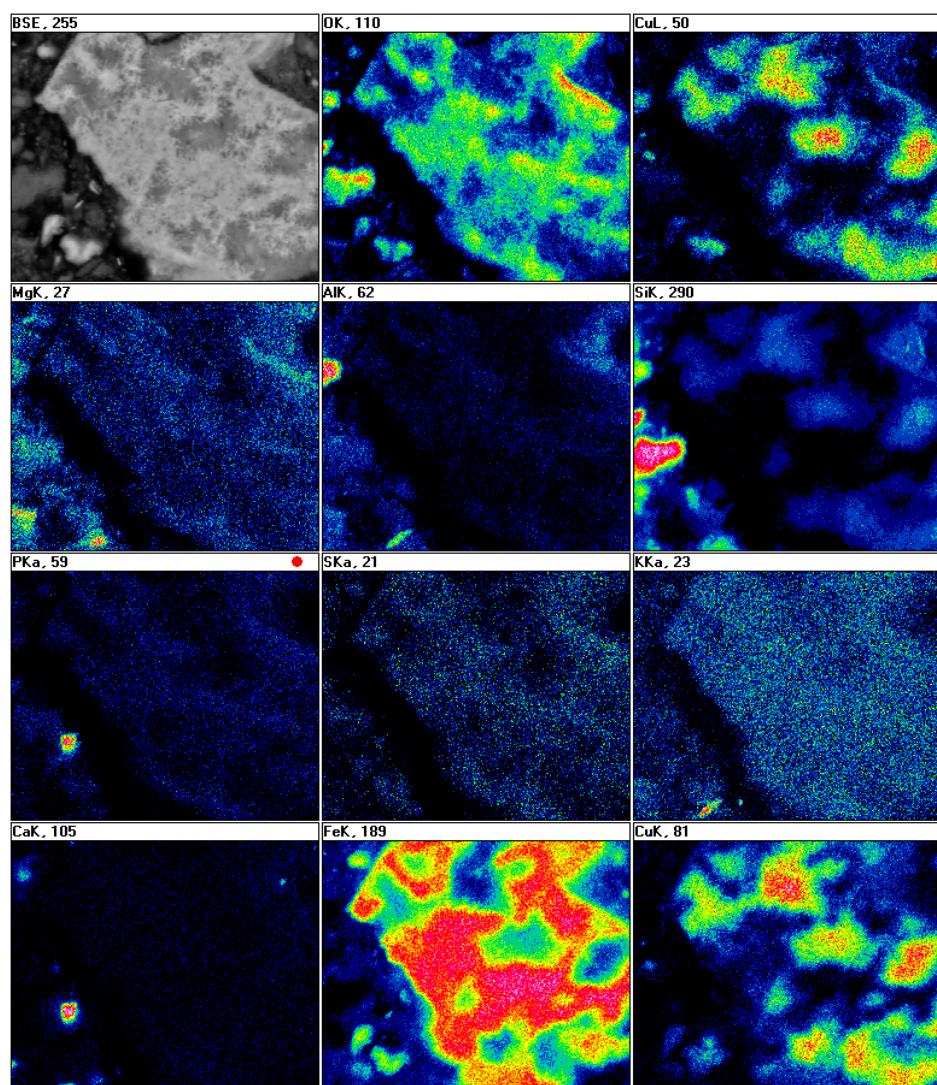
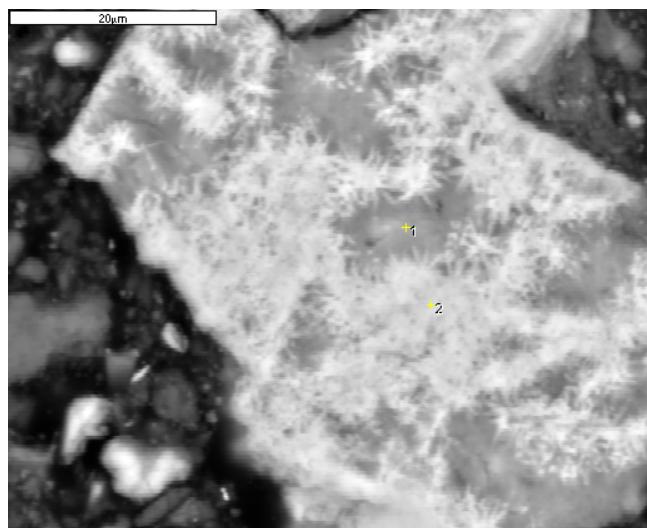
SEM BSE image and corresponding element x-ray maps note copper bearing particles in the Cu map panel at lower right. Red grains are cuprite, blue grains are all ferruginous (see Fe panel) with minor copper phases dispersed. Quartz is red in the Si panel; the bright green grain in the Mg map is likely an amphibole.



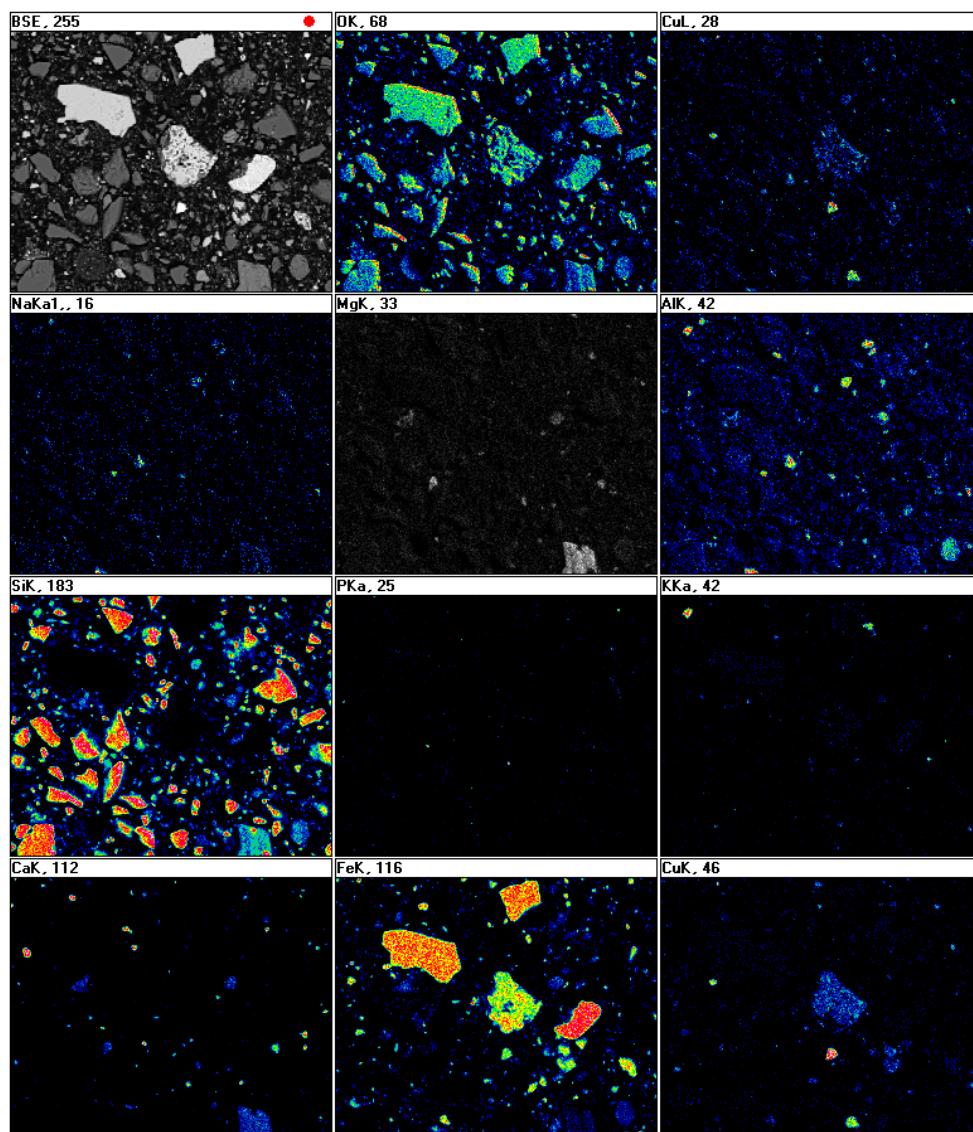
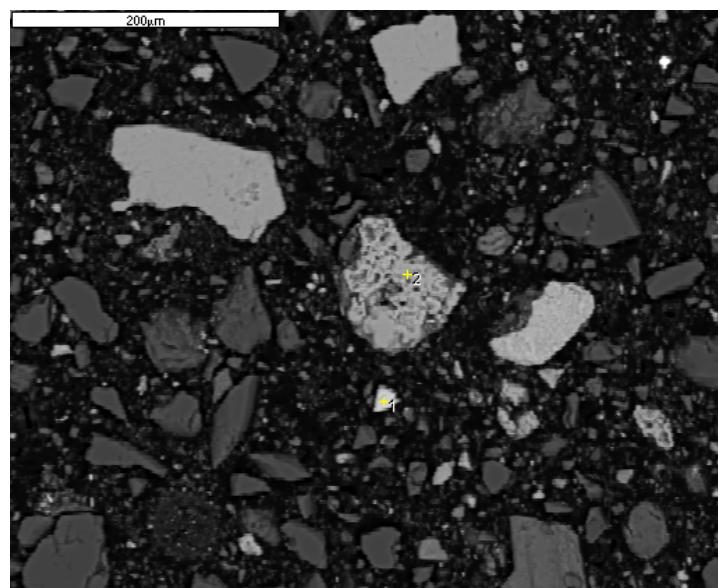
SEM BSE image and corresponding element x-ray maps – note the Cu panel. Copper bearing grains are mainly Fe rich, the weak blue colour of the grains in the Cu map is indicative of low Cu levels. Quartz grains are red in the Si map.



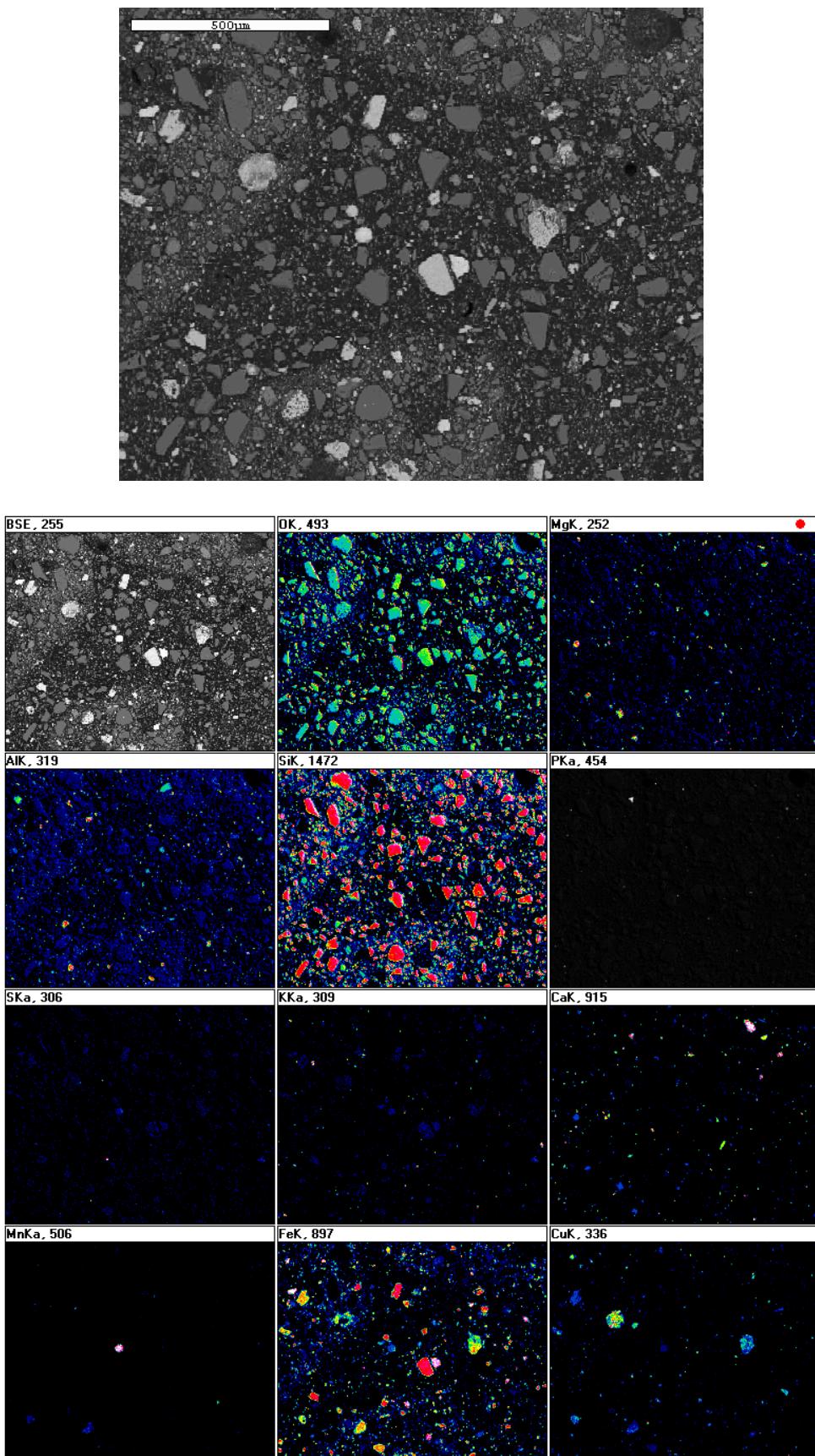
SEM BSE image and corresponding element x-ray maps – two grains of cuprite are attached a goethite particle - the large yellow composite grain in the Fe map.



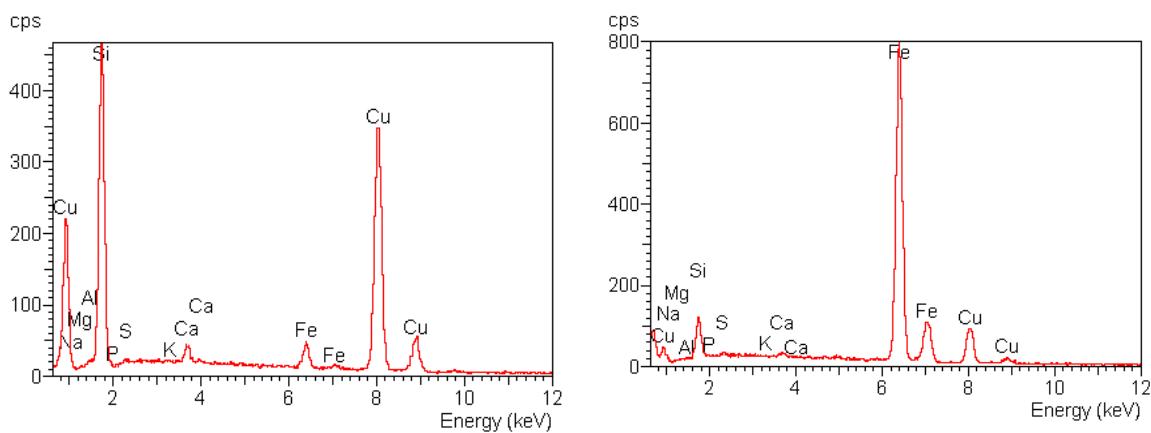
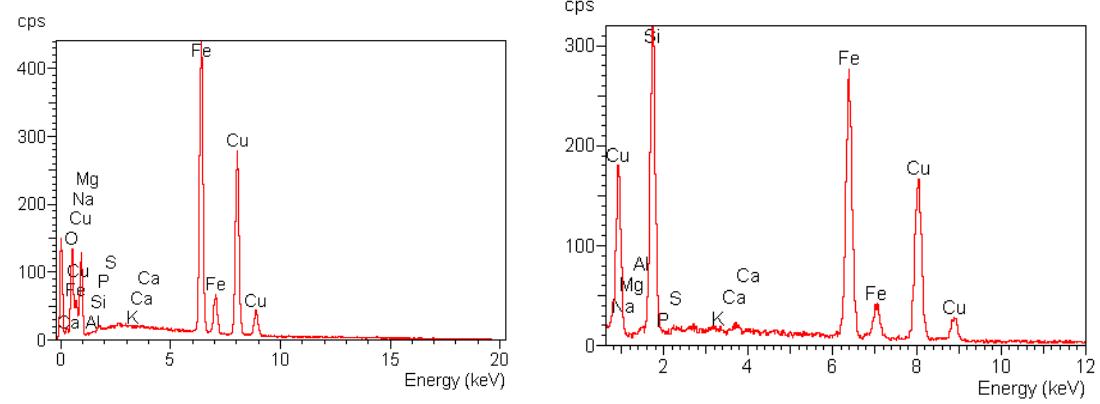
SEM BSE image and corresponding element x-ray maps of a composite goethite (crystalline) grain containing a copper oxide phase (could be carbonate).



SEM BSE image and corresponding element x-ray maps – red grain in the Cu map is a Cu oxide, other colours are ferruginous but Cu bearing.



SEM BSE image and corresponding element x-ray maps – note the abundance of grains (blue) which contain low levels of copper (2-4% from EDS analysis).

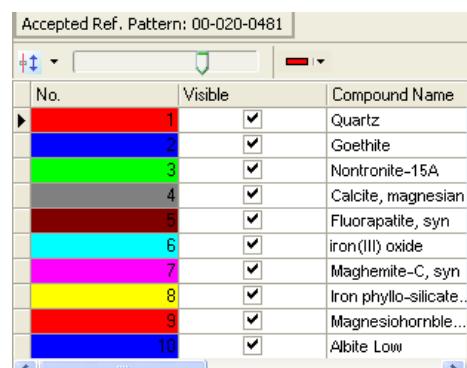
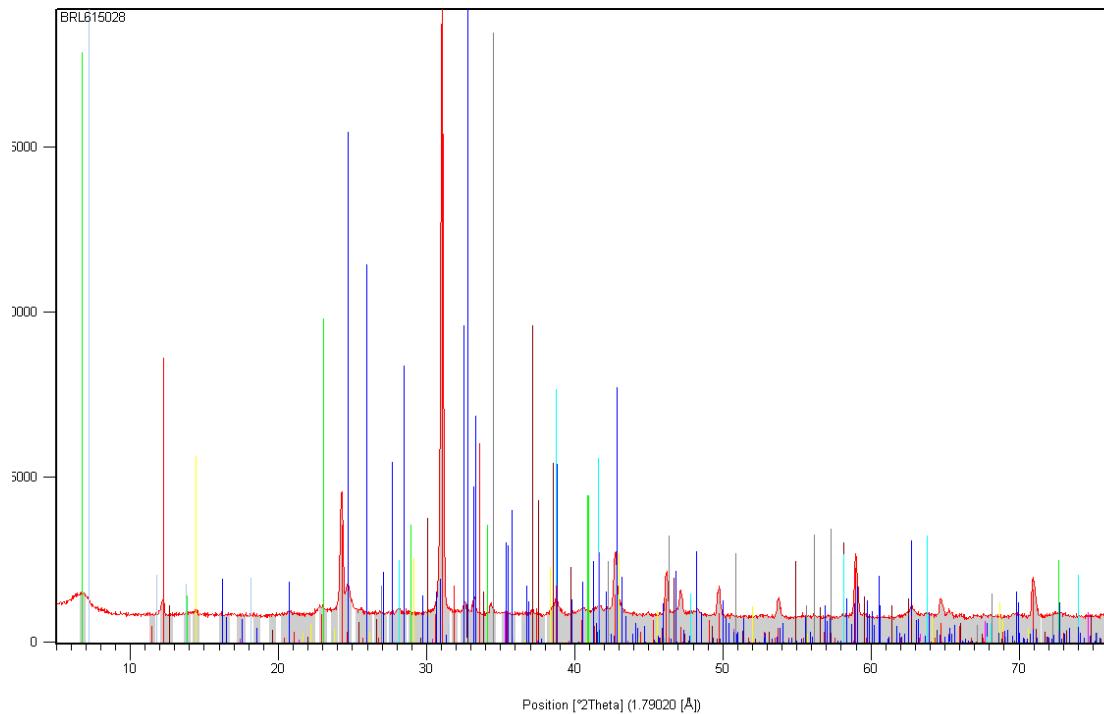


Typical EDS x-ray spectra obtained from copper bearing grains – note occurrence of a Cu silicate (chrysocolla or diopptase?)

