TESTWORK REPORT

PC Gold Pty Ltd – Spring Hill Gold Project
Gravity and Flotation Testwork

T1520

8th June 2016

gekkos.com

CONCENTRATING ON THE FUTURE, NOW

Approved by:

Name: Adam Teague

Role: Laboratory Senior Metallurgist

Accepted by:

Name: Tim Bell

Role: Manager WA & Asian Operations

Version**:** **1.0**

Date: 8th June 2016

Status: Final

For more information on procedures and testwork results:

Gekko contact

Name : Dr Adam Teague

Title : Laboratory Senior Metallurgist

321 Learmonth Road

Ballarat, Victoria

Australia 3350

Telephone : +61 3 5339 5859

Fax : +61 3 5339 5803

e-mail : adamt@gekkos.com

About this document

Filename: T1520 - PC Gold Pty Ltd - Spring Hill Project - Composite A Testwork Report.docx
Produced using Microsoft® Word 2007

Revision History

Version	Date	Author	Description
0.1	7/6/2016	Peter Henderson	Draft Report
0.1	9/6/2016	Adam Teague	Peer Review
1.0	9/6/2016	Adam Teague	Final Report

Copyright Notice

Copyright © 2015 Gekko Systems Pty. Limited. All rights reserved.

Executive Summary

This report presents the results of testwork conducted on Composite A Reverse Circulation (RC) drill chip sample supplied by PC Gold Pty Ltd to further assess the gravity and flotation performance. The metallurgical testwork was conducted at the Gekko Metallurgical Laboratory (GML) and the assaying was conducted at the Gekko Assay Laboratory (GAL), which are both located in Ballarat, Australia.

Fire assay (1.79 g/t) and Grade-by-Size (1.70 g/t) gold head grade analysis were in close agreement indicating the samples were well homogenised.

Single Pass GRG test, at a grind size of P_{100} 850 µm, was able to recover 59.3% of the gold into a mass yield of 0.25% at a gold grade of 766 g/t. Approximately 77% of the gold recovered to the gravity gold concentrate was greater than 106 µm with a high gold distribution observed in the 300 µm fraction. The calculated gold grade of the gravity tail obtained from Grade-by-Size analysis of the Single Pass GRG test was 0.90 g/t gold.

The flotation test performed on the gravity tail recovered 55.8% of the contained gold. The overall gold recovery of the gravity test followed by flotation is 82% with a final tail gold grade of 0.62 g/t.

The reconciled gold head grade for composite A using gravity concentrate, flotation concentrate and flotation tail results is 3.21 g/t. The main contributor of the variance from the assayed head grade data is the gold recovered to gravity concentrate.

The metallurgical testwork results indicate the presence of gravity recoverable gold and Gekko recommends incorporating a gravity circuit as part of the process plant design. Additional confirmatory testwork using a representative sample should be performed on the clients preferred process flowsheet.

Table of Contents

1. Introduction

In January 2016, Mr Ashley Pattison, on behalf of PC Gold Pty Ltd engaged Gekko Systems to establish a metallurgical testwork program for the Spring Hill Project. Two composites comprised of RC chip samples were received from PC Gold, namely Composite A and Composite B. Gravity, flotation and leaching test work program on Composite B was completed in March 2016. This report captures the findings for gravity and flotation test work completed on Composite A.

The purpose of this testwork was to determine the amenability of Composite A to the following metallurgical testwork:

i) Gravity recoverable gold at P100 of 850 µm followed by flotation tests on the gravity tail.

1.1. Definitions and Acronyms

These are the definitions and acronyms used in this document.

Table 1: Definitions and Acronyms

Term or Acronym	Definition
µm	Micrometer
AAS	Atomic Absorption Spectroscopy
Au	Gold
BCC	Batch Centrifugal Concentration
BMWI	Bond Ball Mill Work Index
Cwi	Bond Crushing Work Index
FA	Fire Assay
g	Grams
g/t	grams per tonne
GAL	Gekko Assay Laboratory
Gekko	Gekko Systems Pty Ltd
GML	Gekko Metallurgical Laboratory
GRG	Gravity Recoverable Gold
IC	Intensive Cyanidation
kg	Kilogram
mm	Millimeter
ppm	Parts per million
PSD	Particle Size Distribution
P_{xx}	xx% passing size of product
SG	Specific Gravity

2. Sample Receipt and Preparation

On the 20th of January 2016, the following reverse circulation (RC) drill chip samples were received by Gekko from PC Gold:

1) Composite A – 117 kg

2) Composite B – 90 kg

Each sample was logged, dried at 60°C and weighed at the Gekko Metallurgical Laboratory (GML).

Table 2 shows the reserve mass for Composite A.

Table 2: Composite A Reserve Mass

Sample	Sample Mass
Composite A (homogenised sample)	84.9 kg
Testwork Feed Sizing (P100 850 μm)	0.5 kg
GRG Tail Sizing (P100 850 μm)	0.3 kg
Flotation Tail	2.5 kg
Flotation Tail Sizing	0.8 kg

3. Metallurgical Tests

3.1. Testwork Flowsheet

The testwork flowsheet was as per the quote: T1520 - PC Gold Pty Ltd - GRG and Flotation Testwork.Docx and shown in Figure 1.

