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RIO TINTO TECHNICAL SERVICES

**Final Report Describing Flotation Testing on Master Composite No. 1
(RES 2C-2, 3-1 and 3A-1) from the Resolution Project.**

OUR PROJECT NO. P-2694E

November 11, 2002

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November 11, 2002

Rio Tinto Technical Services
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Attention: Mr. Anthony Moon

Subject: Final Report Describing Flotation Testing on Master Composite No. 1
(RES 2C-2, 3-1 and 3A-1) from the Resolution Project. Our Project No.
2694E.

Dear Mr. Moon:

In accordance with discussions between you and DML, flotation test work was conducted on Master Composite No. 1 (MC-1) consisting of 33% material each from composite drill holes 2C-2, 3-1 and 3A-1 from the Resolution porphyry copper project.

I. Background

A series of flotation tests had been conducted at DML on the three individual composites that comprise MC-1. The initial scope of that test work was to evaluate if:

- The individual composites could be processed using conventional flotation techniques.
- An acceptable copper concentrate could be produced.

As the test work progressed the scope of work expanded to evaluate the primary grind size, rougher pH and flotation reagent dosage. Cleaner test work was also conducted to evaluate regrind fineness, and reagent addition to maximize copper and moly grade and recovery.

Optimizing the flotation conditions (primary grind fineness, pH, flotation kinetics, etc.) was beyond the scope of the initial work.

Results of the initial test work on composites 3-1 and 3A-1 show that 86 and 89% copper was recovered into a No. 2 cleaner concentrate containing 37% and 39% copper, respectively. Results of composite 2C-2 show that only 77% copper was recovered into a No. 2 cleaner concentrate that contained only 22% copper. Moly recovery from the three composites ranged from 70 to 75% into the No. 2 cleaner concentrate. Similar reagent

dosages on each composite were used during the rougher/scavenger and cleaner flotation work.

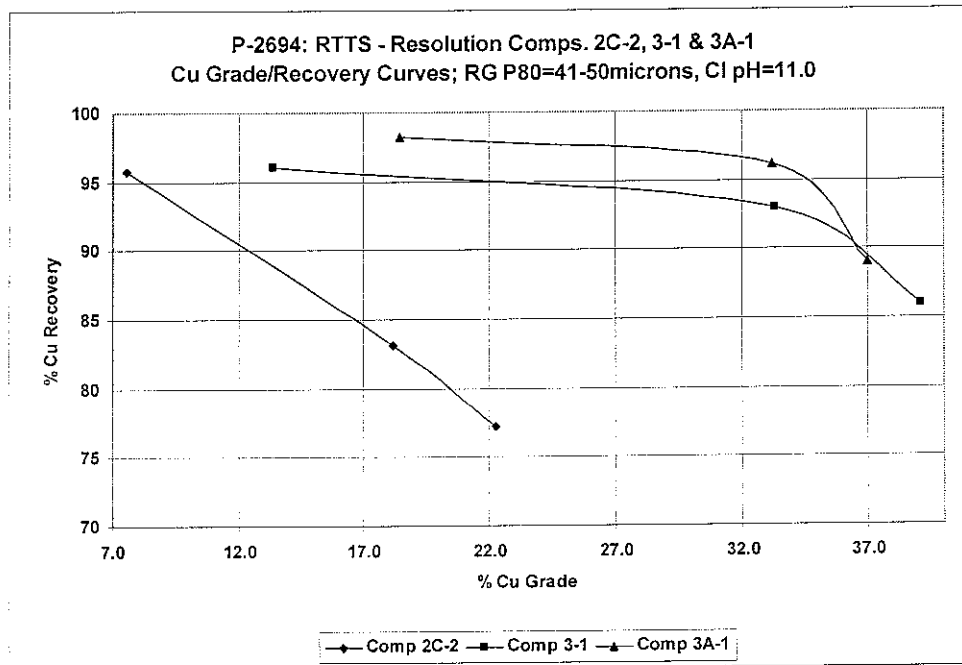
It was noted during cleaner flotation test work on composite 2C-2 that the froth was very slimy. This observation indicates excessive flotation of clays/insolubles into the final concentrate. Additional test work was conducted on 2C-2 to assist in reducing the clays/insolubles reporting to the cleaner circuit. Results of this work are summarized later in this report.

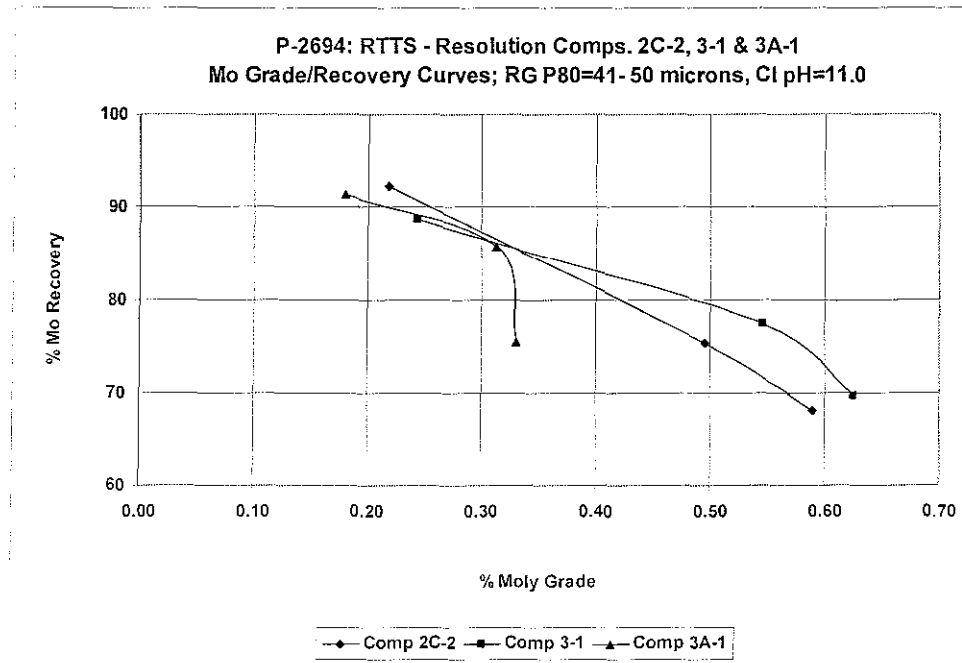
Individual test sheets from the work conducted on the three composites are in the appendix at the end of this report. Complete results from the earlier work are in a report issued July 16, 2002 to Mr. Tony Moon and Mr. Rich Heig.

A summary of the flotation test work along with grade recovery curves is presented below.

P-2694: Rio Tinto Technical Services – Resolution Comps. 2C-2, 3-1 & 3A-1
Results of the Cleaner Test Series: RG P₈₀=41-50 μ , Cleaner pH=11.0

Comp.	P-2694 Test No.	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
		Assay, %		Assay, %		Distribution, %		Assay, %		Distribution, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
2C-2	35	1.94	0.058	22.3	0.590	77.2	68.0	0.20	0.009	9.1	14.5
3-1	24	2.85	0.056	39.1	0.625	85.9	69.7	0.19	0.012	5.9	19.1
3A-1	30	5.45	0.057	37.0	0.330	89.1	75.5	0.21	0.009	3.2	12.4





II. Testing Program on MC-1

A laboratory testing program was performed to evaluate the flotation response of the MC-1 sample to bulk copper-molybdenum flotation. The MC-1 sample was tested using conventional batch grinding and mechanical flotation testing equipment to delineate important processing parameters. The MC-1 was used to evaluate the following:

- Appropriate collector reagent scheme.
- Primary grind fineness.
- Rougher flotation pH.
- Rougher flotation kinetics.
- Cleaner circuit configuration including regrind fineness, pulp pH and number of cleaner stages.
- Conduct a seven-cycle locked cycle test using the rougher and cleaner flotation operating parameters.
- A single moly flotation test on a final Cu/Mo concentrate

Locked cycle test products and the final moly concentrate from the moly separation test were submitted to Dr. Ivan Reynolds, RTTS, Great Britain for mineralogical evaluation. In addition, locked-cycle test products were sent to RTTS, Australia for QemSEM analysis. Gold and silver analysis was conducted on locked cycle test products. A trace element analysis was also conducted on the final cleaner concentrate from the locked cycle test.

Acid Base Accounting (ABA) tests were conducted on specific cleaner tailings and scavenger tailings using a Kennecott Utah Copper (KUC) test procedure.

III. Sample Description and Head Assay

Three composite groups of samples (2C-2, 3-1, and 3A-1) were received at DML in early to mid 2002. The three composites constituted the Master Composite No. 1 (MC-1) which was assigned our project number P-2694E.

All samples were coarse reject from the Resolution project in Superior, Arizona. Each composite contained several meter intervals from diamond drill holes. Each weighed 62 to 131 kg and contained material up to ¼ inch in size. The MC-1 was produced by splitting out 50 kg from each composite. The remainder from each hole is retained in cold storage. The master composite was stage crushed to minus 10 mesh using a parallel rolls crusher then thoroughly blended. Two kg test charges were split out using a rotary splitting wheel.

A head sample was split out from one of the test charges and submitted to local laboratories and Skyline Laboratories in Tucson for Cu, Cu (nonsulfide), Mo, Fe, S (total) and S (sulfide), Au and Ag. All of the analytical work on flotation products was performed by DML (Cu, Mo and Fe) and Assay Labs Inc. (Cu, S(total)). Head assay results are summarized below and compared to back-calculated head assays from the test work. Description of the MC-1 makeup is presented on the following page.

P-2694E – Rio Tinto Technical Services
Head Assay and Back Calculated Assays of Master Composite No. 1 from the Resolution Project

Comp.	Hd Assay	Cu, %	Cu _(ns) , %	Mo, %	Au, ppb	Ag, ppm	Fe, %	S _(tot) , %	SO ₄ ⁼ , %	S ⁼ , %
MC-1	Direct	3.49	0.01	0.052	50	12.2	8.99	9.01	0.09	8.92
	Back-Calc	3.41	-	0.056	-	-	9.14	10.00	-	-

P-2694E: Rio Tinto Resolution Project
Weight and Cu, Mo Analyses of As-Received Samples

Composite	Individual Sample	From	To	Interval	Cu ICP %	Cu AAS %	Mo ICP %	Weight, kilograms		
								As-rec'd Sample	Sample to Composite	Sample Reserve
RES-2C-2	RES-3059	1865.10	1868.00	2.90	2.490	2.530	0.072	10.9	10.9	0.0
RES-2C-2	RES-3061	1871.00	1874.00	3.00	2.570	2.630	0.028	10.1	10.1	0.0
RES-2C-2	RES-3063	1877.00	1880.00	3.00	1.430	1.440	0.105	9.5	9.5	0.0
RES-2C-2	RES-3066	1886.00	1889.00	3.00	1.240	1.290	0.130	9.2	9.2	0.0
RES-2C-2	RES-3068	1892.00	1895.00	3.00	1.540	1.580	0.039	10.9	10.9	0.0
RES-2C-2	RES-3073	1899.10	1902.00	2.90	2.000	2.040	0.023	10.9	10.9	0.0
RES-2C-2	Composite	1865.00	1902.00	17.80	1.897	1.937	0.064	61.5	61.5	0.0
RES-3-1	RES-01053	1690.00	1693.00	3.00	2.320	2.320	0.024	11.6	5.8	5.8
RES-3-1	RES-01056	1694.00	1695.00	1.00	1.230	1.210	0.014	3.7	1.8	1.9
RES-3-1	RES-01060	1697.00	1698.50	1.50	3.600	3.600	0.014	6.4	3.2	3.2
RES-3-1	RES-01064	1703.00	1704.00	1.00	2.950	2.900	0.058	4.1	2.0	2.1
RES-3-1	RES-01067	1706.00	1707.00	1.00	5.700	5.850	0.067	4.1	2.0	2.1
RES-3-1	RES-01071	1711.00	1712.00	1.00	2.810	2.850	0.020	4.2	2.1	2.1
RES-3-1	RES-01075	1715.00	1716.00	1.00	3.200	3.250	0.022	3.8	1.9	1.9
RES-3-1	RES-01078	1721.50	1723.00	1.50	3.400	3.450	0.024	6.2	3.1	3.1
RES-3-1	RES-01082	1729.00	1732.00	3.00	3.700	3.700	0.077	12.5	6.3	6.2
RES-3-1	RES-01085	1738.00	1740.00	2.00	4.150	4.100	0.076	8.2	4.1	4.1
RES-3-1	RES-01088	1744.00	1746.00	2.00	2.840	2.830	0.049	8.6	4.3	4.3
RES-3-1	RES-01091	1749.00	1752.00	3.00	1.220	1.250	0.180	12.7	6.3	6.4
RES-3-1	RES-01095	1757.00	1758.00	1.00	2.010	1.960	0.021	3.4	1.7	1.7
RES-3-1	Composite	1690.00	1758.00	22.00	2.929	2.937	0.063	89.4	44.6	44.8
RES-3A-1	RES02215	1736.00	1737.00	1.00	6.900	6.950	0.078	3.6	1.8	1.8
RES-3A-1	RES02218	1738.00	1739.00	1.00	5.050	5.100	0.036	3.3	1.7	1.7
RES-3A-1	RES02220	1740.00	1741.00	1.00	3.500	3.550	0.081	3.4	1.7	1.7
RES-3A-1	RES02223	1742.00	1744.40	2.40	4.600	4.650	0.037	10.0	5.0	5.0
RES-3A-1	RES02226	1745.00	1748.00	3.00	3.200	3.250	0.030	11.6	5.8	5.8
RES-3A-1	RES02228	1750.00	1751.00	1.00	5.450	5.400	0.021	4.6	2.3	2.3
RES-3A-1	RES02230	1752.00	1753.00	1.00	10.600	10.500	0.057	4.9	2.4	2.4
RES-3A-1	RES02232	1756.00	1759.00	3.00	3.350	3.200	0.061	9.9	5.0	5.0
RES-3A-1	RES02234	1762.00	1765.00	3.00	4.000	3.850	0.055	11.2	5.6	5.6
RES-3A-1	RES02237	1766.00	1767.00	1.00	6.350	6.350	0.035	4.3	2.1	2.1
RES-3A-1	RES02240	1768.00	1769.00	1.00	7.300	7.300	0.026	4.2	2.1	2.1
RES-3A-1	RES02242	1770.00	1771.00	1.00	5.350	5.150	0.047	3.5	1.7	1.7
RES-3A-1	RES02244	1772.00	1773.00	1.00	7.250	7.150	0.255	3.8	1.9	1.9
RES-3A-1	RES02246	1774.00	1775.00	1.00	4.650	4.500	0.185	3.6	1.8	1.8
RES-3A-1	RES02248	1776.00	1777.00	1.00	6.500	6.500	0.036	3.7	1.8	1.8
RES-3A-1	RES02250	1778.00	1779.00	1.00	6.700	6.550	0.013	3.8	1.9	1.9
RES-3A-1	RES02302	1780.00	1781.00	1.00	10.200	10.200	0.060	3.9	1.9	1.9
RES-3A-1	RES02304	1782.00	1783.00	1.00	4.300	4.200	0.089	3.7	1.8	1.8
RES-3A-1	RES02307	1784.00	1785.00	1.00	7.900	7.900	0.110	3.8	1.9	1.9
RES-3A-1	RES02309	1786.00	1787.00	1.00	6.250	6.300	0.078	3.5	1.7	1.7
RES-3A-1	RES02311	1788.00	1789.00	1.00	5.000	4.900	0.047	3.3	1.6	1.6
RES-3A-1	RES02313	1790.00	1791.00	1.00	4.600	4.750	0.023	3.7	1.8	1.8
RES-3A-1	RES02316	1792.00	1793.00	1.00	5.050	5.200	0.030	4.1	2.1	2.1
RES-3A-1	RES02318	1794.00	1795.00	1.00	6.150	6.150	0.033	3.7	1.9	1.9
RES-3A-1	RES02320	1796.00	1797.00	1.00	9.200	9.200	0.032	3.8	1.9	1.9
RES-3A-1	RES02322	1798.00	1799.00	1.00	3.900	3.950	0.041	4.7	2.3	2.3
RES-3A-1	RES02324	1800.00	1801.00	1.00	3.400	3.400	0.046	4.0	2.0	2.0
RES-3A-1	Composite	1736.00	1801.00	34.40	5.416	5.389	0.057	131.2	65.6	65.6

Kennecott provided assay standards for control purposes. The standards were submitted along with test products for check assays. Results are shown in Appendix B at the end of this report, and indicate good agreement between the DML, Assay Labs Inc. and results provide by Kennecott.

A brief description of the three samples used in MC-1 is presented below:

Composite RES2C-2: Chalcopyrite with Pyrite

Composite RES3-1: Chalcopyrite and Bornite with Pyrite

Composite RES3A-1: Chalcopyrite and Bornite with Pyrite

IV. Test Results

Results presented in this section are also included in detailed summary tables and individual test sheets that are appended to this report.

A. Summary

Copper recovered in a rougher-scavenger concentrate was greater than 97%, while moly recovery was 91%. Approximately 91% of the copper and 86% of the moly was recovered into a 2nd cleaner concentrate that assayed 36% Cu and 0.55% moly. These results are based on the last three cycles of a seven cycle locked cycle test. Sodium cyanide was required in the cleaner circuit (0.012 #/ton ore) to depress pyrite. High pH (11.5) in the cleaner circuit was not as affective as cyanide in depressing the pyrite.

A summary of the locked-cycle results (wgt ave. from cycles 5, 6, 7) is presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Summary of Locked Cycle Results (T34 cycles 5, 6, and 7)

Test	Product	Wgt %	Assay, %		% Distribution	
			Cu	Mo	Cu	Mo
34(5,6, & 7)	No. 2 Cl conc.	9.0	36.3	0.549	90.8	85.6
	No. 1 Cl scav tail	17.9	1.3	0.023	6.4	7.2
	Scav tail	73.1	0.14	0.006	2.8	7.2
	Back-calc. Hd	100.0	3.60	0.058	100.0	100.0
	Assay Hd		3.49	0.052		

A copper-moly separation test indicated that approximately 31% moly in the ore was recovered into a 5th moly cleaner concentrate that assayed 44% Mo. These results were based on a single moly separation test using emulsified burner oil and NaHS. The reagent additions were not optimized during this test.

The Cu-Mo and moly flotation results were obtained under the following conditions:

- Primary grind : $P_{80}=120\mu$
- Regrind: $P_{80}=35-40\mu$
- Rougher-Scav flotation Time: 12 minutes (laboratory)
- Rougher-Scavenger pH: 9.0 adjusted with $\text{Ca}(\text{OH})_2$ - 0.98 #/ton ore (total)
- Rougher pulp density: 25-30%
- Cleaner flotation stages: 2
- Cleaner flotation Time: No. 1 Cl – 11 minutes
No. 2 Cl – 8 minutes
- Cleaner pH: 10.5 adjusted with $\text{Ca}(\text{OH})_2$ - 1.1 #/ton ore (total)
- Collectors (Rougher-Scavenger) Burner oil - 0.023 #/ton ore (total)
NaIPX - 0.0175 #/ton ore (sodium isopropyl xanthate) total
- Collectors (Cleaner) Burner oil - 0.01 #/ton ore (total)
NaCN - 0.012 #/ton ore (total)
NaIPX – 0.01 #/ton ore (total)
- Moly cleaner circuit Emulsified burner oil - +0.2 #/ton conc.
NaHS - 48 #/ton conc. (not optimized)

Acid Base Accounting (ABA) results indicate that the No. 1 cleaner scavenger tails has the potential to be a significant acid producer, while the scavenger tails will have slight net neutralizing capacity. Combining the two streams (weight proportioned) yielded net acid production. Removing residual sulfides from the scavenger tailings (test 33, pyrite scav tail) resulted in a tails with net neutralizing capacity. Results are summarized in the following table.

P-2694E: Rio Tinto Technical Services Resolution - MC 1
Summary of ABA Results

Sample	ABA (NP-AP) Ton CaCO_3 / 1000 ton mat.
T-33: No. 1 Cl pyrite tail	-482.9
T-33: Pyrite scav conc.	-138.6
T-33: Pyrite scav tail	19.6
T-34 (5, 6 & 7): No. 1 Cl scav tail	-1216.3
T-34 (5, 6 & 7): Scav tail	10.1
T-34 (5, 6 & 7): Scav tail + No. 1 Cl scav tail (wgt averaged)	-209.8*

Note: Samples from T34 (locked - cycle test) were weight averaged from cycles 5, 6 & 7.

* Calculated ABA (using wgt ave.) = -231.2 ton CaCO_3 /1000 ton mat.

B. Reagent Scoping Test Series

A series of four preliminary reagent scoping tests was performed on the MC-1 sample ground to a $P_{80}=134-137\mu$ and subjected to rougher-scavenger flotation at a pH=9.1. Isopropyl xanthate, thionocarbamate, modified thiourea, and a mixture of thionocarbamate/dithiophosphate collectors were evaluated.

Results indicate that all of the collectors tested produced comparable overall copper and moly recovery. Copper and moly recovery of 97% and 92-94%, respectively, were achieved. A summary of the test results is presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results of Rougher-Scavenger Flotation Reagent Scoping Test Series: $P_{80}=134\mu$, pH 9.3

Test No.	Reagents Dosage (#/ton ore)				Back Calc. Hd, %		Final Tails Assay, %		Metal Recovery, %		Conc. Assay, %	
					Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
1	NaIPX (0.018)				3.40	0.057	0.15	0.006	96.8	92.4	12.1	0.190
2		5415 (0.024)	3477 (0.024)		3.53	0.057	0.15	0.005	96.9	93.6	12.5	0.190
3				5540 (0.048)	3.35	0.053	0.17	0.005	96.3	93.2	11.7	0.180
4		5415 (0.048)			3.56	0.061	0.16	0.005	96.7	94.1	12.5	0.210
		Assay Head, %			3.49	0.052						

NaIPX – Sodium isopropyl xanthate

5415 – Thionocarbamate

3477 – Dithiophosphate

5540 – Modified thiourea

Note: All tests employed the addition of 0.018 and 0.005 lb/ton burner oil to the grind and scav flotation, respectively

NaIPX is less expensive compared to the other collectors tested. A dosage of 0.018 #/ton NaIPX was used for the remainder of the rougher-scavenger test work unless otherwise specified.

C. Primary Grind Fineness Test Series

A series of rougher-scavenger kinetic tests was conducted varying the primary grind fineness from $P_{80}=199$ to 64μ . Results show that copper and to a certain extent moly recovery increased as the grind fineness increased. Results are summarized in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results of the Primary Grind Test Series Using NaIPX, pH=9.3

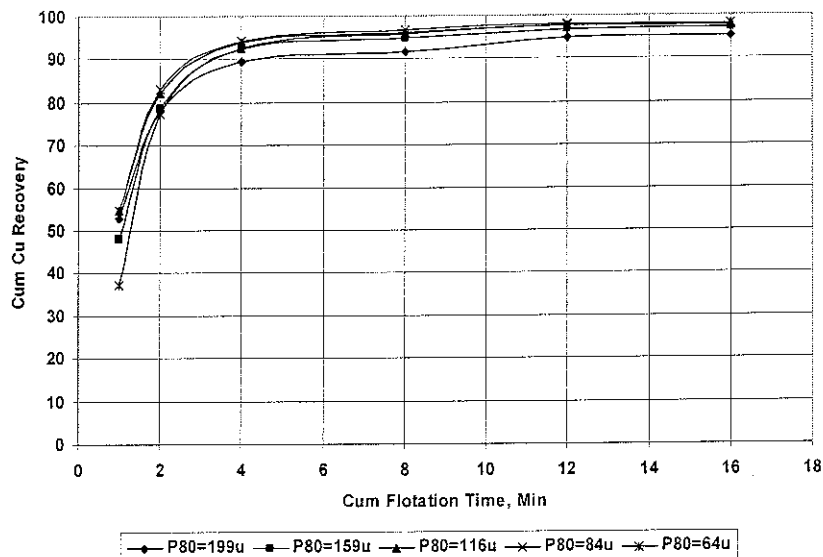
Test No.	Grind P ₈₀ , μ	Back Calc. Hd, %		Final Tails Assay, %		Metal Recovery, %		Conc. Assay, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
5	199	3.38	0.049	0.220	0.008	95.3	88.3	11.4	0.15
6	159	3.44	0.050	0.140	0.005	97.2	93.0	11.2	0.16
7	116	3.38	0.047	0.100	0.006	97.9	91.0	11.2	0.15
8	84	3.42	0.052	0.088	0.005	98.2	93.2	11.5	0.17
9	64	3.34	0.050	0.090	0.004	98.2	94.4	11.2	0.16
Assay Head, %		3.49	0.052						

Based on the results presented, a primary grind of approximately 120 μ was determined as optimum. Flotation kinetic data for copper and moly are presented in the following table and graphs and indicate a rougher-scavenger flotation time of 12 minutes is adequate.