X-ray Diffraction Results

Quantitative XRD (estimate) wt%:

Phase	Weight%
Quartz	64.2
Goethite	13.2
Smectite clay	13.1
Albite	3.1
Amphibole	2.5
Hematite	1.5
Calcite	1.2
Apatite	0.5
Cronstedtite	0.4
Maghemite	0.1
Malachite	0



Indexed XRD trace obtained from milled sample – peaks are indexed using the colour scheme shown at left. No peaks have been assigned to a Cu mineral.



Burnie RESEARCH LABORATORY

FLOTATION TESTING

OF

CUDECO ORE TYPES

FOR

CUDECO LTD

REPORT NO: T0513 – 1 REV

J R GLEN

DECEMBER 2009

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1. SUMMARY

Three copper ore types were received for flotation assessment. These were:

- CC Met 3: A high grade chalcocite/pyrite ore.
- HBX Met 2: A high grade primary chalcopyrite/pyrite ore.
- Nat Cu Met 2: A medium grade mixed oxide ore containing native copper.

Each of the ores contained significant cobalt values.

Ore types were prepared to grind size and floated using conventional reagents and techniques for these types of ores.

CC Met 3

Batch flotation results indicate that flotation separation is dominated by the ability to separate chalcocite from pyrite. Conventional lime depression of pyrite is insufficient to give acceptable concentrate grade and recovery. The use of an organic pyrite depressant (lignosulphonate) in regrind and a selective collector (dithiocarbamate) are required. Locked cycle results using this routine yielded a 35% Cu concentrate at 84% recovery.

HBX Met 2

HBX ore responded well to the reagent regime developed for the CC ore. No further batch testing has been indicated for this ore given the high grades and recoveries seen. An overall copper recovery of 94% at a concentrate grade of 32% has been achieved.

Nat Cu Met 2

This ore responded well to conventional NaSH activation and rougher flotation with SIBX. A 35% Cu concentrate at 84% recovery was produced in roughing. Further assessment of NaSH and collector type is required.

2. SAMPLE RECEIVED

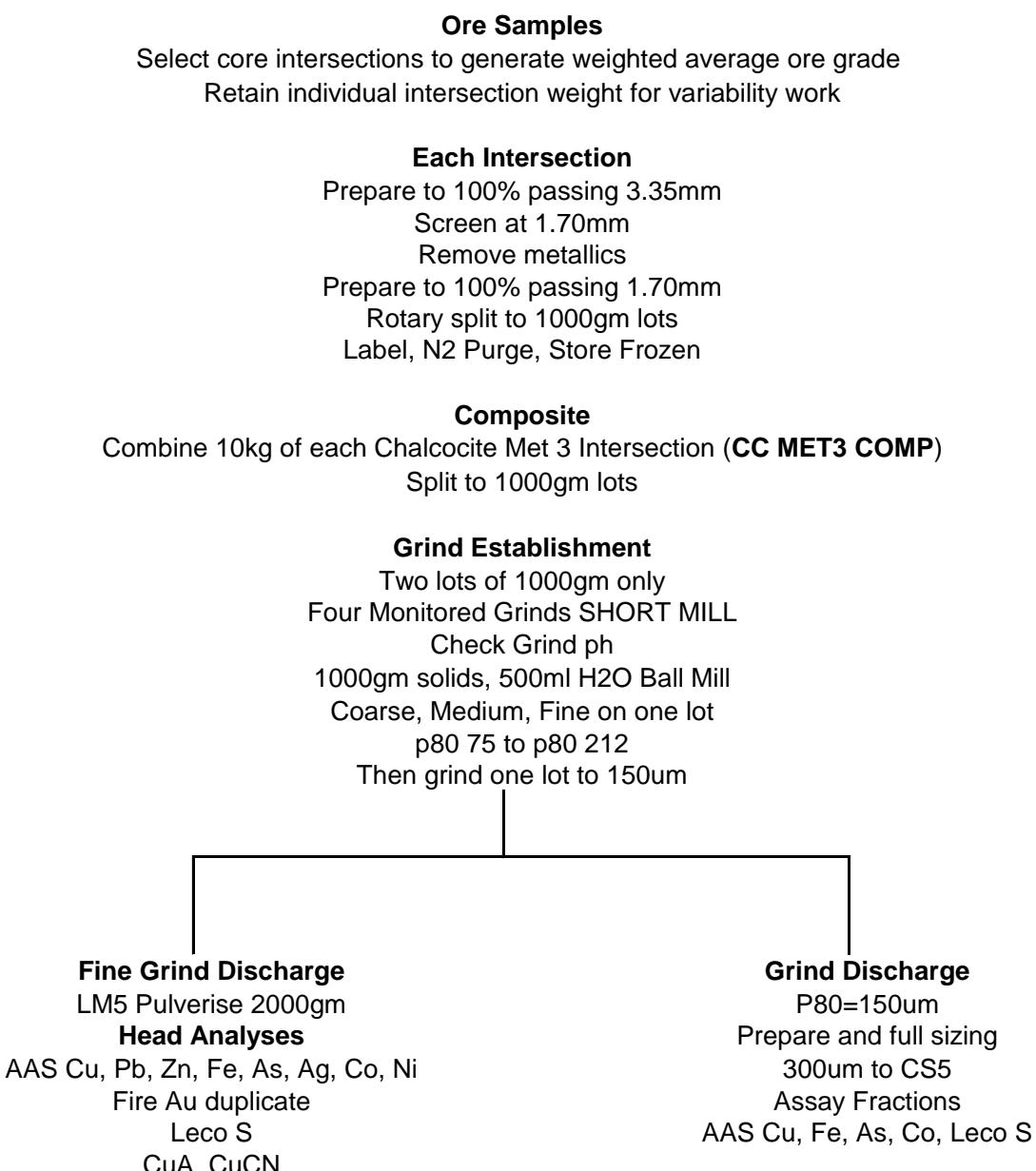
Samples were received as bagged dry split core samples. A list of the intersections samples received is appended. Samples were coarse then fine crushed to 3.35mm then split for testing. Remnant ore has been stored.

NAME	METERAGE	WT
HBX MET 2 LMDH 033	76-86	15 Kg
HBX MET 2 LMDH 033	76-86	15 Kg
NAT CU MET 2	34-40	16 Kg
NAT CU MET 2	40-46	15 Kg
CHALCOCITE MET 3 LMDH 033	31.6-36.7	15 Kg
CHALCOCITE MET 3 LMDH 033	49.0-52.1 53.1-54.8	15 Kg

3. TEST METHODS

Diagram 1 outlines the testing procedure performed FOR CC MET 3 ore. Similar preparation programs were undertaken for HBX and Nat Cu types.

DIAGRAM 1: TESTWORK



Rougher Flotation: Define Reagents

Allow for 5 x 1kg tests
Primary grind p80=125um, pH 8.5
Collector: SIBX,
Depressants if required
Products: 4 concentrates and tail
AAS Cu, Fe, As, Co, Leco S

Rougher Flotation: Grind Size

Allow for 3 x 1kg tests
P80 180, 125, 75um
Use best reagent suite defined above
Products: 4 concentrates and tail
AAS Cu, Fe, As, Co, Leco S

Rougher, Regrind and Cleaner Flotation

Allow for 4 x 1kg tests
Primary grind as defined
Rougher Flotation as defined

Rougher and Ro Conc Regrind
Regrind to two sizes, high Ph
Test Cleaner 1 profile
Depressants required
Two stage cleaner float
5 products per test
AAS Cu, Fe, As, Co, Leco S

Locked Cycle Test

Allow for 6 x 1kg tests
Allow one test using defined circuit
Six Cycles
21 products
AAS Cu, Fe, As, Co, Leco S
Spot analyses, AAS Cu
Concentrate: full assay analysis
ICP 25 element scan, Wet Cu

SAMPLE PREPARATION: DRILL CORE

Samples were received as bagged damp half core. Samples were crushed in a single toggle lab jaw crusher to 100% passing 25mm. Crusher discharge was screened at 1.70mm and screen oversize stage rolls crushed to 100% passing 1.70mm. The combined crushed ore was rotary split to lots for cold storage.

SIZING AND MINERALOGY

Samples were riffle split from products and wet screened at 38um. Oversize was dried and dry screened to generate dry fractions with the dry -38 returned to the undersize. Undersize was cyclized to generate sub 38 micron fractions. Individual fractions were riffle split for analysis and recombined as required for mineralogy.

GRIND ESTABLISHMENT

Samples of fine ore (100% passing 1.70mm) were assessed by batch grinding to establish a curve for discharge p80 versus grind time for the grind conditions required for further testing. The following grind conditions were used:

- 400mm long x 320mm diameter open ended mill steel mill.
- 6.0 kg of a graded (10 – 30mm diameter) mild ball charge.
- 1000gm of prepared ore at 66% solids.
- Grind times from 10 to 30 minutes.

Grind discharges were fully removed, filtered, dried and prepared for sizing as detailed below. Grind curves were generated and fitted to allow prediction of grind time for target grind p80. Fits are presented below for each ore type.

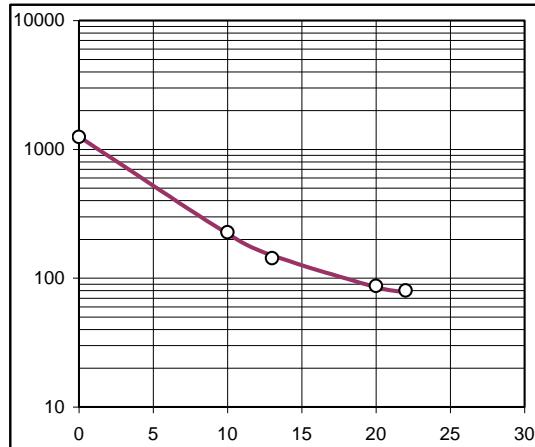
DIAGRAM 2: GRIND ESTABLISHMENTS

Burnie RESEARCH LABORATORY
GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	31/08/2009
TECHNICIAN	MW

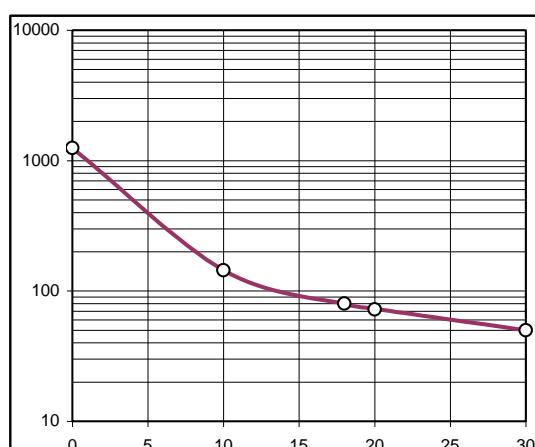
CC Met 3 Comp	
FEED mm	1.700
TYPE	BALL
MEDIA	BALL
MEDIA kg	6.00
SOLIDS kg	1.00
WATER kg	0.50

GRIND	TIME	p80	EST	DIFF	FIT	TIME	P80
	0	1250	1250	2E-01			
G1	10	227	221	3E+01	1179.0	20	85
G2	13	143	150	5E+01	0.20		
G3	20	87	85	5E+00	71		
G4	22	80	78	6E+00	0.00		
				9E+01			



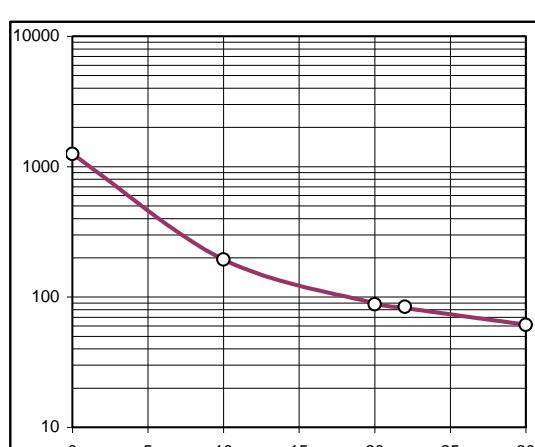
HBX Met 2	
FEED mm	1.700
TYPE	BALL
MEDIA	BALL
MEDIA kg	6.00
SOLIDS kg	1.00
WATER kg	0.50

GRIND	TIME	p80	EST	DIFF	FIT	TIME	P80
	0	1250	1250	5E-09			
G1	10	144	144	7E-04	1105.6	20	73
G2	18	80	79	3E-01	0.33		
G3	20	72	73	5E-01	144		
G4	30	50	50	2E-02	0.04		
				8E-01			



NAT Cu Met 2	
FEED mm	1.700
TYPE	BALL
MEDIA	BALL
MEDIA kg	6.00
SOLIDS kg	1.00
WATER kg	0.50

GRIND	TIME	p80	EST	DIFF	FIT	TIME	P80
	0	1250	1250	6E-07			
G1	10	194	194	3E-03	1091	20	90
G2	20	88	90	3E+00	0.26		
G3	22	84	82	4E+00	159		
G4	30	61	61	2E-01	0.03		
				6E+00			



COPPER FLOTATION

Sulphide rougher and cleaner flotation tests were performed under the following conditions:

- Ore was dry jaw and rolls crushed to 100% passing 1.70mm.
- Ground at 66% solids in an open mild steel rod mill and charge to target P₈₀.
- Rougher floats were performed in a 3.5L Agitaire style laboratory cell.
- Dilute reagents were added and conditioned for two minutes prior to flotation.
- Air rate and time were recorded for each concentrate.
- Regrinds were performed in a mild steel open ball mill or vertical stirred mill.
- Cleaner floats were performed in an Agitaire style 1.2L cell.
- Products were wet weighed, filtered and dried for dry weight and analysis.

TABLE 2: FLOTATION TESTS

Test No	Ore Type	Test	Reagents
01	CC MET 3	Ro	Lime SIBX
02	CC MET 3	Ro Reg Clean	Lime 3009 SIBX 300P
03	CC MET 3	Ro Reg Clean	Lime SIBX 300P
04	CC MET 3	Ro Reg Clean	Lime SIBX 300P
05	CC MET 3	Ro Reg Clean	Lime SIBX 300P
06	CC MET 3	Ro Reg Clean	Lime SIBX 300P
07	CC MET 3	Ro Reg Clean	Lime SIBX 300P
08	HBX MET 2	Ro Reg Clean	Lime SIBX 300P
09	Nat Cu MET 2	Ro Reg Clean	Lime SIBX
10	Nat Cu MET 2	Ro Reg Clean	Lime NaSH SIBX
11	HBX MET 2	Ro Reg Clean	Lime X23 300P
12	CC MET 3	Ro Reg Clean	Lime X23 300P
13	CC MET 3	Ro Reg Clean	Lime 9810 300P
14	CC MET 3	Ro Reg Clean	Lime 9810 300P
15	HBX MET 2	Ro Reg Clean	Lime 9810 300P
16	Nat Cu MET 2	Ro	Lime NaSH SIBX
17	Nat Cu MET 2	Ro	Lime NaSH PAX

REAGENTS USED

The following reagents were used in this test program:

- SIBX, collector, Sodium Iso Butyl Xanthate, Orica
- PAX, collector, Potassium Amyl Xanthate, Orica
- 9810, copper collector, Dithiocarbamate blend, Cytec
- X23, copper collector, Diethyl Dithiocarbamate, Clariant
- 3009, copper collector, Dithiophosphate Blend, Tall Bennett
- Lime, pH modifier, dry slaked lime
- 300P, Na Lignosulphonate, Albright and Wilson
- NaSH, sodium hydrosulphite, commercial flake
- MIBC, frother, Methyl Iso Butyl Carbinol, Shell

4. RESULTS AND DISCUSSION

HEAD ANALYSIS

Table 2 details head analysis results.

TABLE 3: HEAD SAMPLE ANALYSES

Sample Description	Number	Pulv	Cu % aas	Fe % aas	As ppm aas	Co ppm aas	S % Leco	SiO2 % XRF	
CC MET3	513018	LM5	4.59	24.6	477	1551	6.49	17.3	
HBX MET2	513077	LM5	2.24	7.67	200	816	4.69	28.3	
NAT CU MET2	513078	LM5	1.67	15.9	383	957	0.15	45.2	

Sample Description	Number	Pulv	Pb ppm aas	Zn ppm aas	Ni ppm aas	Ag ppm aas	Au(d) ppm Fire	CuA % Sol	CuCN % Sol
CC MET3	513018	LM5	60	17	136	5	0.60	2.00	2.34
HBX MET2	513077	LM5	35	102	125	4	0.17	0.07	0.06
NAT CU MET2	513078	LM5	<5	46	127	3	0.17	1.04	0.46

FLOTATION

Flotation results are summarised in Table 3 below, full flotation test details are appended.

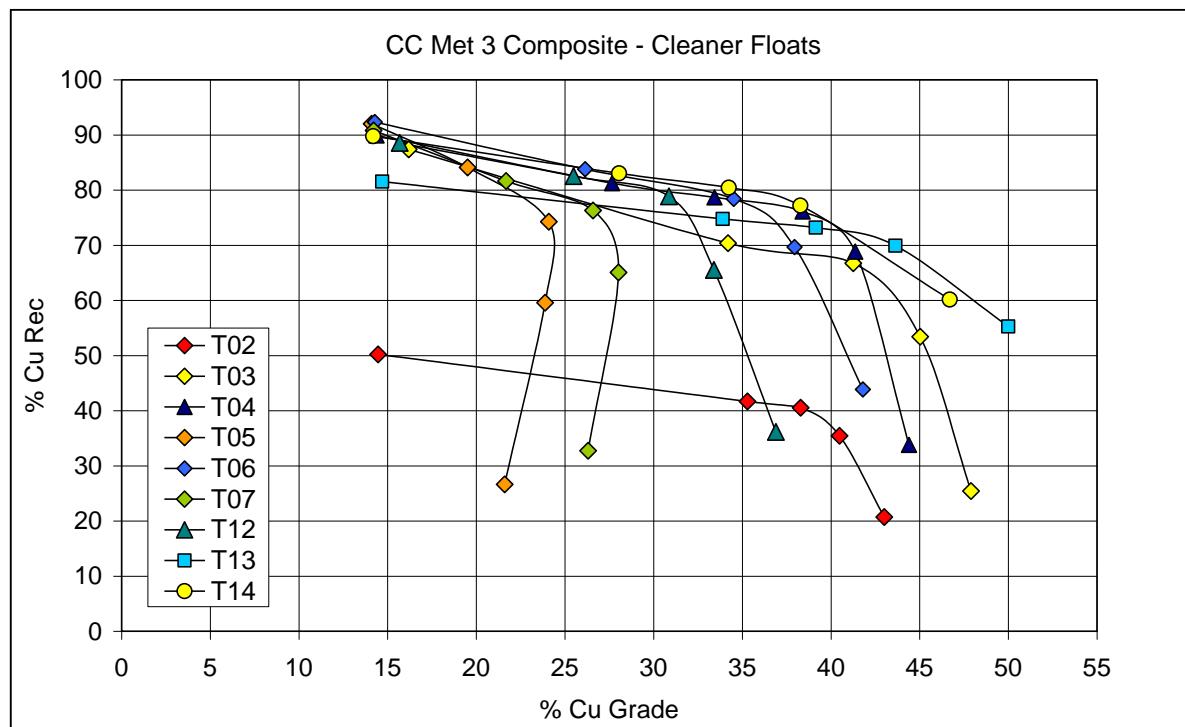
TABLE 4: FLOTATION RESULTS

Test No	Ore Type	Test Conditions	Primary Grind P80 (um)	Conc Cu (%)	Cu Rec (%)	Cu Rec to 35% Cu	Conc Fe (%)
01	CC	Lime SIBX Ro	100	15.1	88	0	27.1
02	CC	Lime 300P 3009 SIBX Ro Lime 300P Reg	123	38.3	40	42	18.1
03	CC	Lime 300P SIBX Ro Lime 300P Reg	80	41.3	67	69	16.4
04	CC	SIBX Ro Lime 300P Reg	80	38.4	76	77	20.1
05	CC	SIBX Ro Lime 300P Reg	80	24.1	74	0	28.0
06	CC	SIBX Ro Lime 300P Reg	80	34.5	78	76	20.9
07	CC	SIBX Ro Lime 300P Reg	80	26.6	76	0	26.1
12	CC	X23 Ro Lime 300P Reg	80	30.9	79	40	23.9
13	CC	9810 Ro Lime 300P Reg	80	39.1	73	75	17.8
14	CC	9810 Ro Lime 9810 300P	80	34.2	80	78	20.0
08	HBX	SIBX Ro Lime 300P Reg	80	35.2	75	75	29.3
11	HBX	X23 Ro Lime 300P Reg	80	31.9	94	70	26.6
15	HBX	9810 Ro Lime 300P Reg	80	32.2	94	65	58.2
09	Nat Cu	SIBX Ro Cl	84	49.3	58	62	10.9
10	Nat Cu	NaSH SIBX Ro	84	23.2	86	80	13.4
16	Nat Cu	NaSH SIBX Ro	84	15.4	85	78	14.4
17	Nat Cu	NaSH PAX Ro	84	27.5	84	0	13.3

CC MET 3 ORE

CC ore rougher and cleaner testing indicated significant difficulty in separation from the high volume of feed pyrite. Test results are summarised in Graph 1. Testing of grind size and pH with xanthate could only produce a copper/pyrite for regrind and cleaning. Testing of more selective collectors (Dithiocarbamates) and an organic depressant in regrind (Lignosulphonate) enabled a high grade concentrate at high recovery to be attained. Locked cycle testing of xanthate (with no cleaner tail regrind) and dithiocarbamate (with cleaner tail regrind) indicated marked improvement in performance using the dithiocarbamate and cleaner tails regrind. An overall recovery of 84% copper to a 35% Cu concentrate has been achieved.