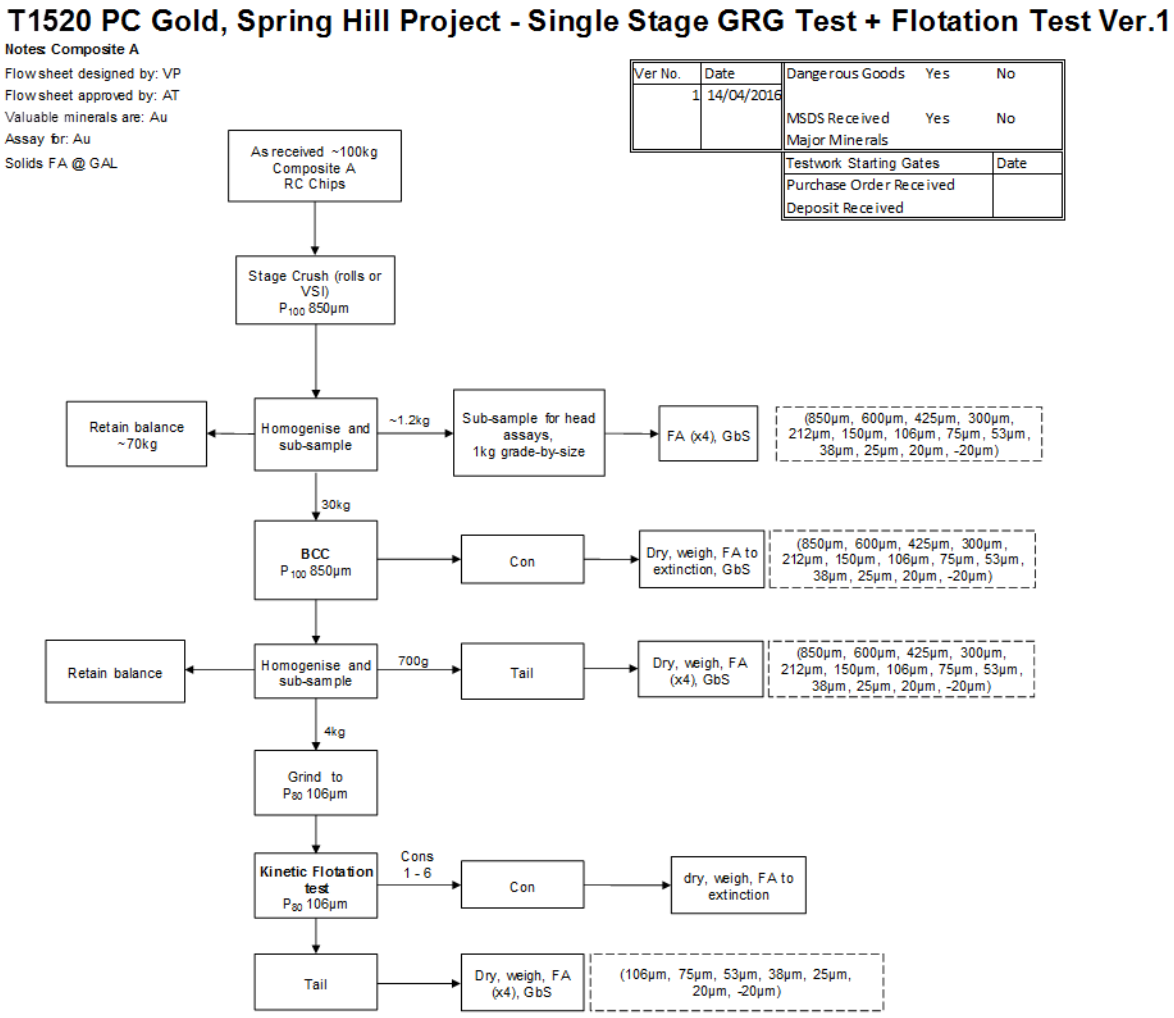


Figure 1: Testwork Flowsheet for T1520

3.2. Testwork Variations

No variations to note.

3.3. Assay Method

During this testwork program head grades, grade-by-size (G-by-S), concentrate and tail samples were assayed to determine gold content. All samples were sent for analysis to GAL.

The gold content in solid samples was determined by fire assay (FA) and atomic absorption spectroscopy (AAS). The gold content in solutions was determined by AAS.

3.4. **LeachWell Grade Analysis Method**

The LeachWell method of grade determination is applicable where the presence of coarse gold in a sample dictates the requirement for a larger sample mass to be assayed. The LeachWell method involves leaching up to 2 kg of solids in a bottle roll for 24 hours with a LeachWell Assay Tab. The final solution is analysed via AAS. The final residue is analysed in duplicate via FA-AAS, enabling the sample grade to be reconciled.

3.5. **Grade-by-Size Analysis Method**

Various samples were subjected to a grade-by-size distribution analysis throughout the program. By separating a sample into size fractions, the particle size distribution of the sample can be determined. After assay the particle size at which precious metals are contained can also be determined. The sieve sizes used were a root 2 series from 11.2 mm to 20 µm.

The minus 75 µm fractions were obtained via washing 100% of the sample over screens using a pneumatic sieve shaker. The plus 75 µm fractions were dried in a low (60 ºC) temperature oven and dry sieved through a nest of sieves using an electric shaker for 20 minutes.

The weight of sample contained in each size fraction was recorded and a sub-sample sent for assay. The gold content in each size fraction was determined by FA-AAS.

The final residue is analysed in duplicate via FA-AAS, enabling the sample grade to be reconciled.

3.6. **Single Pass GRG test Method**

The Single Pass GRG test assesses the amount of gravity recoverable gold in a sample by feeding it through a batch centrifugal concentrator (BCC) at a nominated grind size to maximise the chance of gravity gold liberation recovery.

Stage 1

Approximately 30 kg of sample prepared to a P_{100} of 850 µm was fed to a Knelson BCC at a constant rate. Once all the material had passed through the BCC the unit was stopped and the concentrate washed out with clean tap water. The tailings were weighed, dried and sub-sampled with approximately 27 kg used for flotation test.

The concentrate sample was dried, weighed and sized with each size fraction assayed to extinction for gold determination. A sub-sample of the tail from each stage was also sized and assayed for gold.

Figure 2 shows the laboratory Knelson concentrator used for the testwork.

Figure 2: Laboratory Knelson Concentrator

4. Results

4.1. Head Grade Determination

Head grade results are summarised in Table 3, along with the calculated head grades from the grade-by-size results and various test products.

Table 3: Composite A Head Grades

Sample	Method	Gold Grade
Gravity Feed	FA x 4	1.79 g/t
Gravity Feed	Grade x Size	1.70 g/t
Gravity Test	Calculated	2.80 g/t
Gravity + Flotation	Calculated	3.21 g/t

The calculated head grades from the tests have a positive variance with reference to the gravity feed results. The positive variance is attributable to the coarse gravity gold recovered in the gravity test and the fact that a larger sample mass was used in the GRG (~31 kg) compared to the 50 gram fire assays and 1 kg grade by size. Calculated head grades from larger sample masses are considered more accurate than head grades derived from smaller masses.

For more detail, refer to Appendix A – Head Grades.

4.2. GRG Feed Grade-by-Size Analysis

A 1 kg sub-sample was taken for grade-by-size analysis on the GRG testwork feed to determine particle and gold distributions by size. The calculated head grade was 1.70 g/t gold. The cumulative P_{80} and P_{50} values for particle size and gold are shown in Table 4, with the grade-by-size curve shown in Figure 3.