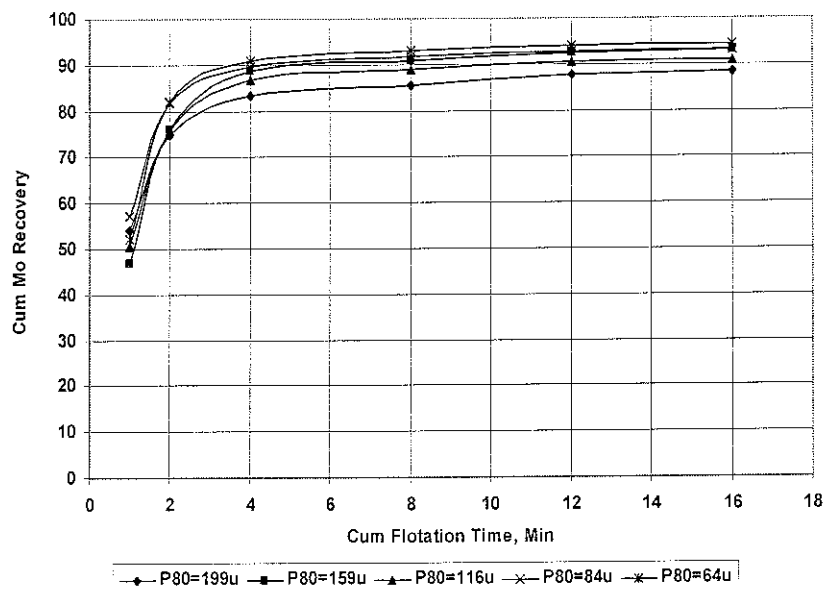
P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Results of the Rougher/Scavenger Kinetic Test Series; pH=9.3

Cum Flotation Time, Min	T-5, 199 μ		T-6, 159 μ		T-7, 116 μ		T-8, 84 μ		T-9, 64 μ	
	Recovery, %		Recovery, %		Recovery, %		Recovery, %		Recovery, %	
	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
1	52.8	54.0	48.0	46.9	54.8	50.7	54.7	57.2	37.3	52.1
2	77.9	75.0	78.5	76.0	82.2	75.8	83.2	81.8	77.4	82.1
4	89.5	83.2	92.5	88.5	94.1	86.8	94.1	89.7	92.7	91.0
8	91.8	85.7	94.8	91.0	96.3	89.2	96.7	91.9	95.8	93.0
12	95.0	87.7	96.9	92.5	97.7	90.6	98.0	92.9	97.8	94.0
16	95.3	88.3	97.2	93.0	97.9	91.0	98.2	93.2	98.2	94.4
Scav Tails	4.7	11.7	2.8	7.0	2.1	9.0	1.8	6.8	1.8	5.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Calc Hd, %	3.38	0.049	3.44	0.050	3.38	0.047	3.42	0.052	3.34	0.050
Assay Hd, %	3.49	0.052	3.49	0.052	3.49	0.052	3.49	0.052	3.49	0.052

P-2694E: RTTS - Resolution Master Comp. No. 1
Cum Cu Recovery vs Flotation Time



P-2694E: RTTS - Resolution Master Comp. No. 1
Cum Mo Recovery vs Flotation Time



D. Rougher-Scavenger Flotation pH Test Series

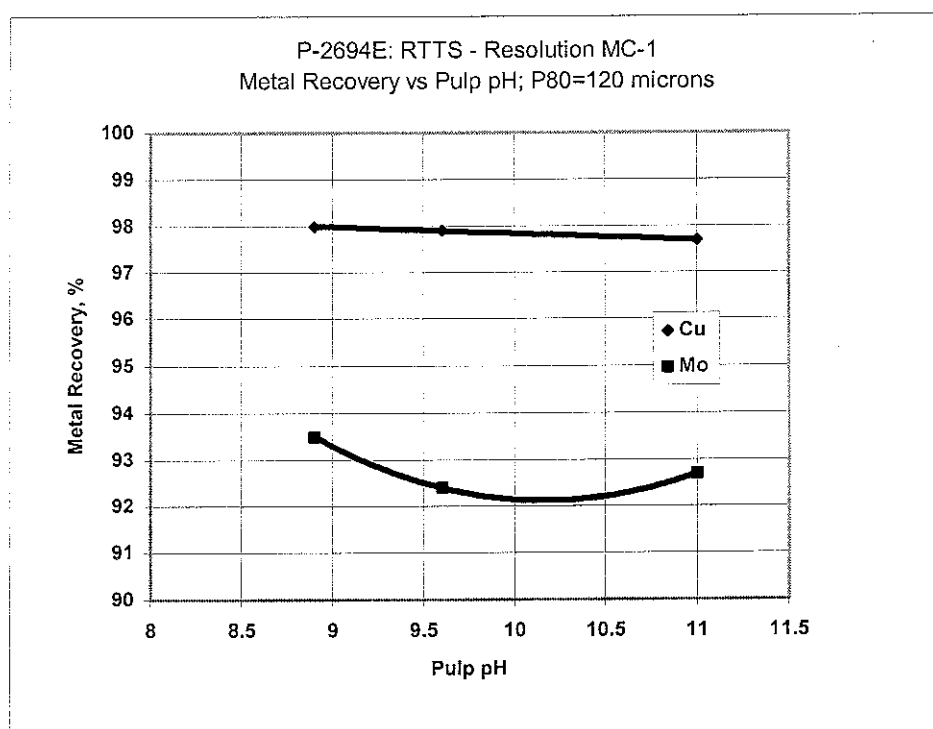
There is little correlation between copper and moly recovery and rougher flotation pH. Copper recovery was approximately 98% while moly recovery increased slightly from 92.7 to 93.5 as the pH decreased from 11.0 to 8.9. A summary of the test results is presented in the following table

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results of the pH Test Series Using NaIPX, P₈₀=120 μ

Test No.	Ca(OH) ₂ , #/ton ore	Flotation pH	Back Calc. Hd, %		Final Tails Assay, %		Metal Recovery, %		Conc. Assay, %	
			Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
10	0.6	8.9	3.40	0.066	0.094	0.006	98.0	93.5	11.8	0.22
11	0.9	9.6	3.44	0.066	0.099	0.007	97.9	92.4	12.1	0.22
12	1.5	11.0	3.42	0.063	0.100	0.006	97.7	92.7	14.8	0.26
Assay Head, %			3.49	0.052						

Hydrated lime was used for all pH adjustment test work. Hydrated lime dosages presented in the table are addition to the primary grind only. Between 0.7 and 2.1 lb/ton Ca(OH)₂ was required to maintain the pulp pH at the desired level for the duration of the rougher-scavenger float. Based on the results presented a rougher-scavenger pH of 9.0 was adequate and used for the remainder of the test work.

A plot of metal recovery versus pulp pH is presented in the following graph.



E. Cleaner Flotation – Effect of Regrind Fineness

The following procedure was conducted to produce sufficient concentrate for subsequent cleaner flotation test work.

Three, 2 kg rougher-scavenger flotation tests were conducted on MC-1. The rougher-scavenger flotation conditions were a primary grind fineness $P_{80}=120\mu$, flotation pH=9.0 and pulp density of 30% solids. The rougher-scavenger concentrates from the three tests were combined, filtered and split into four equal weight charges for regrind fineness tests. Each charge was submerged in water to prevent surface oxidation until tested.

All regrind cleaner tests were conducted at a pH=11.0 along with the addition of 0.005 #/ton burner oil each to regrind mill and No. 1 cleaner. NaIPX dosages of 0.019 #/ton and 0.002 #/ton ore were added to the No. 1 and No. 2 cleaners, respectively.

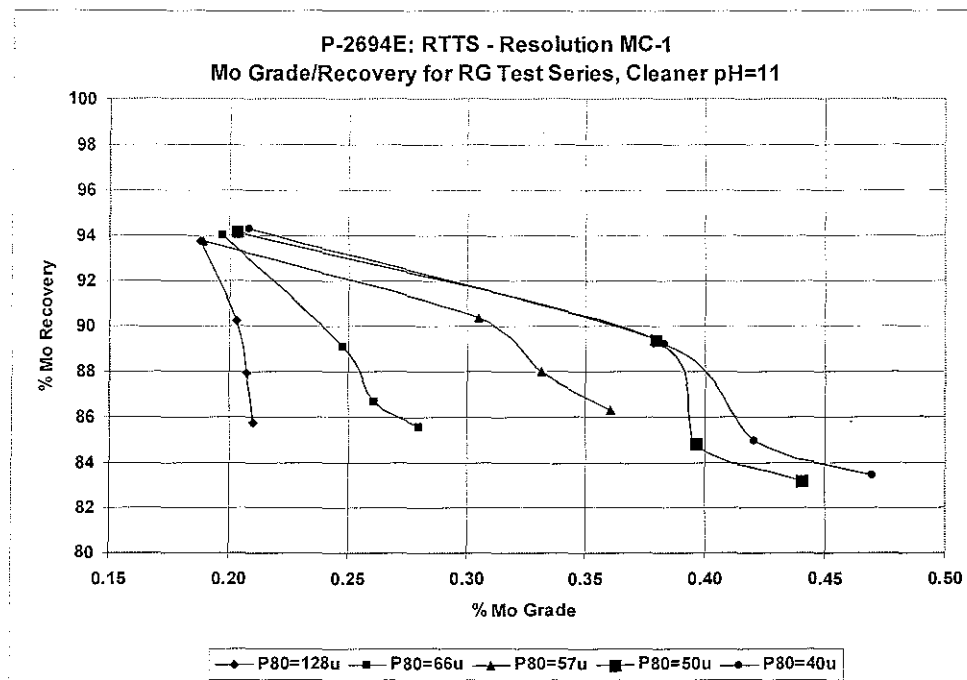
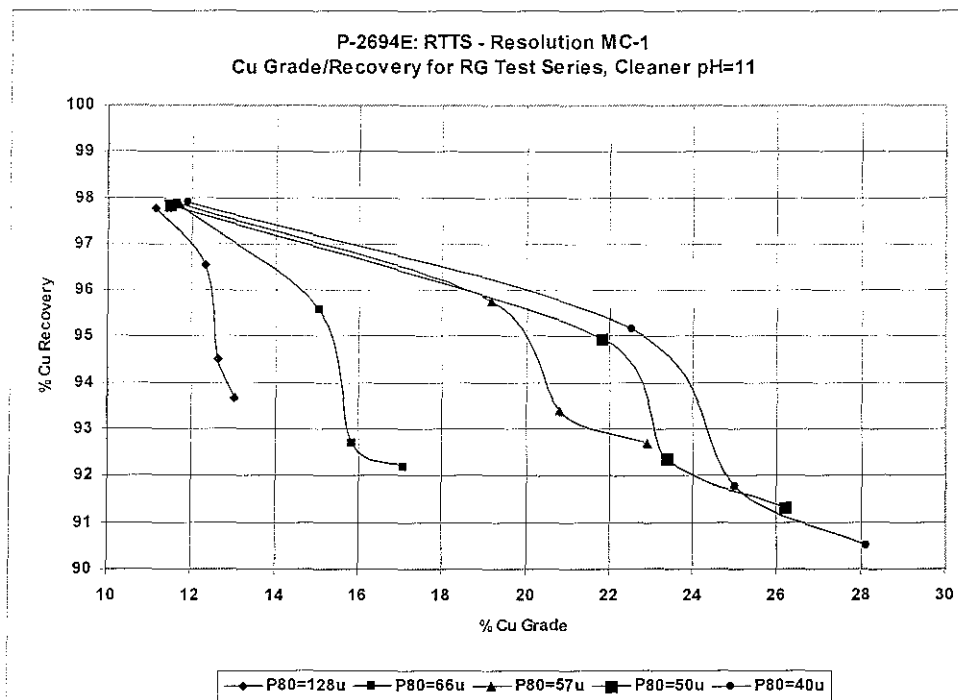
Results show that as the regrind P_{80} decreased, copper and moly recovery into the No. 2 cleaner concentrate also decreased. The No. 2 cleaner copper recovery ranged from 90 to 94% as the grind fineness increased from 128 μ (no regrind) to 40 μ . While the copper recovery was excellent, the No. 2 cleaner concentrate grade was poor. The No. 2 cleaner concentrate copper grades ranged from only 13 to 27% as the grind fineness decreased from 128 to 40 μ , respectively. Results are presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results from Regrind Cleaner Test Series; Cleaner pH=11.0

Test No.	RG P_{80}, μ	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
				Assay, %		Distribution, %		Assay, %		Distribution, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
14	128*	3.24	0.057	13.0	0.21	93.7	85.8	0.15	0.007	3.4	9.7
15	66	3.39	0.060	17.1	0.28	92.2	85.6	0.19	0.008	4.4	10.9
16	57	3.40	0.057	22.7	0.36	92.5	86.3	0.17	0.007	4.3	9.6
17	50	3.34	0.062	26.2	0.44	91.0	83.2	0.20	0.008	5.1	10.6
18	40	3.46	0.063	27.4	0.47	90.1	83.4	0.20	0.008	5.1	10.8
Head Assay, %		3.49	0.052								

* No regrind

Copper and moly grade/recovery curves are presented below.



The correlation between reduced copper recovery and sample aging is described in the report issued July 16, 2002. High NaIPX dosages were required during this work to ensure flotation of bornite from the aged composites (all composites were kept frozen until tested).

During the current test series significant pyrite was observed (using an optical microscope) in the final concentrates. Although the cleaner pH was 11.0, the pyrite responded as if it had/was activated. Further evaluation of the reagent scheme suggested that the addition of 0.019 #/ton NaIPX to the No. 1 cleaner was probably excessive. Once the pyrite had been activated in this stage it was not depressed in subsequent cleaning stages.

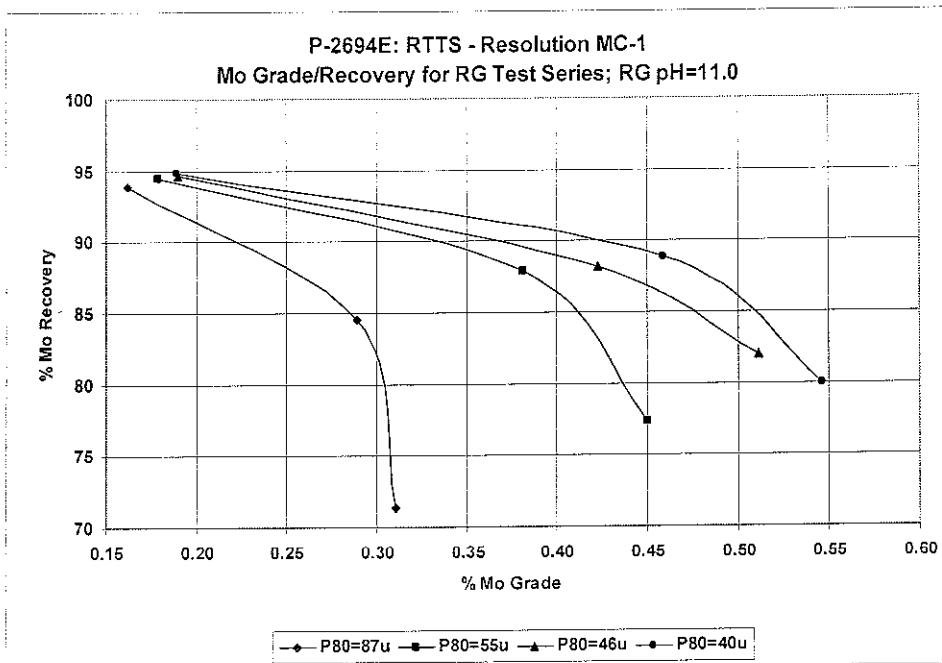
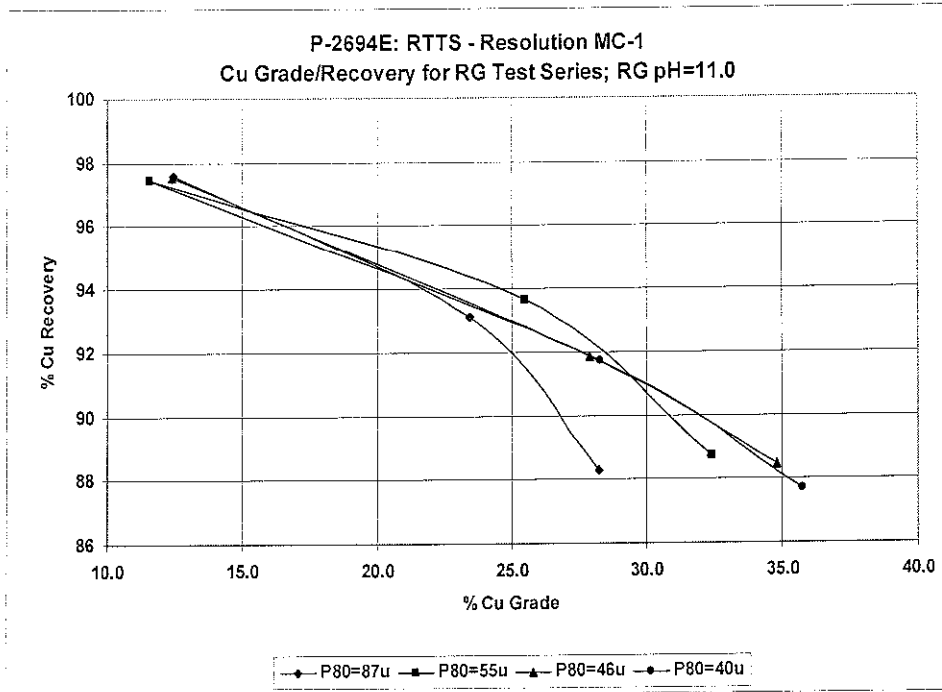
The regrind test series was repeated with minimal NaIPX addition to the cleaner circuit. During this series no xanthate was added to the No. 1 cleaner. A dosage of 0.004 #/ton ore of NaIPX each was added to a No. 1 and No. 2 cleaner extension stages. Concentrate from the No. 1 and No. 2 cleaner extension stages were combined with the No. 1 and No. 2 concentrates, respectively. Results show that as the grind fineness increased copper and moly grades into the No. 2 cleaner concentrate increased. The moly recovery into the final concentrate also increased at the finer grind. At a regrind $P_{80}=40\mu$, 88% copper was recovered into the final concentrate that contained 36% Cu. A summary of the test results is presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results from Repeat Regrind Cleaner Test Series: Cleaner pH=11.0

Test No.	RG P_{80}, μ	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
				Assay, %		Distribution, %		Assay, %		Distribution, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
21	87	3.49	0.048	28.3	0.31	88.3	71.4	0.216	0.007	5.3	13.3
22	55	3.30	0.053	32.4	0.45	88.7	77.4	0.197	0.006	5.2	10.0
23	46	3.48	0.055	34.8	0.51	88.4	82.0	0.205	0.006	5.1	8.7
24	40	3.33	0.056	35.8	0.55	87.7	79.9	0.210	0.006	5.6	9.0
Head Assay, %		3.49	0.052								

The copper recovery into the No. 2 cleaner concentrate was equivalent at all regrind fineness tested, while moly recovery increased at a finer grind. A targeted regrind fineness of 40μ was used for the remainder of the cleaner test work.

Copper and moly grade/ recovery curves are presented in the following graphs.



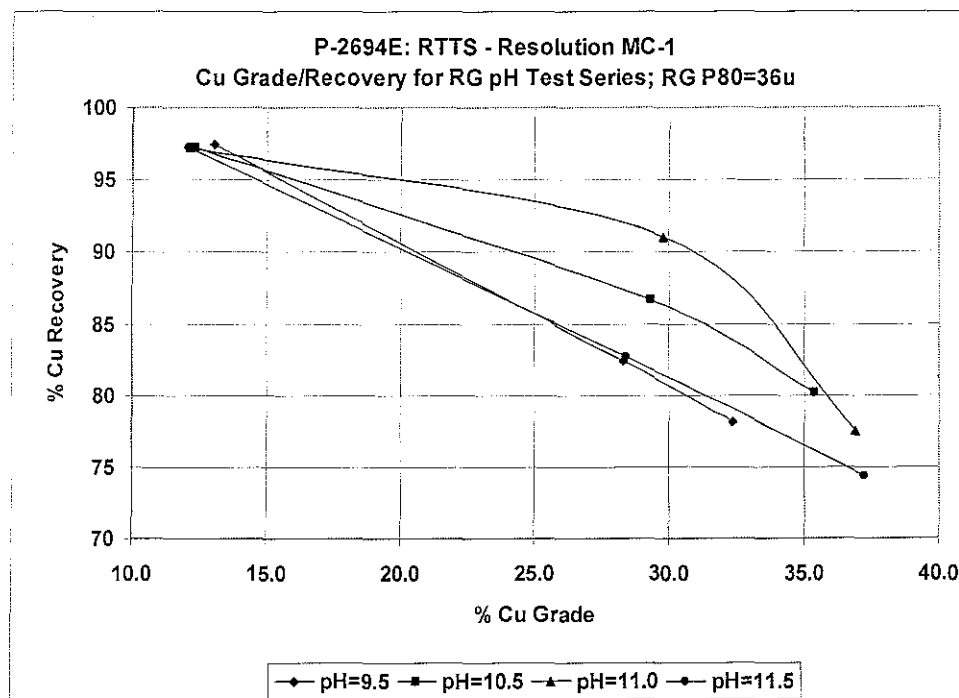
F. Cleaner Flotation – Effect of Pulp pH

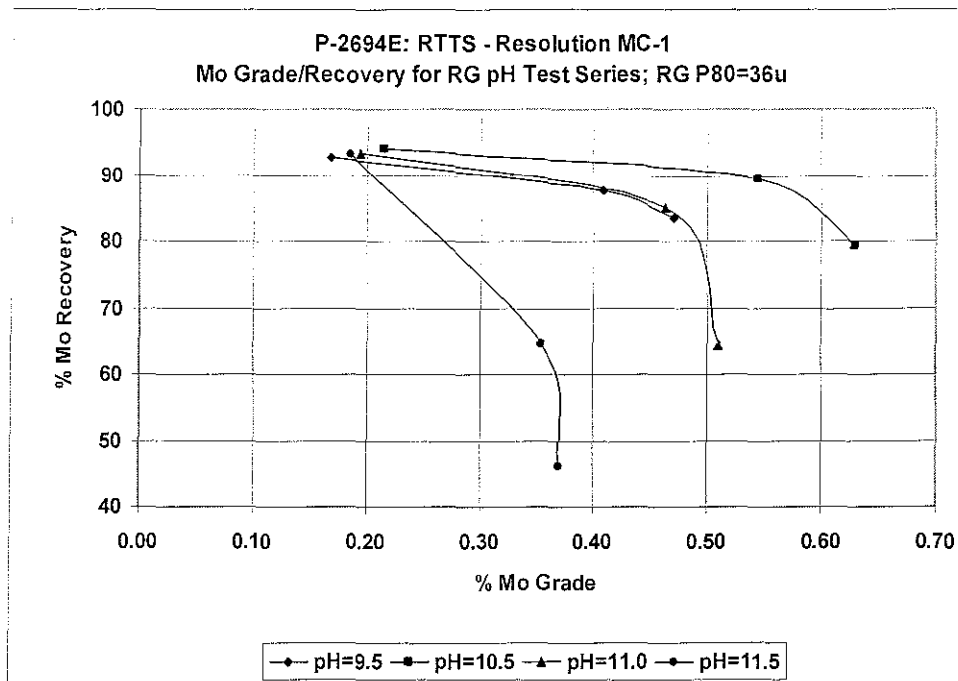
The same rougher-scavenger test procedure described earlier was conducted to produce enough concentrate for the cleaner regrind pH series. The cleaner pH series was performed in which the pulp pH varied from 9.5 to 11.5 using hydrated lime. Results summarized below, indicate that a pH of 10.5 yielded the highest copper recovery into the No. 2 cleaner concentrate. Moly recovery into the No. 2 cleaner concentrate decreased as the pH increased. A summary of the results is presented below.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results from Regrind Cleaner pH Test Series; RG P₈₀=36 μ

Test No.	Cl pH	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
				Assay, %		Distribution, %		Assay, %		Distribution, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
26	9.5	3.65	0.049	32.4	0.47	78.1	83.6	0.300	0.006	7.2	11.1
27	10.5	3.42	0.062	35.4	0.63	80.2	79.4	0.233	0.006	6.1	8.7
28	11.0	3.37	0.056	36.9	0.51	77.6	64.4	0.226	0.006	5.9	10.2
29	11.5	3.36	0.054	37.3	0.37	74.3	46.3	0.306	0.011	8.1	18.2
Head Assay, %		3.49	0.052								

Copper and moly grade/recovery curves are presented below.





Based on the results reported a cleaner pH of 10.5 was used for the remainder of the test work.

G. Cleaner Flotation – Optimizing Reagent Dosages

The cleaner test work conducted yielded copper grades and recovery into the final concentrate of 35% and 80%, respectively. A series of tests were conducted to optimize the reagent dosage and determine if an increase in copper and moly grade and recovery into final flotation concentrates could be achieved. The primary focus of the test work was to reduce the amount of pyrite reporting to the final concentrate thus increasing copper grade.

The test series evaluated three scenarios; 1) excluding burner oil to the No. 1 cleaner stage, 2) replacing NaIPX with 5415/3477, and 3) adding sodium cyanide to the No. 1 cleaner stage. A brief explanation for the purpose of each test is described: 1) Apparently burner oil added to the flotation circuit has been documented as enhancing pyrite flotation, 2) Cytec has reported that the combination of 5415/3477 is more selective than xanthates for recovering copper minerals and rejecting pyrite, and 3) cyanide is well documented for pyrite depression.

Results show that copper and moly grade and recovery decreased without burner oil to the No. 1 cleaner (T27 and 30). Replacing NaIPX with 5415/3477 yielded comparable

copper grades to the No. 2 cleaner concentrate (T27 and 31). The copper recovery to the No. 2 cleaner concentrate was 3.5% greater (83.7% vs 80.2%), while moly recovery was 4% less (75% vs 79%) using 5415/3477. The addition of sodium cyanide to the No. 1 cleaner (T33) subsequently yielded a No. 2 cleaner concentrate containing 36% copper while recovering 84% copper. This is approximately 4% greater copper recovery than without cyanide addition (T27 and 33). However, moly recovery into the No. 2 cleaner concentrate decreased by 5%. A summary of the test results is reported in the following table. A detailed description of reagent type, dosage and addition point is presented in the appendix section at the end of this report.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results from Cleaner Reagent Optimization Tests; pH=10.5, RG P₈₀=36 μ

Test No.	Reagent Addition (#/ton of ore)	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
		Assay, %		Distribution, %		Assay, %		Distribution, %		Assay, %	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
27	BO No.1 Cl (0.005)	3.42	0.062	35.4	0.63	80.2	79.4	0.233	0.006	6.1	8.7
30	BO No.1 Cl Scav (0.005)	3.31	0.058	31.3	0.53	70.8	69.0	0.321	0.008	8.6	11.7
31*	BO No.1 Cl (0.005)	3.41	0.059	35.0	0.54	83.7	75.2	0.229	0.006	5.9	9.1
32*	BO No.1 Cl Scav (0.005)	3.37	0.058	34.7	0.51	80.5	69.2	0.258	0.007	6.7	9.9
33**	NaCN No. 1 Cl (0.01)	3.43	0.057	35.9	0.53	83.9	74.1	0.220	0.006	5.6	8.7
Assay Head, %		3.49	0.052								

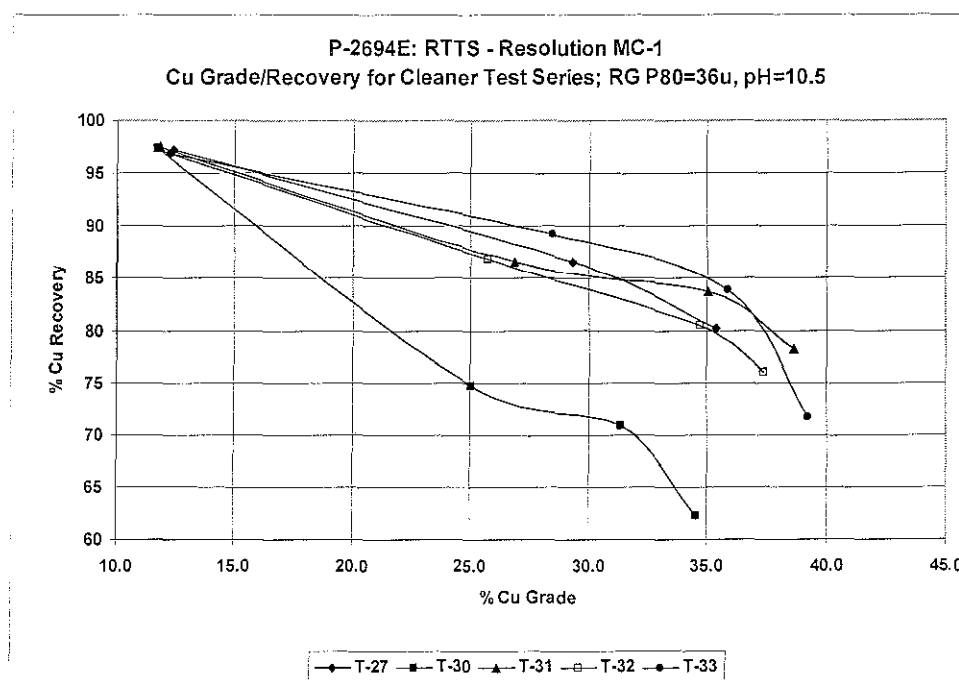
* Replace NaIPX with 5415/3477

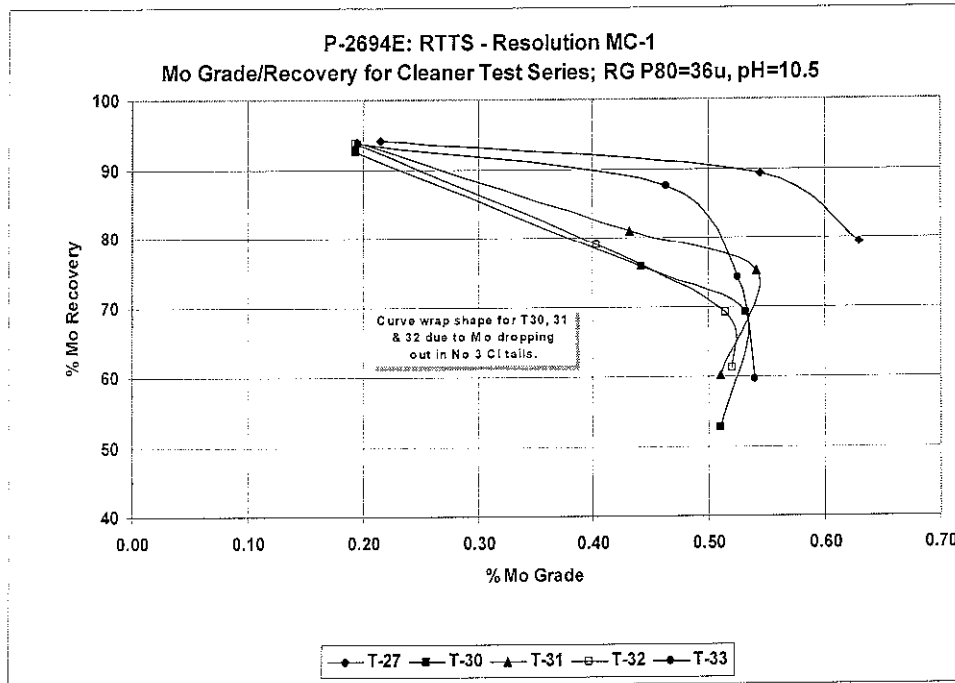
** Repeat T27 except add 0.01 #/ton NaCN to the No. 1 Cl

BO – Burner oil

Based on the results reported, the addition of NaCN to the No. 1 cleaner circuit yielded sufficient copper grade and recovery to the No. 2 cleaner concentrate. NaCN was therefore used in all remaining flotation cleaner test work.