GRAPH 1: CC Met 3 GRADE/RECOVERY CURVES



MINERALOGY: CC MET3 FLOAT TAILS (T06)

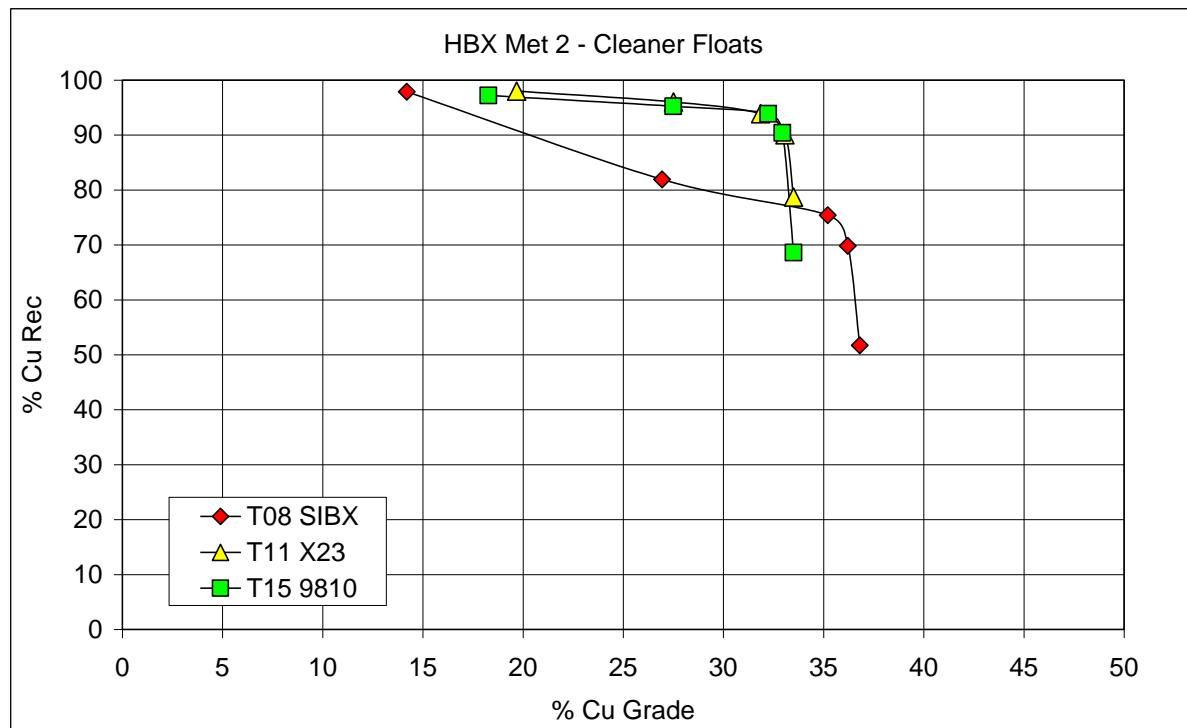
Mineral	Rougher Tail				Cleaner Tail			
	Vol (%)	Liberated (%)	Pyrite Locked (%)	Gangue Locked (%)	Vol (%)	Liberated (%)	Pyrite Locked (%)	Gangue Locked (%)
Chalcocite	44	5	1	54	45	11	9	45
Covellite	11	20	0	45	11	0	1	72
Bornite	43	13	1	33	41	18	5	15
Chalcopyrite	3	0	0	35	3	18	0	35

Mineralogical assessment was made of the tails products from T06 to determine the mode of loss of copper. Some 8% of copper reported to the Rougher tail and 9% to the Cleaner tail for this test. Results indicate that the majority of copper losses are locked as fine intergrowths in silicate gangue. Some moderate improvement in copper recovery (around 4%) of liberated copper mineral is possible. The full mineralogical report is appended.

HBX MET 2 ORE

HBX ore responded extremely well with reagent regime developed for the CC ore. No further batch testing has been indicated for this ore given the high grades and recoveries seen. An overall copper recovery of 94% at a concentrate grade of 32% has been achieved.

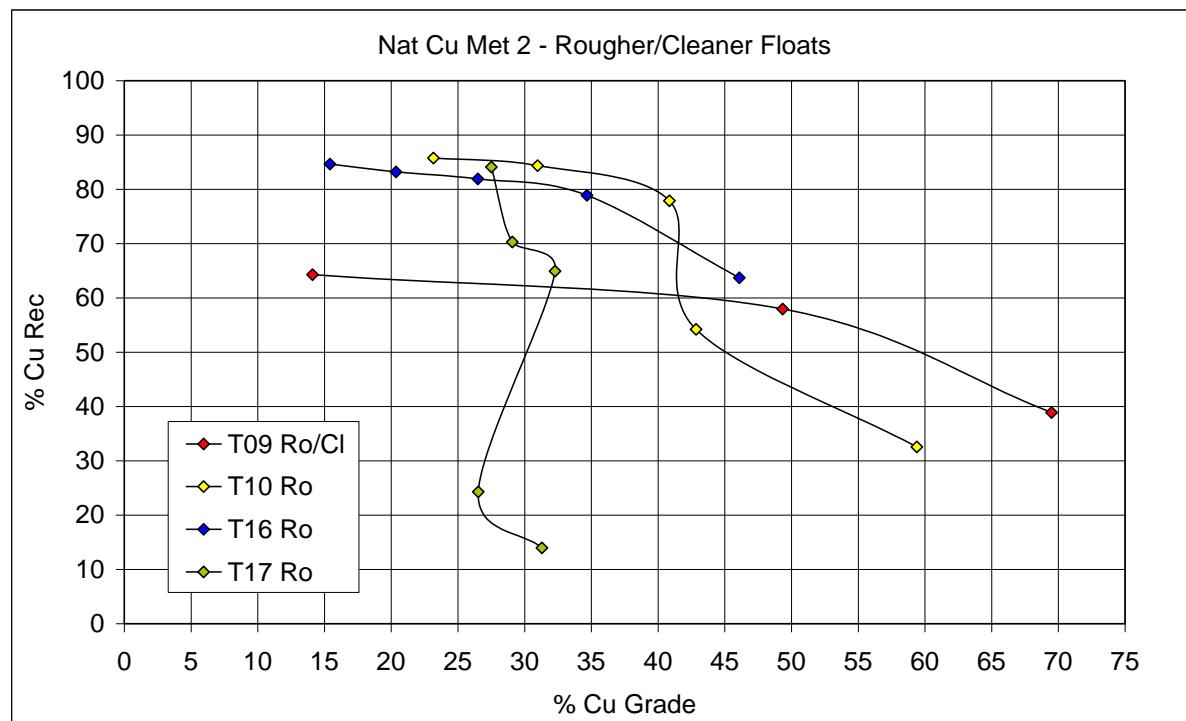
GRAPH 2: HBX Met 2 GRADE/RECOVERY CURVES



NAT CU MET 2 ORE

Rougher flotation of the Nat Cu ore yielded acceptable rougher results with NaSH activation and SIBX. Tests results indicate erratic response to NaSH addition. This will be examined in further detail in later tests. The use of collector 9810 will also be tested. A 35% Cu concentrate at 84% recovery has been achieved using rougher flotation alone.

GRAPH 3: Nat Cu Met 2 GRADE/RECOVERY CURVES

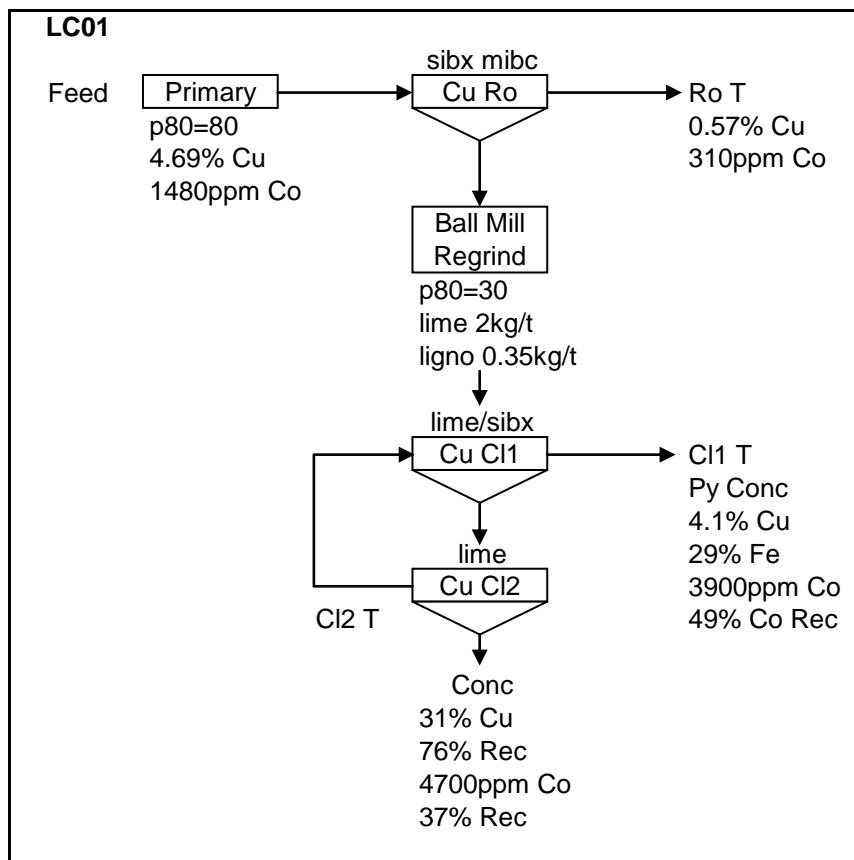


LOCKED CYCLE TESTS: CC MET 3 ORE

Two locked cycle flotation tests were performed for the CC Met 3 ore composite. Tests are summarised in Diagrams 3 and 4 below.

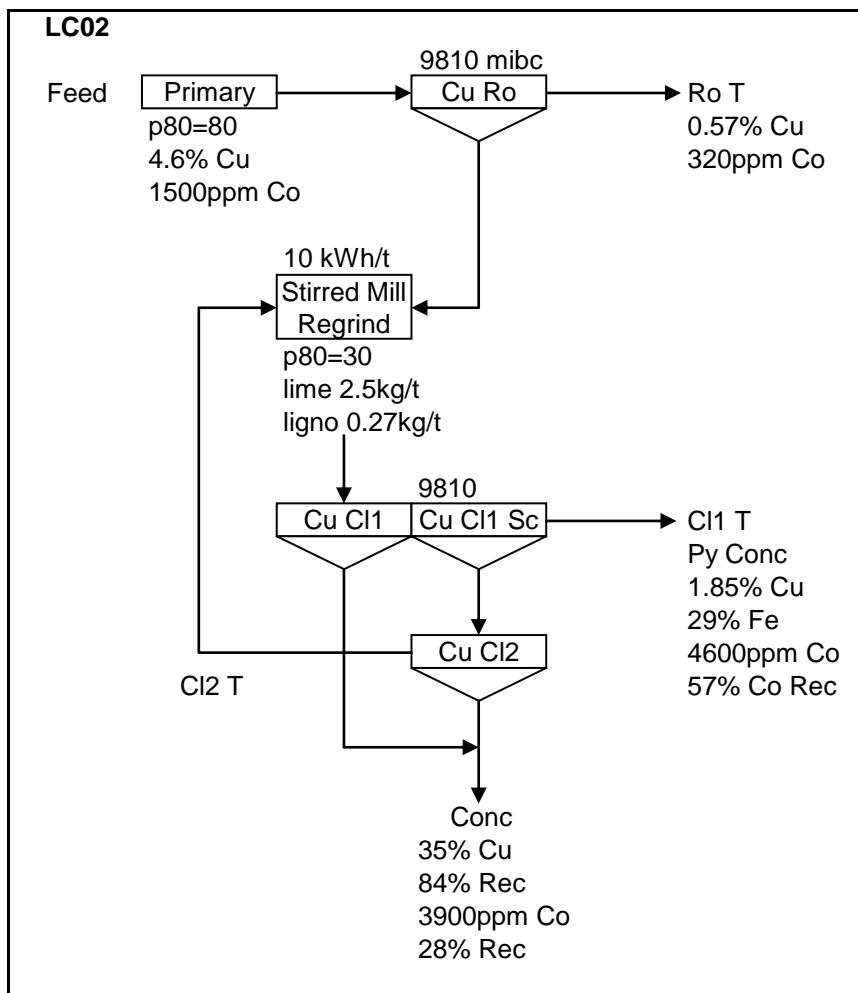
LC01 consisted of a simple [rougher, rougher conc regrind and a two stage clean] configuration using SIBX collector and lime/lignosulphonate for pyrite depression in cleaning. This circuit and reagent suite did not yield sufficient recovery of copper to concentrate at target grade.

DIAGRAM 3: LOCKED CYCLE LC01



The second test, using the collector 9810, yielded a much improved outcome with some 84% copper recovery to a 35% Cu concentrate. The test is summarised in Diagram 4 below.

DIAGRAM 4: LOCKED CYCLE LC02



CONCENTRATE ANALYSES

Table 5 details LC02 (Cycle 4 concentrate product) analyses.

TABLE 5: CONCENTRATE ANALYSES

Analyte	Cu(%) AAS	Cu (%) Wet	Fe(%) AAS	S(%) Leco	Au(ppm) Fire
513233	35.90	35.60	19.5	29.2	3716
Analyte	As(ppm) ICP	Bi(ppm) ICP	Cd(ppm) ICP	Co(ppm) ICP	Hg(ppm) ICP
513233	369	<10	<5	3716	0.5
Analyte	In(ppm) ICP	Mg(ppm) ICP	Mo(ppm) ICP	Ni(ppm) ICP	Pb(ppm) ICP
513233	0.78	2499	<5	260	822
Analyte	Sb(ppm) ICP	Se(ppm) ICP	Si(%) ICP	Te(ppm) ICP	U(ppm) ICP
513233	<5	156	1.26	1.9	2
Analyte	Zn(ppm) ICP				
513233	188				

APPENDIX

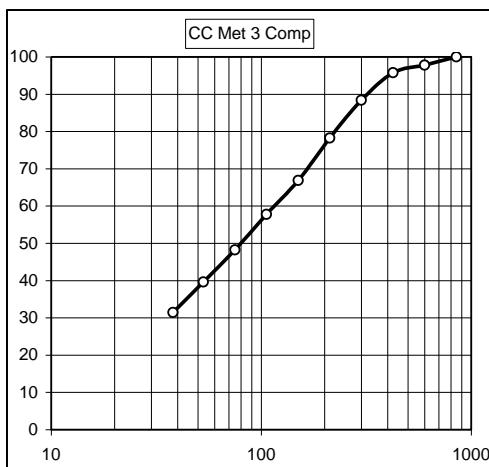
APPENDIX A: GRIND ESTABLISHMENT

Bunie RESEARCH LABORATORY
GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	31/08/2009
TECHNICIAN	MW

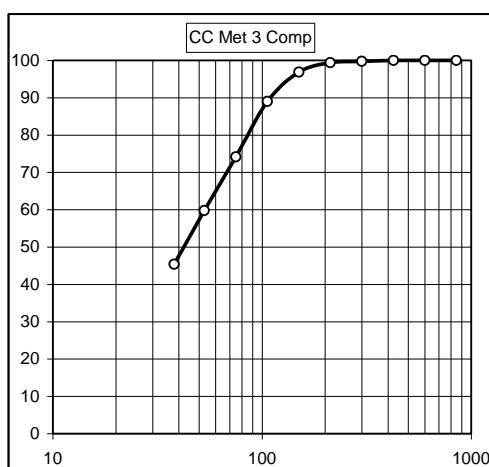
SIZING

CC Met 3 Comp		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.700	600	1.13	2.22	97.8
TYPE	BALL	425	1.02	2.00	95.8
MEDIA	BALL	300	3.78	7.42	88.4
MEDIA kg	6.0	212	5.17	10.14	78.2
SOLIDS kg	1	150	5.81	11.40	66.8
WATER kg	0.5	106	4.63	9.08	57.7
TIME min	10.0	75	4.86	9.54	48.2
SPEED rpm	50	53	4.37	8.57	39.6
		38	4.19	8.22	31.4
CYCLOSIZER	CS1	27	0.00	0.00	31.4
FLOW	185	22	0.00	0.00	31.4
TEMP	21	15	0.00	0.00	31.4
SG	4.00	10	0.00	0.00	31.4
MINS	20	6	0.00	0.00	31.4
CENTRIFUGE	CS6	3	0.00	0.00	31.4
		SUB	16.01	31.41	0.0
		TOTAL	50.97	95.78	



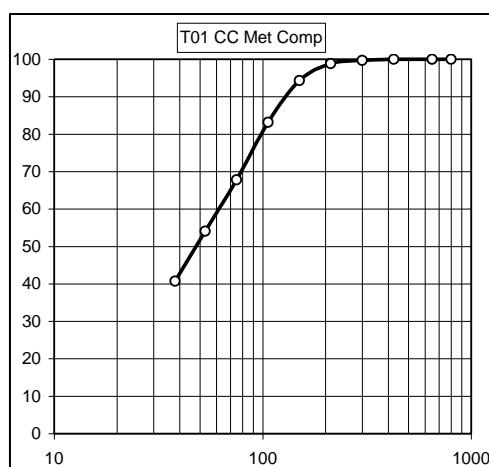
SIZING

CC Met 3 Comp		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.70	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.27	0.24	99.8
MEDIA kg	6.00	212	0.43	0.38	99.4
SOLIDS kg	1.00	150	2.85	2.51	96.9
WATER kg	0.50	106	8.94	7.87	89.0
TIME min	20	75	16.91	14.88	74.1
SPEED rpm	50	53	16.32	14.36	59.8
		38	16.32	14.36	45.4
CYCLOSIZER	CS1	27	0.00	0.00	45.4
FLOW	185	22	0.00	0.00	45.4
TEMP	21	15	0.00	0.00	45.4
SG	4.00	10	0.00	0.00	45.4
MINS	20	6	0.00	0.00	45.4
CENTRIFUGE	CS6	3	0.00	0.00	45.4
		SUB	51.60	45.41	0.0
		TOTAL	113.64	100.00	