Table 4: Particle Size and Gold Distributions

Size	PSD	Au
P80 (µm)	347	385
P50 (µm)	71	130

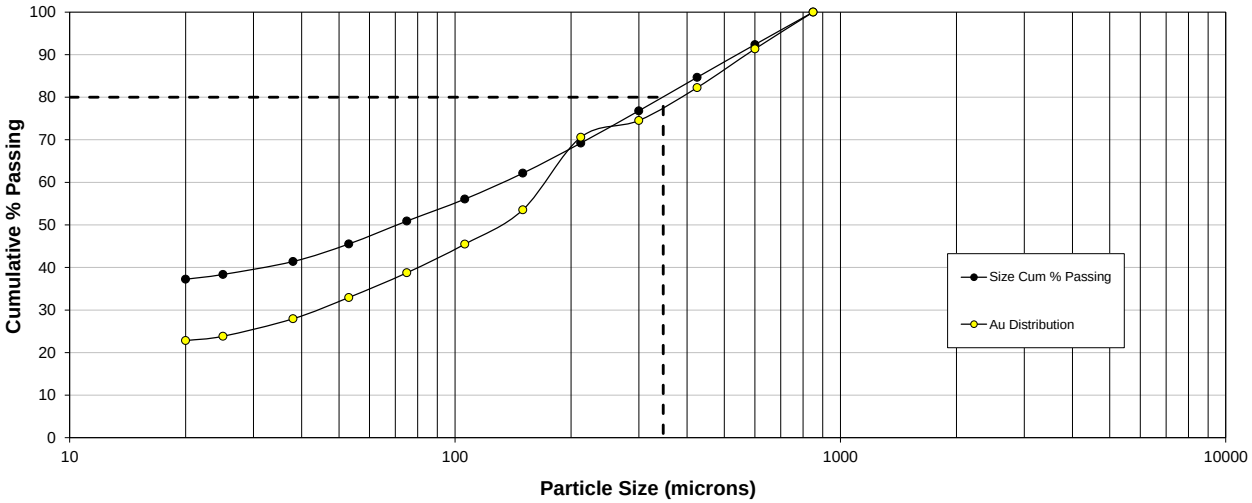


Figure 3: GRG Feed Distribution by Particle Size and Gold

Figure 3 shows the gold distribution was slightly coarser than the particle size distribution at sizes below 212 µm.

For more detail, refer to Appendix B – GRG Feed Particle Size Analysis.

4.3. **Single Pass GRG Test**

The Single Pass GRG test at a grind size of P_{100} 850 µm, was able to recover 59.3% of the gold, into a mass yield of 0.25%, at a gold grade of 766 g/t.

Approximately 77% of the gold recovered to the gravity gold concentrate was greater than 106 µm with a high gold distribution observed in the 300 µm fraction.

The calculated gold grade of the gravity tails obtained from Grade-by-Size analysis of the Single Pass GRG test was 0.90 g/t gold.

For comparison, Composite B at a grind size of P_{100} 850 µm, was able to recover 43.7% of the gold, of which 71% was contained in the plus 106 µm size fraction.

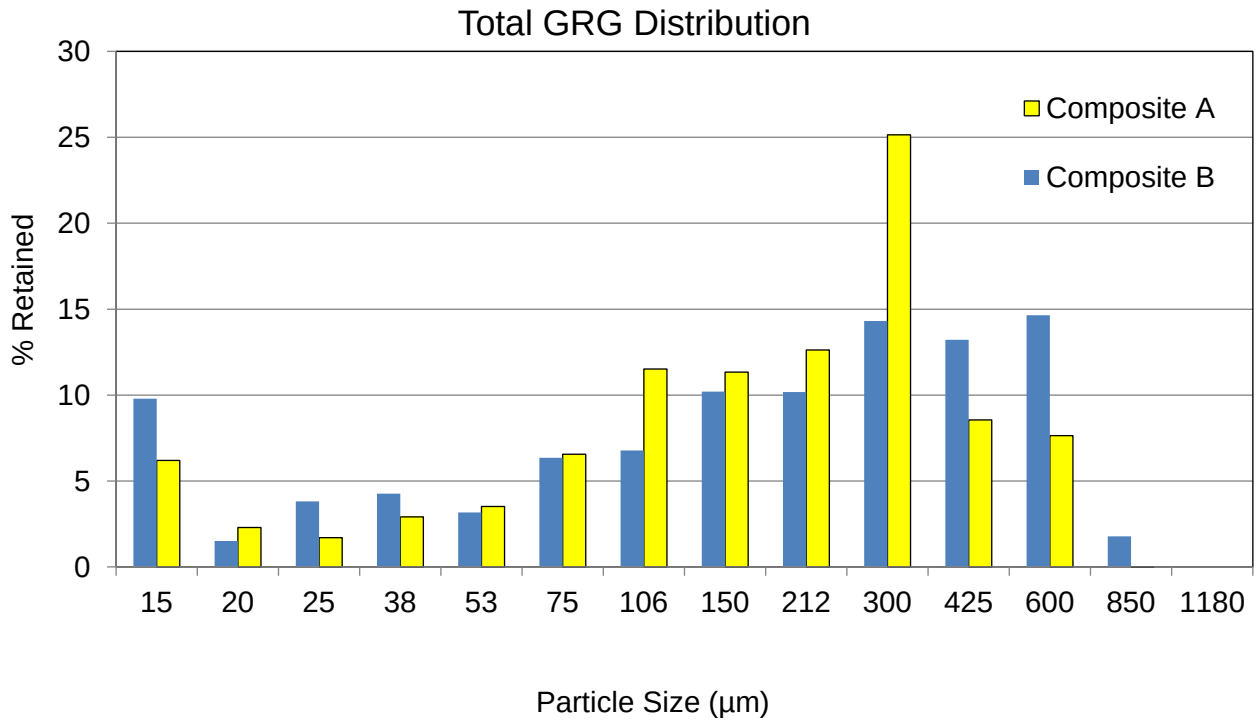


Figure 4: GRG Size Distribution of the Single Pass GRG Test Concentrate

Figure 4 shows the GRG distribution by particle size. There was approximately 77% of the total GRG in the plus 106 µm size fraction. For comparison purposes, results have been added for Composite B.

The GRG result indicates the gold in the ore is amenable to gravity concentration by BCC.