Copper and moly grade/ recovery curves are shown in the following graphs.





H. Removal of Pyrite from Scavenger and Cleaner Scavenger Tailings Products

A single 2 kg test was conducted on the MC-1 sample to evaluate flotation procedures and reagent dosages to remove pyrite from the scavenger tail and No. 1 cleaner scavenger tail. The purpose of the test was to determine if a pyrite/sulfide free tailings product could be produced thus minimizing the likely hood of acid generating tailings.

Results from test 33 show that a pyrite concentrate from the No. 1 cleaner scavenger tails was produced containing 10% of the total weight and assaying 43% Fe and 50% S(tot). This concentrate represented 48% and 50% of the total Fe and S(tot), respectively. A pyrite scavenger concentrate from the scavenger tails was produced that assayed 6% Fe and 5% S(tot). A summary of the results along with internal balances of combined streams is presented in the following tables.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Test 33: Pyrite Removal from Tailings Products; Cl pH=10.5. RG P₈₀=36u

Test No.	Product	Wgt %	Assay, %				% Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
33	No. 1 Cl pyrite conc.	9.9	0.62	0.007	43.3	50.3	1.8	1.2	48.4	50.2
	No. 1 Cl pyrite tail	5.1	0.5	0.013	14.8	15.2	0.8	1.2	8.6	7.9
	Pyrite scav conc.	1.6	2.2	0.046	6.2	5.3	1.0	1.3	1.1	0.8
	Pyrite scav tail	71.3	0.100	0.004	1.51	0.27	2.1	5.0	12.2	1.9
	Ro & Scav conc.	27.1	12.3	0.196	28.4	35.6	96.9	93.7	86.8	97.2
	Scav tails	72.9	0.146	0.005	1.61	0.38	3.1	6.3	13.3	2.8
	Pyrite scav tails & No. 1 Cl pyrite tail	76.5	0.127	0.005	2.4	1.3	2.8	6.2	20.7	9.8
	Calc. head		3.43	0.057	8.86	9.91	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				

P-2694E: Rio Tinto Technical Services – Resolution MC-1Test 33: Fe and S(tot) Balance on No. 1 Cl Scav Tailings; Cl pH=10.5, RG P₈₀=36 μ

Test No.	Product	Wgt %	Assay, %		% Distribution	
			Fe	S(tot)	Fe	S(tot)
33	No. 1 Cl pyrite conc.	66.0	43.3	50.3	85.0	86.5
	No. 1 Cl pyrite tail	34.0	14.8	15.2	15.0	13.5
	No. 1 Cl scavenger tail	100.0	33.6	38.4	100.0	100.0

P-2694E: Rio Tinto Technical Services – Resolution MC-1Test 33: Fe and S(tot) Balance on Scav Tailings; Cl pH=10.5, RG P₈₀=36 μ

Test No.	Product	Wgt %	Assay, %		% Distribution	
			Fe	S(tot)	Fe	S(tot)
33	Pyrite scav conc.	2.2	6.2	5.3	8.5	28.4
	Pyrite scav tail	97.8	1.5	0.3	91.5	71.6
	Scavenger tail	100.0	1.6	0.4	100.0	100.0

P-2694E: Rio Tinto Technical Services – Resolution MC-1Test 33: Fe and S(tot) Balance on No. 1 Cl Scav & Scav Tailings; Cl pH=10.5, RG P₈₀=36 μ

Test No.	Product	Wgt %	Assay, %		% Distribution	
			Fe	S(tot)	Fe	S(tot)
33	No. 1 Cl scavenger tail	17.1	33.6	38.4	81.2	95.2
	Scavenger tail	82.9	1.6	0.4	18.8	4.8
	Scavenger & No. 1 Cl Scav tail	100.0	7.1	6.9	100.0	100.0

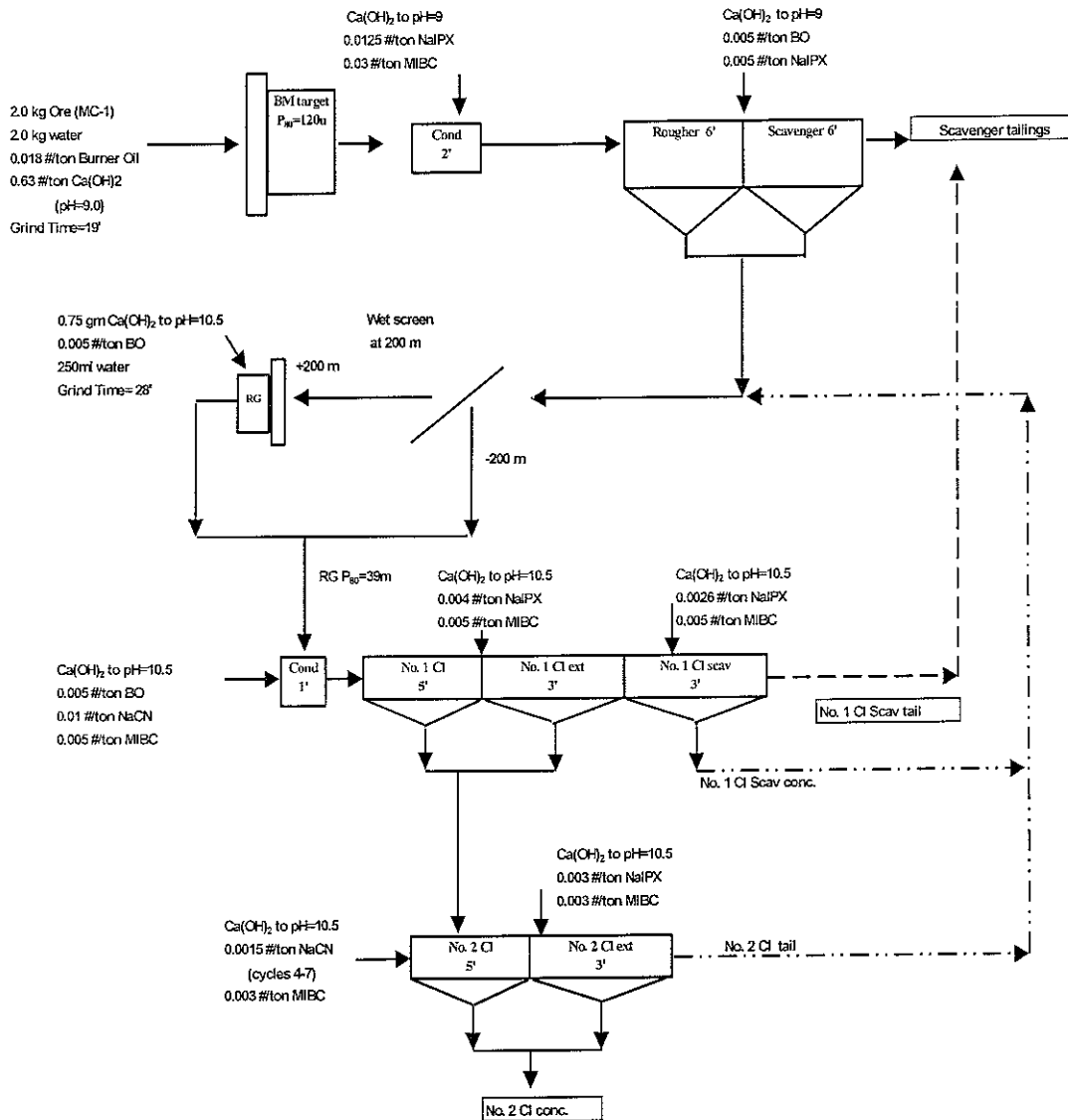
I. Locked Cycle Test on MC-1

A locked cycle test was conducted using the flowscheme illustrated on the following page. A summary of the locked cycle results is presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1Summary of Locked Cycle Results (T34 cycles 5, 6, and 7)

Test	Product	Wgt %	Assay, %		% Distribution	
			Cu	Mo	Cu	Mo
34(5, 6, & 7)	No. 2 Cl conc.	9.0	36.3	0.549	90.8	85.6
	No. 1 Cl scav tail	17.9	1.3	0.023	6.4	7.2
	Scav tail	73.1	0.14	0.006	2.8	7.2
	Back-calc. Hd	100.0	3.60	0.058	100.0	100.0
	Assay Hd		3.49	0.052		

P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
T-34: Flow Diagram for Locked Cycle Test



Approximately 91% of the copper and 86% of the moly was recovered into the No. 2 cleaner concentrate. During the locked cycle test, increased amounts of chalcopyrite and bornite were observed (using an optical microscope) in the No. 2 cleaner tail. A dosage of 0.0015 #/ton NaCN was added, prior to the xanthate, to the No. 2 cleaner in cycles 4-7 to assist in depressing activated pyrite. It was assumed that prior to the NaCN addition pyrite in the No. 2 cleaner was activated by the xanthate preferentially to the copper minerals. With the addition of NaCN to the No. 2 cleaner, copper in the No. 2 cleaner tails steadily decreased from 3.5% in cycle 4 to 1.0% in cycle 7.

Weight average flotation products from cycles 5, 6 and 7 were produced for detailed mineralogy. The samples examined were the No. 2 cleaner concentrate, No. 1 cleaner scavenger tails and scavenger tails. Splits from these products were sent to RTTS in Great Britain for mineralogy and to RTTS in Australia for QemSEM analysis. In addition, a split from these samples was also sent to ACT Labs, Tucson for gold and silver analysis and a detailed trace element analysis on the No. 2 cleaner concentrate. Results from mineralogy and QemSEM work will be provided in separate reports.

Although specified to ACT Labs to perform detailed analyses on only the No. 2 Cl concentrate the analyses were conducted on the three flotation products. The elements and assays underlined and in **bold** are the most important smelter penalty items. Results are presented in the following table and on the next page.

A gold and silver balance from the locked cycle test (test 34 cycles 5, 6 & 7) is presented in the following table.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Au and Ag Balance from the Locked Cycle Test (T34 cycles 5, 6, and 7)

Test	Product	Wgt %	Assay		% Distribution	
			Au, ppb	Ag, ppm	Au	Ag
34(5, 6, & 7)	No. 2 Cl conc.	9.0	666	105.7	62.2	84.9
	No. 1 Cl scav tail	17.9	98	7.0	18.1	11.2
	Scav tail	73.1	26	0.6	19.7	3.9
	Back-calc. Hd	100.0	97	11.2	100.0	100.0
	Assay Hd		50	12.2		

P-2694E: Rio Tinto Technical Services - Resolution MC1
Detailed Assays from Locked Cycle Test 33 (5, 6, & 7); wgt averaged

Element	Units	No. 2 CI Conc	No. 1 CI scav tail	Scav tail	Method
Ag	ppm	105.7	7	0.6	ICP
Al	%	0.54	1.78	3.71	ICP
As	ppm	987	64.5	13.9	INAA
Au	ppb	666	98	26	INAA
Ba	ppm	<50	<50	240	INAA
Bi	ppm	580	24.8	2.3	ICP-MS
Br	ppm	<0.5	<0.5	<0.5	INAA
Ca	%	0.72	1.45	2.28	ICP
Cd	ppm	30.6	1.8	<0.3	ICP
Ce	ppm	23	32	36	INAA
Cl	%	0.2	-	-	INAA
Co	ppm	241	242	4	INAA
Cu*	%	36.3	1.2	0.1	Titrl./ICP
Cr	ppm	67	240	77	INAA
Cs	ppm	<1	<1	<1	INAA
Eu	ppm	<0.2	1	1	INAA
F	%	0.22	-	-	SIE
Fe	%	26.4	36.7	1.95	INAA
Ge	ppm	1.1	1.4	1.1	ICP-MS
Hf	ppm	1	2	4	INAA
Hg	ppm	<1	<1	<1	INAA
In	ppm	18.8	1.5	0.6	ICP-MS
Ir	ppb	<5	<5	<5	INAA
K	%	0.1	0.5	1.48	ICP
La	ppm	11.6	15.8	18.1	INAA
Lu	ppm	0.08	0.12	0.24	INAA
Mg	%	0.03	0.22	0.58	ICP
Mn	ppm	154	395	619	ICP
Mo	ppm	5992	374	52	ICP
Na	%	0.01	0.01	0.03	INAA
Nd	ppm	<5	15	17	INAA
Ni	ppm	95	111	4	ICP
P	%	<0.001	0.031	0.046	ICP
Pb	ppm	323	79	84	ICP
Rb	ppm	<15	30	76	INAA
S	%	25.4	27.7	0.4	ICP
Sb	ppm	24.9	3.9	1.4	INAA
Sc	ppm	1.4	3.6	8.3	INAA
Se	ppm	177	54.3	1.5	ICP-MS
Sm	ppm	1.7	3	3.5	INAA
Sn	ppm	44	8	8	ICP-MS
Sr	ppm	249	291	267	ICP
Ta	ppm	<0.5	0.8	0.8	INAA
Tb	ppm	<0.5	<0.5	<0.5	INAA
Te	ppm	30.6	6.1	0.7	ICP-MS
Th	ppm	3.2	3.7	4.6	INAA
Ti	ppm	3.5	0.5	0.3	ICP-MS
U	ppm	7.7	8	9.1	INAA
V	ppm	<2	54	121	ICP
W	ppm	43	51	74	INAA
Y	ppm	8	11	11	ICP
Yb	ppm	0.6	0.9	1.6	INAA
Zn	ppm	6180	229	111	INAA

* The No. 2 CI conc. assay was determined by Assay Labs Inc. using a long iodide titration procedure. The No. 1 CI scav tail and scav tail assays were determined using ICP by ACT labs.

INAA - Neutron Activation

ICP - Total Digestion ICP

ICP-MS - ICP - Mass Spec.

SIE - Specific Ion Electrode

Titrl./ICP - Long Iodide Titration (No. 2 CI Conc.) / ICP (No. 1 CI scav tail & scav tails)

J. Moly Separation Test

A single moly separation test was conducted on combined No. 2 cleaner concentrates generated from three separate 2 kg rougher-scavenger-cleaner flotation tests. The No. 2 cleaner concentrates were generated in three batch tests using the locked cycle test reagent scheme. The purpose of the moly separation test was to determine if a final moly concentrate could be produced from a final copper-moly concentrate. Reagent dosages were not optimized during this test. Nitrogen was used as the flotation gas.

Overall results show that 31% of the moly was recovered into a No. 5 moly cleaner concentrate assaying 44% Mo. Based on the moly rougher feed, 92.4% of the moly was recovered into the rougher concentrate; while 47% Mo was recovered into the subsequent No. 5 moly cleaner concentrate. Emulsified burner oil (+0.2 #/ton concentrate) was used during the test work along with a total of 48 #/ton concentrate NaHS. The moly circuit feed was initially conditioned at approximately 15% solids, not 30-40% solids as is typically conducted at moly plants. The EMF was maintained between -315 and -530 mv (Pt/Ag-AgCl electrode) during the test.

A summary of the test results is presented in the following tables. A flow diagram of the complete test is appended at the end of this report.

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results of Cu-Mo Bulk Cleaner Test; RG P₃₀=39%, Cleaner pH=10.5

Test No.	Product	Wgt %	Assay, %		% Distribution	
			Cu	Mo	Cu	Mo
36	No. 2 Cl conc.	7.8	34.7	0.510	80.5	67.5
	No. 1 Cl conc.	10.4	28.1	0.450	87.4	80.7
	No. 1 Cl scav tail	15.6	0.8	0.012	3.8	3.2
	Ro + scav conc.	27.6	11.7	0.190	96.8	91.7
	Scav tail	72.4	0.147	0.007	3.2	8.3
	Calc. head	100.0	3.35	0.058	100.0	100.0
	Assay head		3.49	0.052		

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Summary of Moly Separation Test

Test No	Product	Wgt %	Assays, %		% Distribution, (of ore)		% Distribution, (of Mo Fd)	
			Cu	Mo	Cu	Mo	Cu	Mo
36	No. 5 Mo Cl conc. *	0.042	3.2	43.8	0.04	31.4	0.05	46.6
	No. 4 Mo Cl conc.	0.046	3.8	42.6	0.05	34.0	0.06	50.4
	No. 3 Mo Cl conc.	0.052	4.8	40.3	0.07	35.8	0.09	53.1
	No. 2 Mo Cl conc.	0.074	9.2	30.8	0.20	39.2	0.25	58.1
	No. 1 Mo Cl conc.	0.132	12.9	23.3	0.51	53.0	0.63	78.5
	Mo Rougher conc.	0.656	25.4	5.5	5.0	62.4	6.19	92.4
	Mo Ro Fd (No. 2 Cl conc.)	7.8	34.7	0.51	80.5	67.5	100.0	100.0
	Ro-Scav conc.	27.6	11.7	0.19	96.8	91.7	-	-
	Scav Tail	72.4	0.147	0.007	3.2	8.3	-	-

* No. 5 Cl conc. contained: Fe -4.7 %, S(tot) - 37.6% and Insol - 6.6%

K. Effect of NaCN Addition to the Cleaner Circuit on Moly Recovery

The previous test results showed that the only 68% of the moly was recovered in the No. 2 cleaner concentrate (moly rougher feed). This compares with 74% moly recovery in test 33 and 79% moly recovery from test 27. The reagent scheme was the same for all three tests with the exception that NaCN was added to the No. 1 cleaner in tests 33 and 36 and also added to No. 2 cleaner in test 36. No NaCN was added to test 27. A summary table showing copper and moly results from these tests is presented below.

P-2694E: Rio Tinto Technical Services – Resolution MC-1
Results of NaCN Addition to Cleaner Circuit Tests

Test No.	NaCN (Total #/ton)	Back Calc. Hd, %		Final (No. 2 Cleaner) Concentrate				Final Tails (Scav + No. 1 Cl scav tail)			
				Assay, %		% Distribution		Assay, %		% Distribution	
		Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo	Cu	Mo
27	-	3.42	0.062	35.4	0.63	80.2	79.4	0.233	0.006	6.1	8.7
33	No. 1 Cl (0.01)	3.43	0.057	35.9	0.53	83.9	74.1	0.220	0.006	5.6	8.7
36	No. 1 & 2 Cl (0.012)	3.35	0.058	34.7	0.51	80.5	67.5	0.263	0.008	6.9	11.5
34(5, 6 & 7)*	No. 1 & 2 Cl (0.012)	3.60	0.058	36.3	0.55	90.8	85.6	0.301	0.008	7.0	11.9
Head Assay, %		3.49	0.052								

*The final tailing results are from cycle 7 only.

The batch results presented suggest that moly is depressed when NaCN is added to the Cu-Mo cleaner circuit. However, locked cycle results (test 34 cycles 5, 6 & 7) show that the moly is recovered in subsequent cycles.

Any additional moly separation work should be evaluated without the used of NaCN in batch Cu-Mo cleaner circuit test work.

L. Acid Base Accounting (ABA)

A series of ABA tests were conducted on select flotation products from test 33 (pyrite removal from tailings products) and test 34 (locked cycle test). The purpose of the ABA work was to determine if the samples would be net acid producing or have an excess neutralizing capacity. A Kennecott Utah Copper (KUC) ABA test procedure was used.

A sample from each was leached separately with dilute HCl, water washed, air dried then analyzed for S(tot) to subsequently determine the acid potential (AP). A separate sample from each was contacted with 0.25–0.5 N HCl then back titrated with NaOH to determine the neutralizing potential (NP). The difference (NP – AP) yields the ABA. A negative ABA value indicates potential acid production. A positive ABA values indicates excess neutralizing capacity. A summary of the ABA results is presented in the following table.

P-2694E: Rio Tinto Technical Services Resolution - MC 1
Summary of ABA Results

Sample	Wgt % (of ore)	Net Base Potential	Net Acid Potential	ABA (NP-AP) Ton CaCO ₃ / 1000 ton mat.
T-33: No. 1 Cl pyrite tail	1.3	7.6	490.5	-482.9
T-33: Pyrite scav conc.	1.6	13.0	151.6	-138.6
T-33: Pyrite scav tail	71.3	27.7	8.1	19.6
T-34 (5, 6 & 7): No. 1 Cl scav tail	17.9	30.4	1246.7	-1216.3
T-34 (5, 6 & 7): Scav tail	73.1	27.1	17.0	10.1
T-34 (5, 6 & 7): Scav tail + No. 1 Cl scav tail (wgt averaged)	91.0	25.8	235.6	-209.8*

Note: Samples from T34 (locked – cycle test) were weight averaged from cycles 5, 6 & 7.

* Calculated ABA (using wgt ave.) = -231.2 ton CaCO₃/1000 ton mat.

Results indicate that removing pyrite from the scavenger tails (T33) yields a final tails with a net neutralizing potential. However, the pyrite bearing scavenger concentrate is net acid producing. Results from the locked-cycle test show that the combined (weight averaged) scavenger tails and No. 1 Cl scavenger tail will be a net acid producer at -210 ton CaCO₃/1000 ton material.

The No. 1 Cl scavenger tails represents approximately 20 wgt % of the combined scavenger tail/No. 1 Cl scavenger tails product. Due to the high acid producing potential of the No. 1 Cl scavenger tails, this material could be stored in a separate tailings impoundment.

M. Flotation Results of Sample 2C-2

As stated earlier, flotation test work had been conducted on the individual samples that comprise MC-1. Flotation results of samples 3-1 and 3A-1 show that greater than 85% Cu had been recovered into No. 2 Cl concentrates that assayed 39 and 37% copper, respectively. Results of sample 2C-2 show that only 77% copper was recovered into a No. 2 Cl concentrate that assayed 22% copper. The concentrate contained significant clays and insolubles.

Additional test work had been performed on sample 2C-2 to assist in reducing the amount of clays/insolubles reporting to the rougher/scavenger and eventually to the final concentrate. The test work examined pH and NaIPX dosages. During this test work, the rougher/scavenger float pH was 9.5 or 10.5 and the NaIPX addition varied from 0.01 to 0.0175 #/ton ore. The cleaner pH was 11.0 for all tests

Results show that at a NaIPX dosage of 0.01 #/ton ore copper grade into the rougher/scavenger concentrate was 10% with 92% recovery. A recovery of 68% was achieved into the subsequent final concentrate which assayed 25.5% copper. At the higher NaIPX dosages, rougher/scavenger concentrates contained approximately 8%

copper with 95-96% copper recovery. A summary of the 2C-2 test series is shown in the following table and grade/recovery curves.

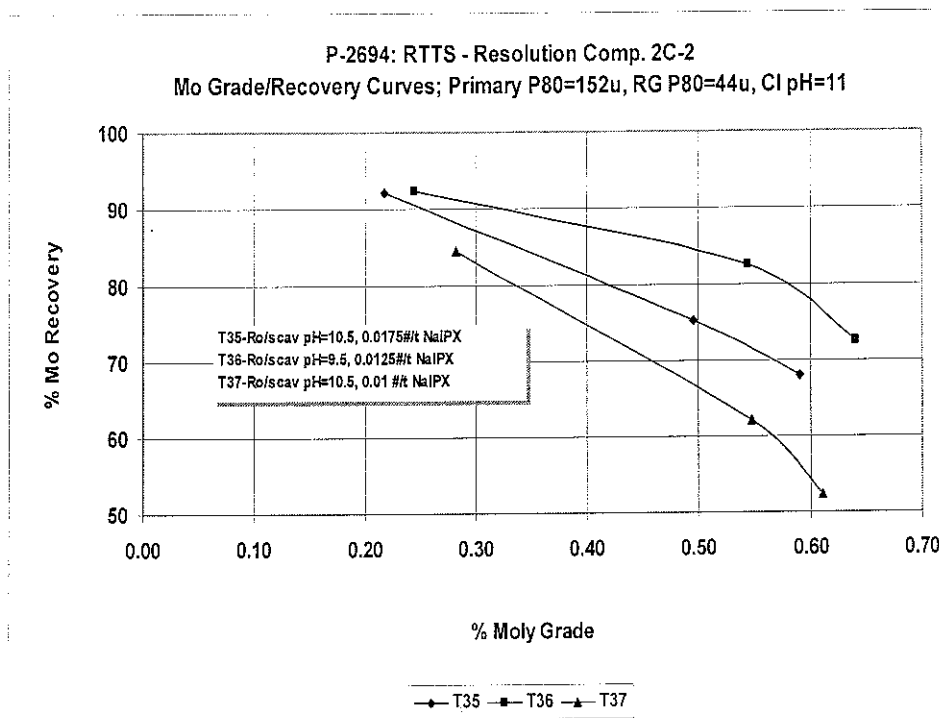
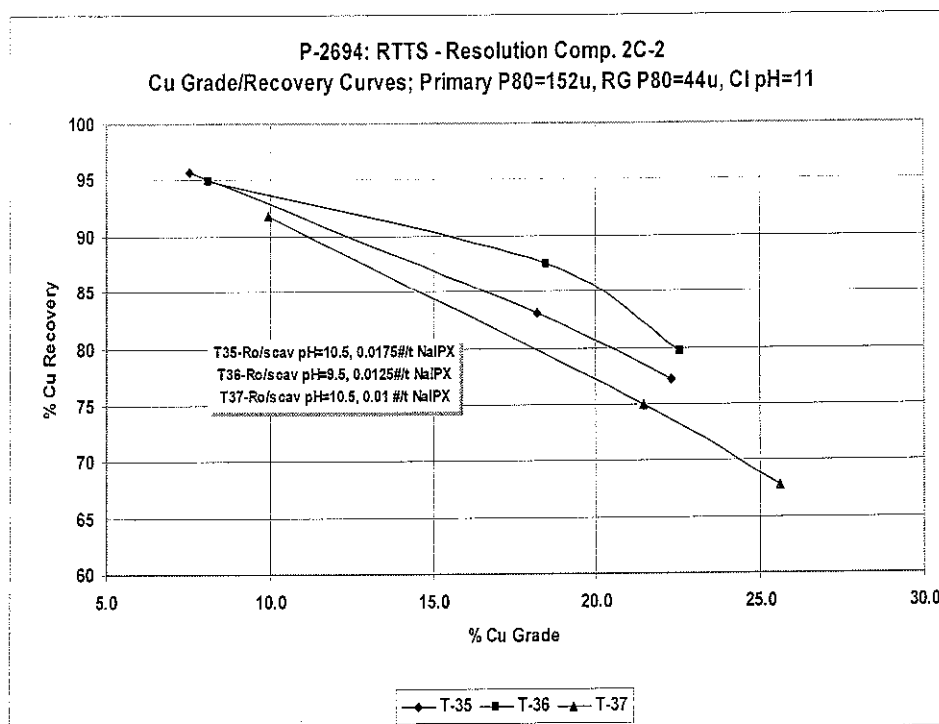
P-2694: Rio Tinto Technical Services -- Resolution Project
Results of Composite 2C-2 Test Series; Primary $P_{80}=152\mu$, RG $P_{80}=44\mu$, Cl pH = 11.0

Test No.	NaIPX to Ro/scav #/ton ore	pH Ro	Product	Wgt %	Assay, %		% Distribution	
					Cu	Mo	Cu	Mo
35	0.0175	10.5	No. 2 Cl conc.	6.7	22.3	0.590	77.2	68.0
			No. 1 Cl conc.	8.9	18.2	0.495	83.1	75.4
			No. 1 Cl scav tail	14.0	0.67	0.028	4.8	6.7
			Ro + scav conc.	24.6	7.5	0.218	95.7	92.2
			Scav tail	75.4	0.110	0.006	4.3	7.8
			Calc. head	100.0	1.94	0.058	100.0	100.0
			Assay head		1.94	0.064		
36	0.0125	9.5	No. 2 Cl conc.	6.8	22.5	0.640	79.7	72.6
			No. 1 Cl conc.	9.1	18.5	0.544	87.5	82.6
			No. 1 Cl scav tail	12.2	0.45	0.019	2.9	3.9
			Ro + scav conc.	22.6	8.1	0.245	95.0	92.3
			Scav tail	77.4	0.125	0.006	5.0	7.7
			Calc. head	100.0	1.93	0.060	100.0	100.0
			Assay head		1.94	0.064		
37	0.010	10.5	No. 2 Cl conc.	5.1	25.6	0.610	67.8	52.4
			No. 1 Cl conc.	6.7	21.4	0.547	75.0	62.1
			No. 1 Cl scav tail	9.5	1.34	0.053	6.7	8.6
			Ro + scav conc.	17.6	9.90	0.282	91.8	84.6
			Scav tail	82.4	0.19	0.011	8.2	15.4
			Calc. head	100.0	1.91	0.059	100.0	100.0
			Assay head		1.94	0.064		

Note: Burner oil added to Ro/scav at 0.023 #/ton ore for all tests.