SIZING

T01 CC Met Comp		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	800	0.00	0.00	100.0
FEED mm	1.70	650	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.08	0.31	99.7
MEDIA kg	6	212	0.22	0.86	98.8
SOLIDS kg	1	150	1.16	4.53	94.3
WATER kg	0.5	106	2.85	11.12	83.2
TIME min	17	75	3.94	15.38	67.8
SPEED rpm	50	53	3.52	13.74	54.1
		38	3.41	13.31	40.7
CYCLOSIZER	CS1	27	0.00	0.00	40.7
FLOW	185	22	0.00	0.00	40.7
TEMP	21	15	0.00	0.00	40.7
SG	4.00	10	0.00	0.00	40.7
MINS	20	6	0.00	0.00	40.7
CENTRIFUGE	CS6	3	0.00	0.00	40.7
		SUB	10.44	40.75	0.0
		TOTAL	25.62	100.00	

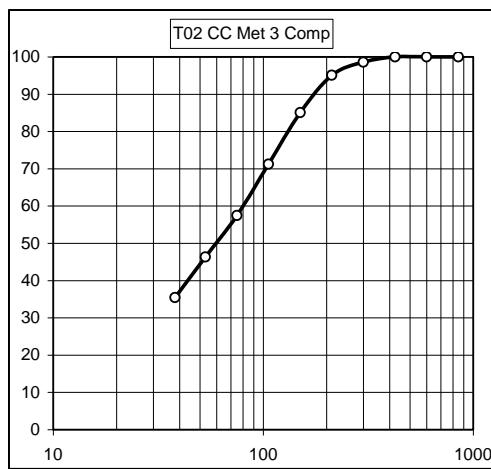


Bunie RESEARCH LABORATORY
GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	31/08/2009
TECHNICIAN	MW

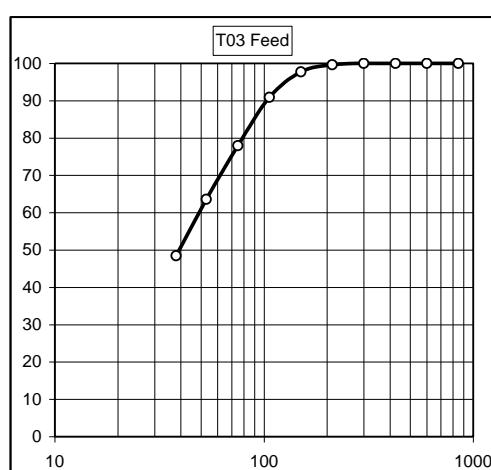
SIZING

T02 CC Met 3 Comp		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.700	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.35	1.40	98.6
MEDIA kg	6.0	212	0.88	3.51	95.1
SOLIDS kg	1	150	2.51	10.02	85.1
WATER kg	0.5	106	3.48	13.89	71.2
TIME min	14.0	75	3.44	13.73	57.5
SPEED rpm	50	53	2.80	11.17	46.3
		38	2.72	10.85	35.4
CYCLOSIZER	CS1	27	0.00	0.00	35.4
FLOW	185	22	0.00	0.00	35.4
TEMP	21	15	0.00	0.00	35.4
SG	4.00	10	0.00	0.00	35.4
MINS	20	6	0.00	0.00	35.4
CENTRIFUGE	CS6	3	0.00	0.00	35.4
		SUB	8.88	35.43	0.0
		TOTAL	25.06	100.00	



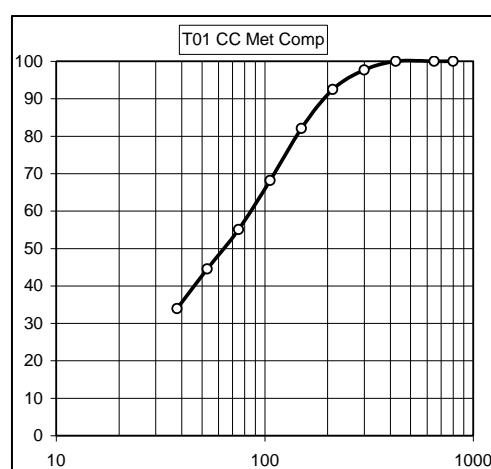
SIZING

T03 Feed		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.70	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.00	0.00	100.0
MEDIA kg	6.00	212	0.10	0.40	99.6
SOLIDS kg	1.00	150	0.47	1.86	97.7
WATER kg	0.50	106	1.72	6.81	90.9
TIME min	22	75	3.28	12.98	77.9
SPEED rpm	50	53	3.63	14.37	63.6
		38	3.82	15.12	48.5
CYCLOSIZER	CS1	27	0.00	0.00	48.5
FLOW	185	22	0.00	0.00	48.5
TEMP	21	15	0.00	0.00	48.5
SG	4.00	10	0.00	0.00	48.5
MINS	20	6	0.00	0.00	48.5
CENTRIFUGE	CS6	3	0.00	0.00	48.5
		SUB	12.24	48.46	0.0
		TOTAL	25.26	100.00	



SIZING

T01 CC Met Comp		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	800	0.00	0.00	100.0
FEED mm	1.70	650	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	2.86	2.35	97.6
MEDIA kg	6	212	6.31	5.19	92.5
SOLIDS kg	1	150	12.60	10.37	82.1
WATER kg	0.5	106	16.89	13.90	68.2
TIME min	13	75	15.95	13.13	55.0
SPEED rpm	50	53	12.76	10.50	44.5
		38	12.93	10.64	33.9
CYCLOSIZER	CS1	27	0.00	0.00	33.9
FLOW	185	22	0.00	0.00	33.9
TEMP	21	15	0.00	0.00	33.9
SG	4.00	10	0.00	0.00	33.9
MINS	20	6	0.00	0.00	33.9
CENTRIFUGE	CS6	3	0.00	0.00	33.9
		SUB	41.18	33.90	0.0
		TOTAL	121.48	100.00	

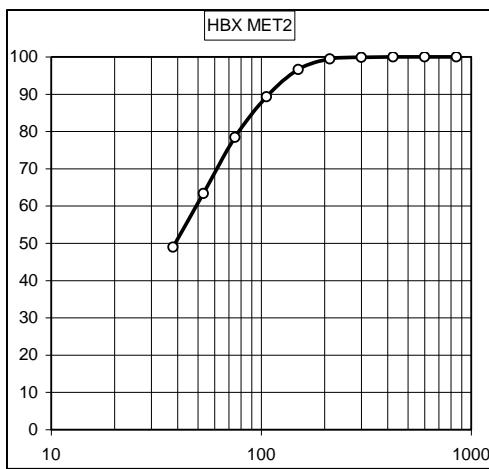


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GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	17/09/2009
TECHNICIAN	MW

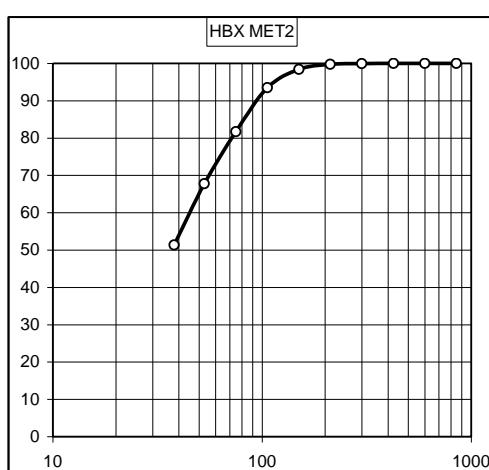
SIZING

HBX MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.700	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.03	0.12	99.9
MEDIA kg	6.0	212	0.11	0.45	99.4
SOLIDS kg	1	150	0.68	2.78	96.6
WATER kg	0.5	106	1.80	7.36	89.3
TIME min	18.0	75	2.66	10.87	78.4
SPEED rpm	50	53	3.69	15.09	63.3
		38	3.52	14.39	48.9
CYCLOSIZER	CS1	27	0.00	0.00	48.9
FLOW	185	22	0.00	0.00	48.9
TEMP	21	15	0.00	0.00	48.9
SG	4.00	10	0.00	0.00	48.9
MINS	20	6	0.00	0.00	48.9
CENTRIFUGE	CS6	3	0.00	0.00	48.9
		SUB	11.97	48.94	0.0
		TOTAL	24.46	100.00	



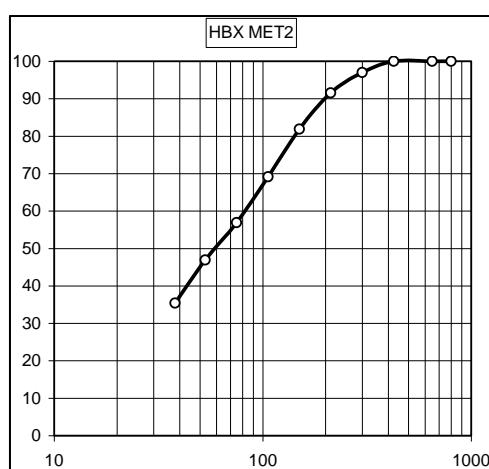
SIZING

HBX MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.70	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.08	0.07	99.9
MEDIA kg	6.00	212	0.22	0.18	99.8
SOLIDS kg	1.00	150	1.65	1.36	98.4
WATER kg	0.50	106	5.96	4.92	93.5
TIME min	20	75	14.25	11.76	81.7
SPEED rpm	50	53	16.89	13.94	67.8
		38	19.93	16.45	51.3
CYCLOSIZER	CS1	27	0.00	0.00	51.3
FLOW	185	22	0.00	0.00	51.3
TEMP	21	15	0.00	0.00	51.3
SG	4.00	10	0.00	0.00	51.3
MINS	20	6	0.00	0.00	51.3
CENTRIFUGE	CS6	3	0.00	0.00	51.3
		SUB	62.20	51.33	0.0
		TOTAL	121.18	100.00	



SIZING

HBX MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	800	0.00	0.00	100.0
FEED mm	1.70	650	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	3.02	3.01	97.0
MEDIA kg	6	212	5.47	5.45	91.5
SOLIDS kg	1	150	9.73	9.69	81.9
WATER kg	0.5	106	12.74	12.69	69.2
TIME min	10	75	12.32	12.27	56.9
SPEED rpm	50	53	10.03	9.99	46.9
		38	11.56	11.52	35.4
CYCLOSIZER	CS1	27	0.00	0.00	35.4
FLOW	185	22	0.00	0.00	35.4
TEMP	21	15	0.00	0.00	35.4
SG	4.00	10	0.00	0.00	35.4
MINS	20	6	0.00	0.00	35.4
CENTRIFUGE	CS6	3	0.00	0.00	35.4
		SUB	35.52	35.38	0.0
		TOTAL	100.39	100.00	

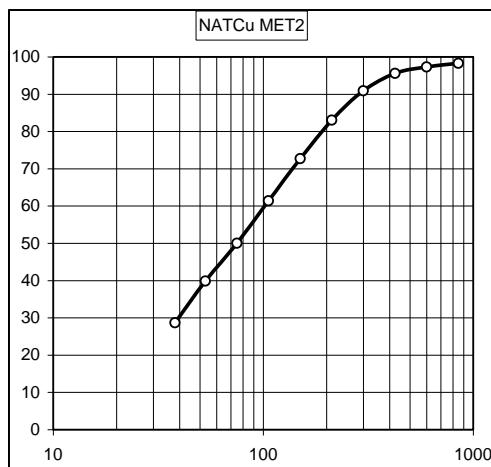


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GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	17/09/2009
TECHNICIAN	MW

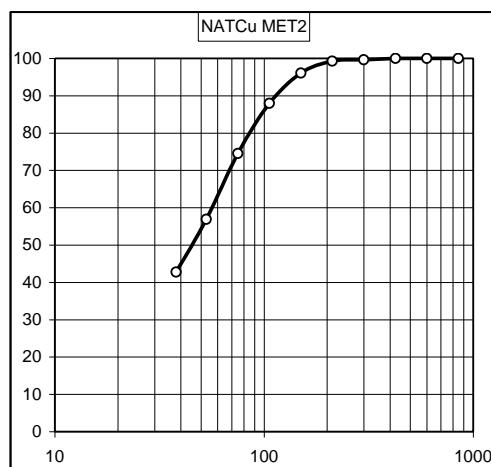
SIZING

NATCu MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	1.73	1.71	98.3
FEED mm	1.700	600	1.02	1.01	97.3
TYPE	BALL	425	1.71	1.69	95.6
MEDIA	BALL	300	4.75	4.69	90.9
MEDIA kg	6.0	212	8.00	7.90	83.0
SOLIDS kg	1	150	10.42	10.29	72.7
WATER kg	0.5	106	11.45	11.31	61.4
TIME min	10.0	75	11.56	11.42	50.0
SPEED rpm	50	53	10.27	10.14	39.8
		38	11.29	11.15	28.7
CYCLOSIZER	CS1	27	0.00	0.00	28.7
FLOW	185	22	0.00	0.00	28.7
TEMP	21	15	0.00	0.00	28.7
SG	4.00	10	0.00	0.00	28.7
MINS	20	6	0.00	0.00	28.7
CENTRIFUGE	CS6	3	0.00	0.00	28.7
		SUB	29.04	28.68	0.0
		TOTAL	101.24	95.59	



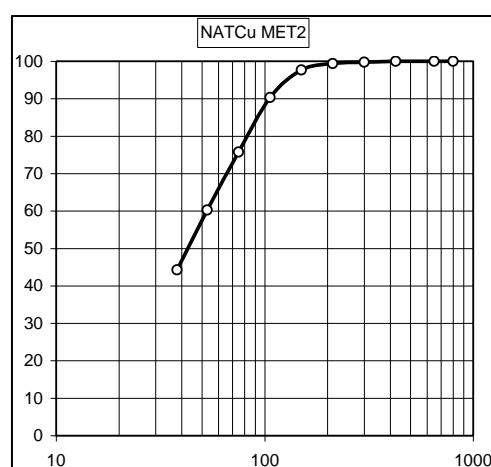
SIZING

NATCu MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.70	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.35	0.35	99.7
MEDIA kg	6.00	212	0.42	0.42	99.2
SOLIDS kg	1.00	150	3.21	3.19	96.0
WATER kg	0.50	106	8.13	8.09	88.0
TIME min	20	75	13.53	13.46	74.5
SPEED rpm	50	53	17.73	17.64	56.9
		38	14.14	14.07	42.8
CYCLOSIZER	CS1	27	0.00	0.00	42.8
FLOW	185	22	0.00	0.00	42.8
TEMP	21	15	0.00	0.00	42.8
SG	4.00	10	0.00	0.00	42.8
MINS	20	6	0.00	0.00	42.8
CENTRIFUGE	CS6	3	0.00	0.00	42.8
		SUB	43.00	42.78	0.0
		TOTAL	100.51	100.00	



SIZING

NATCu MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	800	0.00	0.00	100.0
FEED mm	1.70	650	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.07	0.27	99.7
MEDIA kg	6	212	0.08	0.31	99.4
SOLIDS kg	1	150	0.45	1.77	97.6
WATER kg	0.5	106	1.87	7.34	90.3
TIME min	22	75	3.70	14.53	75.8
SPEED rpm	50	53	3.96	15.55	60.2
		38	4.07	15.98	44.2
CYCLOSIZER	CS1	27	0.00	0.00	44.2
FLOW	185	22	0.00	0.00	44.2
TEMP	21	15	0.00	0.00	44.2
SG	4.00	10	0.00	0.00	44.2
MINS	20	6	0.00	0.00	44.2
CENTRIFUGE	CS6	3	0.00	0.00	44.2
		SUB	11.27	44.25	0.0
		TOTAL	25.47	100.00	

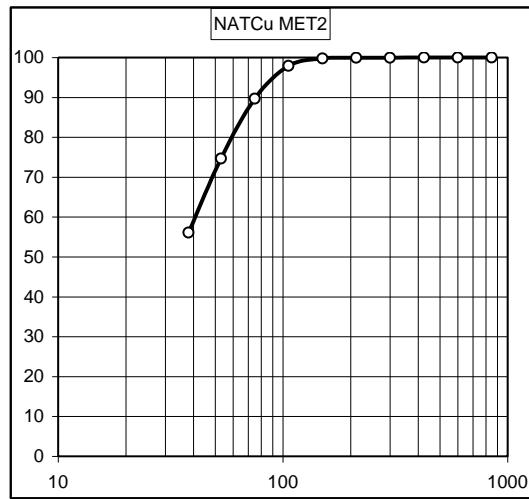


Burnie RESEARCH LABORATORY
GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	18/09/2009
TECHNICIAN	MW

SIZING

NATCu MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.700	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.04	0.04	100.0
MEDIA kg	6.0	212	0.05	0.05	99.9
SOLIDS kg	1	150	0.18	0.18	99.7
WATER kg	0.5	106	1.85	1.82	97.9
TIME min	30.0	75	8.38	8.26	89.7
SPEED rpm	50	53	15.21	14.98	74.7
		38	18.88	18.60	56.1
CYCLOSIZER	CS1	27	0.00	0.00	56.1
FLOW	185	22	0.00	0.00	56.1
TEMP	21	15	0.00	0.00	56.1
SG	4.00	10	0.00	0.00	56.1
MINS	20	6	0.00	0.00	56.1
CENTRIFUGE	CS6	3	0.00	0.00	56.1
		SUB	56.92	56.07	0.0
		TOTAL	101.51	100.00	

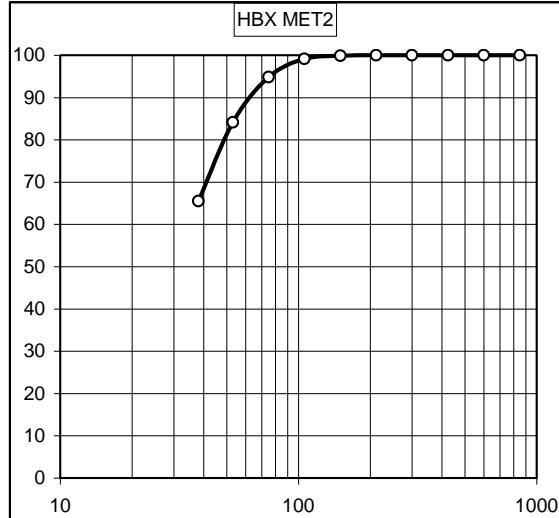


Burnie RESEARCH LABORATORY
GRIND ESTABLISHMENT REPORT SHEET

PROJECT	T0513
ORE	CUDECO
DATE	17/09/2009
TECHNICIAN	MW

SIZING

HBX MET2		SIZE um	WEIGHTS		
GRIND ESTABLISHMENT			gm	(%)	(%)PASS
MILL CONDITIONS	p80	850	0.00	0.00	100.0
FEED mm	1.700	600	0.00	0.00	100.0
TYPE	BALL	425	0.00	0.00	100.0
MEDIA	BALL	300	0.00	0.00	100.0
MEDIA kg	6.0	212	0.00	0.00	100.0
SOLIDS kg	1	150	0.10	0.10	99.9
WATER kg	0.5	106	0.76	0.75	99.2
TIME min	30.0	75	4.38	4.30	94.9
SPEED rpm	50	53	10.92	10.71	84.1
		38	19.03	18.67	65.5
CYCLOSIZER	CS1	27	0.00	0.00	65.5
FLOW	185	22	0.00	0.00	65.5
TEMP	21	15	0.00	0.00	65.5
SG	4.00	10	0.00	0.00	65.5
MINS	20	6	0.00	0.00	65.5
CENTRIFUGE	CS6	3	0.00	0.00	65.5
		SUB	66.74	65.48	0.0
		TOTAL	101.93	100.00	