For more detail, refer to Appendix C – Single Pass GRG Test

4.4. GRG Tails Grade-by-Size Analysis

A 600 g sub-sample was taken for grade-by-size analysis on the Single Pass GRG tail produced from the GRG test to determine particle size and gold distributions by size. The calculated gold head grade was 0.90 g/t. The cumulative P_{80} and P_{50} passing for particle size and gold distributions are shown in Table 5, with the grade-by-size curve shown in Figure 5.

Table 5: 1st Pass GRG Tail Particle Size and Gold Distribtuions

Size	PSD	Au
P80 (µm)	343	484
P50 (µm)	66	197

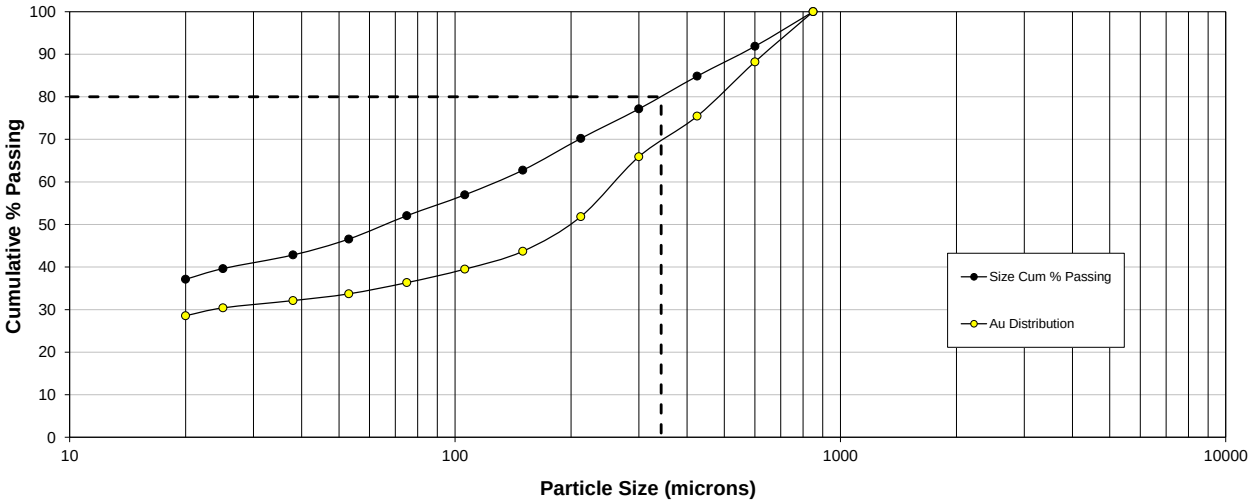


Figure 5: GRG Tail Size Distributions by Particle Size and Gold content

The GRG tail PSD in Figure 5 shows the gold distribution was coarser than the PSD. The unrecovered gold was distributed into the coarser size fractions with 61% of the unrecovered gold in the plus 106 µm size fraction. For more detail, refer to Appendix D – GRG Tails PSD.

4.5. GRG Tails Flotation Test, FL01

A flotation test was conducted on the GRG tails after further grinding to P_{80} 106 µm. The flotation test at a grind size of P_{80} 106 µm, was able to recover 55.8% of the gold, into a mass yield of 6.8%, at a gold grade of 10.76 g/t.

The calculated flotation head grade was 1.31 g/t gold. During the flotation test, a number of concentrates were collected to measure the grade and recovery as a function of mass yield and time. The gold grade recovery curve and recovery versus time curve are shown in Figure 6 andFigure 7.