Burner oil added to the cleaners at 0.006 #/ton for all tests

It was noted during the flotation work that the froth in tests 35 and 36 was slimy and foamy. This is usually characteristic of ores with significant clays. This particular composite appears to contain excessive clays and fine silica material that floats readily when compared to composites 3-1 and 3A-1.



V. Discussion

Results from the last three cycles of a locked cycle test on MC-1 show that greater than 90% Cu and 85% Mo were recovered into the No. 2 cleaner concentrate that assayed 36% Cu and 0.55% Mo. These results were obtained with the addition of 0.012 #/ton NaCN to the cleaner circuit to depress pyrite.

Batch flotation test results indicate that moly recovery into final cleaner concentrates is dependent on the addition of NaCN to the cleaner circuit. As the amount of NaCN increases in the cleaner circuit, moly recovery in the final concentrate decreases. However, locked cycle results show that with the addition of NaCN in the cleaner circuit moly is recovered in subsequent cycles.

Overall results from a moly cleaner flotation test show that 31% of the moly was recovered into a final moly concentrate that assayed 44% Mo. Based on the moly rougher feed, 92.4% of the moly was recovered in the moly rougher concentrate, and that greater than 46% of the moly reported to the subsequent No. 5 moly cleaner concentrate. Additional work is required in this area.

ABA results indicate that the No. 1 cleaner scavenger tails has the potential to be a significant acid producer, while the scavenger tails will have a slight net neutralizing capacity. Combining the two streams (weight proportioned) yielded net acid production.

If there are any comments or questions regarding this report, please contact me.

Sincerely,

DAWSON METALLURGICAL LABORATORIES, INC

Paul Bennett
Metallurgist

APPENDIX A

TEST WORK DESCRIPTION TABLE

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Description of Test Work Conducted

Test	Test Type			Grind, μ		Test Description
	Ro	Ro + Cl	Cl	PG P ₈₀	RG P ₈₀	
1				134		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.3
2				137		Float with 5415 & 3477 (0.024 #/t ea) & BO (0.023 #/t) @ pH= 9.1
3				138		Float with 5540 (0.048 #/t) & BO (0.023 #/t) @ pH= 9.1
4				137		Float with 5415 (0.048 #/t) & BO (0.023 #/t) @ pH= 9.1
5				199		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.2
6				159		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0
7				116		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0
8				84		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 8.6
9				64		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 8.5
10				114		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 8.9
11				114		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.6
12				114		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 11.0
13, 13A & 13B				124		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 8.9 Combine Ro + scav conc. for cleaner flotation tests
14					128	Cl float with NaIPX (0.03 #/t) & BO (0.01 #/t) @ pH= 11.0
15					66	Cl float with NaIPX (0.024 #/t) & BO (0.01 #/t) @ pH= 11.0
16					57	Cl float with NaIPX (0.024 #/t) & BO (0.01 #/t) @ pH= 11.0
17					50	Cl float with NaIPX (0.024 #/t) & BO (0.01 #/t) @ pH= 11.0
18					40	Cl float with NaIPX (0.024 #/t) & BO (0.01 #/t) @ pH= 11.0
19					45	Ro float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH=9.0 Cl float with NaIPX (0.012 #/t) & BO (0.01 #/t) @ pH=11.0
20, 20A & 20B				124		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0 Combine Ro + scav conc. for cleaner flotation tests
21					87	Cl float with NaIPX (0.009 #/t) & BO (0.01 #/t) @ pH=11.0
22					55	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=11.0
23					46	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=11.0
24					40	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=11.0
25, 25A & 25B				120		Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0 Combine Ro + scav conc. for cleaner flotation tests
26					35	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=9.5
27					35	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=10.5
28					35	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=11.0
29					35	Cl float with NaIPX (0.01 #/t) & BO (0.01 #/t) @ pH=11.5
30				120		Ro float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0 Cl float with NaIPX (0.011 #/t) & BO (0.005 #/t to RG and 0.005 #/t to No. 1 Cl scav) @ pH=10.5
31				120		Repeat T2 Ro scheme
32				120		Cl float with 5415/3477 (0.011 #/t ea) & BO (0.01 #/t) @ pH=10.5 Repeat T2 Ro scheme
33					35	Repeat T30 Cl scheme except substitute 5415/3477 for NaIPX Cl float 5415/3477 (0.011 #/t ea) & BO (0.01 #/t) @ pH=10.5
34				120		Ro float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0. Add H ₂ SO ₄ (0.21#/t) to scav tail to rec pyrite Cl float repeat T27, except add NaCN (0.01 #/t) to No. 1 Cl, add H ₂ SO ₄ (0.9 #/t) to No. 1 Cl scav tail to rec pyrite
35 (1, 2 & 4)				120		Locked cycle test: Ro float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH=9.0 Cl float with NaIPX (0.01 #/t), BO (0.01 #/t) & NaCN (0.012 #/t) @ pH=10.5 Float with NaIPX (0.018 #/t) & BO (0.023 #/t) @ pH= 9.0
36					35	Repeat T34 Cl test procedure to produce final conc for Mo cleaner test work Mo Cl: Emulsified BO (0.2 #/t), NaHS (48 #/t) pH=8.8 - 11.5, EMF=-370 to -533mv

Note: All reagent dosages are in #/ton ore, unless otherwise specified.

APPENDIX B

ASSAY OF KUC STANDARDS @ DML AND SKYLINE

P-2694E: Rio Tinto Technical Services Resolution MC-1
Assay Comparisons Using Kennecott Standards

STD No.	Cu, %			Mo, %		
	KUC (ICP)	DML (AA)	Skyline (ICP)*	KUC (ICP)	DML (AA)	Skyline (ICP)*
KC-1A	2.75	2.77	2.72	0.031	0.026	0.028
KC-1B	2.75	2.83		0.031	0.028	
KC-2A	1.50	1.52	1.49	0.031	0.033	0.028
KC-2B	1.50	1.54		0.031	0.032	
KC-3A	1.85	1.94	1.84	0.023	0.025	0.021
KC-3B	1.85	1.91		0.023	0.025	
KC-4A	1.88	1.21	1.18	0.018	0.019	0.016
KC-4B	1.88	1.19		0.018	0.021	

* Results report March, 2002

APPENDIX C

ABA RESULTS

P-2694E: Rio Tinto Technical Services - MC 1
Acid Base Accounting (ABA) Results

Sample	Acid Potential					Neutralizing Potential						ABA (NP-AP) ton CaCO ₃ / 1000 ton mat.
	Wgt, gm		S(tot), %		AP	Sample wgt, gm	Acid (HCl)		Base (NaOH)			
	Initial	End	Initial	End			Volume	Normality	Volume Titrated	Normality	NP	
T-33: No. 1 Cl pyrite tail	2.0535	1.9220	15.19	16.77	490.5	0.9940	10.0	0.25	23.6	0.0995	7.64	-482.9
T-33: Pyrite scav conc.	2.1285	1.9625	5.25	5.26	151.6	0.6356	5.0	0.25	10.9	0.0995	13.01	-138.6
T-33: Pyrite scav tail	1.9947	1.9242	0.27	0.27	8.14	1.1659	7.0	0.25	11.1	0.0995	27.68	19.5
T-34 (5, 6 & 7): No. 1 Cl scav tail	2.4114	2.3311	39.92	41.27	1246.7	0.9742	20.0	0.25	44.3	0.0995	30.39	-1216.3
T-34 (5, 6 & 7): Scav tail	1.9831	1.8634	0.53	0.58	17.0	0.5182	10.0	0.25	22.3	0.0995	27.1	10.1
T-34 (5, 6 & 7): Scav tail + No. 1 Cl scav tail (wgt averaged)	1.9772	1.9056	7.84	7.82	235.6	0.7315	7.0	0.25	13.8	0.0995	25.8	-209.8

Note: Samples from T34 (locked - cycle test) were weight averaged from cycles 5, 6 and 7

APPENDIX D

DATA TABLES AND TEST WORK FLOW DIAGRAMS

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results from Rougher/Scavenger Flotation Collector Test Series; $P_{80}=134\mu$, pH 9.3.

Test No.	Flotation Collector (lb/ton)	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
1	NaIPX (0.0125 Ro) (0.005 Scav)	Ro-Scav Conc.	27.3	12.1	0.19	28.9	35.9	96.8	92.4	85.9	97.9
		Scav Tail	72.7	0.15	0.006	1.77	0.29	3.2	7.6	14.1	2.1
		Calc Hd	100.0	3.40	0.057	9.15	10.00	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
2	5415 (0.024 Ro+Scav) 3477 (0.024 Ro+Scav)	Ro-Scav Conc.	27.5	12.5	0.19	29.2	35.7	96.9	93.6	85.4	97.2
		Scav Tail	72.5	0.15	0.005	1.89	0.39	3.1	6.4	14.6	2.8
		Calc Hd	100.0	3.53	0.057	9.40	10.10	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
3	5540 (0.040 Ro) (0.008 Scav)	Ro-Scav Conc.	27.7	11.7	0.18	28.9	34.0	96.3	93.2	83.8	94.8
		Scav Tail	72.3	0.17	0.005	2.14	0.71	3.7	6.8	16.2	5.2
		Calc Hd	100.0	3.35	0.053	9.53	9.92	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
4	5415 (0.040 Ro) (0.008 Scav)	Ro-Scav Conc.	27.5	12.5	0.21	28.5	35.1	96.7	94.1	85.6	94.5
		Scav Tail	72.5	0.16	0.005	1.82	0.78	3.3	5.9	14.4	5.5
		Calc Hd	100.0	3.56	0.061	9.15	10.23	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				

NaIPX - Sodium isopropyl xanthate

5415 - Thionocarbamate

3477 - Dithiophosphate

5540 - Modified thiourea

Note: All tests employed the addition of 0.018 and 0.005 lb/ton burner oil to the grind and scav, respectively.

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results from Rougher/Scavenger Kinetic Flotation Grind Test Series Using NaIPX, pH 9.3.

Test No.	Grind P ₈₀ , μ	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
5	199	0'-8' Ro Conc.	25.3	12.3	0.17	29.2	37.3	91.8	85.7	82.4	90.5
		0'-16' Ro+Scav Conc.	28.2	11.4	0.15	27.3	34.8	95.3	88.3	86.2	94.3
		Scav Tails	71.8	0.22	0.008	1.72	0.83	4.7	11.7	13.8	5.7
		Calc. Hd	100.0	3.38	0.049	8.95	10.40	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
6	159	0'-8' Ro Conc.	26.4	12.4	0.17	28.6	36.5	94.8	91.0	82.6	92.6
		0'-16' Ro+Scav Conc.	29.9	11.2	0.16	26.6	33.9	97.2	93.0	86.9	97.2
		Scav Tails	70.1	0.14	0.005	1.71	0.41	2.8	7.0	13.1	2.8
		Calc. Hd	100.0	3.44	0.050	9.13	10.39	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
7	116	0'-8' Ro Conc.	26.2	12.4	0.16	27.6	34.9	96.3	89.2	80.4	90.0
		0'-16' Ro+Scav Conc.	29.5	11.2	0.15	26.4	33.3	97.9	91.0	86.8	96.8
		Scav Tails	70.5	0.10	0.006	1.68	0.47	2.1	9.0	13.2	3.2
		Calc. Hd	100.0	3.38	0.047	8.99	10.17	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
8	84	0'-8' Ro Conc.	26.4	12.5	0.18	27.4	35.2	96.7	91.9	81.1	93.1
		0'-16' Ro+Scav Conc.	29.2	11.5	0.17	26.2	33.4	98.2	93.2	86.0	98.0
		Scav Tails	70.8	0.088	0.005	1.76	0.28	1.8	6.8	14.0	2.0
		Calc. Hd	100.0	3.42	0.052	8.92	9.96	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
9	64	0'-8' Ro Conc.	26.5	12.3	0.18	27.2	35.3	95.8	93.0	80.3	90.0
		0'-16' Ro+Scav Conc.	29.8	11.2	0.16	26.1	33.6	98.2	94.4	87.0	96.5
		Scav Tails	70.2	0.090	0.004	1.66	0.52	1.8	5.6	13.0	3.5
		Calc. Hd	100.0	3.34	0.050		0.050	100.0	100.0		100.0
		Assay Hd		3.49	0.052		0.052				

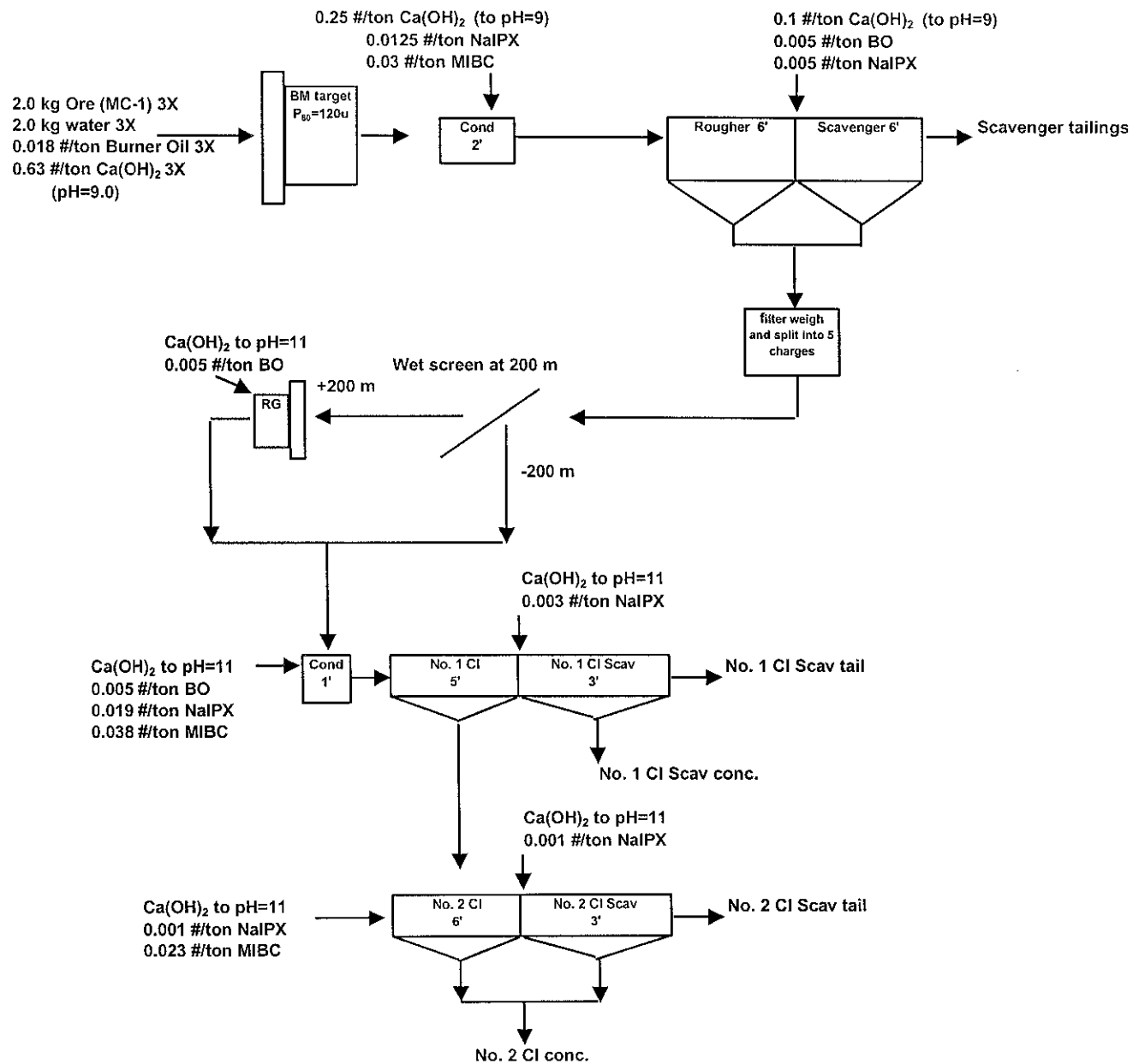
P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results from Rougher/Scavenger Kinetic Flotation pH Test Series Using NaIPX, P₈₀=114u.

Test No.	Flotation pH	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
10	8.9	0'-8' Ro Conc.	23.1	14.2	0.26	27.4	34.7	96.1	91.9	69.6	79.1
		0'-16' Ro+Scav Conc.	28.3	11.8	0.22	28	34.9	98.0	93.5	86.8	97.2
		Scav Tails	71.7	0.094	0.006	1.67	0.39	2.0	6.5	13.2	2.8
		Calc. Hd	100.0	3.40	0.066	9.10	10.10	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
11	9.6	0'-8' Ro Conc.	21.2	15.5	0.28	27.6	34.4	95.7	90.4	63.9	74.1
		0'-16' Ro+Scav Conc.	27.7	12.1	0.22	28.4	34.5	97.9	92.4	86.1	97.2
		Scav Tails	72.3	0.099	0.007	1.76	0.38	2.1	7.6	13.9	2.8
		Calc. Hd	100.0	3.44	0.066	9.16	9.850	100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052	8.99	9.01				
12	11.0	0'-8' Ro Conc.	19.1	17.2	0.30	23.5	30.40	95.8	90.4	47.0	56.5
		0'-16' Ro+Scav Conc.	22.7	14.8	0.26	23.5	29.80	97.7	92.7	55.8	66.1
		Scav Tails	77.3	0.100	0.006	5.44	4.49	2.3	7.3	44.2	33.9
		Calc. Hd	100.0	3.42	0.063			100.0	100.0	100.0	100.0
		Assay Hd		3.49	0.052						

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results of Cleaner Flotation Regrind Test Series; Ro; pH=9.0 P₈₀=124μ, Cleaner pH=11.0

Test No.	RG P ₈₀ , μ	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
14	128 (no RG)	No. 2 Cl conc.	23.3	13.0	0.210	33.3	41.1	93.7	85.8	83.4	93.2
		No. 1 Cl conc.	24.3	12.6	0.207	32.2	39.9	94.5	88.0	84.3	94.1
		Ro + scav conc.	28.5	11.1	0.188	28.4	34.9	97.8	93.7	87.0	96.5
		Scav tail	71.5	0.101	0.005	1.7	0.5	2.2	6.3	13.0	3.5
		Calc. head	100.0	3.24	0.057	9.32	10.31	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
15	66	No. 2 Cl conc.	18.3	17.1	0.280	32.2	41.5	92.2	85.6	67.3	76.8
		No. 1 Cl conc.	19.8	15.8	0.260	31.5	40.6	92.7	86.7	71.5	81.5
		Ro + scav conc.	28.5	11.6	0.197	26.5	33.4	97.9	94.0	86.2	96.4
		Scav tail	71.5	0.101	0.005	1.7	0.5	2.1	6.0	13.8	3.6
		Calc. head	100.0	3.39	0.060	8.75	9.89	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
16	57	No. 2 Cl conc.	13.8	22.9	0.360	28.9	34.5	92.7	86.3	45.0	48.3
		No. 1 Cl conc.	15.3	20.8	0.331	28.4	34.2	93.4	88.0	49.1	53.1
		Ro + scav conc.	28.5	11.7	0.189	26.8	33.2	97.9	93.8	86.3	96.4
		Scav tail	71.5	0.101	0.005	1.7	0.5	2.1	6.2	13.7	3.6
		Calc. head	100.0	3.40	0.057	8.84	9.83	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
17	50	No. 2 Cl conc.	11.6	26.2	0.440	27.9	34.5	91.3	83.2	35.8	41.1
		No. 1 Cl conc.	13.2	23.4	0.396	27.8	34.1	92.4	84.9	40.4	46.1
		Ro + scav conc.	28.5	11.5	0.203	27.6	33.1	97.8	94.2	86.7	96.4
		Scav tail	71.5	0.101	0.005	1.69	0.5	2.2	5.8	13.3	3.7
		Calc. head	100	3.34	0.062	9.07	9.78	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
18	40	No. 2 Cl conc.	11.1	28.1	0.470	26.7	35.2	90.5	83.4	33.5	41.2
		No. 1 Cl conc.	12.7	25.0	0.420	26.3	34.0	91.8	85.0	37.6	45.4
		Ro + scav conc.	28.5	11.9	0.208	26.9	32.1	97.9	94.3	86.4	96.3
		Scav tail	71.5	0.101	0.005	1.69	0.5	2.1	5.7	13.6	3.7
		Calc. head	100	3.46	0.063	8.88	9.52	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				

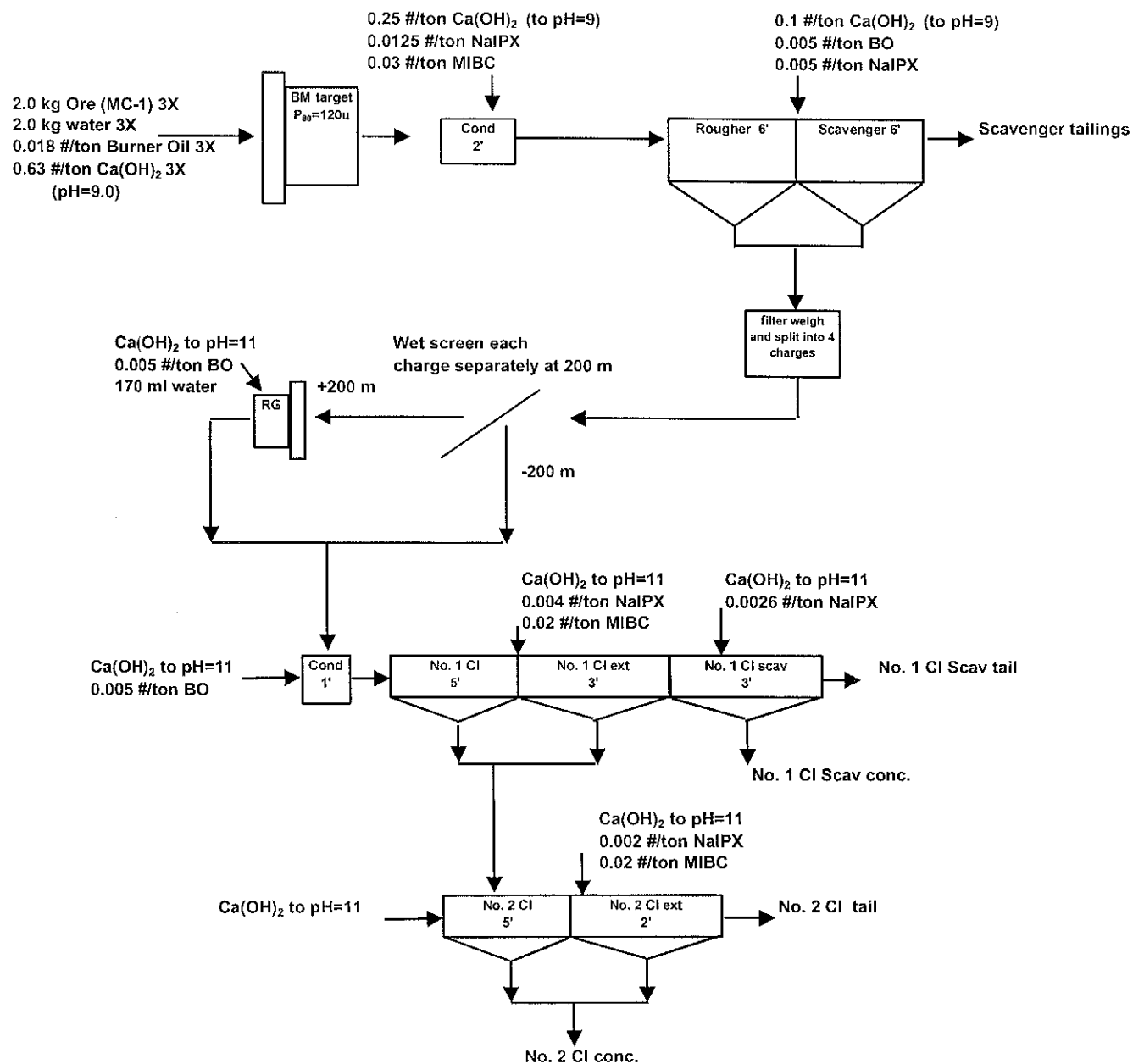
P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Cleaner Flotation Tests 14 - 18



P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results of Cleaner Flotation Regrind Test Series (Repeat); Cleaner pH=11.0