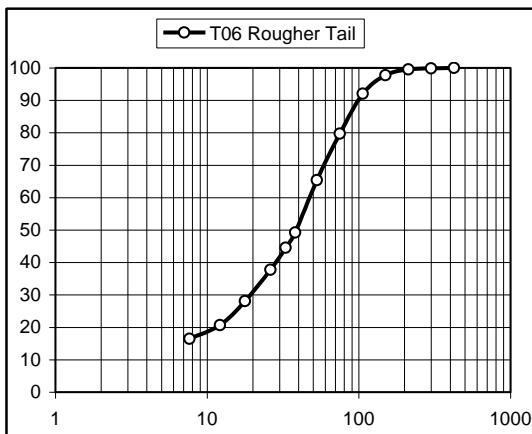
APPENDIX B: SIZING FOR MINERALOGY

Burnie RESEARCH LABORATORY
SIZING AND SIZE ANALYSIS REPORT SHEET

PROJECT	T0513
SAMPLE	CC Met 3 Comp
FROM TEST NO	Flotation Tails
DATE	14/09/2009
TECHNICIAN	MW

SIZING

T06 Rougher Tail	SIZE um	WEIGHTS		
		gm	(%)	%PASS
P80	425	0.00	0.00	100.0
	300	0.18	0.14	99.9
	212	0.40	0.30	99.6
	150	2.43	1.83	97.7
	106	7.58	5.71	92.0
	76	16.29	12.28	79.7
CYCLOSIZER	75	19.07	14.38	65.4
	53	21.46	16.18	49.2
	38			
FLOW	CS1	33	6.14	44.6
TEMP	CS2	26	9.07	37.7
SG	CS3	18	12.79	28.1
MINS	CS4	12	9.77	20.7
CENTRIFUGE	CS5	8	5.60	16.5
	CS6	4	0.00	16.5
	SUB	21.87	16.49	0.0
	TOTAL	132.65	100.00	



ANALYSES

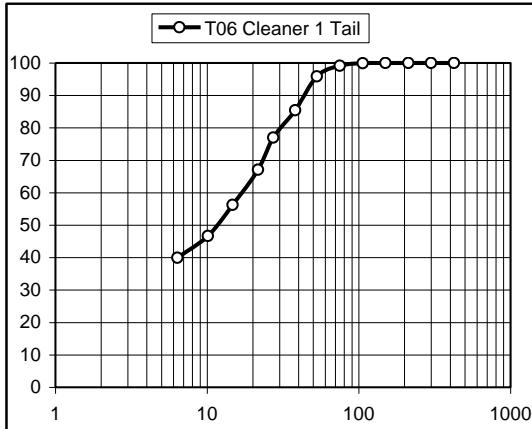
SIZE um	WT %	Cu		Fe		Mount Number
		%	dist	%	dist	
212	0.44	0.92	0.8	7.24	0.1	
53	34.20	0.52	35.6	19.60	29.3	513061
33	20.81	0.24	10.0	35.90	32.6	513062
18	16.48	0.27	8.9	21.60	15.5	513063
8	11.59	0.43	10.0	16.00	8.1	512064
CALC<8	16.49	1.05	34.8	19.90	14.3	
ASSAY	100.00	0.50	100.0	22.90	100.0	

Burnie RESEARCH LABORATORY
SIZING AND SIZE ANALYSIS REPORT SHEET

PROJECT	T0513
SAMPLE	CC Met 3 Comp
FROM TEST NO	Flotation Tails
DATE	14/09/2009
TECHNICIAN	MW

SIZING

T06 Cleaner 1 Tail	SIZE um	WEIGHTS		
		gm	(%)	%PASS
p80 =34um	P80	425	0.00	0.00
		300	0.00	0.00
		212	0.00	0.00
		150	0.03	0.03
		106	0.05	0.05
		75	0.77	0.78
		53	3.23	3.28
		38	10.25	10.41
	SUB	39.30	39.92	0.0
	TOTAL	98.45	100.00	



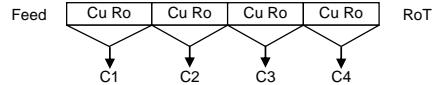
ANALYSES

SIZE um	WT %	Cu		Fe		Mount Number
		%	dist	%	dist	
53	4.14	4.73	7.2	34.90	4.7	513066
27	18.87	2.41	16.7	39.20	24.1	513067
15	20.72	2.07	15.8	35.40	23.9	513068
6	16.34	2.14	12.9	29.20	15.5	513069
CALC<8	39.92	3.23	47.4	24.42	31.8	
ASSAY	100.00	2.72	100.0	30.70	100.0	

APPENDIX C: FLOTATION TESTS

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regind
Mill	type	Ball	0
Media	type	MS	0
Media	kg	6	0
Solids	g	1000	0
Water	g	500	0
Time	min	19	0
Speed	rpm	50	0
Lime	g	0.5	0
End pH	pH	8.23	0
End p80	μm	100	0



PROJECT	T0513
TEST NO	01
DATE	31/08/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm

	pH	100 Lime g/t	0.1 SIBX g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Condition			5					1					
Condition				52				1					
Cu Ro C1	8.4								1-2	2.0	2.0	150	11
Condition			5					1					
Cu Ro C2	8.3			31					1-2	3.5	5.5	300	20
Condition								1					
Cu Ro C3	8.3		5	31					3-10	5.0	10.5	500	23
Condition								1					
Cu Ro C4	8.3		5	10					3-10	6.0	16.5	600	11
REAGENT TOTALS (g/t)	518	21	124										

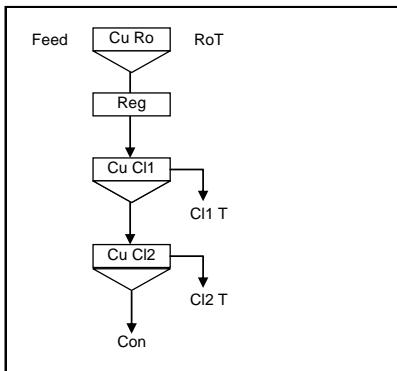
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuRoC1	16.6	1.7	31.2	11.8	17.2	1.2	513	2.1	3058	3.4	23.2	4.7	37	32
CuRoC2	58.9	6.1	22.5	30.2	23.8	6.1	746	11.0	4591	18.2	29.4	21.3	26	46
CuRoC3	112.7	11.7	11.1	28.5	31.4	15.3	1133	32.0	5836	44.2	37.7	52.2	13	65
CuRoC4	67.6	7.0	11.3	17.4	25.4	7.4	726	12.3	3683	16.7	22.5	18.6	13	37
RoT	708.9	73.5	0.74	12.0	22.8	70.0	239	42.5	366	17.4	0.36	3.1	1	0
CALC	964.7	100.0	4.54	100.0	24.0	100.0	413	100.0	1542	100.0	8.44	100.0		
ASSAY HEAD			1.00		2.00		3.00		4.00		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuRoC1	16.6	1.7	31.2	11.8	17.2	1.2	513	2.1	3058	3.4	23.2	4.7
CuRoC2	75.5	7.8	24.4	42.1	22.3	7.3	695	13.2	4254	21.6	28.0	26.0
CuRoC3	188.2	19.5	16.4	70.6	27.8	22.6	957	45.2	5201	65.8	33.8	78.2
CuRoC4	255.8	26.5	15.1	88.0	27.1	30.0	896	57.5	4800	82.6	30.8	96.9
FEED	964.7	100.0	4.54	100.0	24.0	100.0	413	100.0	1542	100.0	8.44	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	190
Water	g	500	300
Time	min	14	4
Speed	rpm	50	50
Lime	g	0.8	1.5
End pH	pH	8.57	11.3
End p80	μm	134	0

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	02
DATE	31/08/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
RTD3009 as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 3009 g/t	2.0 300P g/t	0.1 SIBX g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind		829		518										
Condition			62						1					
Condition	8.4				10	52			1					
Cu Ro C1					5	31			1					
Condition	8.3				5	21			1					
Cu Ro C2									3-10					
Condition	8.3													
Cu Ro C3														
Regrind	11.3	1553		311					4					
Condition					5	31			1					
Condition	11.3								2-5					
CuCL1Con										7.0				
Condition	11.0	62				21			1					
CuCl2C1						21					1-2			
CuCl2C2						21					2-4			
CuCl2C3											2-5			
REAGENT TOTALS (g/t)		2444	62	829	26	176								

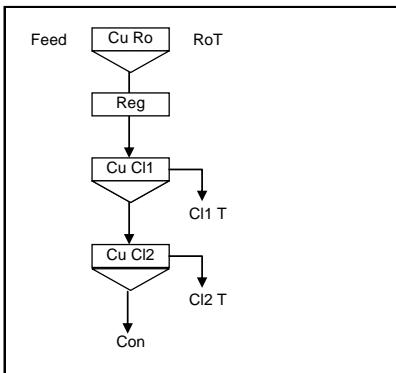
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl2C1	21.3	2.2	43.0	20.7	16.1	1.5	352	2.5	3106	4.4	29.3	8.0	51	39
C2	17.4	1.8	37.4	14.7	18.7	1.4	503	2.9	3645	4.2	32.0	7.2	44	46
C3	8.1	0.8	27.8	5.10	21.8	0.8	701	1.9	4223	2.3	30.1	3.1	33	46
Cl2Tail	5.4	0.6	9.28	1.13	27.0	0.6	797	1.4	4085	1.5	24.6	1.7	11	42
Cl1Tail	101.1	10.5	3.72	8.51	35.3	15.4	1161	38.9	6672	44.7	39.2	51.1	4	70
RoTail	812.3	84.1	2.71	49.8	23.0	80.4	195	52.4	798	43.0	2.75	28.8	3	4
CALC	965.6	100.0	4.58	100.0	24.1	100.0	313	100.0	1562	100.0	8.03	100.0		
ASSAY HEAD			1.00		2.00		3.00		4.00		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	
CuCl2C1	21.3	2.2	43.0	20.7	16.1	1.5	352	2.5	3106	4.4	29.3	8.0	
C2	38.7	4.0	40.5	35.4	17.3	2.9	420	5.4	3348	8.6	30.5	15.2	
C3	46.8	4.8	38.3	40.5	18.1	3.6	469	7.3	3500	10.9	30.4	18.4	
Cl2Tail	52.2	5.4	35.3	41.7	19.0	4.3	503	8.7	3560	12.3	29.8	20.1	
Cl1Tail	153.3	15.9	14.5	50.2	29.7	19.6	937	47.6	5612	57.0	36.0	71.2	
FEED	965.6	100.0	4.58	100.0	24.1	100.0	313	100.0	1562	100.0	8.03	100.0	

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind	
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	290
Water	g	500	300
Time	min	22	5
Speed	rpm	50	50
Lime	g	1.0	1.5
End pH	pH	8.63	10.9
End p80	μm	80	0

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	03
DATE	1/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind		1027		308										
Condition									1					
Cu Ro C1	8.6		10		51				1	2-5	2.5	2.5	200	
Cu Ro C2	8.6		5		31				1	2-5	3.0	5.5	300	
Cu Ro C3	8.6		5		31				1	3-7	4.5	10.0	500	
Cu Ro C4	8.6		5		21				1	4-10	6.5	16.5	600	
Regrind	10.9	1541		308					5					
Condition	11.0	41	6		41				1					
CuCl1Con	11.0								1	2-5	10.0	10.0	600	
Condition	11.5	175			21					1-2	2.0	2.0	60	39
CuCl2C1	11.5									2-4	2.5	4.5	80	36
CuCl2C2										2-5	5.0	9.5	160	12
CuCl2C3														
REAGENT TOTALS (g/t)		2783	32	616	195									

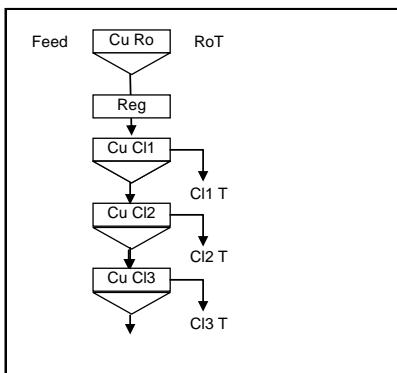
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl2C1	23.5	2.4	47.9	25.4	13.7	1.4	445	2.2	2062	3.5	26.5	8.1	56	33
C2	29.0	3.0	42.7	28.0	16.3	2.0	415	2.5	2591	5.4	27.6	10.4	50	36
C3	19.1	2.0	30.9	13.3	19.7	1.6	579	2.3	3149	4.3	26.8	6.6	36	39
Cl2Tail	19.5	2.0	8.27	3.64	27.4	2.3	775	3.1	3713	5.2	22.6	5.7	10	38
Cl1Tail	147.8	15.2	5.09	17.0	32.0	20.3	935	28.6	4999	53.1	29.5	56.7	6	52
RoTail	734.7	75.5	0.76	12.6	22.9	72.3	403	61.3	539	28.5	1.30	12.4	1	2
CALC	973.6	100.0	4.55	100.0	23.9	100.0	496	100.0	1429	100.0	7.89	100.0		
ASSAY HEAD			4.59		24.6		477		1551		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl2C1	23.5	2.4	47.9	25.4	13.7	1.4	445	2.2	2062	3.5	26.5	8.1
C2	52.5	5.4	45.0	53.4	15.1	3.4	428	4.7	2354	8.9	27.1	18.5
C3	71.6	7.4	41.3	66.7	16.4	5.0	469	6.9	2566	13.2	27.0	25.1
Cl2Tail	91.1	9.4	34.2	70.4	18.7	7.3	534	10.1	2812	18.4	26.1	30.9
Cl1Tail	238.9	24.5	16.2	87.4	26.9	27.7	782	38.7	4165	71.5	28.2	87.6
FEED	973.6	100.0	4.55	100.0	23.9	100.0	496	100.0	1429	100.0	7.89	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling				Regrind
Mill	type	Ball	Ball	
Media	kg	MS	MS	
Media	kg	6	10	
Solids	g	1000	370	
Water	g	500	300	
Time	min	22	8	
Speed	rpm	50	50	
Lime	g	0.0	1.8	
End pH	pH	8.1	10.4	
End p80	μm	80	30	

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	04
DATE	2/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
3 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind		0		0										
Condition									1					
Condition									2					
Cu Ro C1	8.1		10		50									
Condition									1					
Cu Ro C2	8.1		8		30									
Condition									1					
Cu Ro C3	8.2		8		30									
Condition									1					
Cu Ro C4	8.2		15		20									
Regrind	10.4	1802		300					8					
Condition	11.0	300												
Condition	11.0		6		40									
CuCl1 Con	11.5				10									
Condition	11.5	501	2		20									
CuCl2 Con	11.5								1					
Condition	11.5	360			10									
CuCl3 C1	11.5													
CuCl3 C2														
CuCl3 C3														
REAGENT TOTALS (g/t)		2964	49	300	210									

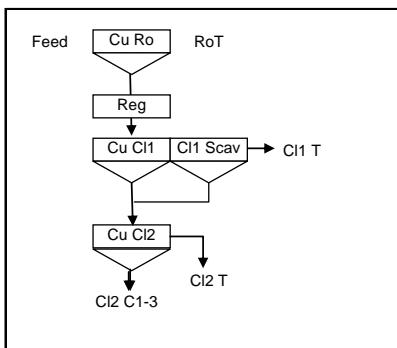
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl3C1	34.9	3.5	44.4	33.8	15.6	2.3	506	3.8	2791	6.7	28.9	12.5	52	38
C2	41.4	4.1	38.8	35.0	18.5	3.2	571	5.0	3226	9.3	29.0	14.9	46	40
C3	14.6	1.5	22.9	7.29	23.8	1.5	715	2.2	3871	3.9	28.3	5.1	27	44
Cl3Tail	17.0	1.7	6.89	2.55	30.1	2.2	905	3.3	4693	5.5	28.5	6.0	8	50
Cl2Tail	26.8	2.7	4.40	2.57	27.1	3.1	828	4.7	3413	6.3	19.1	6.4	5	33
Cl1Tail	152.0	15.2	2.61	8.65	31.3	20.2	1012	32.9	4865	51.2	28.0	53.0	3	50
RoTail	712.1	71.3	0.65	10.1	22.4	67.6	316	48.1	344	17.0	0.23	2.0	1	0.2
CALC	998.8	100.0	4.59	100.0	23.6	100.0	469	100.0	1445	100.0	8.04	100.0		
ASSAY HEAD			4.59		24.6		477		1551		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl3C1	34.9	3.5	44.4	33.8	15.6	2.3	506	3.8	2791	6.7	28.9	12.5
C2	76.3	7.6	41.4	68.8	17.2	5.6	541	8.8	3027	16.0	28.9	27.5
C3	90.9	9.1	38.4	76.1	18.2	7.0	569	11.1	3163	19.9	28.8	32.6
Cl3Tail	107.9	10.8	33.4	78.7	20.1	9.2	622	14.3	3404	25.4	28.8	38.6
Cl2Tail	134.7	13.5	27.7	81.3	21.5	12.3	663	19.1	3406	31.8	26.8	45.0
Cl1Tail	286.7	28.7	14.4	89.9	26.7	32.4	848	51.9	4179	83.0	27.4	98.0
FEED	998.8	100.0	4.59	100.0	23.6	100.0	469	100.0	1445	100.0	8.04	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind
Mill	type	Ball
Media	kg	MS
Media	kg	6
Solids	g	1000
Water	g	500
Time	min	22
Speed	rpm	50
Lime	g	0
End pH	pH	8.1
End p80	μm	80
		9.8
		30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	05
DATE	8/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind		0		0										
Condition														
Cu Ro C1	8.1		10		50				2					
Condition														
Cu Ro C2	8.1		10		30				1					
Condition														
Cu Ro C3	8.2		15		30				1					
Condition														
Cu Ro C4	8.2		20		20				1					
Regrind	9.8	1510		342					8					
Condition														
Condition	10.0		5		50				1					
CuCl1 Con	10.0													
Cl1 Scav Con			5											
Condition	10.0		181	2		30			1					
CuCl2 C1	10.0													
CuCl2 C2														
CuCl2 C3														
REAGENT TOTALS (g/t)		1691	67	342	211									