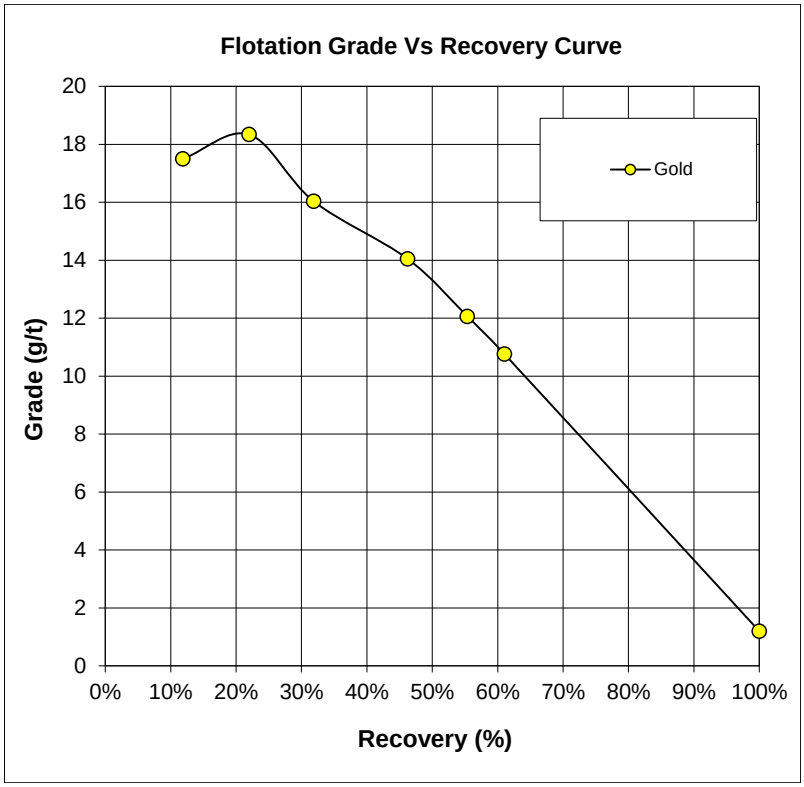


Figure 6: FL01 Flotation Grade Recovery Curve

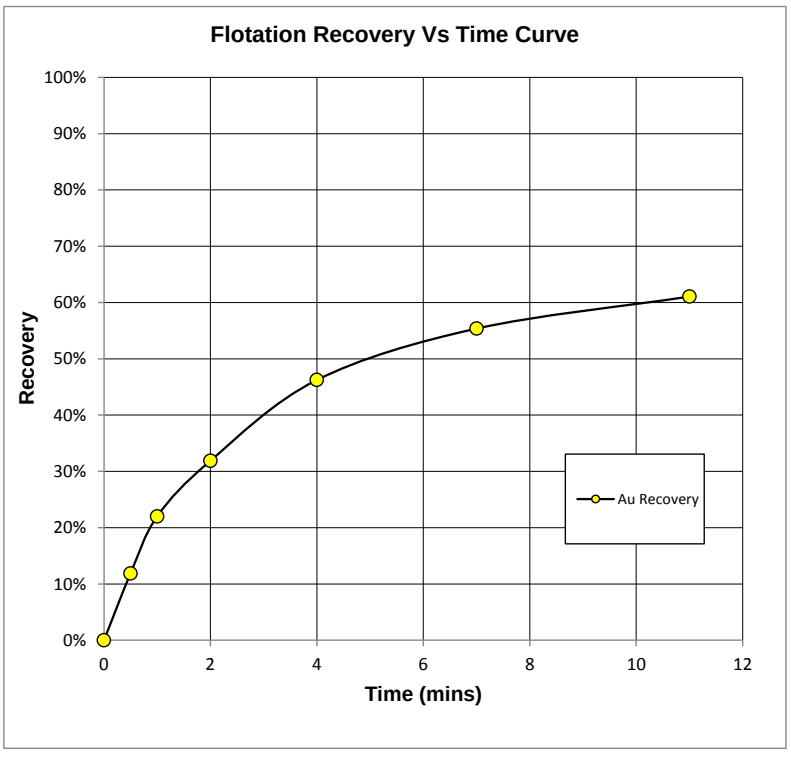


Figure 7: FL01 Flotation Recovery Time Curve

For more detail, refer to Appendix E – FL01 Flotation test.

4.6. **Final Flotation Tail Grade-by-Size Analysis**

A 600 g sub-sample was taken for grade-by-size analysis on the final tail produced from the flotation test to determine particle size and gold distributions by size. The calculated head grade was 1.31 g/t gold. The cumulative P_{80} passing for particle size and gold distributions are shown in Table 6, with the grade-by-size curve show in Figure 8.

Table 6: Final Flotation Tail Particle Size and Gold Distribtuions

Size	PSD	Au
P80 (μm)	112	131
P50 (μm)	22	88

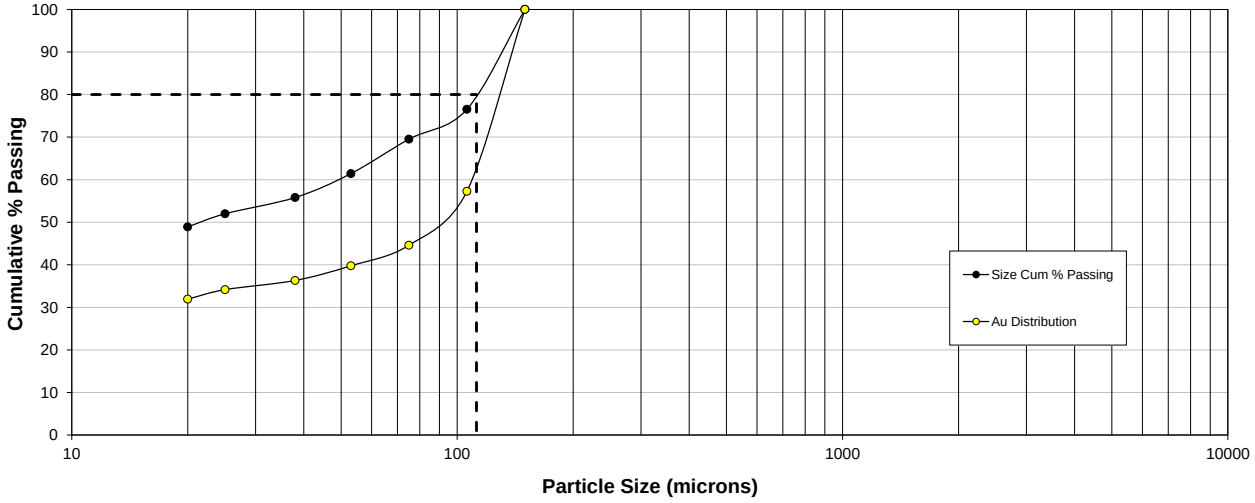


Figure 8: Final Flotation Tail Size Distributions by Particle Size and Gold content

The final tail PSD in Figure 8 shows the unrecovered gold was distributed preferentially into the coarser size fractions with 57% of the unrecovered gold passing 106 μm and 36% of the unrecovered gold in the minus 38 μm size fraction. For more detail, refer to Appendix G – Final Tail Particle Size Analysis.

4.7. **Overall Recovery**

Table 7 summarises the overall gold recovery results of the various processing options tested. The recoveries are based on the overall calculated head grade, which is calculated using gravity concentrate, flotation concentrate and flotation tail (grade by size) results.

Table 7: Overall Processing Options Gold Recovery

Test	Calculated Au Head Grade (g/t)	Mass Yield (%)	Au Recovery (%)	Recovered Au Grade (g/t)	Residue Au Grade (g/t)
Single Pass Gravity	3.21	0.25	59.3	766	1.31
Flotation Test	1.31	6.77	55.8	10.8	0.62
Gravity + Flotation	3.21	7.02	82.0	37.4	0.62

5. Conclusions

The following conclusions can be made from the metallurgical testwork:

- The head grade determined by the fire assay and Grade-by-Size method was 1.79 g/t and 1.70 g/t respectively.
- The calculated gold head grade was 3.21 g/t for the gravity plus flotation testwork.
- Single Pass GRG test at a grind size of P_{100} 850 µm, was able to recover 59.3% of the gold, into a mass yield of 0.25%, at a gold grade of 766 g/t.
- Approximately 77% of the gold recovered to the gravity gold concentrate was greater than 106 µm with a high gold distribution observed in the 300 µm fraction.
- The calculated gold grade of the gravity tail obtained from Grade-by-Size analysis of the Single Pass GRG test was 0.90 g/t gold. The gold distribution in the gravity tail was coarser than the PSD with 61% of the unrecovered gold in the plus 106 µm size fraction.
- Flotation on the GRG tail after further grinding to P_{80} 106 µm was able to recover 55.8% of the gold, into a mass yield of 6.8%, at a gold grade of 10.76 g/t.
- The calculated flotation head grade was 1.31 g/t gold.
- The final flotation tail PSD showed the unrecovered gold was distributed preferentially into the coarser size fractions with only 36% of the unrecovered gold in the minus 38 µm size fraction.
- The combined GRG plus flotation test recovered 82.0% of the gold into a mass yield of 7% at a grade of 37.5 g/t. The final tail grade was 0.62 g/t.

6. Recommendations

The following recommendations can be made:

- The metallurgical testwork results indicate the presence of gravity recoverable gold and Gekko recommends incorporating a gravity circuit as part of the process plant design.