Test No.	RG P ₈₀ , μ	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
21	87	No. 2 Cl conc.	10.9	28.3	0.310	27.4	34.6	88.3	71.4	32.8	39.2
		No. 1 Cl conc.	13.9	23.4	0.289	26.9	33.3	93.1	84.5	40.8	47.9
		No. 1 Cl scav tail	12.1	0.81	0.028	29.9	34.5	2.8	7.2	39.8	43.5
		Ro + scav conc.	27.4	12.4	0.162	28.4	33.9	97.6	93.9	85.3	96.5
		Scav tail	72.6	0.117	0.004	1.85	0.46	2.4	6.1	14.7	3.5
		Calc. head	100.0	3.49	0.047	9.13	9.63	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
22	55	No. 2 Cl conc.	9.0	32.4	0.450	24.7	34.6	88.7	77.4	23.4	32.1
		No. 1 Cl conc.	12.1	25.5	0.381	25.0	33.0	93.7	88.0	31.7	41.1
		No. 1 Cl scav tail	14.6	0.59	0.016	33.6	34.5	2.6	4.5	51.5	51.8
		Ro + scav conc.	27.8	11.6	0.179	29.6	33.9	97.4	94.5	86.0	96.6
		Scav tail	72.2	0.117	0.004	1.85	0.46	2.6	5.5	14.0	3.4
		Calc. head	100.0	3.30	0.053	9.55	9.74	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
23	46	No. 2 Cl conc.	8.8	34.8	0.511	21.7	33.2	88.4	82.0	21.7	30.7
		No. 1 Cl conc.	11.5	27.9	0.423	22.7	32.5	91.9	88.2	29.5	39.0
		No. 1 Cl scav tail	14.7	0.64	0.013	30.7	34.4	2.7	3.5	50.9	52.7
		Ro + scav conc.	27.4	12.4	0.190	27.4	33.6	97.6	94.7	84.8	96.5
		Scav tail	72.6	0.117	0.004	1.85	0.46	2.4	5.3	15.2	3.5
		Calc. head	100.0	3.48	0.055	8.84	9.55	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
24	40	No. 2 Cl conc.	8.2	35.8	0.546	23.5	32.5	87.7	79.9	20.0	26.2
		No. 1 Cl conc.	10.8	28.3	0.459	24.2	32.2	91.7	88.9	27.2	34.2
		No. 1 Cl scav tail	16.4	0.62	0.013	33.2	36.9	3.0	3.8	56.4	59.5
		Ro + scav conc.	28.0	11.6	0.189	29.6	35.0	97.5	94.9	86.2	96.7
		Scav tail	72.0	0.117	0.004	1.85	0.46	2.5	5.1	13.8	3.3
		Calc. head	100.0	3.33	0.056	9.62	10.15	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				

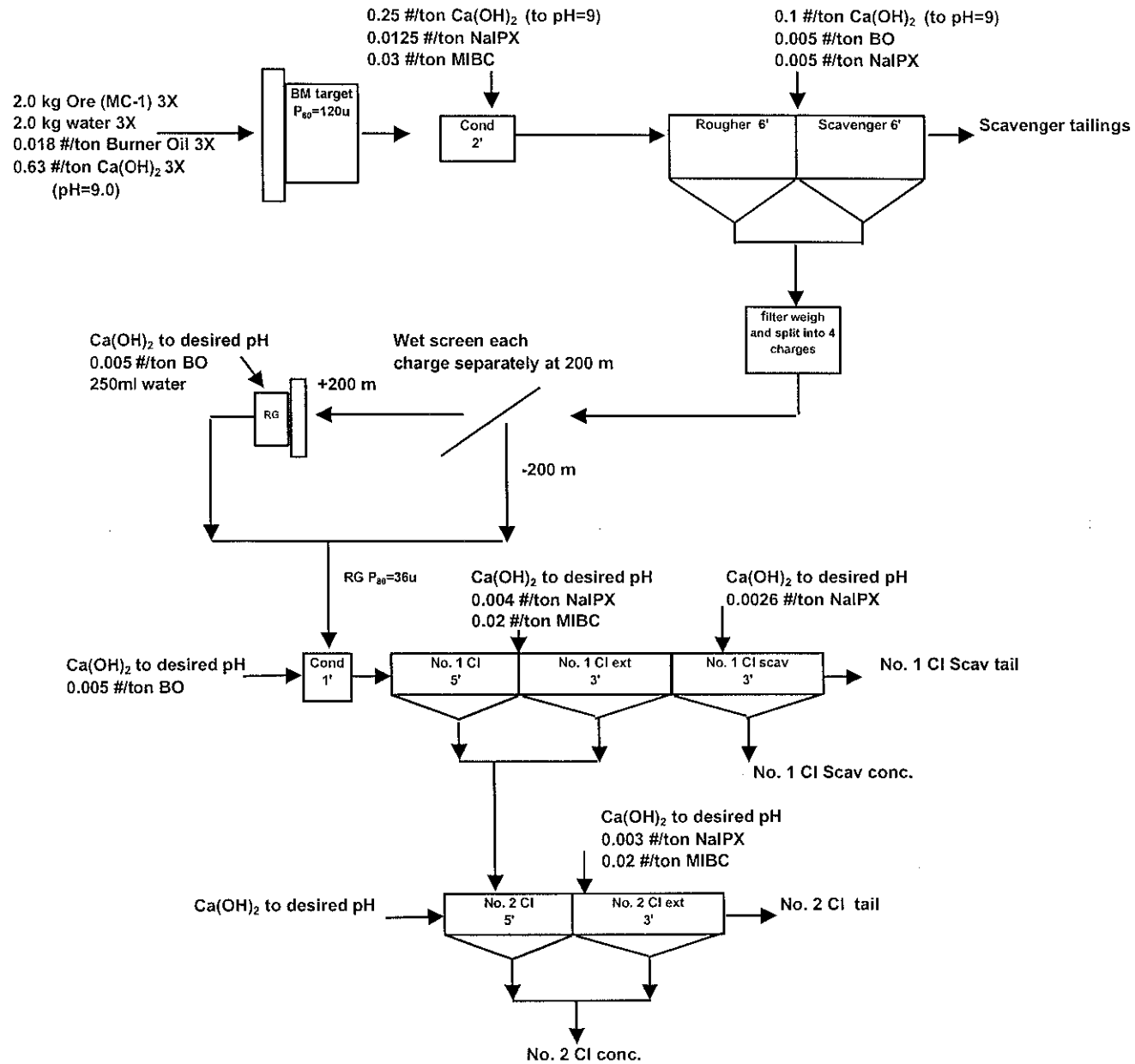
P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
 Flow Diagram for Regrind P₈₀ Cleaner Flotation Test Series: Tests 21 - 24



P-2694E: Rio Tinto Technical Services - Resolution MC-1
Results of Cleaner Flotation Regrind pH Test Series; RG P₈₀=36 μ

Test No.	RG pH	Product	Wgt %	Assay, %				% Distribution			
				Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
26	9.5	No. 2 Cl conc.	8.8	32.4	0.470	26.5	36.6	78.1	83.6	26.1	33.0
		No. 1 Cl conc.	10.6	28.3	0.408	26.2	35.2	82.5	87.7	31.1	38.2
		No. 1 Cl scav tail	15.3	1.1	0.012	30.8	33.8	4.7	3.7	52.7	52.8
		Ro + scav conc.	27.2	13.1	0.168	28.6	34.4	97.5	92.7	87.1	95.6
		Scav tail	72.8	0.127	0.005	1.59	0.59	2.5	7.3	12.9	4.4
		Calc. head	100.0	3.65	0.049	8.94	9.79	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
27	10.5	No. 2 Cl conc.	7.8	35.4	0.630	23.2	33.9	80.2	79.4	20.4	26.7
		No. 1 Cl conc.	10.1	29.3	0.544	23.8	33.2	86.7	89.4	27.3	34.1
		No. 1 Cl scav tail	15.6	0.73	0.011	31.6	36.1	3.3	2.8	56.1	57.3
		Ro + scav conc.	26.9	12.4	0.215	28.4	35.0	97.3	94.1	86.8	95.6
		Scav tail	73.1	0.127	0.005	1.59	0.59	2.7	5.9	13.2	4.4
		Calc. head	100.0	3.42	0.062	8.80	9.84	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
28	11.0	No. 2 Cl conc.	7.1	36.9	0.510	22.7	33.1	77.6	64.4	17.5	22.7
		No. 1 Cl conc.	10.3	29.8	0.463	24.1	32.9	91.1	85.1	27.1	32.9
		No. 1 Cl scav tail	15.8	0.68	0.013	33.2	38.9	3.2	3.7	57.2	59.6
		Ro + scav conc.	27.1	12.1	0.194	29.6	36.5	97.3	93.5	87.4	95.8
		Scav tail	72.9	0.127	0.005	1.59	0.59	2.7	6.5	12.6	4.2
		Calc. head	100.0	3.37	0.056	9.17	10.32	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				
29	11.5	No. 2 Cl conc.	6.7	37.3	0.370	22.7	31.1	74.3	46.3	16.3	20.9
		No. 1 Cl conc.	9.8	28.4	0.354	24.1	30.8	82.7	64.7	25.3	30.2
		No. 1 Cl scav tail	15.6	1.1	0.039	34.3	38.2	5.3	11.4	57.6	59.9
		Ro + scav conc.	27.1	12.1	0.185	30.1	35.2	97.3	93.2	87.6	95.7
		Scav tail	72.9	0.127	0.005	1.59	0.59	2.7	6.8	12.4	4.3
		Calc. head	100	3.36	0.054	9.32	9.98	100.0	100.0	100.0	100.0
		Assay head		3.49	0.052	8.99	9.01				

P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Regrind Cleaner pH Flotation Test Series: Tests 26 - 29



P-2694E: Rio Tinto Technical Services - Resolution MC-I
Results of Cleaner Flotation Optimization Test Series: Regrind P₈₀=36 μ , pH=10.5

Test No.	Product	Wgt %	Assay, %				% Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
27	No. 2 Cl conc.	7.8	35.4	0.630	23.2	33.9	80.2	79.4	20.4	26.7
	No. 1 Cl conc.	10.1	29.3	0.544	23.8	33.2	86.7	89.4	27.3	34.1
	No. 1 Cl scav tail	15.6	0.73	0.011	31.6	36.1	3.3	2.8	56.1	57.3
	Ro + scav conc.	26.9	12.4	0.215	28.4	35.0	97.3	94.1	86.8	95.6
	Scav tail	73.1	0.127	0.005	1.59	0.59	2.7	5.9	13.2	4.4
	Calc. head	100.0	3.42	0.062	9.84	9.84	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				
30	No. 3 Cl conc.	6.0	34.5	0.510	24.1	33.8	62.3	52.8	15.5	20.1
	No. 2 Cl conc.	7.5	31.3	0.532	24.4	33.8	70.8	69.0	19.7	25.2
	No. 1 Cl conc.	9.9	25.0	0.442	24.6	32.8	74.7	75.7	26.2	32.3
	No. 1 Cl scav tail	16.0	1.23	0.015	32.9	37.4	6.0	4.2	56.8	59.8
	Ro + scav conc.	27.6	11.7	0.193	29.2	35.4	97.4	92.5	86.8	97.3
	Scav tail	72.4	0.120	0.006	1.69	0.38	2.6	7.5	13.2	2.7
	Calc. head	100.0	3.31	0.058	9.28	10.03	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				
31*	No. 3 Cl conc.	6.9	38.6	0.510	23.2	32.4	78.2	60.1	17.2	22.2
	No. 2 Cl conc.	8.2	35.0	0.541	23.6	32.4	83.7	75.2	20.7	26.2
	No. 1 Cl conc.	11.0	26.8	0.431	24.2	31.3	86.6	81.1	28.6	34.2
	No. 1 Cl scav tail	15.6	0.73	0.011	31.7	35.3	3.3	2.9	53.2	54.6
	Ro + scav conc.	28.2	11.8	0.195	28.5	33.6	97.5	93.9	86.3	93.9
	Scav tail	71.8	0.120	0.005	1.78	0.85	2.5	6.1	13.7	6.1
	Calc. head	100.0	3.41	0.059	9.30	10.06	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				
32*	No. 3 Cl conc.	6.9	37.4	0.520	23.1	35.0	76.0	61.3	18.0	23.7
	No. 2 Cl conc.	7.8	34.7	0.514	23.3	34.6	80.5	69.2	20.7	26.7
	No. 1 Cl conc.	11.4	25.7	0.403	24.5	32.8	86.8	79.0	31.7	36.9
	No. 1 Cl scav tail	15.3	0.86	0.014	29.5	36.1	3.9	3.7	51.2	5.1
	Ro + scav conc.	28.1	11.7	0.194	27.4	34.7	97.2	93.8	87.6	96.5
	Scav tail	71.9	0.130	0.005	1.52	0.49	2.8	6.2	12.4	3.5
	Calc. head	100.0	3.37	0.058	8.81	10.12	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				
33	No. 3 Cl conc.	6.3	39.2	0.540	21.1	33.3	71.7	59.6	14.9	21.0
	No. 2 Cl conc.	8.0	35.9	0.525	21.0	32.7	83.9	74.1	19.0	26.5
	No. 1 Cl conc.	10.7	28.5	0.463	21.4	31.6	89.2	87.6	26.0	34.3
	No. 1 Cl pyrite conc.*	9.9	0.62	0.007	43.3	50.3	1.8	1.2	48.4	50.2
	No. 1 Cl scav tail	15.0	0.58	0.009	33.6	38.3	2.5	2.4	57.0	58.1
	Ro + scav conc.	27.1	12.3	0.196	28.4	35.6	96.9	93.7	86.7	97.2
	Pyrite scav conc.	1.6	2.2	0.046	6.2	5.3	1.0	1.3	1.1	0.8
	Pyrite scav tail	71.3	0.100	0.004	1.51	0.27	2.1	5.0	12.2	1.9
	Scav tails	72.9	0.146	0.005	1.61	0.38	3.1	6.3	13.3	2.8
	Calc. head	100.0	3.43	0.057	8.86	9.91	100.0	100.0	100.0	100.0
	Assay head		3.49	0.052	8.99	9.01				

* Concentrate obtained from cleaning the No. 1 Cl scav tails.

P-2694E: Rio Tinto Technical Services - Resolution MC-1
Reagent Addition to the Cleaner for Tests 27, 30-33

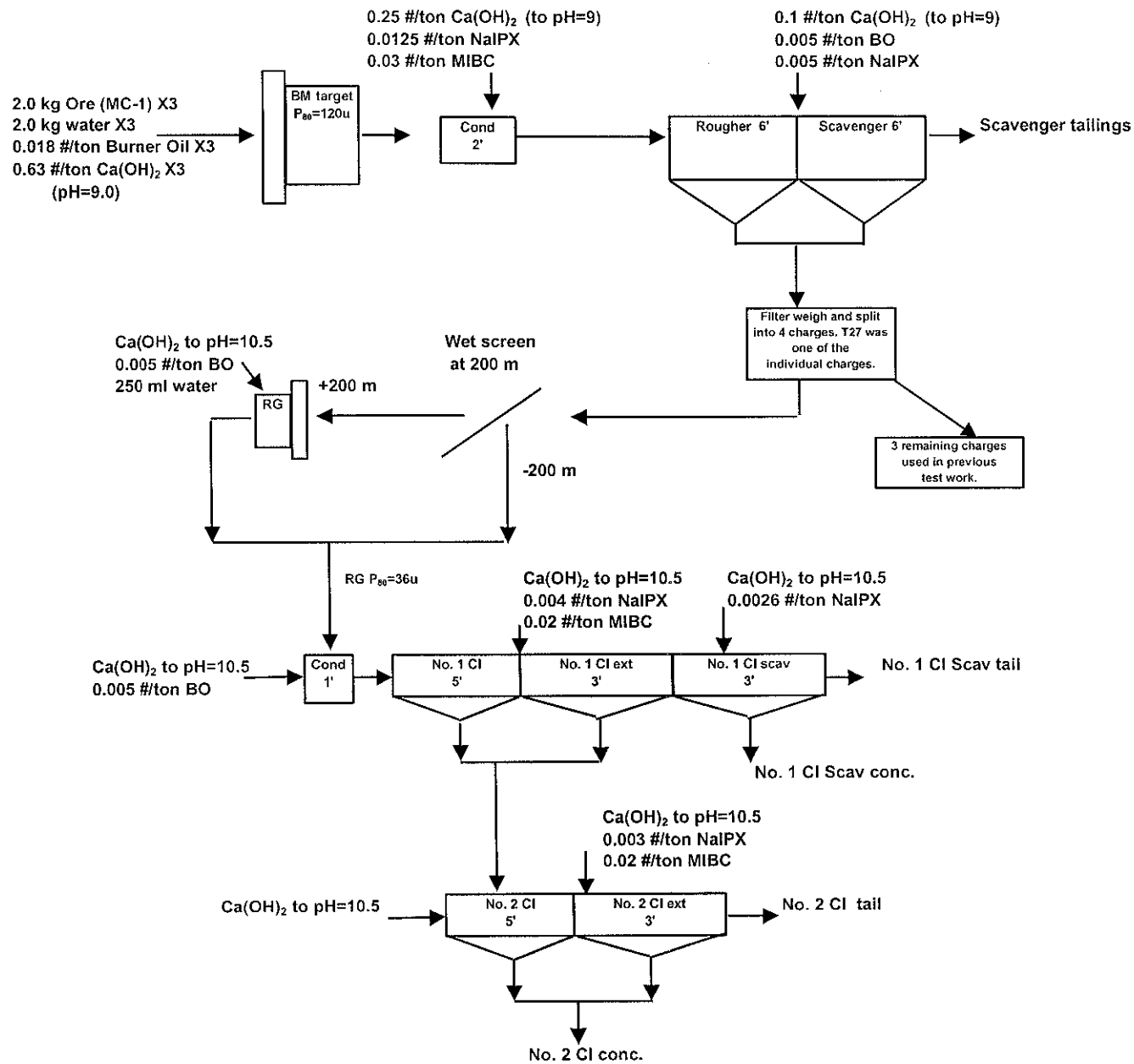
Cl Flotation Stage	Reagents Added (#/ton ore) to Cleaners				
	T-27	T-30	T-31*	T-32*	T-33
No. 1 Cl	Ca(OH) ₂ to pH=10.5 BO (0.005)	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5 BO (0.005)	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5 BO (0.005) NaCN (0.01)
No. 1 Cl ext	Ca(OH) ₂ to pH=10.5 NaIPX (0.004) MIBC (0.02)	Ca(OH) ₂ to pH=10.5 NaIPX (0.004) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.004) 3477 (0.004) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.004) 3477 (0.004) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 NaIPX (0.004) MIBC (0.015)
No. 1 Cl Scav	Ca(OH) ₂ to pH=10.5 NaIPX (0.0026)	Ca(OH) ₂ to pH=10.5 BO (0.005) NaIPX (0.0026)	Ca(OH) ₂ to pH=10.5 5415 (0.0026) 3477 (0.0026)	Ca(OH) ₂ to pH=10.5 5415 (0.0026) 3477 (0.0026) BO (0.005)	Ca(OH) ₂ to pH=10.5 NaIPX (0.0026) A Cl pyrite float was conducted on the No. 1 Cl scav tails using H ₂ SO ₄ and NaIPX.
No. 2 Cl	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5
No. 2 Cl ext	Ca(OH) ₂ to pH=10.5 NaIPX (0.003) MIBC (0.02)	Ca(OH) ₂ to pH=10.5 NaIPX (0.003) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.003) 3477 (0.003) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.003) 3477 (0.003) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 NaIPX (0.003) MIBC (0.015)
No. 3 Cl	Not conducted	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5	Ca(OH) ₂ to pH=10.5
No. 3 Cl ext	Not conducted	Ca(OH) ₂ to pH=10.5 NaIPX (0.0017) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.0017) 3477 (0.0017) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 5415 (0.0017) 3477 (0.0017) MIBC (0.015)	Ca(OH) ₂ to pH=10.5 NaIPX (0.0017) MIBC (0.015)

- Primary grind (P₈₀=120μ), w /Ca(OH)₂ to pH=9.0 & BO
- Ro&scav flotation : pH =9.0 add NaIPX to each stage; BO to scav flotation stage
- Combine ro & scav concentrates. Wet screen conc. across 200m. Regrind +200m w/Ca(OH)₂ (pH=10.5) & BO
- Conduct cleaner flotation series.
- * Replace NaIPX with 5415 and 3477 in the ro and scav stages.

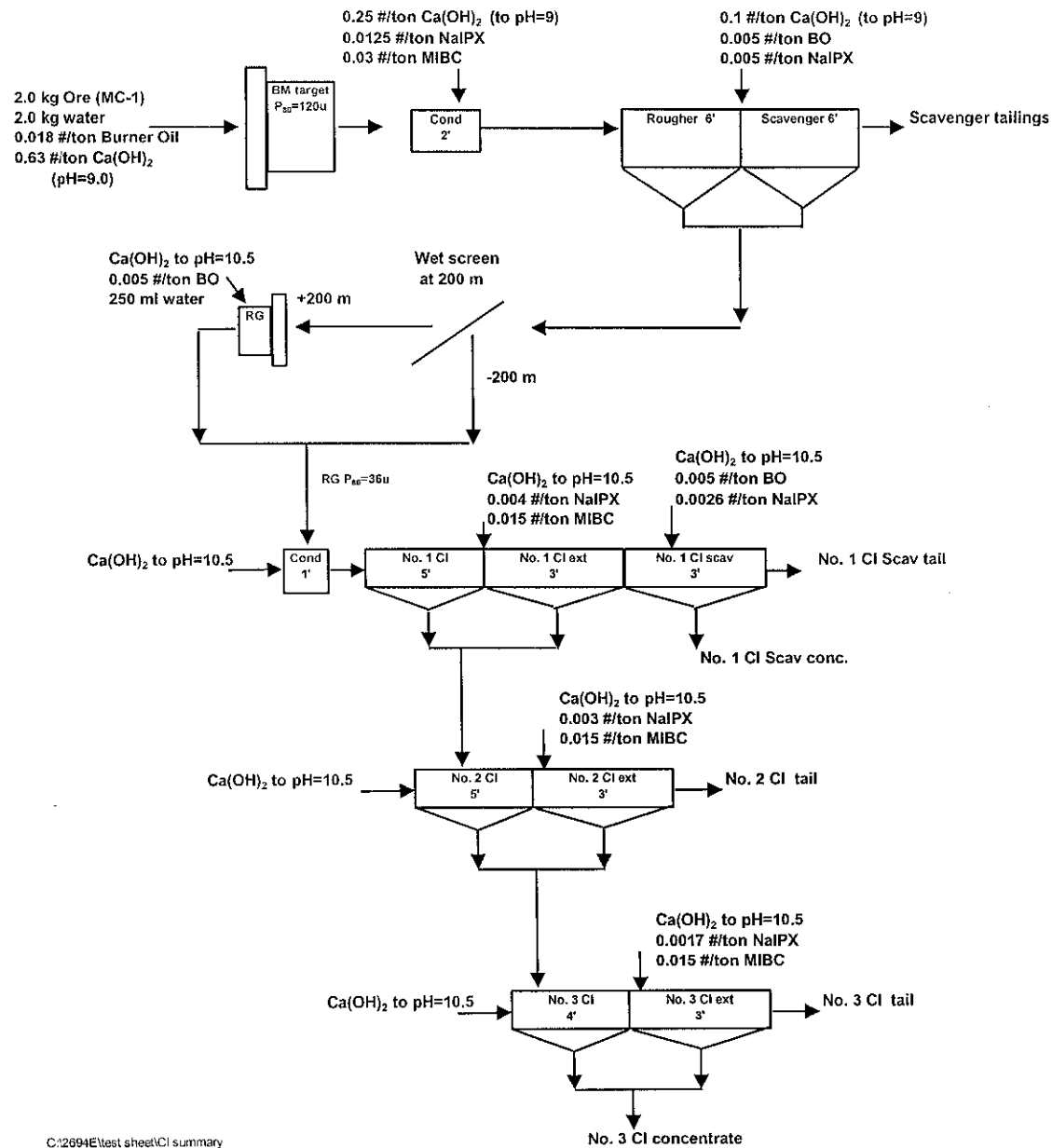
Note: Test 27 was a 1/4 split of combined Ro/Scav conc. from test 25, 25A & 25B. Tests 30-33 were 2.0 kg individual tests.