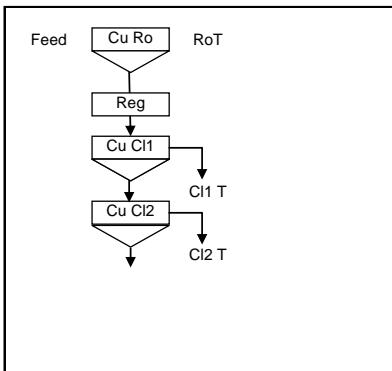
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl2C1	55.9	5.6	21.6	26.6	30.4	7.0	1230	12.1	7506	27.4	42.5	37.4	25	70
CuCl2C2	57.3	5.8	26.1	33.0	27.0	6.4	1103	11.1	5490	20.6	36.6	33.1	31	58
CuCl2C3	26.6	2.7	25.0	14.7	25.0	2.7	919	4.3	4758	8.3	29.8	12.5	29	46
Cl2Tail	55.7	5.6	8.03	9.86	26.0	6.0	857	8.4	3213	11.7	16.0	14.0	9	27
Cl1Tail	100.6	10.1	3.56	7.90	26.4	11.0	860	15.2	2866	18.8	1.24	2.0	4	1
RoTail	697.4	70.2	0.52	7.99	23.2	66.9	400	49.0	290	13.2	0.09	1.0	1	0
CALC	993.5	100.0	4.57	100.0	24.4	100.0	573	100.0	1540	100.0	6.38	100.0		
ASSAY HEAD			4.59		24.6		477		1551		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl2C1	55.9	5.6	21.6	26.6	30.4	7.0	1230	12.1	7506	27.4	42.5	37.4
CuCl2C2	113.2	11.4	23.9	59.6	28.7	13.4	1166	23.2	6486	48.0	39.5	70.5
CuCl2C3	139.8	14.1	24.1	74.2	28.0	16.2	1119	27.5	6157	56.2	37.6	83.0
Cl2Tail	195.5	19.7	19.5	84.1	27.4	22.2	1044	35.8	5318	67.9	31.5	97.0
Cl1Tail	296.1	29.8	14.1	92.0	27.1	33.1	982	51.0	4485	86.8	21.2	99.0
FEED	993.5	100.0	4.57	100.0	24.4	100.0	573	100.0	1540	100.0	6.38	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind	
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	370
Water	g	500	300
Time	min	22	8
Speed	rpm	50	50
Lime	g		2
End pH	pH	8.1	10.54
End p80	μm	80	30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	06
DATE	10/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind													
Condition								1					
Condition								2					
Cu Ro C1	8.1		5		50								
Condition								1					
Cu Ro C2	8.1		10		30								
Condition								1					
Cu Ro C3	8.2		20		30								
Condition								1					
Cu Ro C4	8.2		20		20								
Regrind	10.5	2015		343				8					
Condition	11.0	302											
Condition	11.0	302	6		50			1					
CuCl1 Con	11.0								2-5				
Condition	11.0												
Condition	11.0												
CuCl2 C1			2		20			1					
CuCl2 C2								1					
CuCl2 C3									1-2				
									2-4				
									2-5				
										1.5			
									3.0				
									4.5				
									5.0				
									9.5				
REAGENT TOTALS (g/t)	2619	63	343	201									

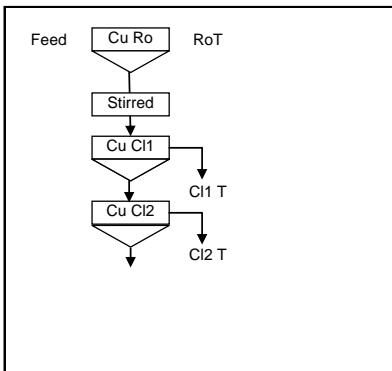
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %
CuCl2C1	47.7	4.8	41.8	43.8	18.6	3.7	685	5.4	3677	11.8	28.9	18.8	1.15 0.3
CuCl2C2	35.8	3.6	32.8	25.8	21.3	3.2	855	5.1	4260	10.3	28.4	13.8	2.08 0.4
CuCl2C3	19.8	2.0	20.1	8.75	25.5	2.1	905	3.0	4458	5.9	25.4	6.8	4.66 0.5
Cl2Tail	42.5	4.3	5.75	5.37	28.9	5.1	892	6.3	3941	11.3	19.2	11.1	9.00 2.2
Cl1Tail	148.3	14.9	2.62	8.54	31.4	19.3	1015	25.0	4575	45.6	23.4	47.2	9.53 8.1
RoTail	698.5	70.4	0.50	7.68	23.0	66.6	477	55.3	323	15.2	0.25	2.4	22.1 88.4
CALC	992.6	100.0	4.58	100.0	24.3	100.0	607	100.0	1499	100.0	7.41	100.0	17.6 100.0
ASSAY HEAD			4.59		24.6		477		1551		6.49		0.00

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %
CuCl2C1	47.7	4.8	41.8	43.8	18.6	3.7	685	5.4	3677	11.8	28.9	18.8	1.15 0.3
CuCl2C2	83.5	8.4	37.9	69.7	19.8	6.8	758	10.5	3927	22.0	28.7	32.6	1.55 0.7
CuCl2C3	103.3	10.4	34.5	78.4	20.9	8.9	786	13.5	4029	28.0	28.1	39.4	2.15 1.3
Cl2Tail	145.8	14.7	26.1	83.8	23.2	14.0	817	19.8	4003	39.2	25.5	50.4	4.14 3.5
Cl1Tail	294.1	29.6	14.3	92.3	27.3	33.4	917	44.7	4292	84.8	24.4	97.6	6.86 11.6
FEED	992.6	100.0	4.58	100.0	24.3	100.0	607	100.0	1499	100.0	7.41	100.0	17.6 100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind
Mill	type	Ball
Media	kg	MS
Media	kg	6
Solids	g	370
Water	g	1000
Time	min	500
Speed	rpm	22
Lime	g	60hz
End pH	pH	2
End p80	μm	8.1
		11.05
		80
		29

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	07
DATE	16/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Stirred Mill Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind													
Condition								1					
Condition								2					
Cu Ro C1	8.1		5		51								
Condition								1					
Cu Ro C2	8.1		10		30								
Condition								1					
Cu Ro C3	8.2		20		30								
Condition								1					
Cu Ro C4	8.2		20		20								
Regrind	11.1	2023		344				2					
Condition	11.0												
Condition	11.0		6		61			1					
CuCl1 Con	11.0								2-5				
Condition	11.0							1					
Condition	11.0	364	2		20			1					
CuCl2 C1									1-2				
CuCl2 C2								1	2-4				
CuCl2 C3								1	2-5				
REAGENT TOTALS (g/t)	2387	64	344	212									

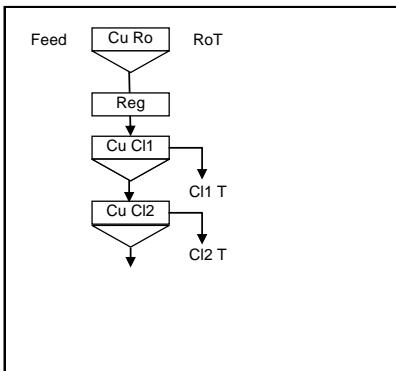
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl2C1	58.0	5.9	26.3	32.7	27.1	6.4	1165	11.7	5798	22.4	40.3	29.3	31	65
CuCl2C2	50.2	5.1	30.0	32.3	24.9	5.1	1075	9.3	5131	17.1	36.1	22.7	35	56
CuCl2C3	25.5	2.6	20.5	11.2	26.2	2.7	1064	4.7	4900	8.3	30.9	9.9	24	50
Cl2Tail	41.8	4.2	5.98	5.37	26.7	4.6	739	5.3	3335	9.3	17.5	9.2	7	30
Cl1Tail	122.2	12.4	3.49	9.15	27.6	13.8	969	20.5	3424	27.8	18.0	27.5	4	32
RoTail	691.1	69.9	0.62	9.20	23.9	67.4	406	48.5	329	15.1	0.17	1.5	1	0.1
CALC	988.8	100.0	4.71	100.0	24.8	100.0	585	100.0	1521	100.0	8.07	100.0		
ASSAY HEAD			4.59		24.6		477		1551		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl2C1	58.0	5.9	26.3	32.7	27.1	6.4	1165	11.7	5798	22.4	40.3	29.3
CuCl2C2	108.2	10.9	28.0	65.1	26.1	11.5	1123	21.0	5489	39.5	38.4	52.0
CuCl2C3	133.7	13.5	26.6	76.3	26.1	14.2	1112	25.7	5376	47.8	36.9	61.9
Cl2Tail	175.5	17.7	21.7	81.6	26.2	18.8	1023	31.0	4890	57.1	32.3	71.0
Cl1Tail	297.7	30.1	14.2	90.8	26.8	32.6	1001	51.5	4288	84.9	26.4	98.5
FEED	988.8	100.0	4.71	100.0	24.8	100.0	585	100.0	1521	100.0	8.07	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	190
Water	g	500	300
Time	min	18	5
Speed	rpm	50	50
Lime	g		1
End pH	pH	8.8	10.65
End p80	μm	80	30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	08
DATE	17/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO
HBX MET2

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.8												
Condition								1					
Condition								2					
Cu Ro C1	8.8		2		51								
Condition								1					
Cu Ro C2	8.7		2		31								
Condition								1					
Cu Ro C3	8.7		5		31								
Condition								1					
Cu Ro C4	8.7		5		20								
Regrind	10.7	1017		305				5					
Condition													
Condition	11.0	92	3		61								
CuCl1 Con	11.0							1					
Condition								2-5					
Condition	11.0	163	1		20								
CuCl2 C1	11.0												
CuCl2 C2								1					
CuCl2 C3								1					
Cl2Tail								1-2					
Cl1Tail								2-4					
RoTail								2-5					
REAGENT TOTALS (g/t)		1271	18	305	214								

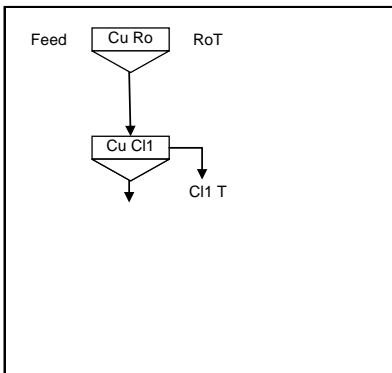
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CP %
CuCl2C1	33.0	3.4	36.8	51.7	29.3	12.7	312	9.8	538	2.4	36.3	21.0	99
CuCl2C2	12.3	1.3	34.6	18.1	29.3	4.7	203	2.4	684	1.2	35.2	7.6	94
CuCl2C3	5.0	0.5	26.2	5.58	29.2	1.9	299	1.4	1565	1.1	30.7	2.7	71
Cl2Tail	21.1	2.1	7.24	6.51	27.4	7.6	400	8.0	3624	10.5	24.3	9.0	20
Cl1Tail	90.6	9.2	4.14	16.0	32.5	38.7	474	40.9	5985	74.5	37.4	59.5	11
RoTail	821.6	83.5	0.06	2.10	3.19	34.4	48	37.5	92.0	10.4	0.01	0.1	0
CALC	983.6	100.0	2.39	100.0	7.74	100.0	107	100.0	740	100.0	5.79	100.0	
ASSAY HEAD			2.24		7.67		200		816		4.69		

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl2C1	33.0	3.4	36.8	51.7	29.3	12.7	312	9.8	538	2.4	36.3	21.0
CuCl2C2	45.3	4.6	36.2	69.8	29.3	17.4	282	12.2	578	3.6	36.0	28.6
CuCl2C3	50.3	5.1	35.2	75.4	29.3	19.3	284	13.6	676	4.7	35.5	31.3
Cl2Tail	71.4	7.3	26.9	81.9	28.7	26.9	318	21.6	1547	15.2	32.2	40.3
Cl1Tail	162.0	16.5	14.2	97.9	30.8	65.6	405	62.5	4029	89.6	35.1	99.9
FEED	983.6	100.0	2.39	100.0	7.74	100.0	107	100.0	740	100.0	5.79	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	
Media	kg	MS	
Media	kg	6	
Solids	g	1000	
Water	g	500	
Time	min	22	
Speed	rpm	50	
Lime	g		
End pH	pH	8.22	
End p80	μm	84	

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	09
DATE	17/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO NATCu MET2 34-40

NOTES
Standard 4stage Copper Rougher 1 stage Cleaner SIBX as Copper Collector

	pH	100 Lime g/t	0.1 SIBX g/t	100.0 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.2												
Condition			5					2					
Condition				53				1					
Cu Ro C1	8.1		11	32					3-5	2.5	2.5	200	
Condition								1					
Cu Ro C2	8.1		21	32					3-5	3.0	5.5	200	
Condition								1					
Cu Ro C3	8.2		42	21					3-7	4.5	10.0	500	
Condition								1					
Cu Ro C4	8.2								4-10	6.5	16.5	600	
Condition	8.3		2	21									
CuCl1 C1	8.3			23					1-2	1.0	1.0	30	30
CuCl1 C2									2-4	4.0	5.0	200	5
REAGENT TOTALS (g/t)			105	159									

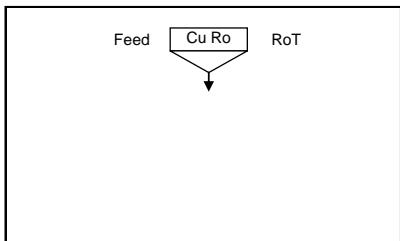
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST
CuCl1C1	9.0	1.0	69.5	38.9	4.54	0.3	1344	7.5	343	0.3	16.5	69.6
CuCl1C2	9.9	1.0	31.0	19.1	16.7	1.1	1925	11.9	1195	1.3	4.43	20.6
Cl1Tail	54.4	5.8	1.87	6.32	18.7	6.5	190	6.4	1637	9.5	0.22	5.6
RoTail	870.3	92.2	0.66	35.7	16.6	92.2	137	74.2	955	88.9	0.01	4.1
CALC	943.6	100.0	1.70	100.0	16.6	100.0	170	100.0	991	100.0	0.23	100.0
ASSAY HEAD			1.67		15.9		383		957		0.15	

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl1C1	9.0	1.0	69.5	38.9	4.54	0.3	1344	7.5	343	0.3	16.5	69.6
CuCl1C2	18.9	2.0	49.3	58.0	10.9	1.3	1648	19.4	789	1.6	10.2	90.3
Cl1Tail	73.3	7.8	14.1	64.3	16.7	7.8	566	25.8	1418	11.1	2.78	95.9

FEED	943.6	100.0	1.70	100.0	16.6	100.0	170	100.0	991	100.0	0.23	100.0
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Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	
Media	kg	MS	
Media	kg	6	
Solids	g	1000	
Water	g	500	
Time	min	22	
Speed	rpm	50	
Lime	g		
End pH	pH	8.22	
End p80	um	84	



PROJECT	T0513
TEST NO	10
DATE	18/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO
NATCu MET2 34-40

NOTES
Standard 2stage Copper Rougher
3 Sulphidisation Steps
SIBX as Copper Collector

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	Litre
Speed	800 rpm

	pH	100 Lime g/t	0.1 SIBX g/t	2.0 NaHS g/t	100 MIBC g/t	Eh			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.2					15								
Condition									2					
Condition									1					
Cu Ro C1	8.1		10		72					3-5	1.0	1.0	50	18
Condition			21		31	16			1					
Cu Ro C2	8.1									3-5	2.5	3.5	150	8
Condition						-100								
Cu Ro C3	8.4		10		52	13			5					
Condition									1	3-7	3.0	6.5	200	5
Cu Ro C4	8.4					-220								
Condition						13								
Cu Ro C5	8.6		41		412				5					
Condition									1	4-10	3.0	9.5	250	5
Cu Ro C5	8.6													
Condition														
Cu Ro C5	9.0													
REAGENT TOTALS (g/t)			134	1340	216									

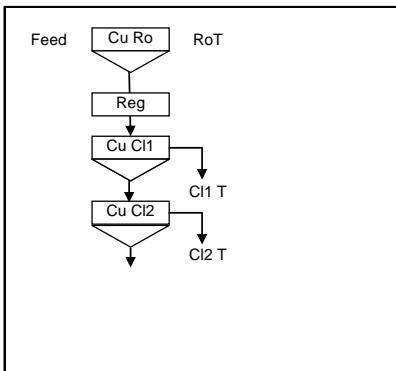
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST
CuRoC1	8.8	0.9	59.4	32.6	6.20	0.3	201	1.0	356	0.3	15.4	48.9
RoC2	11.5	1.2	30.2	21.6	14.7	1.1	370	2.5	932	1.2	4.86	20.2
RoC3	10.3	1.1	36.9	23.7	12.7	0.8	519	3.1	1008	1.1	0.96	3.6
RoC4	13.1	1.4	7.92	6.46	17.6	1.5	384	2.9	1536	2.2	0.61	2.9
RoC5	15.7	1.6	1.42	1.39	17.9	1.8	372	3.4	1641	2.8	0.90	5.1
RoTail+150um	21.3	2.2	1.14	1.51	11.2	1.5	270	3.4	875	2.0	0.01	0.1
RoTail-150um	889.4	91.7	0.23	12.7	16.4	93.0	161	83.6	938	90.4	0.06	19.3
CALC	970.1	100.0	1.65	100.0	16.2	100.0	176	100.0	951	100.0	0.29	100.0
ASSAY HEAD			1.67		15.9		383		957		0.15	

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuRoC1	8.8	0.9	59.4	32.6	6.20	0.3	201	1.0	356	0.3	15.4	48.9
RoC2	20.3	2.1	42.9	54.2	11.0	1.4	297	3.5	682	1.5	9.43	69.1
RoC3	30.6	3.2	40.9	77.9	11.6	2.3	372	6.6	792	2.6	6.58	72.7
RoC4	43.7	4.5	31.0	84.4	13.4	3.7	375	9.6	1015	4.8	4.79	75.6
RoC5	59.4	6.1	23.2	85.7	14.6	5.5	374	13.0	1180	7.6	3.76	80.7
FEED	970.1	100.0	1.65	100.0	16.2	100.0	176	100.0	951	100.0	0.29	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	140
Water	g	500	300
Time	min	18	5
Speed	rpm	50	50
Lime	g		1
End pH	pH	8.8	11.5
End p80	μm	80	30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	11
DATE	23/09/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO
HBX MET2

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
X23 as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 X23 g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.8												
Condition								1					
Condition			2		50			2					
Cu Ro C1	8.8		2		30			1					
Condition			2		30			1					
Cu Ro C2	8.7		5		30			1					
Condition			5		20			1					
Cu Ro C3	8.7		5		20			1					
Condition			5		20			4-10					
Cu Ro C4	8.7												
Regrind	11.5	997		100				5					
Condition	11.5												
Condition	11.5		10		40			1					
CuCl1 Con	11.5		10		40			1					
Condition	11.0							1					
Condition	11.0	100	2		20			1					
CuCl2 C1			2		20			1					
CuCl2 C2			3		20			1					
CuCl2 C3			3		20			1					
REAGENT TOTALS (g/t)	1096	29	100	189									

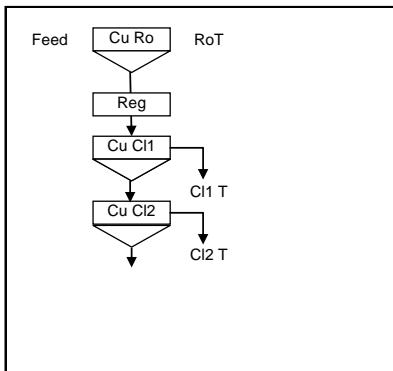
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CP %
CuCl2C1	52.3	5.2	33.5	78.7	26.7	18.3	236	8.5	278	1.9	34.1	32.2	91
CuCl2C2	8.3	0.8	30.4	11.3	27.3	3.0	307	1.8	931	1.0	32.5	4.9	82
CuCl2C3	5.0	0.5	17.1	3.84	24.2	1.6	306	1.1	2042	1.3	25.2	2.3	46
Cl2Tail	12.1	1.2	3.93	2.14	16.7	2.7	335	2.8	2081	3.2	12.8	2.8	11
Cl1Tail	33.1	3.3	1.32	1.96	18.9	8.2	355	8.1	3198	13.6	16.9	10.1	4
RoTail	892.7	89.0	0.05	2.01	5.66	66.3	127	77.9	690	79.0	2.96	47.7	0
CALC	1003.5	100.0	2.22	100.0	7.60	100.0	145	100.0	777	100.0	5.52	100.0	
ASSAY HEAD			2.24		7.67		200		816		4.69		

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM
CuCl2C1	52.3	5.2	33.5	78.7	26.7	18.3	236	8.5	278	1.9	34.1	32.2
CuCl2C2	60.6	6.0	33.1	90.1	26.8	21.3	246	10.2	367	2.9	33.9	37.1
CuCl2C3	65.6	6.5	31.9	93.9	26.6	22.9	250	11.3	495	4.2	33.2	39.3
Cl2Tail	77.7	7.7	27.5	96.0	25.0	25.5	264	14.1	742	7.4	30.0	42.1
Cl1Tail	110.8	11.0	19.7	98.0	23.2	33.7	291	22.1	1476	21.0	26.1	52.3
FEED	1003.5	100.0	2.22	100.0	7.60	100.0	145	100.0	777	100.0	5.52	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind	
Mill	type	Ball	Ball
Media	kg	MS	MS
Media	kg	6	10
Solids	g	1000	315
Water	g	500	350
Time	min	22	8
Speed	rpm	50	50
Lime	g		2
End pH	pH	7.9	10.8
End p80	μm	80	30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	12
DATE	25/09/2009
TECHNICIAN	ANB