- Composite A reconciled grade and recoveries warrants further detailed laboratory investigation to validate head grade, overall recoveries and residue grades.

7. Appendix A – Head Grades

Project Name: PC Gold

Testwork Feed @ P100 -850µm

Assay Weight g	Au ppm
54.55	2.71
50.20	1.15
48.68	1.60
49.63	1.70
	1.79

FL01 Tails @ P80 -106µm

Assay Weight g	Au ppm
53.13	0.48
54.78	0.52
50.93	0.55
51.18	0.43
	0.50

Single Pass GRG Tails @ -850µm

Assay Weight g	Au ppm
51.54	1.52
51.14	1.82
51.56	1.21
51.70	1.04
	1.40

8. Appendix B – Single Pass GRG Feed Particle Size Analysis

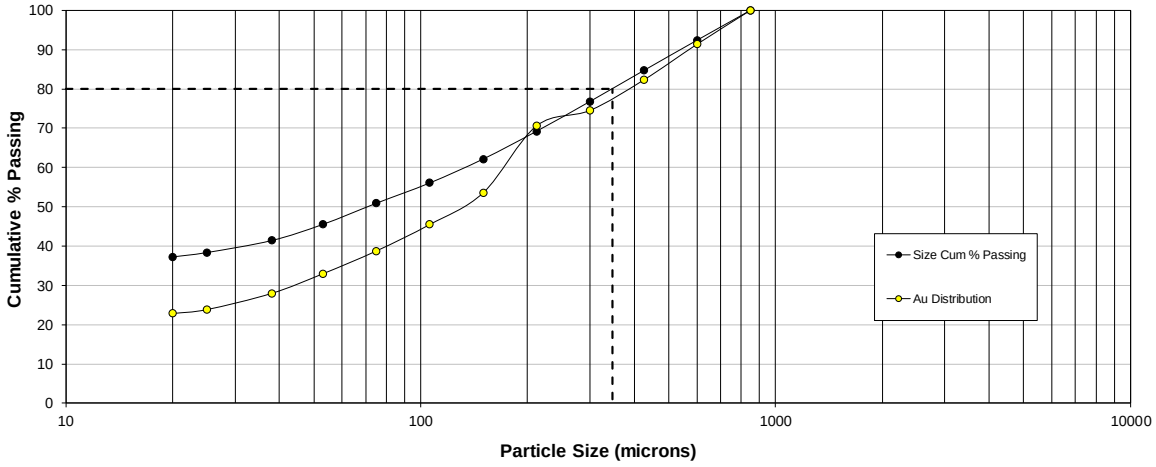
GEKKO

LABORATORY TEST WORK RESULTS

Particle Size Analysis
Project: **PC Gold - Composite A**
Stream: **Single Pass GRG Feed Sizing (sample prepared to -850µm)**
Date: 26/04/2016
Results Date: 3/05/2016

	Particle Size Distribution			Gold Distribution			
Size	Wt Retained (g)	Wt %	Size Cum %	Assay	Mass	Wt%	Cum %
(microns)	Sizing 1	Retained	Passing	(g/t)	(Units)	Retained	Passing
850	0	0.00	100.00	0	0.00	0.00	100.00
600	75.48	7.64	92.36	1.93	0.15	8.67	91.33
425	76.02	7.69	84.67	2.00	0.15	9.07	82.26
300	77.69	7.86	76.81	1.67	0.13	7.74	74.52
212	75.03	7.59	69.22	0.88	0.07	3.94	70.59
150	69.79	7.06	62.15	4.09	0.29	17.03	53.56
106	60.27	6.10	56.06	2.25	0.14	8.09	45.47
75	50.97	5.16	50.90	2.21	0.11	6.72	38.75
53	53.19	5.38	45.52	1.83	0.10	5.81	32.95
38	40.68	4.12	41.40	2.06	0.08	5.00	27.95
25	30.06	3.04	38.36	2.29	0.07	4.11	23.84
20	11.11	1.12	37.23	1.53	0.02	1.01	22.83
0	367.95	37.23	0.00	1.04	0.39	22.83	0.00
Total	988	100.00		Head Grade	1.70	100.00	
Initial Wt	1000.00	Reconcile	101%	Assay Head	1.79		

D80 **347** **D50** **71** **D80** **385** **D50** **130**

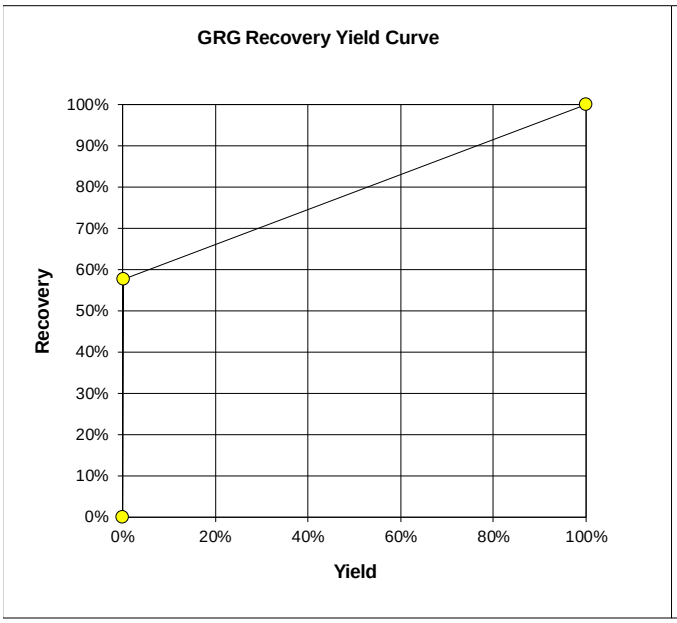


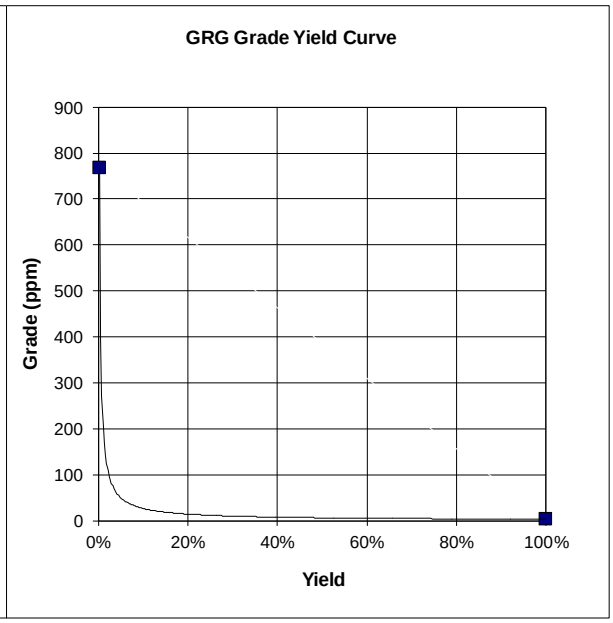
9. Appendix C – Single Pass GRG Results

GEKKO LABORATORY TEST WORK RESULTS

GRG Test
Project: PC Gold Feed rate desired 401.22 operator name BD
Stream: Single Pass GRG test @ P100 -850µm Feed rate acheived 375.67
Date: 27/4/16