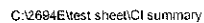
BO - Burner Oil
NaIPX - Sodium isopropyl xanthate
5415 - Thionocarbamate
3477 - Dithiophosphate

P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Cleaner Flotation Test 27

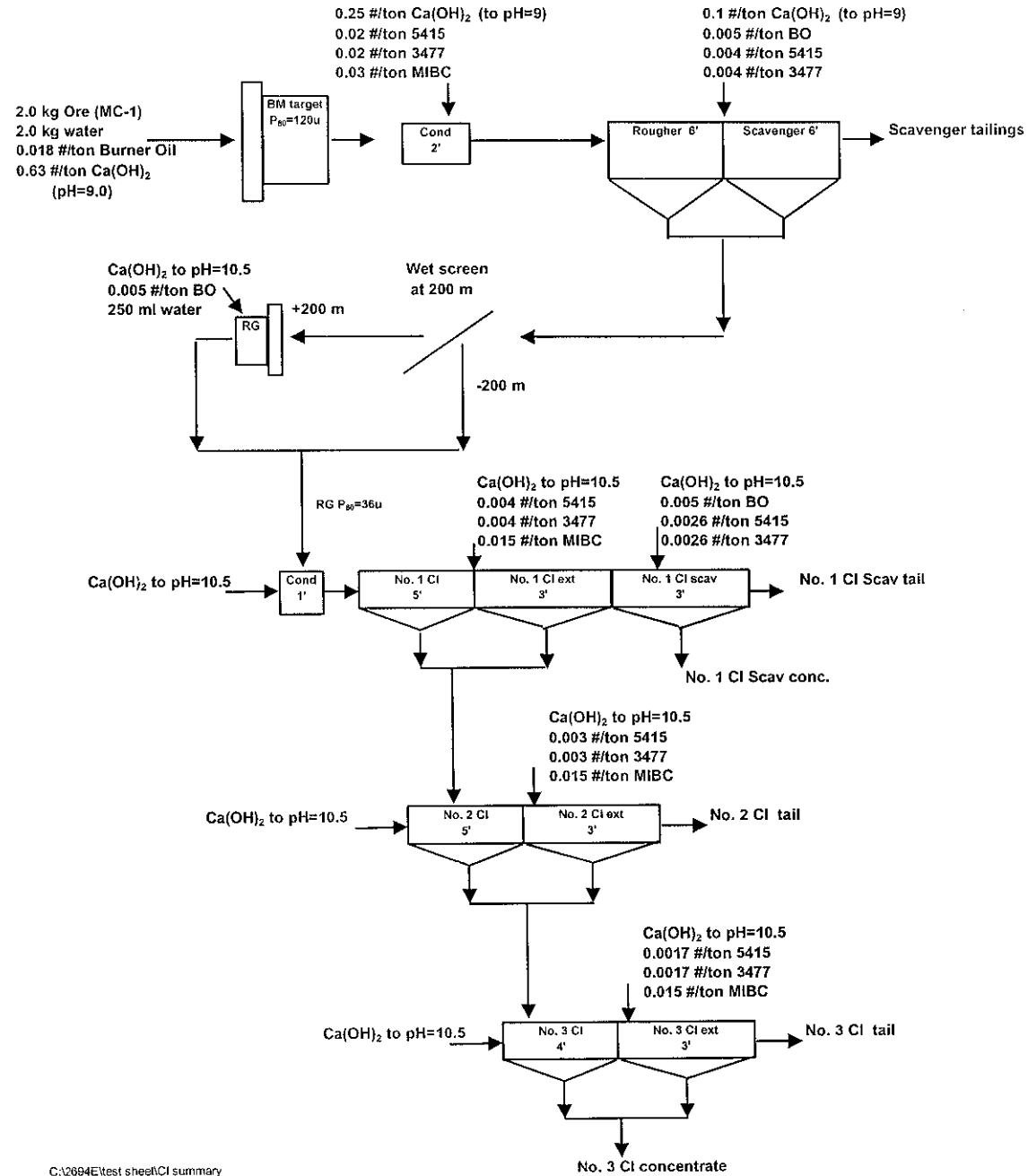


P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Cleaner Flotation Test 30

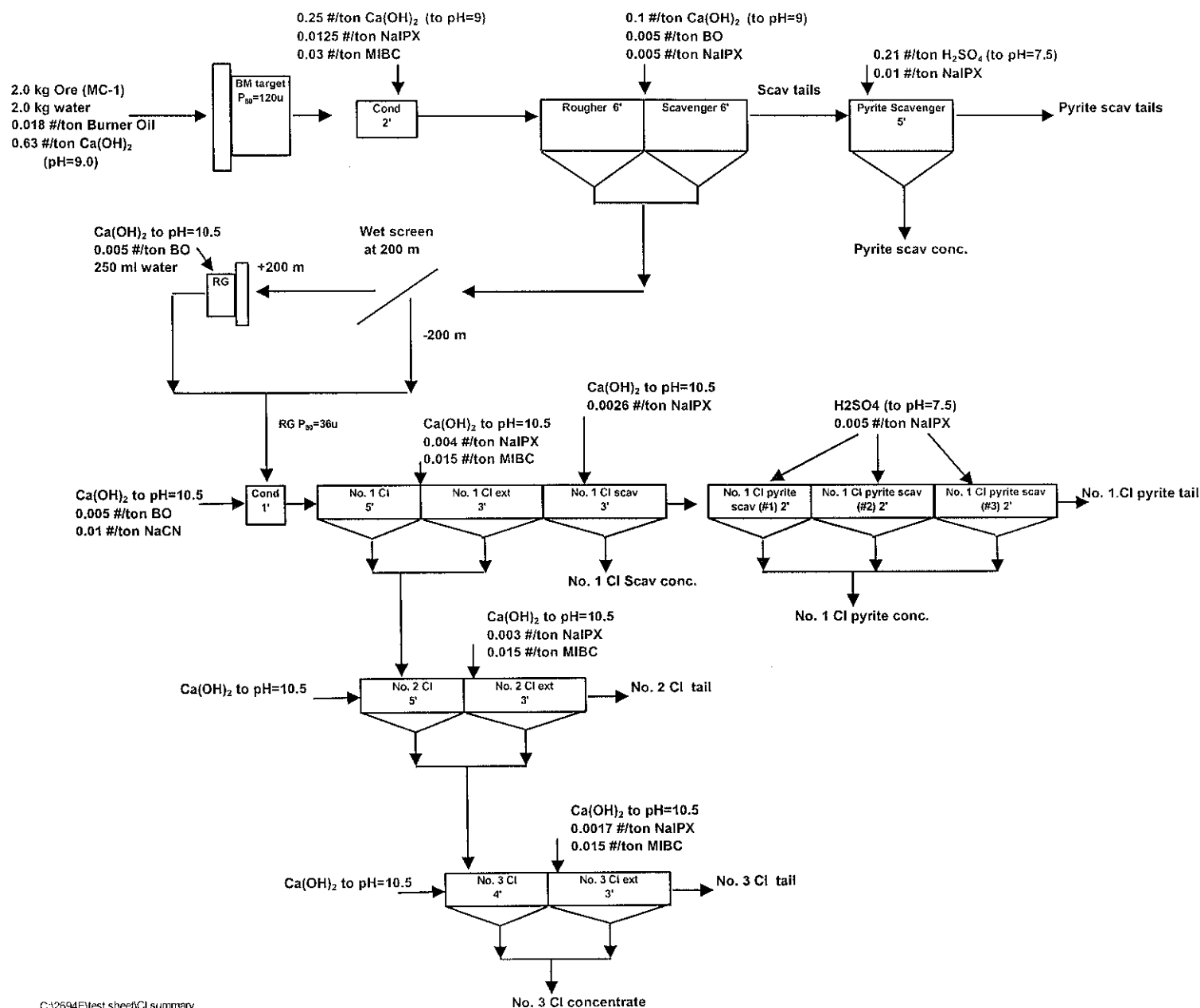




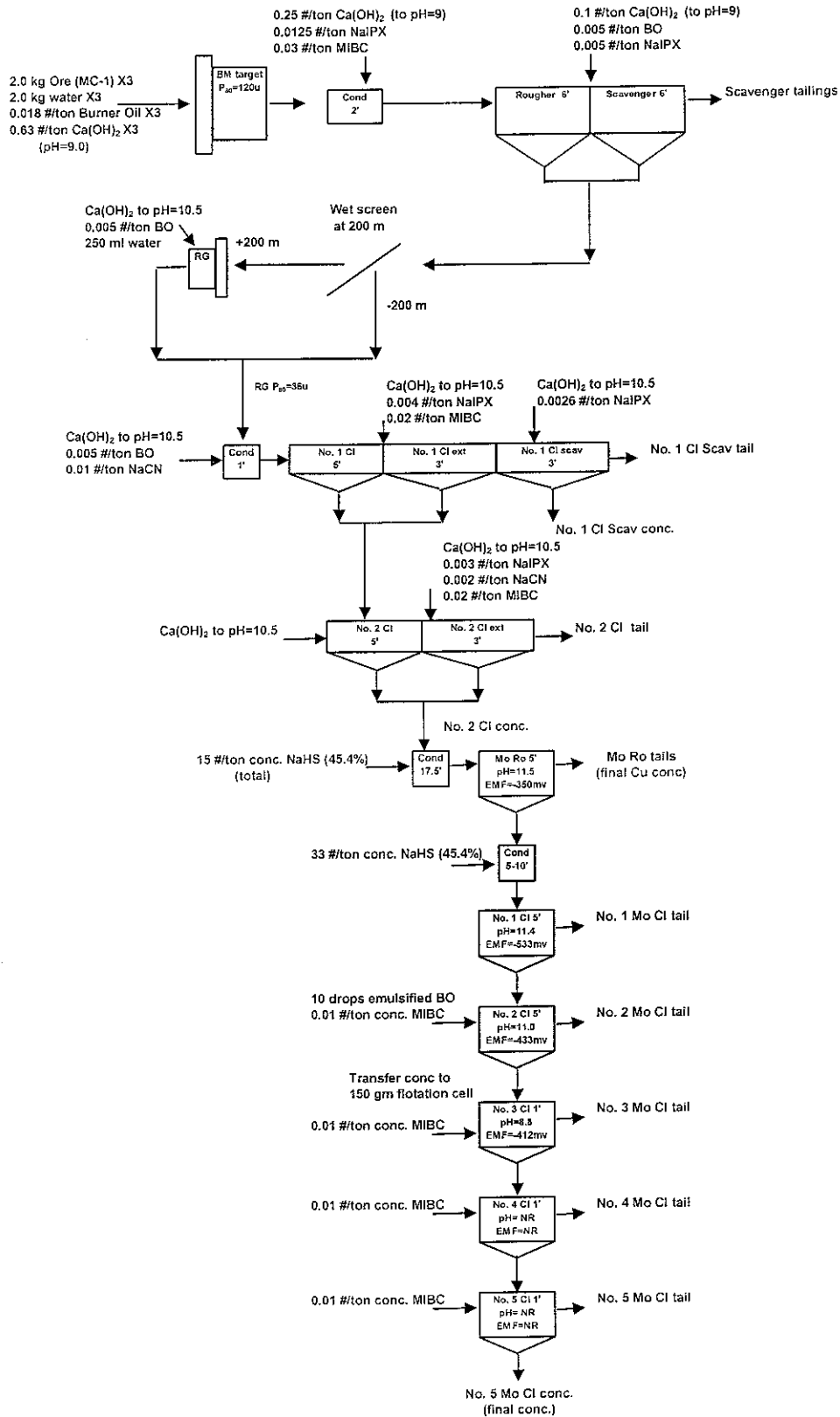
**P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Cleaner Flotation Test 32**



P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Flow Diagram for Cleaner Flotation Test 33



P-2694E: Rio Tinto Technical Services - Resolution Master Composite No. 1
Test 35 (1, 2 and 4) and 36: Flow Diagram for Moly Separation Test



NR - Not recorded

P-2694: Rio Tinto Technical Services - Resolution Project Comps. 2C-2, 3-1 and 3A-1

Results of Cleaner Flotation Test Series; RG P₈₀=41-50 μ , Cleaner pH=11.0

Comp.	P-2694 Test No.	Grind P ₈₀ , μ		Product	Wgt %	Assay, %				% Distribution			
		Primary	RG			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
2C-2	35	152	44	No. 2 Cl conc.	6.7	22.3	0.590	25.6	28.4	77.2	68.0	17.4	28.6
				No. 1 Cl conc.	8.9	18.2	0.495	24.4	26.4	83.1	75.4	21.9	35.0
				No. 1 Cl scav tail	14.0	0.67	0.028	28.4	27.0	4.8	6.7	40.3	56.5
				Ro + scav conc.	24.6	7.5	0.218	26.4	26.4	95.7	92.2	66.0	97.2
				Scav tail	75.4	0.110	0.006	4.45	0.25	4.3	7.8	34.0	2.8
				Calc. head	100.0	3.49	0.047	9.13	9.63	100.0	100.0	100.0	100.0
				Assay head		3.49	0.052	8.99	9.01				
3-1	24	119	41	No. 2 Cl conc.	6.3	39.1	0.625	20.0	31.6	85.9	69.7	11.6	17.1
				No. 1 Cl conc.	8.0	33.3	0.547	22.4	32.8	93.0	11.5	16.5	22.5
				No. 1 Cl scav tail	11.9	0.49	0.037	38.3	39.4	2.0	7.8	41.9	40.1
				Ro + scav conc.	20.5	13.4	0.243	32.1	36.9	96.1	88.7	60.8	65.1
				Scav tail	79.5	0.140	0.008	5.35	5.10	3.9	11.3	39.2	34.9
				Calc. head	100.0	2.85	0.056	10.84	11.63	100.0	100.0	100.0	100.0
3A-1	30	162	50	Assay head		2.86	0.059	10.4	12.25				
				No. 2 Cl conc.	13.1	37.0	0.330	23.6	31.9	89.1	75.5	38.7	45.0
				No. 1 Cl conc.	15.8	33.2	0.312	24.2	32.1	96.1	85.7	47.8	54.4
				No. 1 Cl scav tail	12.7	0.64	0.017	28.3	31.3	1.5	3.8	44.9	42.8
				Ro + scav conc.	29.0	18.5	0.180	26.1	31.8	98.2	91.3	94.9	99.3
				Scav tail	71.0	0.135	0.007	0.58	0.09	1.8	8.7	5.1	0.7
				Calc. head	100.0	5.45	0.057	8.00	9.29	100.0	100.0	100.0	100.0
				Assay head		5.55	0.053	8.10	9.55				

APPENDIX E

TEST PROCEDURES

Test Procedures

A. Rougher – Scavenger Flotation Tests

A 2 kg charge of MC-1 was used for each rougher-scavenger test. Each charge was ball mill ground at 50% solids using DML tap water (Salt Lake City, Utah) and 10 kg of grinding balls. Burner oil was added as full strength, hydrated lime was added as 50% active. NaIPX was added as a 0.5% solution strength. Collectors 5415 and 5540 were added as full strength using a micro syringe and needle. The reagent scoping, primary grind and pH tests were conducted in an Agitair 2.0 kg mechanical flotation cell operating at 800-900 rpm.

B. Cleaner Flotation Tests

Three, 2.0 kg charges were floated separately to produce rougher –scavenger concentrates. The concentrates were then combined and filtered. The wet filtered cake was split into equal weight samples, with each portion submerged in water prior to testing to prevent surface oxidation. All cleaner flotation work was conducted in an Agitair 500 gm mechanical flotation cell operating at 900 rpm. Burner oil, hydrated lime and NaIPX was added at the same concentrations as stated in the rougher-scavenger flotation work. Sodium cyanide was added as a 1% solution.

C. Moly Separation Flotation Test

The No. 2 cleaner concentrates from three separate 2 kg flotation tests were combined for the copper- moly separation work. Nitrogen was used as the flotation gas throughout this test. Emulsified burner oil was added at a 10% concentration (2.5 ml burner oil in 22.5 ml water and 0.1 gm sodium cetyl/stearyl sulfate as an emulsifier). Sodium hydrosulfide (NaHS) was added as a 45.5% active NaHS solution. MIBC frother was added as a 0.15% solution. The test was conducted in a 500 gm Agitair flotation cell until the No. 2 cleaner concentrate was collected. This concentrate was placed into a 150 cc glass flotation cell with the slurry agitated using a motor and impeller operating at 250 rpm.

D. Acid - Base Accounting

The procedure used was supplied by Kennecott Utah Copper (KUC).

Acid Potential – An HCl leach is used to remove most sulfate minerals and other non-acid producing forms of sulfur.

1. Weigh out a 1-2 gm sample of pulverized material. Record to 4 decimal places
2. Transfer the sample to a tarred Whatman 40 filter paper
3. Slowly add 100 ml of a 2:3 HCl:H₂O reagent
4. Rinse the sample with DI water until all of the Cl⁻ ions are removed. Test for residual Cl⁻ using a 10% solution of AgNO₃
5. Air dry the sample overnight

6. Weigh the sample and filter paper. Subtract the filter paper weight from the total weight to get the sample weight
7. Analyze the sample for S(tot)
8. Correction for the amount of sample dissolved is accomplished using the following:
% S(tot) corrected = % S(tot) uncorrected X (1-(initial wgt-final wgt)/initial wgt)
9. Report : S(tot) – wgt corrected S(tot) in the extracted sample. This is the HCl Extractable S(tot)
10. AP = (S(tot) – HCl extractable S(tot)) X 31.25
11. The results are reported as tons CaCO₃/1000 tons sample

Neutralization Potential:

1. Weigh out 1.0 gram of sample to four decimal places. Put into an Erlenmeyer flask
2. Add 5-10 ml of 0.1 to 0.5 N HCl slowly to the sample
3. Add 75 ml of DI water to the sample and reflux for 1 minute to drive off CO₂
4. Set the slurried sample on a stir plate with a stir bar in the sample
5. Record the pH of slurry. If the pH is less than 2.0, proceed with the titration step. If the pH is greater than 2.0, repeat the above steps with half the amount of sample
6. Transfer the slurried sample to a 100 ml beaker, and titrate using a 0.1–0.25 N NaOH to the end point
7. Calculate the Neutralization Potential (NP) using the following equation:

$$NP = \frac{(\text{Volume acid} \times \text{Normality of acid} - \text{Volume of base} \times \text{Normality of base}) \times 50}{\text{Sample weight}}$$

The results are reported as tons CaCO₃/1000 tons sample

ABA Potential = Neutralization Potential – Acid Potential

If the ABA is negative, the material tested will likely be an acid producer. If the ABA is positive then the material has excess neutralizing capacity.

APPENDIX F

INDIVIDUAL TEST SHEETS



**DAWSON
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Salt Lake City, Utah 84116
Phone: (801) 596-0430
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Email: dmlmetlab@aol.com

PROJECT No. P-2694E

DATE: 7-3-02

BY: PCB

TEST No. 1 **NAME:** Rio Tinto Technical Services Resolution MC-1

Conduct reagent scoping test using NaIPX @ a targeted grind of P₈₀=160u.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc	463.4	23.20	13.57	0.220	29.80	37.55	3.1489	0.0511	6.9150	8.7134	92.57	89.07	75.55	87.15
Scavenger conc.	80.7	4.04	3.55	0.047	23.50	26.57	0.1435	0.0019	0.9496	1.0737	4.22	3.31	10.38	10.74
Scavenger tails	1452.9	72.75	0.15	0.006	1.77	0.29	0.1091	0.0044	1.2877	0.2110	3.21	7.62	14.07	2.11
Head Calculated	1997.0	100.00	3.40	0.057	9.15	10.00	3.4015	0.0573	9.1524	9.998	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Rougher + Scav conc. 27.25 12.08 0.19 28.87 35.92 3.292 0.053 7.865 9.787 96.79 92.38 85.93 97.89

													Grinding Product
OPERATION	BM		Cond.	Ro	Cond.	Scav							
TIME	16'		2'	5'	1'	4'							
REAGENTS - LBS PER TON													Flotation Fd
Ore (-10 m) gm	2000												MESH % Cum %
Water (DML tap) gm	2000												+10 Passing
Ca(OH) ₂ (@ 50% active) gm	1.25		0.30		0.23								+14
Burner oil	0.018				0.005								+20
													+28
NaIPX (@ 0.5%)			0.0125		0.005								+35 0.2 99.8
MIBC			0.03		0.015								+48 0.9 98.9
													+65 4.4 94.5
													+100 9.7 84.8
													+150 14.9 69.9
MACHINE			2000	2000	2000	2000							+200 11.7 58.2
R.P.M.			800	800	800	800							+325 16.3 41.9
pH	9.3		8.3/9.3		8.4/9.4	8.4							+400 4.4 37.5
% SOLIDS	50		29										-400 37.5
TEMPERATURE													Total 100.0

Remarks: Scav Tailings - Minor amount of magnetics, trace bornite and trace locked sulfides w/gangue.

P₈₀= 134u

BO - 0.0024 gm/drop



**DAWSON
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PROJECT No. P-2694E

DATE: 7-3-02

BY: PGB

TEST No. 2 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct reagent scoping test using Cytec 5415 & 3477 (thionocarbamate and dithiophosphate) @ a targeted grind of $P_{80}=160\mu$.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc	482.4	24.13	13.47	0.210	30.90	38.05	3.2509	0.0507	7.4576	9.1832	92.08	89.33	79.34	90.97
Scavenger conc.	66.4	3.32	5.14	0.073	17.20	18.94	0.1708	0.0024	0.5714	0.6292	4.84	4.27	6.08	6.23
Scavenger tails	1450.0	72.54	0.15	0.005	1.89	0.39	0.1088	0.0036	1.3711	0.2829	3.08	6.39	14.59	2.80
Head Calculated	1998.8	100.00	3.53	0.057	9.40	10.10	3.5305	0.0567	9.4000	10.095	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Rougher + Scav conc. 27.46 12.46 0.19 29.24 35.74 3.422 0.053 8.029 9.812 96.92 93.61 85.41 97.20

Grinding													Product	
OPERATION	BM		Cond.	Ro	Cond.	Scav								
TIME	16'		2'	5'	1'	4'								
REAGENTS - LBS PER TON													Flotation Fd	
Ore (-10 m) gm	2000												MESH	Cum %
Water (DML tap) gm	2000												+10	Passing
Ca(OH) ₂ (@ 50% active) gm	1.25		0.40		0.21								+14	
Burner oil	0.018				0.005								+20	
													+28	
5415			0.02		0.004								+35	0.3
3477			0.02		0.004								+48	1.1
MIBC			0.03		0.015								+65	4.8
													+100	9.7
													+150	15.1
MACHINE			2000	2000	2000	2000							+200	11.7
R.P.M.			800	800	800	800							+325	16.5
pH	9.1		8.3/9.4		8.4/9.3	8.6							+400	4.1
% SOLIDS	50		29										-400	36.7
TEMPERATURE													Total	100.0

Remarks: Rougher conc. - Appeared more selective for chalcopyrite than test 1

$P_{80}=137\mu$

Scav Tailings - Trace fine sulfides (bornite), minor magnetics. A few coarse pieces of liberate pyrite. Trace sulfide locking w/gangue.

5415 - 0.002 gm/drop 3477 - 0.002 gm/drop



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Email: dmlmetlab@aol.com

PROJECT No. P-2694E

DATE: 7-3-02

BY: PGB

TEST No. 3 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct reagent scoping test using Cytec 5540 (modified thiourea) @ a targeted grind of P₈₀=160u.

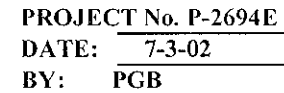
Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc	499.2	25.00	12.36	0.190	30.20	35.78	3.0898	0.0475	7.5496	8.9446	92.37	89.49	79.20	90.18
Scavenger conc.	52.9	2.65	4.99	0.074	16.40	17.38	0.1322	0.0020	0.4345	0.4604	3.95	3.69	4.56	4.64
Scavenger tails	1444.8	72.35	0.17	0.005	2.14	0.71	0.1230	0.0036	1.5483	0.5137	3.68	6.82	16.24	5.18
Head Calculated	1996.9	100.00	3.35	0.053	9.53	9.92	3.3450	0.0531	9.5324	9.919	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								
Rougher + Scav conc.		27.65	11.65	0.18	28.88	34.02	3.222	0.049	7.984	9.405	96.32	93.18	83.76	94.82

OPERATION	BM	Cond.	Ro	Cond.	Scav	Grinding Product		
TIME	16'	2'	5'	1'	4'	Flotation Fd		
REAGENTS - LBS PER TON						MESH	%	Cum %
Ore (-10 m) gm	2000					+10		Passing
Water (DML tap) gm	2000					+14		
Ca(OH) ₂ (@ 50% active) gm	1.25	0.35		0.20		+20		
Burner oil	0.018			0.005		+28		
						+35	0.3	99.7
5540		0.04		0.008		+48	1.2	98.5
MIBC		0.03		0.015		+65	4.8	93.7
						+100	9.9	83.8
						+150	15.4	68.4
MACHINE		2000	2000	2000	2000	+200	11.6	56.8
R.P.M.		800	800	800	800	+325	16.4	40.4
pH	9.1	8.6/9.3		8.6/9.3	8.7	+400	4.0	36.4
% SOLIDS	50	29				-400	36.4	
TEMPERATURE						Total	100.0	

Remarks: Scav tail - More coarse and fine liberated pyrite than test 1 & 2, still a minor amount. Trace fine bornite
minor magnetics, trace locked sulfides w/gangue.

5540 - 0.002 gm/drop

P₈₀=138u



5415 - 0.002 gm/drop



PROJECT No. P-2694E
DATE: 7-10-02
BY: PGB

Conduct a primary grind rougher/scavenger kinetic flotation test using NaIPX @ a targeted grind of $P_{80}=200\mu$ and pH of 9.3.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	278.6	13.95	12.79	0.190	31.60	40.16	1.7841	0.0265	4.4081	5.6021	52.78	54.00	49.27	53.87
Rougher conc. 1' - 2'	137.2	6.87	12.35	0.150	29.40	37.81	0.8484	0.0103	2.0197	2.5974	25.10	20.99	22.57	24.98
Rougher conc. 2' - 4'	67.3	3.37	11.68	0.120	23.50	30.81	0.3936	0.0040	0.7919	1.0382	11.64	8.24	8.85	9.98
Rougher conc. 4' - 8'	21.6	1.08	7.20	0.110	14.20	16.16	0.0779	0.0012	0.1536	0.1748	2.30	2.42	1.72	1.68
Scavenger conc. 8' - 12'	47.7	2.39	4.53	0.041	12.90	15.41	0.1082	0.0010	0.3081	0.3680	3.20	1.99	3.44	3.54
Scavenger conc. 12' - 16'	11.0	0.55	1.90	0.058	5.68	4.20	0.0105	0.0003	0.0313	0.0231	0.31	0.65	0.35	0.22
Scavenger tails	1433.8	71.79	0.22	0.008	1.72	0.83	0.1579	0.0057	1.2348	0.5959	4.67	11.70	13.80	5.73
Head Calculated	1997.2	100.00	3.38	0.049	8.95	10.40	3.3806	0.0491	8.9474	10.400	100.00	100.00	100.00	100.00
Head Assaved	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	20.82	12.64	0.177	30.87	39.38	2.633	0.037	6.428	8.200	77.87	74.99	71.84	78.85
Rougher conc. 0' - 4'	24.19	12.51	0.169	29.85	38.19	3.026	0.041	7.220	9.238	89.51	83.23	80.69	88.83
Rougher conc. 0' - 8'	25.27	12.28	0.166	29.18	37.25	3.104	0.042	7.373	9.413	91.82	85.65	82.41	90.51
Rougher + Scav conc. 0' - 12'	27.66	11.61	0.156	27.77	35.36	3.212	0.043	7.681	9.781	95.02	87.65	85.85	94.05
Rougher + Scav conc. 0' - 16'	28.21	11.42	0.154	27.34	34.75	3.223	0.043	7.713	9.804	95.33	88.30	86.20	94.27

											Grinding				
OPERATION	BM		Cond.	Rougher flotation				Cond.	Scavenger flotation					Product	
TIME	11'		2'	0 - 1'	1' - 2'	2' - 4'	4' - 8'	1'	8' - 12'	12' - 16'					
REAGENTS - LBS PER TON													Flotation Fd		
Ore (-10 m) gm	2000												MESH	%	Cum %
Water (DML tap) gm	2000												+10		Passing
Ca(OH) ₂ (@ 50% active) gm	1.25		0.40					0.40					+14		
Burner oil	0.018							0.005					+20		
													+28	1.0	99.0
NaIPX (@ 0.5%)			0.0125					0.005					+35	1.9	97.1
MIBC			0.03					0.015					+48	2.6	94.5
													+65	12.3	82.2
													+100	12.0	70.2
													+150	9.8	60.4
MACHINE			2000	2000	2000	2000	2000	2000	2000	2000			+200	10.3	50.1
R.P.M.			800	800	800	800	800	800	800	800			+325	13.0	37.1
pH	9.2		8.3/9.3					8.2/9.3		8.2			+400	2.9	34.2
% SOLIDS	50		29										-400	34.2	
TEMPERATURE													Total	100.0	

$$P_{80} = 199u$$

Approximately 5 pieces liberated molybdenite (150-300u in size) Trace sulfides locked w/gangue, trace magne+A26tics.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-10-02

BY: PGB

TEST No. 6 **NAME:** Rio Tinto Technical Services Resolution MC-1

Conduct a primary grind rougher/scavenger kinetic flotation test using NaIPX @ a targeted grind of $P_{80}=160\mu$ and pH of 9.3.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	246.7	12.36	13.39	0.190	31.90	40.14	1.6544	0.0235	3.9414	4.9595	48.02	46.90	43.18	47.73
Rougher conc. 1' - 2'	161.6	8.09	12.98	0.180	29.20	37.97	1.0505	0.0146	2.3633	3.0730	30.50	29.10	25.89	29.58
Rougher conc. 2' - 4'	89.5	4.48	10.75	0.140	23.40	30.80	0.4819	0.0063	1.0489	1.3806	13.99	12.54	11.49	13.29
Rougher conc. 4' - 8'	29.0	1.45	5.31	0.086	12.90	14.27	0.0771	0.0012	0.1874	0.2073	2.24	2.50	2.05	1.99
Scavenger conc. 8' - 12'	55.9	2.80	2.64	0.026	12.70	16.39	0.0739	0.0007	0.3556	0.4589	2.15	1.45	3.90	4.42
Scavenger conc. 12' - 16'	13.3	0.67	1.33	0.038	4.64	3.50	0.0089	0.0003	0.0309	0.0233	0.26	0.51	0.34	0.22
Scavenger tails	1400.7	70.15	0.14	0.005	1.71	0.41	0.0982	0.0035	1.1996	0.2876	2.85	7.01	13.14	2.77
Head Calculated	1996.7	100.00	3.44	0.050	9.13	10.39	3.4449	0.0501	9.1269	10.390	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	20.45	13.23	0.186	30.83	39.28	2.705	0.038	6.305	8.032	78.52	76.00	69.08	77.31
Rougher conc. 0' - 4'	24.93	12.78	0.178	29.50	37.76	3.187	0.044	7.354	9.413	92.51	88.54	80.57	90.60
Rougher conc. 0' - 8'	26.38	12.37	0.173	28.58	36.46	3.264	0.046	7.541	9.620	94.75	91.03	82.62	92.59
Rougher + Scav conc. 0' - 12'	29.18	11.44	0.159	27.06	34.54	3.338	0.046	7.896	10.079	96.89	92.49	86.52	97.01
Rougher + Scav conc. 0' - 16'	29.85	11.21	0.156	26.56	33.85	3.347	0.047	7.927	10.103	97.15	92.99	86.86	97.23

OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation					Grinding	
			0' - 1'	1' - 2'	2' - 4'	4' - 8'		8' - 12'	12' - 16'				Product	
TIME	14'	2'					1'						Flotation Fd	
REAGENTS - LBS PER TON														
Ore (-10 m) gm	2000												MESH	% Cum %
Water (DML tap) gm	2000												+10	Passing
Ca(OH) ₂ (@ 50% active) gm	1.25	0.45					0.20						+14	
Burner oil	0.018						0.005						+20	
													+28	0.3 99.7
NaIPX (@ 0.5%)		0.0125					0.005						+35	0.6 99.1
MIBC		0.03					0.015						+48	0.5 98.6
													+65	8.3 90.3
													+100	12.5 77.8
													+150	11.8 66.0
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000				+200	11.6 54.4
R.P.M.		800	800	800	800	800	800	800	800				+325	15.1 39.3
pH	9.0	8.3/9.3					8.6/9.3		8.7				+400	3.5 35.8
% SOLIDS	50	29											-400	35.8
TEMPERATURE													Total	100.0

Remarks: Scav tail - Trace sulfides (pyrite or chalcopyrite & bornite). Minor liberated fine bornite (50u in size).