PRODUCT FLOATED
CUDECO CC MET3 Composite

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
SIBX as Copper Collector
300p as Pyrite depressant

	pH	100 Lime g/t	0.1 X23 g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind													
Condition													
Condition	7.9				50			2					
Cu Ro C1	8.0		5										
Condition	8.1		10		30			1					
Cu Ro C2	8.2		15		50			1					
Condition	8.2		20		20			1					
Cu Ro C3	8.1												
Condition	10.8	2015		161				8					
Cu Ro C4													
Regrind													
Condition	11.0	111						2					
Condition	11.0		6		60			1					
CuCl1 Con									1-7	11.0	11.0	900	
Condition	10.2	101											
Condition	11.0												
CuCl2 C1									0.5	0.5	0.5	100	47
CuCl2 C2									0.5-2	3.0	3.5	120	39
CuCl2 C3					10				2.6	5.0	8.5	200	14
REAGENT TOTALS (g/t)		2226	56	161	222								

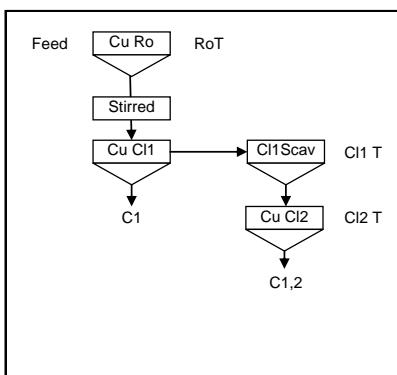
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %
T12 CuCl2Con1	47.0	4.7	36.9	36.2	22.3	4.5	753	8.4	4829	15.6	35.0	20.8	0.77 0.2
CuCl2Con2	47.1	4.7	29.9	29.4	24.5	4.9	849	9.4	5000	16.2	34.8	20.7	1.11 0.3
CuCl2Con3	28.5	2.9	22.5	13.4	25.6	3.1	857	5.8	4856	9.5	31.4	11.3	3.00 0.5
Cl2Tail	32.7	3.3	5.34	3.64	30.6	4.3	885	6.8	4838	10.9	26.6	11.0	6.94 1.3
Cl1Tail	115.6	11.6	2.51	6.05	29.5	14.5	913	24.9	4085	32.5	23.3	34.1	9.49 6.3
RoTail	721.8	72.7	0.76	11.4	22.3	68.7	262	44.7	310	15.4	0.24	2.2	21.9 91.3
CALC	992.7	100.0	4.83	100.0	23.6	100.0	427	100.0	1466	100.0	7.98	100.0	17.4 100.0
ASSAY HEAD			4.59		24.6		477		1551		6.49		0.00

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %
T12 CuCl2Con1	47.0	4.7	36.9	36.2	22.3	4.5	753	8.4	4829	15.6	35.0	20.8	0.77 0.2
CuCl2Con2	94.1	9.5	33.4	65.5	23.4	9.4	801	17.8	4915	31.8	34.9	41.5	0.94 0.5
CuCl2Con3	122.6	12.4	30.9	78.9	23.9	12.5	814	23.6	4901	41.3	34.1	52.8	1.42 1.0
Cl2Tail	155.3	15.6	25.5	82.5	25.3	16.8	829	30.4	4888	52.2	32.5	63.8	2.58 2.3
Cl1Tail	270.9	27.3	15.7	88.6	27.1	31.3	865	55.3	4545	84.6	28.6	97.8	5.53 8.7
FEED	992.7	100.0	4.83	100.0	23.6	100.0	427	100.0	1466	100.0	7.98	100.0	17.4 100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind
Mill	type	Ball
Media	kg	MS
Media	kg	6
Solids	g	1000
Water	g	500
Time	min	22
Speed	rpm	50
Lime	g	2
End pH	pH	8.1
End p80	μm	80
		11.6
		29

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	13
DATE	5/10/2009
TECHNICIAN	MJR

PRODUCT FLOATED	CUDECO
	CC MET3 Composite

NOTES	Standard 4stage Copper Rougher
	Rougher Stirred Mill Regrind
	2 stage Cleaner
	S9810 as Copper Collector
	300p as Pyrite depressant

	pH	100 Lime g/t	0.1 S9810 g/t	2.0 300P g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind														
Condition Cu Ro C1	8.1		5		50				2	3-5	3.0	3.0	200	
Condition Cu Ro C2	8.1		10		30				1	3-5	4.0	7.0	400	
Condition Cu Ro C3	8.2		20		30				1	3-7	6.0	13.0	650	
Condition Cu Ro C4	8.2		20		20				1	4-10	8.0	21.0	900	
Regrind	11.6	2020		343					2					
Condition CuCl1 Con	11.6				20				1	2-5	3.0	3.0	200	26
Condition CuCl1 Scav Con	11.4		4		20				1	3-6	6.0	6.0	500	
Condition CuCl2 C1	11.0	61			20				1	1-2	1.0	1.0	100	23
Condition CuCl2 C2	11.0		2						2-4	3.0	4.0	150	8	
REAGENT TOTALS (g/t)		2080	62	343	192									

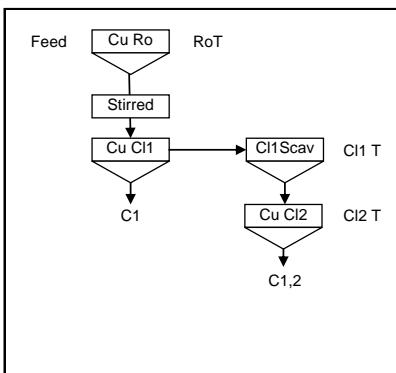
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	CC %	Py %
CuCl1C1	51.3	5.2	50.0	55.2	13.0	2.8	431	4.8	1868	6.9	25.1	16.1	59	30
CuCl2C1	23.1	2.3	29.5	14.7	22.5	2.2	811	4.0	3882	6.4	30.3	8.8	35	46
CuCl2C2	12.4	1.3	12.2	3.26	28.7	1.5	1049	2.8	4551	4.1	30.5	4.7	14	52
Cl2Tail	15.6	1.6	4.68	1.57	25.7	1.7	798	2.7	3075	3.4	18.5	3.6	6	32
Cl1Tail	155.3	15.7	2.03	6.79	32.4	21.2	1057	35.4	5161	57.6	30.6	59.5	2	55
RoTail	732.5	74.0	1.17	18.5	22.9	70.6	318	50.3	409	21.5	0.79	7.3	1	1.1
CALC	990.2	100.0	4.69	100.0	24.0	100.0	468	100.0	1405	100.0	8.06	100.0		
ASSAY HEAD			4.59		24.6		477		1551		6.49			

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM %	Fe %	CUM %	As ppm	CUM	Co ppm	CUM	S %	CUM %
CuCl1C1	51.3	5.2	50.0	55.2	13.0	2.8	431	4.8	1868	6.9	25.1	16.1
CuCl2C1	74.4	7.5	43.6	69.9	15.9	5.0	549	8.8	2493	13.3	26.7	24.9
CuCl2C2	86.8	8.8	39.1	73.2	17.8	6.5	620	11.6	2787	17.4	27.2	29.6
Cl2Tail	102.4	10.3	33.9	74.8	19.0	8.2	647	14.3	2831	20.8	25.9	33.2
Cl1Tail	257.7	26.0	14.7	81.5	27.1	29.4	894	49.7	4235	78.5	28.7	92.7
FEED	990.2	100.0	4.69	100.0	24.0	100.0	468	100.0	1405	100.0	8.06	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind
Mill	type	Ball
Media	kg	MS
Media	kg	6
Solids	g	1000
Water	g	500
Time	min	22
Speed	rpm	50
Lime	g	2
End pH	pH	8.1
End p80	μm	80
		11.34
		29

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	14
DATE	9/10/2009
TECHNICIAN	MJR

PRODUCT FLOATED	
CUDECO	CC MET3 Composite

NOTES	Standard 4stage Copper Rougher
	Rougher Stirred Mill Regrind
	2 stage Cleaner
	S9810 as Copper Collector
	300p as Pyrite depressant

	pH	100 Lime g/t	0.1 S9810 g/t	2.0 300P g/t	100 MIBC g/t				Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind														
Condition Cu Ro C1	8.1		8		50				2	3-5	3.0	3.0	300	
Condition Cu Ro C2	8.3		10		30				1	3-5	4.5	7.5	500	
Condition Cu Ro C3	8.3		25		30				1	3-7	6.0	13.5	800	
Condition Cu Ro C4	8.4		40		20				1	4-10	8.0	21.5	1200	
Regrind	11.3	2020		404					3					
Condition CuCl1 Con	11.3				20				1	2-5	4.0	4.0	200	30
Condition CuCl1 Scav Con	11.3		8		20				1	3-6	8.0	8.0	600	
Condition CuCl2 C1	11.0	50			20				1	1-2	2.0	2.0	150	22
Condition CuCl2 C2	11.0		2						2-4	3.0	5.0	5.0	150	10
REAGENT TOTALS (g/t)		2070	94	404	192									

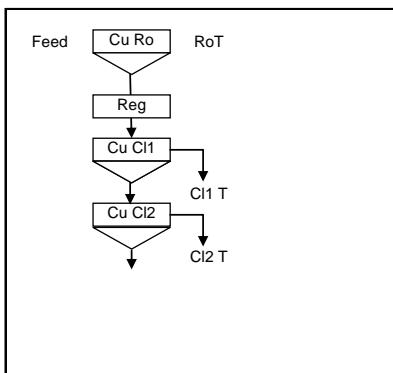
PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %	DIST
CuCl1C1	59.0	6.0	46.7	60.1	13.9	3.5	417	6.3	2183	8.4	25.4	19.1	1.79	0.6
CuCl2C1	33.4	3.4	23.4	17.1	25.8	3.6	753	6.5	4865	10.6	30.5	13.0	3.44	0.7
CuCl2C2	15.2	1.5	9.72	3.22	30.7	2.0	855	3.4	5263	5.2	29.8	5.8	5.76	0.5
Cl2Tail	28.0	2.8	4.26	2.60	25.8	3.1	600	4.3	3572	6.5	17.1	6.1	11.7	1.9
Cl1Tail	154.2	15.6	2.00	6.73	30.9	20.1	867	34.5	4627	46.6	24.5	48.0	10.6	9.4
RoTail	700.3	70.7	0.67	10.2	22.9	67.7	249	45.0	493	22.6	0.90	8.0	21.4	86.9
CALC	990.1	100.0	4.63	100.0	23.9	100.0	391	100.0	1545	100.0	7.94	100.0	17.4	100.0
ASSAY HEAD			4.59		24.6		477		1551		6.49		0.00	

CUM PRODUCTS	CUM WT	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %	CUM %
CuCl1C1	59.0	6.0	46.7	60.1	13.9	3.5	417	6.3	2183	8.4	25.4	19.1	1.79	0.6
CuCl2C1	92.4	9.3	38.3	77.2	18.2	7.1	538	12.8	3152	19.0	27.3	32.1	2.39	1.3
CuCl2C2	107.6	10.9	34.2	80.4	20.0	9.1	583	16.2	3451	24.3	27.6	37.8	2.86	1.8
Cl2Tail	135.6	13.7	28.1	83.0	21.2	12.1	587	20.5	3476	30.8	25.5	43.9	4.69	3.7
Cl1Tail	289.8	29.3	14.2	89.8	26.3	32.3	736	55.0	4088	77.4	24.9	92.0	7.82	13.1
FEED	990.1	100.0	4.63	100.0	23.9	100.0	391	100.0	1545	100.0	7.94	100.0	17.4	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling		Regrind
Mill	type	Ball
Media	kg	MS
Media	kg	6
Solids	g	1000
Water	g	500
Time	min	18
Speed	rpm	50
Lime	g	1
End pH	pH	8.8
End p80	μm	80
		11.9
		30

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	1.2 Litre
Speed	800 rpm



PROJECT	T0513
TEST NO	15
DATE	27/10/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO
HBX MET2

NOTES
Standard 4stage Copper Rougher
Rougher Regrind
2 stage Cleaner
9810 as Copper Collector
300p as Pyrite depressant

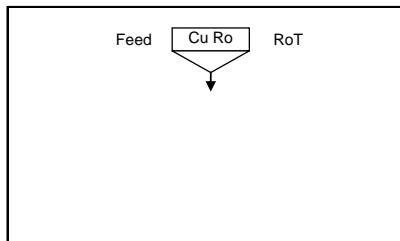
	pH	100 Lime g/t	0.1 9810 g/t	2.0 300P g/t	100 MIBC g/t			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.8												
Condition			2										
Condition					50			2					
Cu Ro C1	8.8		2		30			1					
Condition													
Cu Ro C2	8.7		5		30			1					
Condition													
Cu Ro C3	8.7		5		20			1					
Condition													
Cu Ro C4	8.7							4-10					
Regrind	11.9	1001		100				0					
Condition	11.9												
Condition	11.9		15		40			1					
CuCl1 Con	11.9								2-5				
Condition	11.3												
Condition	11.3	100	2		20			1					
CuCl2 C1								1					
CuCl2 C2									1-2				
CuCl2 C3			2						2-4				
									2-5				
REAGENT TOTALS (g/t)	1101	33	100	190									

PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %
CuCl2C1	45.3	4.5	33.5	68.6	28.8	17.5	328	10.5	308	1.7	34.7	27.2	0.32 0.1
CuCl2C2	15.4	1.5	31.3	21.8	27.7	5.7	407	4.4	633	1.2	33.7	9.0	0.83 0.0
CuCl2C3	3.7	0.4	20.8	3.48	23.6	1.2	347	0.9	1916	0.8	26.8	1.7	6.52 0.1
Cl2Tail	12.2	1.2	2.44	1.35	11.6	1.9	340	2.9	2181	3.2	9.55	2.0	18.1 0.8
Cl1Tail	41.1	4.1	1.07	1.99	17.8	9.8	295	8.6	3790	18.5	17.5	12.5	19.3 2.8
RoTail	881.0	88.2	0.07	2.79	5.40	63.9	116	72.5	713	74.7	3.12	47.6	31.1 96.3
CALC	998.7	100.0	2.21	100.0	7.46	100.0	141	100.0	842	100.0	5.78	100.0	28.5 100.0
ASSAY HEAD			2.24		7.67		200		816		4.69		28.3

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %
CuCl2C1	45.3	4.5	33.5	68.6	28.8	17.5	328	10.5	308	1.7	34.7	27.2	0.32 0.1
CuCl2C2	60.7	6.1	32.9	90.4	28.5	23.2	348	15.0	390	2.8	34.4	36.2	0.45 0.1
CuCl2C3	64.4	6.4	32.2	93.9	28.2	24.4	348	15.9	478	3.7	34.0	37.9	0.80 0.2
Cl2Tail	76.6	7.7	27.5	95.2	25.6	26.3	347	18.9	749	6.8	30.1	39.9	3.55 1.0
Cl1Tail	117.7	11.8	18.3	97.2	22.9	36.1	329	27.5	1811	25.3	25.7	52.4	9.05 3.7
FEED	998.7	100.0	2.21	100.0	7.46	100.0	141	100.0	842	100.0	5.78	100.0	28.5 100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	
Media	kg	MS	
Media	kg	6	
Solids	g	1000	
Water	g	500	
Time	min	22	
Speed	rpm	50	
Lime	g	0	
End pH	pH	8	
End p80	um	84	



PROJECT	T0513
TEST NO	16
DATE	27/10/2009
TECHNICIAN	MJR

PRODUCT FLOATED
CUDECO
NATCu MET2 34-40

NOTES
Standard 2stage Copper Rougher
2 Sulphidisation Steps
SIBX as Copper Collector

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	Litre
Speed	800 rpm

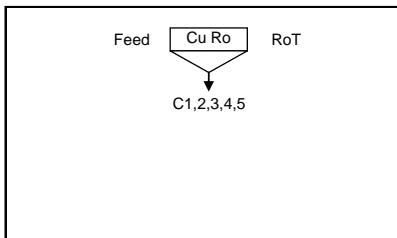
	pH	100 Lime g/t	0.1 SIBX g/t	2.0 NaHS g/t	100 MIBC g/t	Eh			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.0					119								
Condition	8.7					-285			10					
Condition	8.5		31		103	40			1					
Cu Ro C1			21		41									
Condition	8.5					30			1					
Cu Ro C2	8.5					-67			5					
Condition	8.7		21		52				1					
Cu Ro C3	8.7													
Condition	8.6		21		31									
Cu Ro C4	8.6					-33								
Condition	8.6		21		31									
Cu Ro C5	8.6													
REAGENT TOTALS (g/t)			113	824	258									

PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %	DIST
CuRoC1	21.5	2.2	46.1	63.7	8.35	1.2	366	2.2	617	1.5	8.82	75.4	14.6	0.7
RoC2	13.9	1.4	17.0	15.2	18.0	1.7	441	1.7	1217	1.9	1.44	8.0	26.8	0.8
RoC3	12.7	1.3	3.71	3.03	17.4	1.5	307	1.1	1612	2.3	0.69	3.5	36.8	1.0
RoC4	15.5	1.6	1.29	1.29	17.0	1.8	244	1.0	1580	2.8	0.52	3.2	38.4	1.3
RoC5	21.8	2.2	1.02	1.43	17.2	2.5	393	2.4	1708	4.2	0.33	2.9	39.5	1.9
RoTail	885.3	91.2	0.27	15.4	15.4	91.4	373	91.6	878	87.4	0.02	7.0	47.3	94.1
CALC	970.7	100.0	1.60	100.0	15.4	100.0	371	100.0	917	100.0	0.26	100.0	45.8	100.0
ASSAY HEAD			1.67		15.9		383		957		0.15		45.2	

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %	CUM
CuRoC1	21.5	2.2	46.1	63.7	8.35	1.2	366	2.2	617	1.5	8.82	75.4	14.6	0.7
RoC2	35.4	3.6	34.7	78.9	12.1	2.9	395	3.9	853	3.4	5.92	83.4	19.4	1.5
RoC3	48.1	5.0	26.5	81.9	13.5	4.4	372	5.0	1053	5.7	4.54	86.9	24.0	2.6
RoC4	63.6	6.6	20.4	83.2	14.4	6.1	341	6.0	1182	8.4	3.56	90.1	27.5	3.9
RoC5	85.4	8.8	15.4	84.6	15.1	8.6	354	8.4	1316	12.6	2.74	93.0	30.6	5.9
FEED	970.7	100.0	1.60	100.0	15.4	100.0	371	100.0	917	100.0	0.26	100.0	45.8	100.0

Burnie RESEARCH LABORATORY
ROUGHER FLOTATION REPORT SHEET

Primary Milling			Regrind
Mill	type	Ball	
Media	kg	MS	
Media	kg	6	
Solids	g	1000	
Water	g	500	
Time	min	22	
Speed	rpm	50	
Lime	g	0	
End pH	pH	8	
End p80	um	84	



PROJECT	T0513
TEST NO	17
DATE	2/12/2009
TECHNICIAN	ANB

PRODUCT FLOATED
CUDECO NATCu MET2 Comp

NOTES
3 Sulphidation Steps PAX as Copper Collector

Float Cell	Volume
Rougher	2.7 Litre
Cleaner 1,2	Litre
Speed	800 rpm

	pH	100 Lime g/t	0.1 PAX g/t	2.0 NaHS g/t	100 MIBC g/t	Eh			Cond Time min	Air L/min	Float Time min	Cum Float Time	Wet Wt g	Con % Solids
Primary Grind	8.0													
Condition	8.0			624					10					
Condition	8.4		31		104	-18			1					
Cu Ro C1	8.4		21		73	-17			1					
Condition					73									
Cu Ro C2														
Condition	8.3			416			47		10					
Condition	8.6				83	36			1					
Cu Ro C3	8.7		21		52						7	4.0	9.0	150
Condition														
Cu Ro C4														
Condition	8.5		21	312		62			1					
Condition	8.7				31	17			5					
Cu Ro C5	8.7				19				1					
REAGENT TOTALS (g/t)			94	1351	416									