Sample	Mass Yield			Gold Distribution			
	g	%	cumulative %	Assay ppm	Distribution %	Cumulative Distribution	Cumulative grade ppm
GRG Concentrate	76.37	0.25%	0.25%	766.59	57.69%	57.69%	766.59
GRG Tails	30720.00	99.75%	100.00%	1.40	42.31%	100.00%	3.30
Calc'd Feed	30796.37	100.0%		3.30	100.0%		3.30
Assay Feed	30880.00			1.79			





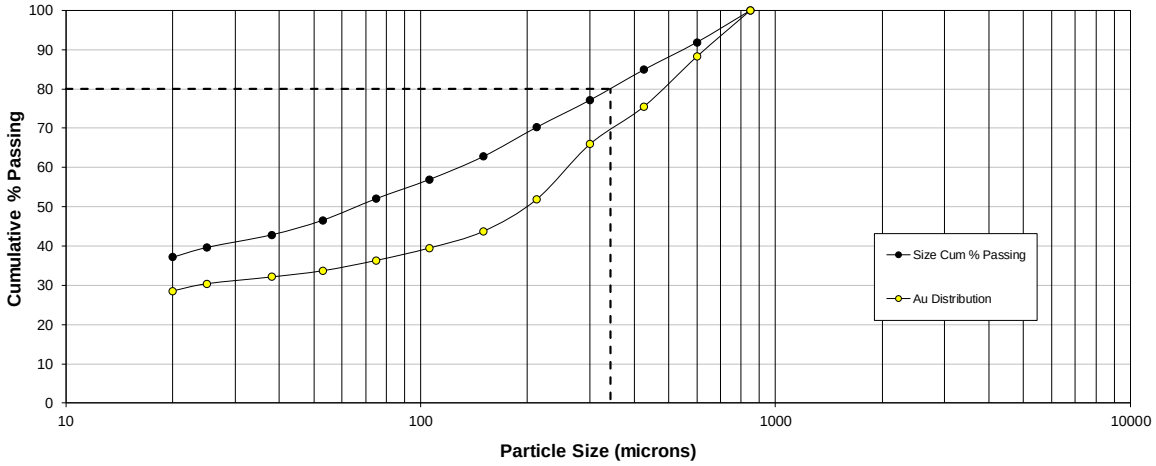
10. Appendix D – GRG Tails Size Analysis

GEKKO LABORATORY TEST WORK RESULTS

Particle Size Analysis
Project: **PC Gold - Composite A**
Stream: **Single Pass GRG Tail Sizing (sample prepared to -850µm)**
Date: 5/05/2016
Results Date: 16/05/2016

	Particle Size Distribution			Gold Distribution			
Size	Wt Retained (g)	Wt %	Size Cum %	Assay	Mass	Wt%	Cum %
(microns)	Sizing 1	Retained	Passing	(g/t)	(Units)	Retained	Passing
850	0	0.00	100.00	0	0.00	0.00	100.00
600	52.27	8.15	91.85	1.30	0.11	11.81	88.19
425	44.97	7.01	84.84	1.63	0.11	12.74	75.45
300	49.37	7.70	77.15	1.11	0.09	9.52	65.93
212	44.53	6.94	70.20	1.82	0.13	14.09	51.84
150	47.74	7.44	62.76	0.98	0.07	8.13	43.71
106	37.23	5.80	56.96	0.65	0.04	4.21	39.50
75	31.42	4.90	52.06	0.58	0.03	3.17	36.33
53	35.19	5.49	46.57	0.43	0.02	2.63	33.70
38	23.96	3.74	42.84	0.38	0.01	1.58	32.12
25	20.57	3.21	39.63	0.48	0.02	1.72	30.41
20	16.08	2.51	37.13	0.66	0.02	1.84	28.56
0	238.16	37.13	0.00	0.69	0.26	28.56	0.00
Total	641	100.00		Head Grade	0.90	100.00	
Initial Wt	647.60	Reconcile	101%	Assay Head	1.40		

D80 343 D50 66 **D80 484 D50 197**



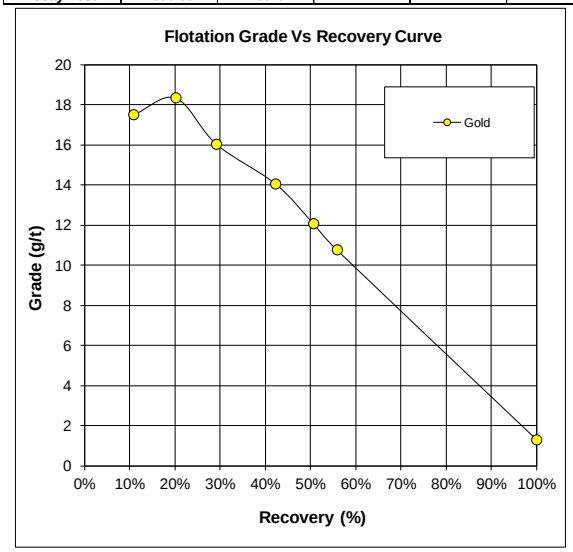
11. Appendix E – Flotation Test FL01

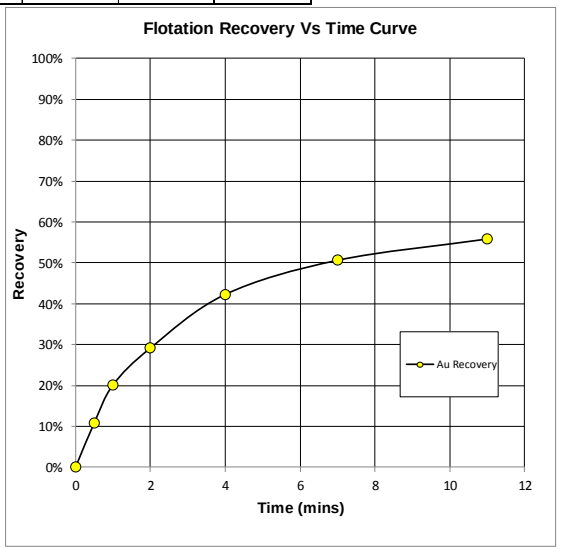
GEKKO LABORATORY TEST WORK RESULTS

Flotation Test

Project: PC Gold - Composite A
Stream: FL01 Sample prepared to P80 -106µm (Single Pass GRG Tails)
Date: 6/05/2016
Results: 20/05/2016