$P_{80}=159\mu$

Trace sulfides locked w/gangue, trace magnetics.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-10-02

BY: PGB

TEST No. 7 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct a primary grind rougher/scavenger kinetic flotation test using NaIPX @ a targeted grind of $P_{80}=120\mu$ and pH of 9.3.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	264.2	13.23	13.98	0.180	31.20	38.59	1.8500	0.0238	4.1287	5.1067	54.79	50.72	45.90	50.19
Rougher conc. 1' - 2'	138.1	6.92	13.38	0.170	27.50	36.55	0.9255	0.0118	1.9022	2.5282	27.41	25.04	21.15	24.85
Rougher conc. 2' - 4'	86.4	4.33	9.28	0.120	22.40	29.56	0.4016	0.0052	0.9694	1.2792	11.89	11.06	10.78	12.57
Rougher conc. 4' - 8'	34.9	1.75	4.22	0.063	13.10	14.02	0.0738	0.0011	0.2290	0.2451	2.18	2.34	2.55	2.41
Scavenger conc. 8' - 12'	56.1	2.81	1.71	0.024	19.60	23.00	0.0480	0.0007	0.5507	0.6463	1.42	1.44	6.12	6.35
Scavenger conc. 12' - 16'	10.1	0.51	1.44	0.038	6.04	7.36	0.0073	0.0002	0.0306	0.0372	0.22	0.41	0.34	0.37
Scavenger tails	1406.7	70.46	0.100	0.006	1.68	0.47	0.0705	0.0042	1.1837	0.3312	2.09	9.00	13.16	3.25
Head Calculated	1996.5	100.00	3.38	0.047	8.99	10.17	3.3767	0.0470	8.9943	10.174	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	20.15	13.77	0.177	29.93	37.89	2.776	0.036	6.031	7.635	82.20	75.75	67.05	75.04
Rougher conc. 0' - 4'	24.48	12.98	0.167	28.60	36.42	3.177	0.041	7.000	8.914	94.09	86.81	77.83	87.62
Rougher conc. 0' - 8'	26.23	12.40	0.160	27.57	34.92	3.251	0.042	7.229	9.159	96.27	89.15	80.38	90.03
Rougher + Scav conc. 0' - 12'	29.04	11.36	0.147	26.79	33.77	3.299	0.043	7.780	9.805	97.70	90.59	86.50	96.38
Rougher + Scav conc. 0' - 16'	29.54	11.19	0.145	26.44	33.32	3.306	0.043	7.811	9.843	97.91	91.00	86.84	96.75

OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation			Grinding		
			0 - 1'	1' - 2'	2' - 4'	4' - 8'		8' - 12'	12' - 16'		Product		
TIME	20'	2'					1'				Flotation Fd		
REAGENTS - LBS PER TON											MESH	%	Cum %
Ore (-10 m)	gm	2000									+10		Passing
Water (DML tap)	gm	2000									+14		
Ca(OH) ₂ (@ 50% active)	gm	1.25	0.50				0.15				+20		
Burner oil	0.018						0.005				+28	0.1	99.9
NaIPX (@ 0.5%)		0.0125					0.005				+35	0.1	99.8
MIBC		0.03					0.015				+48	0.2	99.6
											+65	1.8	97.8
											+100	9.2	88.6
											+150	11.7	76.9
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000		+200	14.0	62.9
R.P.M.		800	800	800	800	800	800	800	800		+325	18.3	44.6
pH	9.0	8.4/9.4					8.9/9.3		8.3		+400	4.4	40.2
% SOLIDS	50	29									-400	40.2	
TEMPERATURE											Total	100.0	

Remarks: Scav tail - Clean; trace sulfide and magnetics. No noticeable locking of sulfides w/gangue.

$P_{80}=116\mu$

BO - 0.0024 gm/drop



PROJECT No. P-2694E
DATE: 7-10-02
BY: PGB

Conduct a primary grind rougher/scavenger kinetic flotation test using NaIPX @ a targeted grind of $P_{80}=80\mu$ and pH of 9.3

Conduct a primary grind rougher/scavenger kinetic flotation test using Matrix A @ a targeted grind of 150 - 60 and produce:														
Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	283.7	14.20	13.19	0.210	30.70	39.38	1.8726	0.0298	4.3585	5.5908	54.70	57.21	48.88	56.14
Rougher conc. 1' - 2'	134.5	6.73	14.47	0.190	27.80	36.14	0.9739	0.0128	1.8711	2.4325	28.45	24.54	20.99	24.42
Rougher conc. 2' - 4'	69.2	3.46	10.85	0.120	21.40	28.03	0.3757	0.0042	0.7411	0.9707	10.98	7.97	8.31	9.75
Rougher conc. 4' - 8'	39.9	2.00	4.38	0.058	12.90	14.10	0.0875	0.0012	0.2576	0.2815	2.55	2.22	2.89	2.83
Scavenger conc. 8' - 12'	45.7	2.29	1.90	0.021	17.40	19.42	0.0435	0.0005	0.3979	0.4441	1.27	0.92	4.46	4.46
Scavenger conc. 12' - 16'	11.3	0.57	1.40	0.032	7.84	7.36	0.0079	0.0002	0.0443	0.0416	0.23	0.35	0.50	0.42
Scavenger tails	1414.0	70.76	0.088	0.005	1.76	0.28	0.0623	0.0035	1.2454	0.1981	1.82	6.79	13.97	1.99
Head Calculated	1998.3	100.00	3.42	0.052	8.92	9.96	3.4234	0.0521	8.9159	9.959	100.00	100.00	100.00	100.00
Head Assaved	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	20.93	13.60	0.204	29.77	38.34	2.847	0.043	6.230	8.023	83.15	81.75	69.87	80.56
Rougher conc. 0' - 4'	24.39	13.21	0.192	28.58	36.87	3.222	0.047	6.971	8.994	94.13	89.72	78.18	90.31
Rougher conc. 0' - 8'	26.39	12.54	0.182	27.39	35.15	3.310	0.048	7.228	9.275	96.68	91.94	81.07	93.13
Rougher + Scav conc. 0' - 12'	28.67	11.69	0.169	26.60	33.90	3.353	0.048	7.626	9.720	97.95	92.86	85.53	97.59
Rougher + Scav conc. 0' - 16'	29.24	11.49	0.166	26.23	33.38	3.361	0.049	7.671	9.761	98.18	93.21	86.03	98.01

[illegible]

Remarks:	Scav tail -Clean; trace sulfide and magnetics. No noticeable locking of sulfides w/gangue.
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$$P_{80} = 84u$$

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-10-02

BY: PGB

TEST No. 9 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct a primary grind rougher/scavenger kinetic flotation test using NaIPX @ a targeted grind of $P_{80}=60u$ and pH of 9.3.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	250.6	12.52	10.14	0.210	31.20	41.31	1.2697	0.0263	3.9066	5.1725	37.31	52.10	43.64	49.82
Rougher conc. 1' - 2'	168.1	8.40	16.23	0.180	26.70	33.93	1.3632	0.0151	2.2426	2.8498	40.06	29.95	25.05	27.45
Rougher conc. 2' - 4'	74.4	3.72	14.03	0.120	21.40	27.72	0.5216	0.0045	0.7955	1.0305	15.33	8.84	8.89	9.93
Rougher conc. 4' - 8'	36.8	1.84	5.78	0.057	13.30	15.66	0.1063	0.0010	0.2445	0.2879	3.12	2.08	2.73	2.77
Scavenger conc. 8' - 12'	48.8	2.44	2.80	0.021	21.70	25.27	0.0683	0.0005	0.5291	0.6162	2.01	1.01	5.91	5.93
Scavenger conc. 12' - 16'	18.5	0.92	1.26	0.025	7.41	6.57	0.0116	0.0002	0.0685	0.0607	0.34	0.46	0.77	0.58
Scavenger tails	1404.2	70.16	0.09	0.004	1.66	0.52	0.0624	0.0028	1.1647	0.3648	1.83	5.56	13.01	3.51
Head Calculated	2001.4	100.00	3.40	0.050	8.95	10.38	3.4030	0.0505	8.9515	10.382	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	20.92	12.59	0.198	29.39	38.35	2.633	0.041	6.149	8.022	77.37	82.05	68.69	77.27
Rougher conc. 0' - 4'	24.64	12.80	0.186	28.19	36.74	3.154	0.046	6.945	9.053	92.69	90.89	77.58	87.19
Rougher conc. 0' - 8'	26.48	12.32	0.177	27.15	35.28	3.261	0.047	7.189	9.341	95.82	92.97	80.31	89.97
Rougher + Scav conc. 0' - 12'	28.91	11.51	0.164	26.69	34.44	3.329	0.047	7.718	9.957	97.82	93.98	86.22	95.90
Rougher + Scav conc. 0' - 16'	29.84	11.20	0.160	26.10	33.57	3.341	0.048	7.787	10.018	98.17	94.44	86.99	96.49

OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation		Grinding	Product	
			0 - 1'	1' - 2'	2' - 4'	4' - 8'		8' - 12'	12' - 16'			
TIME	41.5'	2'										
REAGENTS - LBS PER TON												
Ore (-10 m) gm	2000										MESH	%
Water (DML tap) gm	2000										+10	Cum %
Ca(OH) ₂ (@ 50% active) gm	1.25	0.75					0.45				+14	Passing
Burner oil	0.018						0.005				+20	
											+28	0.0
NaIPX (@ 0.5%)		0.0125					0.005				+35	0.0
MIBC		0.03					0.015				+48	0.0
											+65	0.0
											+100	0.2
											+150	4.3
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000		+200	8.5
R.P.M.		800	800	800	800	800	800	800	800		+325	22.9
pH	8.5	7.8/9.3					8.0/9.3		8.3		+400	6.7
% SOLIDS	50	29									-400	57.4
TEMPERATURE											Total	100.0

Remarks: Scav tail - Clean; trace sulfide and magnetics. No noticeable locking of sulfides w/gangue.

$P_{80}=64u$

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 7-16-02
BY: PGB

TEST No. 10 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat test No. 7 except at a pH=9.0.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	264.5	13.26	16.44	0.310	29.10	36.96	2.1802	0.0411	3.8591	4.9014	64.05	62.29	42.40	48.36
Rougher conc. 1' - 2'	104.3	5.23	13.70	0.230	27.60	35.41	0.7164	0.0120	1.4433	1.8517	21.05	18.22	15.86	18.27
Rougher conc. 2' - 4'	64.9	3.25	9.42	0.190	24.60	30.57	0.3065	0.0062	0.8005	0.9947	9.01	9.37	8.80	9.82
Rougher conc. 4' - 8'	27.2	1.36	4.97	0.098	16.70	19.34	0.0678	0.0013	0.2277	0.2637	1.99	2.02	2.50	2.60
Scavenger conc. 8' - 12'	93.6	4.69	1.23	0.017	32.60	38.44	0.0577	0.0008	1.5299	1.8040	1.70	1.21	16.81	17.80
Scavenger conc. 12' - 16'	9.4	0.47	1.62	0.052	8.96	8.29	0.0076	0.0002	0.0422	0.0391	0.22	0.37	0.46	0.39
Scavenger tails	1430.6	71.73	0.094	0.006	1.67	0.39	0.0674	0.0043	1.1978	0.2797	1.98	6.52	13.16	2.76
Head Calculated	1994.5	100.00	3.40	0.066	9.10	10.13	3.4037	0.0660	9.1006	10.134	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	18.49	15.67	0.287	28.68	36.52	2.897	0.053	5.302	6.753	85.10	80.51	58.26	66.64
Rougher conc. 0' - 4'	21.74	14.73	0.273	28.07	35.63	3.203	0.059	6.103	7.748	94.11	89.87	67.06	76.45
Rougher conc. 0' - 8'	23.11	14.15	0.262	27.40	34.67	3.271	0.061	6.331	8.012	96.10	91.90	69.56	79.05
Rougher + Scav conc. 0' - 12'	27.80	11.97	0.221	28.27	35.31	3.329	0.061	7.861	9.816	97.79	93.11	86.37	96.85
Rougher + Scav conc. 0' - 16'	28.27	11.80	0.218	27.95	34.86	3.336	0.062	7.903	9.855	98.02	93.48	86.84	97.24

OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation		Grinding	Product	
			0' - 1'	1' - 2'	2' - 4'	4' - 8'		8' - 12'	12' - 16'		Flotation Fd	
TIME	19.5'	2'					1'					
REAGENTS - LBS PER TON												
Ore (-10 m) gm	2000									MESH	%	Cum %
Water (DML tap) gm	2000									+10		Passing
Ca(OH) ₂ (@ 50% active) gm	1.25	0.42					0.30			+14		
Burner oil	0.018						0.005			+20		
										+28		
NaPX (@ 0.5%)		0.0125					0.005			+35		
MIBC		0.03					0.015			+48	0.2	99.8
										+65	1.7	98.1
										+100	6.9	91.2
										+150	14.0	77.2
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000	+200	12.7	64.5
R.P.M.		800	800	800	800	800	800	800	800	+325	19.3	45.2
pH	8.9	8.2/9.0					8.2/9.0		8.3	+400	4.5	40.7
% SOLIDS	50	29								-400	40.7	
TEMPERATURE										Total	100.0	

Remarks: Scav tail - Trace fine bornite (+/- 50u in size), trace magnetics. Trace locking of sulfides w/gangue.

P₈₀ = 114u

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-16-02

BY: PGB

TEST No. 11 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat test No. 10 @ a pH=10.0.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	221.6	11.09	18.48	0.330	29.20	36.75	2.0501	0.0366	3.2394	4.0770	59.60	55.28	35.38	41.38
Rougher conc. 1' - 2'	110.4	5.53	14.80	0.270	28.30	35.58	0.8180	0.0149	1.5641	1.9665	23.78	22.53	17.08	19.96
Rougher conc. 2' - 4'	62.3	3.12	10.83	0.210	25.10	30.60	0.3378	0.0065	0.7828	0.9544	9.82	9.89	8.55	9.69
Rougher conc. 4' - 8'	29.6	1.48	5.76	0.120	18.10	20.37	0.0854	0.0018	0.2682	0.3019	2.48	2.69	2.93	3.06
Scavenger conc. 8' - 12'	119.1	5.96	1.14	0.017	33.30	37.64	0.0680	0.0010	1.9855	2.2443	1.98	1.53	21.68	22.78
Scavenger conc. 12' - 16'	11.1	0.56	1.65	0.053	8.08	6.30	0.0092	0.0003	0.0449	0.0350	0.27	0.44	0.49	0.36
Scavenger tails	1443.4	72.26	0.099	0.007	1.76	0.38	0.0715	0.0051	1.2718	0.2746	2.08	7.64	13.89	2.79
Head Calculated	1997.5	100.00	3.44	0.066	9.16	9.85	3.4399	0.0662	9.1568	9.854	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

Rougher conc. 0' - 2'	16.62	17.26	0.310	28.90	36.36	2.868	0.052	4.804	6.043	83.38	77.81	52.46	61.33
Rougher conc. 0' - 4'	19.74	16.24	0.294	28.30	35.45	3.206	0.058	5.586	6.998	93.20	87.70	61.01	71.02
Rougher conc. 0' - 8'	21.22	15.51	0.282	27.59	34.40	3.291	0.060	5.855	7.300	95.68	90.39	63.94	74.08
Rougher + Scav conc. 0' - 12'	27.18	12.36	0.224	28.84	35.11	3.359	0.061	7.840	9.544	97.65	91.92	85.62	96.86
Rougher + Scav conc. 0' - 16'	27.74	12.14	0.221	28.42	34.53	3.368	0.061	7.885	9.579	97.92	92.36	86.11	97.21

OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation		Grinding Product			
TIME	19.5'	2'	0 - 1'	1' - 2'	2' - 4'	4' - 8'	1'	8' - 12'	12' - 16'				
REAGENTS - LBS PER TON													
Ore (-10 m)	gm	2000										MESH	Cum %
Water (DML tap)	gm	2000										+10	
Ca(OH) ₂ (@ 50% active)	gm	1.75	0.72				0.51					+14	
Burner oil		0.018					0.005					+20	
												+28	
NaIPX (@ 0.5%)			0.0125				0.005					+35	
MIBC			0.03				0.015					+48	
												+65	
												+100	
												+150	
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000			+200	
R.P.M.		800	800	800	800	800	800	800	800			+325	
pH	9.6	8.4/10.0					8.7/10.0		8.8			+400	
% SOLIDS	50	29										-400	
TEMPERATURE												Total	

Remarks: Scav tail - Comparable to T-10, except trace coarse sulfide (+/- 250u in size).

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 7-16-02
BY: PGB

TEST No. 12 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat test 10 except at a pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
Rougher conc. 0' - 1'	181.5	9.09	22.28	0.340	25.50	34.48	2.0245	0.0309	2.3171	3.1331	59.12	48.85	24.33	30.61
Rougher conc. 1' - 2'	97.6	4.89	16.86	0.310	24.20	30.83	0.8238	0.0151	1.1825	1.5065	24.06	23.95	12.42	14.72
Rougher conc. 2' - 4'	67.0	3.35	10.48	0.270	20.40	23.63	0.3515	0.0091	0.6843	0.7926	10.27	14.32	7.18	7.74
Rougher conc. 4' - 8'	34.7	1.74	4.57	0.120	16.80	20.46	0.0794	0.0021	0.2919	0.3554	2.32	3.30	3.06	3.47
Scavenger conc. 8' - 12'	60.5	3.03	1.98	0.036	25.70	30.11	0.0600	0.0011	0.7784	0.9120	1.75	1.72	8.17	8.91
Scavenger conc. 12' - 16'	11.8	0.59	1.35	0.056	10.90	11.20	0.0080	0.0003	0.0644	0.0662	0.23	0.52	0.68	0.65
Scavenger tails	1544.3	77.32	0.100	0.006	5.44	4.49	0.0773	0.0046	4.2060	3.4715	2.26	7.33	44.16	33.91
Head Calculated	1997.4	100.00	3.42	0.063	9.52	10.24	3.4246	0.0632	9.5246	10.237	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

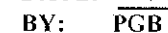
Combined Products

Rougher conc. 0' - 2'	13.97	20.38	0.330	25.05	33.20	2.848	0.046	3.500	4.640	83.17	72.80	36.74	45.32
Rougher conc. 0' - 4'	17.33	18.47	0.318	24.15	31.35	3.200	0.055	4.184	5.432	93.44	87.12	43.93	53.06
Rougher conc. 0' - 8'	19.06	17.20	0.300	23.48	30.36	3.279	0.057	4.476	5.788	95.76	90.42	46.99	56.54
Rougher + Scav conc. 0' - 12'	22.09	15.11	0.264	23.78	30.32	3.339	0.058	5.254	6.700	97.51	92.14	55.16	65.44
Rougher + Scav conc. 0' - 16'	22.68	14.76	0.258	23.45	29.83	3.347	0.059	5.319	6.766	97.74	92.67	55.84	66.09

											Grinding		
OPERATION	BM	Cond.	Rougher flotation				Cond.	Scavenger flotation			Product		
TIME	19.5'	2'	0 - 1'	1' - 2'	2' - 4'	4' - 8'	1'	8' - 12'	12' - 16'				
REAGENTS - LBS PER TON											MESH	%	Cum %
Ore (-10 m) gm	2000										+10		
Water (DML tap) gm	2000										+14		
Ca(OH) ₂ (@ 50% active) gm	3.00	1.30					0.80				+20		
Burner oil	0.018						0.005				+28		
											+35		
NaIPX (@ 0.5%)		0.0125					0.005				+48		
MIBC		0.03					0.015				+65		
											+100		
											+150		
MACHINE		2000	2000	2000	2000	2000	2000	2000	2000		+200		
R.P.M.		800	800	800	800	800	800	800	800		+325		
pH	11.0	10.0/11.0					10.6/11.0		10.7		+400		
% SOLIDS	50	29									-400		
TEMPERATURE											Total		

Remarks: Scav tail -Significant pyrite.

BO - 0.0024 gm/drop



BO = 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-25-02

BY: PGB

TEST No. 14 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind P_{80} = (no regrind), cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	1400.0	23.33	13.02	0.210	33.30	41.21	3.0380	0.0490	7.7700	9.6157	93.65	85.75	83.39	93.24
No. 2 Cl tail	58.0	0.97	2.85	0.130	8.56	8.66	0.0276	0.0013	0.0827	0.0837	0.85	2.20	0.89	0.81
No. 1 Cl scav conc.	66.5	1.11	6.02	0.120	11.80	15.18	0.0667	0.0013	0.1308	0.1682	2.06	2.33	1.40	1.63
No. 1 Cl scav tail	186.0	3.10	1.27	0.064	4.05	2.82	0.0394	0.0020	0.1256	0.0874	1.21	3.47	1.35	0.85
Scavenger tails	4289.5	71.49	0.101	0.005	1.69	0.50	0.0722	0.0036	1.2082	0.3575	2.23	6.26	12.97	3.47
Head Calculated	6000.0	100.00	3.24	0.057	9.32	10.31	3.2438	0.0571	9.3173	10.313	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01								

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 1 Cl conc.	24.30	12.62	0.207	32.32	39.92	3.066	0.050	7.853	9.699	94.50	87.95	84.28	94.05
No. 1 Cl & No. 1 Cl scav conc.	25.41	12.33	0.203	31.42	38.84	3.132	0.052	7.984	9.868	96.56	90.27	85.69	95.69
Ro & Scav conc.	28.51	11.13	0.188	28.44	34.92	3.172	0.054	8.109	9.955	97.77	93.74	87.03	96.53
Scav tail & No. 1 Cl scav tail	74.59	0.150	0.007	1.79	0.60	0.112	0.006	1.334	0.445	3.44	9.73	14.31	4.31

OPERATION	Combine Ro & Scav conc. from T-13 thru 13B and split into 5 charges			Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl scav	No. 2 Cl	No. 2 Cl scav	Combine No. 2 Cl & No. 2 Cl scav Conc.		Grinding	
														Product	
TIME					0'		1'	5'	3'	6'	3'			Ro Fd	Cl Fd
REAGENTS - LBS PER TON															
Ro & scav conc. wgt (wet) gm	1920.5 (total)												MESH	%	Cum %
1/5 split (wet), gm	384.1												+10		
Ca(OH) ₂ (@ 50% active) gm							1.0		0.3	0.7	-		+14		
Burner oil							0.01						+20		
													+28		
NaIPX (@ 0.5%)							0.019*		0.009**	0.001	0.001		+35		
MIBC							0.038			0.023			+48	0.4	0.0
													+65	3.0	2.8
													+100	7.4	7.6
													+150	17.0	20.8
MACHINE							500	500	500	500	500		+200	13.2	14.6
R.P.M.							900	900	900	900	900		+325	19.4	18.4
pH							8.0/11.0		10.8/11.0	8.3/11.0	11.0		+400	4.8	3.2
% SOLIDS													-400	34.8	32.6
TEMPERATURE													Total	100.0	100.0

Remarks: Cleaner tails, - some locking of sulfides w/gangue.

P_{80} = 124u 128u

* Damn, based reagent dosage on 1500gm not 1200gm test. Will carry out this dosage on remaining tests (may have to repeat based on assays).

** - May have over reagentized, will use less collector in subsequent tests.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 7-25-02
BY: PGB

TEST No. 15 NAME: Rio Tinto Technical Services Resolution MC-1
Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind P_{80} = 75u, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	1096.9	18.28	17.08	0.280	32.20	41.53	3.1225	0.0512	5.8867	7.5924	92.19	85.58	67.29	76.76
No. 2 Cl tail	93.4	1.56	1.10	0.042	23.60	30.10	0.0171	0.0007	0.3674	0.4686	0.51	1.09	4.20	4.74
No. 1 Cl scav conc.	101.0	1.68	5.85	0.087	24.90	30.76	0.0985	0.0015	0.4192	0.5178	2.91	2.45	4.79	5.23
No. 1 Cl scav tail	419.2	6.99	1.10	0.042	12.40	13.67	0.0769	0.0029	0.8663	0.9551	2.27	4.91	9.90	9.66
Scavenger tails	4289.5	71.49	0.101	0.005	1.69	0.50	0.0722	0.0036	1.2082	0.3575	2.13	5.98	13.81	3.61
Head Calculated	6000.0	100.00	3.39	0.060	8.75	9.89	3.3872	0.0598	8.7478	9.891	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01								

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 1 Cl conc.	19.84	15.83	0.261	31.53	40.63	3.140	0.052	6.254	8.061	92.69	86.67	71.49	81.50
No. 1 Cl & No. 1 Cl scav conc.	21.52	15.05	0.248	31.01	39.86	3.238	0.053	6.673	8.579	95.60	89.12	76.28	86.73
Ro & Scav conc.	28.51	11.63	0.197	26.45	33.44	3.315	0.056	7.540	9.534	97.87	94.02	86.19	96.39
Scav tail & No. 1 Cl scav tail	78.48	0.19	0.008	2.64	1.67	0.149	0.007	2.075	1.313	4.40	10.88	23.72	13.27

OPERATION	Combine Ro & Scav conc. from T-13 thru 13B and split into 5 charges		Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl scav	No. 2 Cl	No. 2 Cl scav	Combine No. 2 Cl & No. 2 Cl scav Conc.		Grinding	
													Product	
TIME				4'		1'	5'	3'	6'	3'			Cl	
REAGENTS - LBS PER TON													Fd	
Ro & scav conc. wgt (wet) gm	1920.5 (total)											MESH	%	Cum %
1/5 split (wet), gm	384.1											+10		
Ca(OH) ₂ (@ 50% active) gm				0.40		0.8		0.4	0.7	0.25		+14		
Burner oil				0.005		0.005						+20		
												+28		
NaIPX (@ 0.5%)						0.019		0.003	0.001	0.001		+35		
MIBC						0.038			0.023			+48		
												+65		
												+100	0.6	
												+150	3.6	
MACHINE						500	500	500	500	500		+200	8.6	
R.P.M.						900	900	900	900	900		+325	28.8	
pH				11.5		8.8/11.0		10.5/11.0	8.7/11.0	10.8/11.0		+400	7.2	
% SOLIDS												-400	51.2	
TEMPERATURE												Total	100.0	

Remarks: No. 1 & No. 2 Cl scav tails, - clean, trace fine bornite, mostly pyrite and silica.