PRODUCTS	WT g	WT %	Cu %	DIST	Fe %	DIST	As ppm	DIST	Co ppm	DIST	S %	DIST	SiO2 %	DIST
T17 RoC1	15.4	1.6	31.3	14.0	11.4	1.2	419	2.5	920	1.4	6.65	23.9	22.2	0.8
RoC2	16.2	1.7	22.0	10.3	13.3	1.5	427	2.7	1095	1.8	3.74	14.1	27.2	1.0
RoC3	37.8	3.9	37.1	40.6	10.8	2.8	407	6.1	804	3.1	4.99	44.0	75.9	6.8
RoC4	14.0	1.5	13.2	5.35	17.2	1.6	565	3.1	1518	2.2	1.69	5.5	28.8	1.0
RoC5	22.1	2.3	21.6	13.8	16.2	2.4	755	6.6	1310	2.9	1.25	6.4	25.0	1.3
RoT	856.8	89.0	0.64	15.9	15.5	90.5	234	79.0	1021	88.6	0.03	6.0	44.0	89.1
CALC	962.3	100.0	3.59	100.0	15.3	100.0	264	100.0	1026	100.0	0.45	100.0	43.9	100.0
ASSAY HEAD			0.00		0.00		0.00		0.00		0.00		0.00	

CUM PRODUCTS	CUM Wt	WT %	Cu %	CUM	Fe %	CUM	As ppm	CUM	Co ppm	CUM	S %	CUM	SiO2 %	CUM
T17 RoC1	15.4	1.6	31.3	14.0	11.4	1.2	419	2.5	920	1.4	6.65	23.9	22.2	0.8
RoC2	31.6	3.3	26.5	24.3	12.4	2.7	423	5.3	1010	3.2	5.16	38.0	24.8	1.9
RoC3	69.4	7.2	32.3	64.9	11.5	5.4	414	11.3	898	6.3	5.07	82.0	52.6	8.6
RoC4	83.4	8.7	29.1	70.3	12.5	7.1	440	14.4	1002	8.5	4.50	87.6	48.6	9.6
RoC5	105.5	11.0	27.5	84.1	13.3	9.5	506	21.0	1066	11.4	3.82	94.0	43.7	10.9
FEED	962.3	100.0	3.59	100.0	15.3	100.0	264	100.0	1026	100.0	0.45	100.0	43.9	100.0

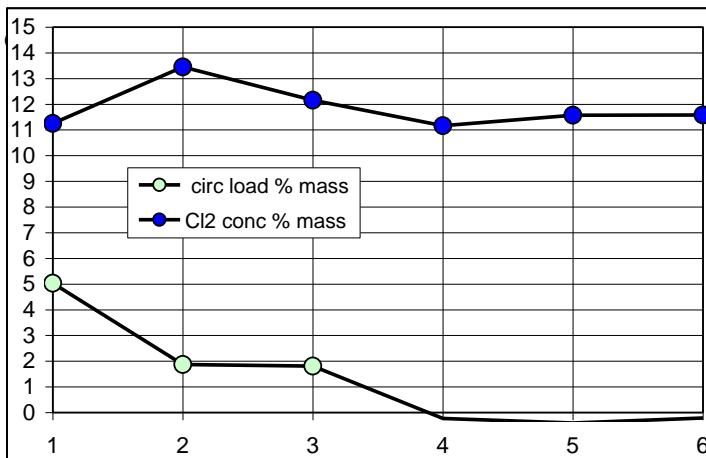
APPENDIX D: LOCKED CYCLE TESTS

Burnie

RESEARCH LABORATORY RO/CL LOCKED CYCLE FLOAT TEST RESULTS SUMMARY

T0513	LC01
CC MET3 Composite	

CYCLE NO		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
ROUGHER TAIL	gm	692.7	692.3	694.5	697.0	695.3	694.4
dry wt and assays	%Cu	0.510	0.620	0.550	0.580	0.570	
	%Fe	22.40	22.40	21.90	22.70	23.10	22.50
	ppmAs	254	320	279	306	306	321
	ppmCo	285	275	291	290	269	293
	%S	0.13	0.20	0.19	0.18	0.14	0.23
CLEANER 1 TAIL	gm	138.1	148.1	159.4	186.9	186.4	185.2
dry wt and assays	%Cu	2.61	2.56	2.75	4.090	4.22	3.90
	%Fe	28.50	26.40	27.70	28.90	29.90	28.40
	ppmAs	805	700	721	949	909	821
	ppmCo	4240	3385	3772	3878	4092	3732
	%S	22.40	18.75	20.80	21.61	23.52	21.19
CLEANER 2 CONCENTRATOR	gm	111.7	133.5	120.6	110.8	114.8	114.9
dry wt and assays	%Cu	32.70	27.50	28.40	30.30	34.10	29.30
	%Fe	22.20	25.10	24.70	25.60	21.30	24.50
	ppmAs	791	864	805	969	704	811
	ppmCo	4599	5451	5337	5162	4224	4823
	%S	33.36	36.35	36.38	36.31	33.15	33.50



NEW FEED	gm	992.4
	%Cu	4.69
	%Fe	23.72
	ppmAs	455
	ppmCo	1481
	%S	8.15
CL2 TAIL	gm	78.0
	%Cu	8.71
	%Fe	26.90
	ppmAs	777
	ppmCo	3490
	%S	21.00

DISTRIBUTIONS	AV (C4,5,6)	FROM NEW FEED (%)					
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
MASS							
Ro Tail	70.1	69.8	69.8	70.0	70.2	70.1	70.0
Cl1 Tail	18.8	13.9	14.9	16.1	18.8	18.8	18.7
Cl2 Conc	11.4	11.3	13.5	12.2	11.2	11.6	11.6
Calc Cl2 Tail	-0.3	5.0	1.9	1.8	-0.2	-0.4	-0.2
COPPER							
Ro Tail	8.5	7.6	9.2	9.3	8.2	8.7	8.5
Cl1 Tail	16.3	7.7	8.1	9.4	16.4	16.9	15.5
Cl2 Conc	76.2	78.5	78.9	73.6	72.2	84.1	72.4
Calc Cl2 Tail	-1.0	6.1	3.7	7.7	3.2	-9.7	3.6
IRON							
Ro Tail	67.3	65.9	65.9	64.6	67.2	68.2	66.4
Cl1 Tail	23.0	16.7	16.6	18.8	22.9	23.7	22.3
Cl2 Conc	11.5	10.5	14.2	12.7	12.0	10.4	12.0
Calc Cl2 Tail	-1.7	6.8	3.3	4.0	-2.2	-2.3	-0.7
ARSENIC							
Ro Tail	47.9	38.9	49.0	42.9	47.2	47.1	49.3
Cl1 Tail	36.8	24.6	22.9	25.4	39.2	37.5	33.6
Cl2 Conc	20.8	19.6	25.5	21.5	23.8	17.9	20.6
Calc Cl2 Tail	-5.4	16.9	2.5	10.2	-10.2	-2.5	-3.6
COBALT							
Ro Tail	13.4	13.4	13.0	13.8	13.8	12.7	13.8
Cl1 Tail	49.4	39.8	34.1	40.9	49.3	51.9	47.0
Cl2 Conc	36.5	35.0	49.5	43.8	38.9	33.0	37.7
Calc Cl2 Tail	0.6	11.8	3.4	1.5	-2.0	2.4	1.4
SULPHUR							
Ro Tail	1.6	1.1	1.7	1.6	1.6	1.2	2.0
Cl1 Tail	50.9	38.2	34.3	41.0	49.9	54.2	48.5
Cl2 Conc	48.1	46.0	60.0	54.2	49.7	47.0	47.6
Calc Cl2 Tail	-0.5	14.6	4.0	3.2	-1.2	-2.4	2.0

Burnie RESEARCH LABORATORY

RO/CL LOCKED CYCLE FLOAT TEST RESULTS SUMMARY

T0513	LC01
CC MET3 Composite	

REAGENT ADDITIONS	Av gpt	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
ROUGHER							
SIBX (ml)	55.4	55	55	55	55	55	55
Lime (g)	3.0	0.00	0.00	0.00	0.00	0.00	0.00
MIBC (g)	131.0	0.13	0.13	0.13	0.13	0.13	0.13
pH		8.10	8.10	8.10	8.10	8.10	8.10
CLEANER 1							
SIBX (ml)	3.5	6	6	3	2	2	2
Lime (g)	225.0	0.23	0.22	0.23	0.21	0.22	0.23
MIBC (g)	36.9	0.05	0.05	0.03	0.03	0.03	0.03
pH		11.00	11.00	11.00	11.00	11.00	11.00
CLEANER 2							
SIBX (ml)	0.3	2	0	0	0	0	0
Lime (g)	223.4	0.24	0.22	0.23	0.21	0.22	0.21
MIBC (g)	3.4	0.02	0.00	0.00	0.00	0.00	0.00
pH		11.10	11.00	11.00	11.00	11.00	11.00

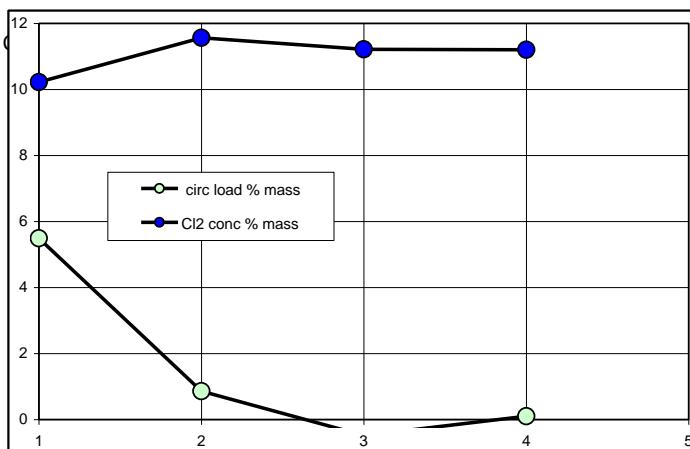
FLOTATION CONDITIONS	Average	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
PRIMARY GRIND							
Time (min)	22.0	22	22	22	22	22	22
Solids (g)	1000.0	1000	1000	1000	1000	1000	1000
Water(ml)	500.0	500	500	500	500	500	500
Grind pH	8.1	8.10	8.12	8.10	8.11	8.11	8.10
Grind p80 (um)	80.0	80	80	80	80	80	80
Lime (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lime (gpt)	0.0	0	0	0	0	0	0
RO CONC REGRIND							
Cake (g)	367.7	368	365	370	370	365	368
Water (g)	300.0	300	300	300	300	300	300
Ball Media (Kg)	10.0	10	10	10	10	10	10
Grind time (min)	8.0	8.00	8.00	8.00	8.00	8.00	8.00
Grind D/C p80		30	30	30	30	30	30
300P (ml)	342.6	17	17	17	17	17	17
Grind pH	10.6	10.60	10.62	10.64	10.60	10.61	10.64
Lime	2.0	2	2	2	2	2	2
Lime g/t	2015.2	2015	2015	2015	2015	2015	2015
ROUGHER FLOAT							
Cell (Litre)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Time (min)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Air (lpm)		3-11	3-11	3-11	3-11	3-11	3-11
Wet wt (g)	2300.0	2300	2300	2300	2300	2300	2300
CLEANER 1 FLOAT							
Cell (Litre)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Time (min)	12.8	12.0	13.0	13.0	13.0	13.0	13.0
Air (lpm)		2-9	2-9	2-9	2-9	2-9	2-9
Wet wt (g)	903.3	900	920	900	900	900	900
CLEANER 2 FLOAT							
Cell (Litre)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Time (min)	6.1	7.0	7.0	6.5	6.5	6.5	3.0
Air (lpm)		1-5	1-5	1-5	1-5	1-5	1-5
Wet wt (g)	316.7	350	350	300	300	300	300

Burnie

RESEARCH LABORATORY RO/CL LOCKED CYCLE FLOAT TEST RESULTS SUMMARY

T0513	LC02
CC MET3 Composite	

CYCLE NO		Cycle 1	Cycle 2	Cycle 3	Cycle 4		
ROUGHER TAIL	gm	697.1	690.1	695.7	691.4		
dry wt and assays	%Cu	0.56	0.57	0.77	0.70		
	%Fe	21.90	21.50	22.40	22.40		
	ppmAs	388	342	416	397		
	ppmCo	359	326	340	306		
	%S	0.78	0.28	0.32	0.17		
CLEANER 1 TAIL	gm	144.8	184.6	195.9	194.5		
dry wt and assays	%Cu	2.03	1.85	1.99	1.84		
	%Fe	26.80	27.40	29.60	29.60		
	ppmAs	966	845	1025	1123		
	ppmCo	4287	4300	4890	4600		
	%S	22.66	21.83	23.62	22.96		
CLEANER 2 CONC	gm	102.1	115.5	112.0	111.9		
83.6 34.77	%Cu	34.50	33.00	35.40	35.90		
9.8 20.03	%Fe	20.00	20.60	20.00	19.50		
16.1 776	ppmAs	788	662	823	844		
28.6 3880	ppmCo	3946	4125	3772	3744		
42.2 30.0	%S	32.03	31.39	29.31	29.37		



NEW FEED	gm	998.8
	%Cu	4.71
	%Fe	23.05
	ppmAs	546
	ppmCo	1540
	%S	8.06
CL2 TAIL	gm	59.6
	%Cu	5.21
	%Fe	26.70
	ppmAs	875
	ppmCo	4021
	%S	21.24

DISTRIBUTIONS	AV (C2,3,4)	FROM NEW FEED (%)				
		Cycle 1	Cycle 2	Cycle 3	Cycle 4	
MASS						
Ro Tail	69.3	69.8	69.1	69.7	69.2	
Cl1 Tail	19.2	14.5	18.5	19.6	19.5	
Cl2 Conc	11.3	10.2	11.6	11.2	11.2	
Calc Cl2 Tail	0.2	5.5	0.9	-0.5	0.1	
COPPER						
Ro Tail	10.0	8.3	8.4	11.4	10.3	
Cl1 Tail	7.7	6.2	7.3	8.3	7.6	
Cl2 Conc	83.6	74.9	81.0	84.3	85.4	
Calc Cl2 Tail	-1.3	10.6	3.3	-4.0	-3.3	
IRON						
Ro Tail	66.5	66.3	64.4	67.7	67.3	
Cl1 Tail	24.1	16.9	22.0	25.2	25.0	
Cl2 Conc	9.8	8.9	10.3	9.7	9.5	
Calc Cl2 Tail	-0.4	8.0	3.3	-2.6	-1.7	
ARSENIC						
Ro Tail	48.9	49.6	43.3	53.1	50.3	
Cl1 Tail	35.2	25.7	28.6	36.8	40.1	
Cl2 Conc	16.1	14.8	14.0	16.9	17.3	
Calc Cl2 Tail	-0.1	10.0	14.1	-6.8	-7.7	
COBALT						
Ro Tail	14.6	16.3	14.6	15.4	13.8	
Cl1 Tail	57.4	40.4	51.6	62.3	58.2	
Cl2 Conc	28.6	26.2	31.0	27.5	27.2	
Calc Cl2 Tail	-0.5	17.2	2.8	-5.2	0.8	
SULPHUR						
Ro Tail	2.2	6.8	2.4	2.8	1.5	
Cl1 Tail	54.3	40.7	50.0	57.5	55.5	
Cl2 Conc	42.2	40.6	45.0	40.8	40.8	
Calc Cl2 Tail	1.3	11.9	2.5	-1.0	2.3	



RESEARCH LABORATORY
RO/CL LOCKED CYCLE FLOAT TEST RESULTS SUMMARY

T0513	LC02
CC MET3 Composite	

REAGENT ADDITIONS	Av gpt	Cycle 1	Cycle 2	Cycle 3	Cycle 4		
ROUGHER							
S9810 (ml)	53.4	80	80	80	80		
Lime (g)	0.0	0.00	0.00	0.00	0.00		
MIBC (g)	100.1	0.15	0.15	0.15	0.15		
pH		8.00	8.00	8.00	8.00		
CLEANER 1							
S9810 (ml)	0.0	0	0	0	0		
Lime (g)	0.0	0.00	0.00	0.00	0.00		
MIBC (g)	13.3	0.02	0.02	0.02	0.02		
pH		11.10	11.10	11.10	11.10		
CLEANER 1SCAVENGER							
S9810 (ml)	5.3	8	8	8	8		
Lime (g)	0.0	0.00	0.00	0.00	0.00		
MIBC (g)	13.3	0.02	0.02	0.02	0.02		
pH		11.00	11.00	11.00	11.00		
CLEANER 2							
S9810 (ml)	0.0	0	0	0	0		
Lime (g)	33.4	0.05	0.05	0.05	0.05		
MIBC (g)	3.3	0.02	0.00	0.00	0.00		
pH		11.00	11.00	11.00	11.00		

FLOTATION CONDITIONS	Average	Cycle 1	Cycle 2	Cycle 3	Cycle 4		
PRIMARY GRIND							
Time (min)	22.0	22	22	22	22		
Solids (g)	1000.0	1000	1000	1000	1000		
Water(ml)	500.0	500	500	500	500		
Grind pH	7.8	7.85	7.80	7.80	7.78		
Grind p80 (um)	80.0	80	80	80	80		
Lime (g)	0.00	0.00	0.00	0.00	0.00		
Lime (gpt)	0.0	0	0	0	0		
RO CONC REGRIND							
Cake (g)	442.8	380	458	465	468		
Water (g)	400.0	400	400	400	400		
Sand Media (Kg)	10.0	1.5	1.5	1.5	1.5		
Grind time (min)	2.5	2.24	2.50	2.57	2.56		
Start		5132.16	5135.16	5138.86	5142.57		
End		5135.16	5138.86	5142.56	5146.27		
wh	3.5	3.00	3.70	3.70	3.70		
kwh/T	10.0	9.99	10.10	10.07	10.01		
Grind D/C p80		30	30	30	30		
300P (ml)	267.0	20	20	20	20		
Grind pH	11.1	11.12	11.10	11.13	11.12		
Lime	2.5	2.5	2.5	2.5	2.5		
Lime g/t	2503.0	2503	2503	2503	2503		
ROUGHER FLOAT							
Cell (Litre)	2.7	2.7	2.7	2.7	2.7		
Time (min)	23.0	23	23	23	23		
Air (lpm)		3-11	3-11	3-11	3-11		
Wet wt (g)	3000.0	3000	3000	3000	3000		
CLEANER 1 FLOAT							
Cell (Litre)	1.2	1.2	1.2	1.2	1.2		
Time (min)	4.0	4.0	4.0	4.0	4.0		
Air (lpm)		2-9	2-9	2-9	2-9		
Wet wt (g)	200.0	200	200	200	200		
CLEANER 1 SCAVENGER							
Cell (Litre)	1.2	1.2	1.2	1.2	1.2		
Time (min)	9.0	9.0	9.0	9.0	9.0		
Air (lpm)		1-5	1-5	1-5	1-5		
Wet wt (g)	475.0	650	650	300	300		
CLEANER 2 FLOAT							
Cell (Litre)	0.5	1.2	1.2	1.2	1.2		
Time (min)	4.0	4.0	4.0	4.0	4.0		
Air (lpm)		1-5	1-5	1-5	1-5		
Wet wt (g)	120.0	120	120	120	120		

APPENDIX E: MINERALOGY (MODA Report)