Sample	Mass Yield			Gold Distribution				Residence Time (mins)	Leachwell		
	g	%	cumulative %	Assay ppm	Distribution %	Cumulative Distribution	Cumulative grade ppm		Au Solution ppm	Au Solids ppm	Total Au ppm
								0			
Concentrate 1	32.43	0.81%	0.81%	17.50	10.87%	10.87%	17.50	0.5	17.46	0.04	17.5
Concentrate 2	24.89	0.62%	1.44%	19.43	9.26%	20.13%	18.34	1	19.36	0.07	19.43
Concentrate 3	37.68	0.94%	2.38%	12.52	9.03%	29.16%	16.03	2	12.33	0.19	12.52
Concentrate 4	62.17	1.56%	3.94%	11.02	13.12%	42.28%	14.05	4	10.98	0.04	11.02
Concentrate 5	62.05	1.55%	5.49%	7.03	8.35%	50.63%	12.06	7	6.92	0.11	7.03
Concentrate 6	51.83	1.30%	6.79%	5.24	5.20%	55.83%	10.76	11	5.2	0.04	5.24
Flotation Tails	3720.00	93.21%	100.00%	0.62	44.17%	100.00%	1.31	11			
Calc'd Feed	3991.05	100%		1.31	100%		1.31				
Assay Feed	4000.00	100%									





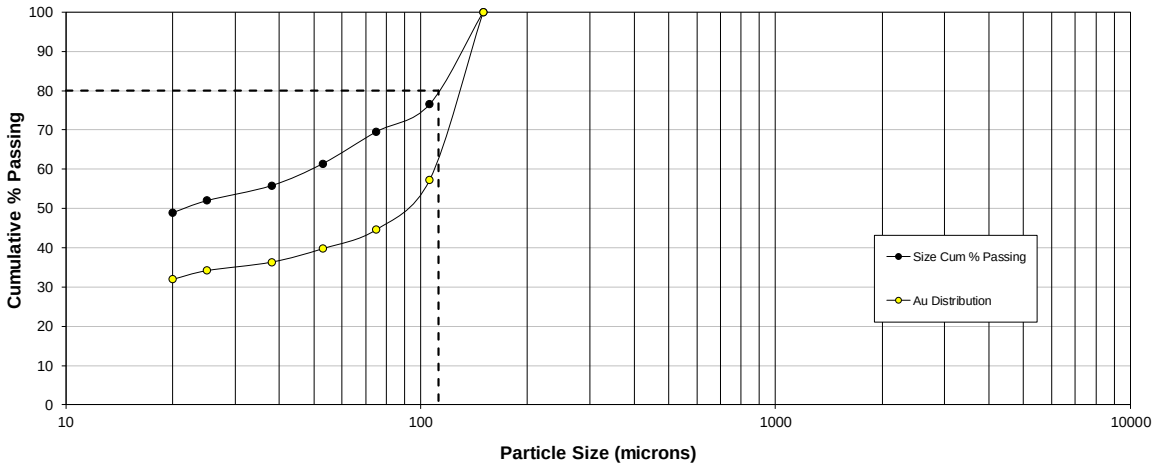
12. Appendix F – Final Tails PSD

GEKKO LABORATORY TEST WORK RESULTS

Particle Size Analysis
Project: **PC Gold - Composite A**
Stream: **FL01 Tail Sizing (sample prepared to P80 -106µm)**
Date: 6/05/2016
Results Date: 18/05/2016

	Particle Size Distribution			Gold Distribution			
Size	Wt Retained (g)	Wt %	Size Cum %	Assay	Mass	Wt%	Cum %
(microns)	Sizing 1	Retained	Passing	(g/t)	(Units)	Retained	Passing
150	0	0.00	100.00	0	0.00	0.00	100.00
106	243.65	23.47	76.53	1.13	0.27	42.75	57.25
75	72.77	7.01	69.52	1.12	0.08	12.66	44.59
53	84.14	8.10	61.42	0.37	0.03	4.83	39.76
38	58.23	5.61	55.81	0.38	0.02	3.44	36.32
25	39.67	3.82	51.99	0.35	0.01	2.16	34.17
20	31.97	3.08	48.91	0.45	0.01	2.23	31.93
0	507.80	48.91	0.00	0.41	0.20	31.93	0.00
Total	1038	100.00		Head Grade	0.62	100.00	
Initial Wt	1047.32	Reconcile	101%	Assay Head	0.50		

D80 **112** **D50** **22** **D80** **131** **D50** **88**



13. Appendix G – Disclaimer

Gekko has undertaken test work to characterize the response of your ore to certain separation techniques and/or to help your own experts make a decision as to whether you wish to purchase our product and, if so, the number and type.

It is important that you understand that:

- Our testing is preliminary only.
- You should obtain, independent advice from all relevant specialists, including a metallurgist, before acquiring any equipment and before committing to and proceeding with your project.
- You must have your own experts examine the detailed analysis in our report to decide its applicability to your project.
- We analyse only the sample you provide. Any one of a number of factors may cause that sample inaccurately to reflect the ore body. You must determine the extent to which the sample represents the ore body. That includes the detection limits and confidence intervals relevant to our results.
- At all times we endeavour to provide accurate test work outcomes but you should not use our results as a basis for your broader business decisions about your project.
- If we have not exercised due care with our tests, the limit of our liability, both at common law and under any statute, will be to provide a further set of test results to you free of charge.
- You indemnify us with respect to all other loss and damage of every kind, including, without limitation:
    - damage to or loss of property;
    - injury to or death of any person; and
    - economic and consequential loss arising from the negligent act or omission of us or anyone else in connection with our test.