P_{80} = 66u

No. 2 Cl scav conc. - Significant pyrite

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-25-02

BY: PGB

TEST No. 16

NAME: Rio Tinto Technical Services

Resolution MC-1

Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind P_{80} = 53u, cleaner pH=11.0

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	825.9	13.77	22.90	0.360	28.90	34.51	3.1522	0.0496	3.9781	4.7503	92.69	86.28	44.99	48.30
No. 2 Cl tail	89.5	1.49	1.63	0.066	24.10	31.31	0.0243	0.0010	0.3595	0.4670	0.71	1.71	4.07	4.75
No. 1 Cl scav conc.	105.2	1.75	4.61	0.078	27.30	32.42	0.0808	0.0014	0.4787	0.5684	2.38	2.38	5.41	5.78
No. 1 Cl scav tail	689.9	11.50	0.62	0.017	24.50	32.10	0.0713	0.0020	2.8171	3.6910	2.10	3.40	31.86	37.53
Scavenger tails	4289.5	71.49	0.101	0.005	1.69	0.50	0.0722	0.0036	1.2082	0.3575	2.12	6.22	13.67	3.63
Head Calculated	6000.0	100.00	3.40	0.057	8.84	9.83	3.4008	0.0574	8.8415	9.834	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01								

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 1 Cl conc.	15.26	20.82	0.331	28.43	34.20	3.176	0.051	4.338	5.217	93.40	87.99	49.06	53.05
No. 1 Cl & No. 1 Cl scav conc.	17.01	19.15	0.305	28.31	34.01	3.257	0.052	4.816	5.786	95.78	90.37	54.47	58.83
Ro & Scav conc.	28.51	11.68	0.189	26.78	33.24	3.329	0.054	7.633	9.477	97.88	93.78	86.33	96.37
Scav tail & No. 1 Cl scav tail	82.99	0.17	0.007	4.85	4.88	0.143	0.006	4.025	4.048	4.22	9.63	45.53	41.17

OPERATION	Combine Ro & Scav conc. from T-13 thru 13B and split into 5 charges		Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl		No. 1 Cl scav		No. 2 Cl		No. 2 Cl scav		Combine No. 2 Cl & No. 2 Cl scav Conc.	Grinding		
																Product		
TIME			8'			1'	5'		3'		6'		3'			Cl		
REAGENTS - LBS PER TON																Fd		
Ro & scav conc. wgt (wet) gm	1920.5 (total)															MESH	%	Cum %
1/5 split (wet), gm	384.1															+10		
Ca(OH) ₂ (@ 50% active) gm			0.50			1.0		0.4		0.6	0.4					+14		
Burner oil			0.005			0.005										+20		
																+28		
NaIPX (@ 0.5%)						0.019		0.003		0.001	0.001					+35		
MIBC						0.038				0.023						+48		
																+65		
																+100		
																+150	1.0	
MACHINE						500	500	500	500	500						+200	3.6	
R.P.M.						900	900	900	900	900						+325	28.2	
pH			10.9			8.5/11.0		10.7/11.0	8.8/11.0	10.8/11.0						+400	8.8	
% SOLIDS																-400	58.4	
TEMPERATURE																Total	100.0	

Remarks: Cleaner tails, - Comparable to T-15

No. 2 Cl scav conc. - Significant pyrite

BO - 0.0024 gm/drop

P_{80} = 57u



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PROJECT No. P-2694E

DATE: 7-25-02

BY: PGB

TEST No. 17

NAME: Rio Tinto Technical Services

Resolution MC-1

Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind $P_{80} = 37\mu$, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	698.6	11.64	26.20	0.440	27.90	34.51	3.0506	0.0512	3.2485	4.0181	91.31	83.24	35.80	41.08
No. 2 Cl tail	93.5	1.56	2.28	0.064	26.80	31.31	0.0355	0.0010	0.4176	0.4879	1.06	1.62	4.60	4.99
No. 1 Cl scav conc.	80.2	1.34	6.44	0.210	26.70	32.42	0.0861	0.0028	0.3569	0.4333	2.58	4.56	3.93	4.43
No. 1 Cl scav tail	838.2	13.97	0.69	0.021	27.50	32.10	0.0964	0.0029	3.8418	4.4844	2.89	4.77	42.34	45.85
Scavenger tails	4289.5	71.49	0.101	0.005	1.69	0.50	0.0722	0.0036	1.2082	0.3575	2.16	5.81	13.32	3.65
Head Calculated	6000.0	100.00	3.34	0.062	9.07	9.78	3.3408	0.0615	9.0730	9.781	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01								

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 1 Cl conc.	13.20	23.38	0.396	27.77	34.13	3.086	0.052	3.666	4.506	92.38	84.86	40.41	46.07
No. 1 Cl & No. 1 Cl scav conc.	14.54	21.82	0.379	27.67	33.97	3.172	0.055	4.023	4.939	94.95	89.42	44.34	50.50
Ro & Scav conc.	28.51	11.47	0.203	27.59	33.06	3.269	0.058	7.865	9.424	97.84	94.19	86.68	96.35
Scav tail & No. 1 Cl scav tail	85.46	0.20	0.008	5.91	5.67	0.169	0.007	5.050	4.842	5.05	10.58	55.66	49.50

OPERATION	Combine Ro & Scav conc. from T-13 thru 13B and split into 5 charges		Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl scav	No. 2 Cl	No. 2 Cl scav	Combine No. 2 Cl & No. 2 Cl scav Conc.	Grinding		
												Product		
TIME			12'			1'	5'	3'	6'	3'		Cl	Fd	
REAGENTS - LBS PER TON														
Ro & scav conc. wgt (wet) gm	1920.5 (total)											MESH	%	Cum %
1/5 split (wet), gm	384.1											+10		
Ca(OH) ₂ (@ 50% active) gm			0.60		0.85		0.5	0.8	-			+14		
Burner oil			0.005		0.005							+20		
												+28		
NaIPX (@ 0.5%)					0.019		0.003	0.001	0.001			+35		
MIBC					0.038			0.023				+48		
												+65		
												+100	0.2	
												+150	0.4	
MACHINE					500	500	500	500	500			+200	1.6	
R.P.M.					900	900	900	900	900			+325	23.0	
pH			10.8		8.6/11.0		10.8/11.0	8.5/11.0	11.0			+400	8.8	
% SOLIDS												-400	67.0	
TEMPERATURE												Total	100.0	

Remarks: Cleaner tails, - Comparable to T-15

$P_{80} = 50\mu$

No. 2 Cl scav conc. - Significant pyrite

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 7-25-02

BY: PGB

TEST No. 18

NAME: Rio Tinto Technical Services

Resolution MC-1

Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind P_{80} = 25u, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	668.3	11.14	28.10	0.470	26.70	35.21	3.1299	0.0524	2.9739	3.9218	90.50	83.44	33.50	41.20
No. 2 Cl tail	93.9	1.57	2.79	0.061	23.20	25.72	0.0437	0.0010	0.3631	0.4025	1.26	1.52	4.09	4.23
No. 1 Cl scav conc.	114.3	1.91	6.21	0.140	26.70	28.72	0.1183	0.0027	0.5086	0.5471	3.42	4.25	5.73	5.75
No. 1 Cl scav tail	834.0	13.90	0.68	0.023	27.50	30.87	0.0945	0.0032	3.8225	4.2909	2.73	5.10	43.06	45.07
Scavenger tails	4289.5	71.49	0.101	0.005	1.69	0.50	0.0722	0.0036	1.2082	0.3575	2.09	5.70	13.61	3.75
Head Calculated	6000.0	100.00	3.46	0.063	8.88	9.52	3.4586	0.0627	8.8764	9.520	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01								

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 1 Cl conc.	12.70	24.98	0.420	26.27	34.04	3.174	0.053	3.337	4.324	91.76	84.96	37.59	45.42
No. 1 Cl & No. 1 Cl scav conc.	14.61	22.53	0.383	26.33	33.35	3.292	0.056	3.846	4.871	95.18	89.21	43.32	51.17
Ro & Scav conc.	28.51	11.88	0.208	26.90	32.14	3.386	0.059	7.668	9.162	97.91	94.30	86.39	96.25
Scav tail & No. 1 Cl scav tail	85.39	0.20	0.008	5.89	5.44	0.167	0.007	5.031	4.648	4.82	10.79	56.68	48.83

OPERATION	Combine Ro & Scav conc. from T-13 thru 13B and split into 5 charges		Wet screen conc. on 200m RG +200 mesh		Cond.	No. 1 Cl	No. 1 Cl scav	No. 2 Cl	No. 2 Cl scav	Combine No. 2 Cl & No. 2 Cl scav Conc.	Grinding	
											Product	
TIME			16'		1'	5'	3'	6'	3'		Cl	
REAGENTS - LBS PER TON											Fd	
Ro & scav conc. wgt (wet) gm	1920.5 (total)										MESH	Cum %
1/5 split (wet), gm	384.1										+10	
Ca(OH) ₂ (@ 50% active) gm			0.60		0.85		0.5	0.8	-		+14	
Burner oil			0.005		0.005						+20	
											+28	
NaIPX (@ 0.5%)					0.019		0.003	0.001	0.001		+35	
MIBC					0.038			0.023			+48	
											+65	
											+100	
											+150	0.2
MACHINE					500	500	500	500	500		+200	1.0
R.P.M.					900	900	900	900	900		+325	14.4
pH					10.8	8.6/11.0	10.8/11.0	8.5/11.0	11.0		+400	6.2
% SOLIDS											-400	78.2
TEMPERATURE											Total	100.0

Remarks: Cleaner tails, - Comparable to T-15

No. 2 Cl scav conc. - Significant pyrite

BO - 0.0024 gm/drop

P_{80} = 40u



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PROJECT No. P-2694E

DATE: 7-25-02

BY: PGB

TEST No. 19 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct cleaner regrind size test series on Ro+Scav conc. split from Tests 13-13b. Targeted regrind $P_{80} = 25\mu$, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution		
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe
No. 2 Cl conc.	127.6	6.39	37.40	0.330	23.70	0.00	2.3914	0.0211	1.5154		69.92	40.61	15.57
No. 2 Cl ext conc.	32.0	1.60	35.80	0.420	23.30	0.00	0.5741	0.0067	0.3736		16.78	12.96	3.84
No. 2 Cl scav conc.	9.9	0.50	23.20	0.520	26.60	0.00	0.1151	0.0026	0.1320		3.36	4.97	1.36
No. 2 Cl scav tail	71.3	3.57	5.12	0.360	27.10	0.00	0.1829	0.0129	0.9682		5.35	24.76	9.95
No. 1 Cl scav conc.	25.8	1.29	0.31	0.150	30.50	0.00	0.0040	0.0019	0.3943		0.12	3.73	4.05
No. 1 Cl scav tail	267.8	13.42	0.43	0.012	36.20	0.00	0.0577	0.0016	4.8579		1.69	3.10	49.90
Scavenger tails	1461.2	73.22	0.130	0.007	2.04	0.00	0.0952	0.0051	1.4937		2.78	9.87	15.34
Head Calculated	1995.6	100.00	3.42	0.052	9.74		3.4204	0.0520	9.7351		100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01							

NOTE: Cleaner product weights have been adjusted to represent a 6000 gm test.

Combined Products

No. 2 Cl & Cl ext conc.	8.00	37.08	0.348	23.62	0.00	2.965	0.0278	1.889	0.000	86.70	53.58	19.40
No. 2 Cl, No. 2 Cl ext & No. 2 Cl scav conc.	8.49	36.27	0.358	23.79	#####	3.081	0.0304	2.021	#VALUE!	90.06	58.54	20.76
No. 1 Cl conc.	12.07	27.05	0.359	24.77	#####	3.263	0.0433	2.989	#VALUE!	95.41	83.30	30.71
No. 1 Cl conc & No. 1 Cl scav conc.	13.36	24.46	0.338	25.33	#####	3.267	0.0452	3.384	#VALUE!	95.53	87.03	34.76
Ro & scav conc.	26.78	12.42	0.175	30.78	0.00	3.325	0.047	8.241	0.000	97.22	90.13	84.66
Scavenger tail and No. Cl scav tail	86.64	0.18	0.008	7.33	#####	0.153	0.0067	6.352	#VALUE!	4.47	12.97	65.24

OPERATION	BM	Cond.	Ro	Cond.	Scav	Combine Ro & scav conc. wet screen on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine the No. 1 Cl & No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	No. 2 Cl scav
							16'									
TIME	19'	2'	6'	1'	6'				1'	5'	3'	3'		5'	2'	3'
REAGENTS - LBS PER TON																
Ore (-10 m) gm	2000															
Water (DML tap) gm	2000															
Ca(OH) ₂ (@ 50% active) gm	1.25	0.5		0.2			0.5		0.85	0.60				0.9	0.3	
Burner oil	0.018			0.005			0.005		0.005							
NaIPX (@ 0.5%)		0.0125		0.005							0.004	0.0026			0.004	0.0018
MIBC		0.03									0.015					
MACHINE																
R.P.M.		2000	2000	2000	2000				500	500	500	500	500	500	500	500
pH	9.0	8.2/9.0		8.5/9.0	8.3		10.8		8.8/11.0	10.4/11.0	11.0	11.0		8.7/11.0	10.7/11.0	11.0
% SOLIDS																
TEMPERATURE																

Remarks: Cleaner tails, - Comparable to T-15

No. 2 Cl scav conc. - Significant pyrite

BO - 0.0024 gm/drop

NaIPX - 0.05 gm/drop



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PROJECT No. P-2694E

DATE: 8/7/02

BY: PGB

TEST Nos. 20, 20A and 20B **NAME:** Rio Tinto Technical Services Resolution MC-1

Repeat reagent scheme from test Nos. 13, 13A and 13B to generate concentrate for subsequent repeat cleaner regrind test series.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
T-20 Scav tails	1447.3	33.39	0.110	0.004	2.02	0.53	0.0367	0.0013	0.6744	0.1770	31.48	30.82	36.45	38.19
T-20A Scav tails	1445.0	33.33	0.120	0.004	1.76	0.37	0.0400	0.0013	0.5867	0.1233	34.29	30.77	31.71	26.62
T-20B Scav tails	1442.6	33.28	0.120	0.005	1.77	0.49	0.0399	0.0017	0.5890	0.1631	34.23	38.40	31.84	35.19
Head Calculated	4334.9	100.00	0.117	0.004	1.85	0.46	0.1167	0.0043	1.8501	0.463	100.00	100.00	100.00	100.00

OPERATION	BM	Cond.	Ro	Cond.	Scav	Combine Ro & Scav conc. from T-20 thru 20B and split into 4 charges for cleaner grind series tests.				Grinding Product			
TIME	19'	2'	6'	1'	6'								
REAGENTS - LBS PER TON										MESH	%	%	
Ore (-10 m) gm 3x	2000									+10			
Water (DML tap) gm 3x	2000									+14			
Ca(OH) ₂ (@ 50% active) gm 3x	1.25	0.5		0.2						+20			
Burner oil, 3x	0.018			0.005						+28			
										+35			
NaIPX (0.5%)		0.0125		0.005						+48			
MIBC		0.03								+65			
										+100			
										+150			
MACHINE		2000	2000	2000	2000					+200			
R.P.M.		900	900	900	900					+325			
pH (all tests)	9.0	8.3/9.0		8.4/9.0						+400			
% SOLIDS	50									-400			
TEMPERATURE										Total			

Remarks: Scav tails - clean, trace sulfides (fine bornite few pieces coarse pyrite), trace magnetics.

BO - 0.0024 gm/drop

BY: PGB

TEST No. 21 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat cleaner regrind size test series on Ro+Scav conc. split from Tests 20-20b. Targeted regrind P_{80} = 100u, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	162.9	10.91	28.25	0.310	27.40	34.61	3.0830	0.0338	2.9902	3.7770	88.30	71.36	32.77	39.23
No. 2 Cl tail	44.2	2.96	5.68	0.210	24.80	28.34	0.1682	0.0062	0.7343	0.8392	4.82	13.12	8.05	8.72
No. 1 Cl scav conc.	20.7	1.39	4.11	0.076	30.90	35.34	0.0570	0.0011	0.4285	0.4901	1.63	2.22	4.70	5.09
No. 1 Cl scav tail	181.2	12.14	0.81	0.028	29.90	34.50	0.0983	0.0034	3.6296	4.1880	2.82	7.17	39.77	43.50
Scavenger tails	1083.7	72.60	0.117	0.004	1.85	0.46	0.0849	0.0029	1.3431	0.3340	2.43	6.13	14.72	3.47
Head Calculated	1492.7	100.00	3.49	0.047	9.13	9.63	3.4914	0.0474	9.1257	9.628	100.00	100.00	100.00	100.00
Head Assaved	1500.0		3.49	0.052	8.99	9.01								

Combined Products

No. 1 conc.	13.87	23.43	0.289	26.85	33.27	3.251	0.040	3.725	4.616	93.12	84.48	40.81	47.94
No. 1 Cl conc. & Cl scav conc.	15.26	21.68	0.269	27.21	33.46	3.308	0.041	4.153	5.106	94.75	86.70	45.51	53.03
Ro & scav conc.	27.40	12.43	0.162	28.40	33.92	3.406	0.045	7.783	9.294	97.57	93.87	85.28	96.53
No. 1 Cl scav tail & scav tails	84.74	0.216	0.007	5.87	5.34	0.183	0.006	4.973	4.522	5.25	13.30	54.49	46.97

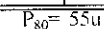
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Remarks:

Na1PX - 0.05 gm/drop

BO = 0.0024 gm/drop

$$P_{80} = 86.5u$$





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PROJECT No. P-2694E

DATE: 8-7-02

BY: PGB

TEST No. 23 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat cleaner regrind size test series on Ro+Scav conc. split from Tests 20-20b. Targeted regrind P_{80} = 37u, cleaner pH=11.0

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	86.3	5.78	36.23	0.490	20.60	33.12	2.0948	0.0283	1.1911	1.9150	60.25	51.52	13.48	20.05
No. 2 Cl ext conc.	45.5	3.05	32.15	0.550	23.80	33.27	0.9801	0.0168	0.7255	1.0142	28.19	30.49	8.21	10.62
No. 2 Cl ext tail	39.2	2.63	4.52	0.130	26.20	30.36	0.1187	0.0034	0.6881	0.7973	3.41	6.21	7.79	8.35
No. 1 Cl scav conc.	19.2	1.29	8.12	0.130	30.30	35.27	0.1045	0.0017	0.3898	0.4537	3.00	3.04	4.41	4.75
No. 1 Cl scav tail	218.7	14.65	0.64	0.013	30.70	34.36	0.0938	0.0019	4.4983	5.0345	2.70	3.46	50.91	52.72
Scavenger tails	1083.7	72.60	0.117	0.004	1.85	0.46	0.0849	0.0029	1.3432	0.3340	2.44	5.28	15.20	3.50
Head Calculated	1492.6	100.00	3.48	0.055	8.84	9.55	3.4767	0.0550	8.8359	9.549	100.00	100.00	100.00	100.00
Head Assayed	1500.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 Cl conc. & No. 2 Cl ext	8.83	34.82	0.511	21.70	33.17	3.075	0.045	1.917	2.929	88.44	82.01	21.69	30.68
No. 1 Cl conc.	11.46	27.88	0.423	22.74	32.53	3.194	0.049	2.605	3.726	91.86	88.21	29.48	39.03
No. 1 Cl conc. & No. 1 Cl scav conc.	12.74	25.88	0.394	23.50	32.80	3.298	0.050	2.994	4.180	94.86	91.26	33.89	43.78
Ro & scav conc.	27.40	12.38	0.190	27.35	33.64	3.392	0.052	7.493	9.215	97.56	94.72	84.80	96.50
No. 1 Cl scav tail & scav tails	87.26	0.205	0.006	6.69	6.15	0.179	0.005	5.841	5.369	5.14	8.74	66.11	56.22

OPERATION	Combine Ro & Scav conc. from T-20 thru 20B and split into 4 charges			Wet screen conc. on 200m			Cond.	No. 1 Cl	No. 1 Cl ext	No. Cl scav	Combine the No.1 Cl & No.1 Cl ext conc.	No. 2 Cl	No. 2 Cl ext			Grin
				RG +200 mesh												
TIME				15'			1'	5'	3'	3'		5'	2'			Cl
REAGENTS - LBS PER TON																Fd
Ro & scav conc. wgt (wet) gm	1900.8 (total)														MESH	%
1/4 split (wet), gm	475.2														+10	
Ca(OH) ₂ (@ 50% active) gm				0.50			1.0		0.4			0.65	0.4		+14	
Burner oil				0.005			0.005								+20	
Water, ml				170											+28	
NaIPX (@ 0.5%)									0.004	0.0026			0.003		+35	
MIBC								0.02					0.02		+48	
															+65	
															+100	
															+150	0.4
															+200	1.0
MACHINE							500	500	500	500		500	500		+270	10.6
R.P.M.							900	900	900	900		900	900		+325	8.8
pH				10.5			8.3/11.0		10.7/11.0	11.0		8.7/11.0	10.7/11.0		+400	8.6
% SOLIDS															+500	15.4
															-500	55.2
TEMPERATURE															Total	100.0

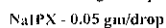
Remarks: No. 1 Cl scav conc. - Significant bornite. Possibly use a little more collector in the No. 1 Cl ext.

No. 1 Cl scav tails - Trace of fine bornite.

BO - 0.0024 gm/drop

NaIPX - 0.05 gm/drop

P_{80} = 46u





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PROJECT No. P-2694E

DATE: 8/14/2002

BY: PGB

TEST Nos. 25, 25A and 25B NAME: Rio Tinto Technical Services Resolution MC-1

Repeat reagent scheme from test Nos. 13, 13A and 13B to generate concentrate for subsequent repeat cleaner regrind test series.

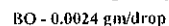
Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
T-25 Scav tails	1453.3	33.25	0.120	0.005	1.52	0.45	0.0399	0.0017	0.5054	0.1496	31.49	33.25	31.78	25.21
T-25A Scav tails	1456.6	33.32	0.120	0.005	1.58	0.65	0.0400	0.0017	0.5265	0.2166	31.56	33.32	33.11	36.49
T-25B Scav tails	1461.3	33.43	0.140	0.005	1.67	0.68	0.0468	0.0017	0.5583	0.2273	36.94	33.43	35.11	38.30
Head Calculated	4371.2	100.00	0.127	0.005	1.59	0.59	0.1267	0.0050	1.5901	0.594	100.00	100.00	100.00	100.00

OPERATION	BM	Cond.	Ro	Cond.	Scav	Combine Ro & Scav conc. from T-25 thru 25B and split into 4 charges for cleaner grind series tests.				Grinding		
TIME	19'	2'	6'	1'	6'					Product		
REAGENTS - LBS PER TON										Flotation		
										Feed		
Ore (-10 m) gm 3x	2000									MESH	%	Cum %
Water (DML tap) gm 3x	2000									+10		Retained
Ca(OH) ₂ (@ 50% active) gm 3x	1.25	0.5		0.2						+14		
Burner oil, 3x	0.018			0.005						+20		
										+28		
NaIPX (0.5%)		0.0125		0.005						+35		
MIBC		0.03								+48	0.6	0.6
										+65	2.0	2.6
										+100	7.6	10.2
										+150	15.2	25.4
										+200	12.2	37.6
MACHINE		2000	2000	2000	2000					+270	12.8	50.4
R.P.M.		900	900	900	900					+325	5.8	56.2
pH (all tests)	9.0	8.3/9.0		8.4/9.0						+400	4.4	60.6
% SOLIDS	50									+500	7.2	67.8
										-500	32.2	
TEMPERATURE										Total	100.0	

Remarks: Scav tails - clean, trace sulfides (fine bornite few pieces coarse pyrite), trace magnetics.

P₈₀ = 120u

BO - 0.0024 gm/drop





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PROJECT No. P-2694E

DATE: 8-14-02

BY: PGB

TEST No. 27 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct cleaner regrind pH test series using scheme from T24; cleaner pH=10.5, targeted regrind P₈₀= 40u

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	115.9	7.75	35.35	0.630	23.20	33.93	2.7405	0.0488	1.7986	2.6304	80.18	79.41	20.43	26.73
No. 2 Cl tail	35.3	2.36	9.41	0.260	25.70	30.89	0.2222	0.0061	0.6068	0.7294	6.50	9.98	6.89	7.41
No. 1 Cl scav conc.	17.4	1.16	21.33	0.099	25.50	35.16	0.2483	0.0012	0.2968	0.4092	7.26	1.87	3.37	4.16
No. 1 Cl scav tail	233.6	15.63	0.73	0.011	31.60	36.10	0.1141	0.0017	4.9376	5.6408	3.34	2.79	56.10	57.32
Scavenger tails	1092.8	73.10	0.127	0.005	1.59	0.59	0.0928	0.0037	1.1622	0.4313	2.72	5.94	13.20	4.38
Head Calculated	1495.0	100.00	3.42	0.062	8.80	9.84	3.4179	0.0615	8.8021	9.841	100.00	100.00	100.00	100.00
Head Assayed	1500.0		3.49	0.052	8.99	9.01								

Combined Products

No. 1 conc.	10.11	29.29	0.544	23.78	33.22	2.963	0.055	2.405	3.360	86.68	89.39	27.33	34.14
No. 1 Cl conc. & Cl scav conc.	11.28	28.47	0.498	23.96	33.42	3.211	0.056	2.702	3.769	93.95	91.26	30.70	38.30
Ro & scav conc.	26.90	12.36	0.215	28.40	34.98	3.325	0.058	7.640	9.410	97.28	94.06	86.80	95.62
No. 1 Cl scav tail & scav tails	88.72	0.233	0.006	6.88	6.84	0.207	0.005	6.100	6.072	6.05	8.74	69.30	61.70

OPERATION	Combine Ro & Scav conc. from T-25 thru 25B and split into 4 charges	Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl ext	No. Cl scav	Combine the No.1 Cl & No.1 Cl ext conc.	No. 2 Cl	No. 2 Cl ext	Combine the No.2 Cl & No.2 Cl ext conc.	Gri Pr
		20'											
REAGENTS - LBS PER TON													
Ro & scav conc. wgt (wet) gm	1832.4* (total)												
1/4 split (wet), gm	450.7*												
Ca(OH) ₂ (@ 50% active) gm			0.60		0.7		0.2	0.1		0.45	0.2		+10
Burner oil			0.005		0.005								+20
Water, ml			250										+28
NaIPX (@ 0.5%)							0.004	0.0026			0.003		+35
MIBC							0.02				0.02		+48
													+65
													+100
													+150
													+200
MACHINE					500	500	500	500		500	500		+270
R.P.M.					900	900	900	900		900	900		+325
pH			10.3		8.4/10.5		10.0/10.5	10.3/10.5		8.4/10.5	9.8/10.5		+400
% SOLIDS													+500
													-500
TEMPERATURE													Total

Remarks: * Removed 29.7 gm (wet) to be used with scav tails for a flotation feed screen analysis. 1802.7 gm remaining.

NaIPX - 0.05 gm/drop

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-14-02

BY: PGB

TEST No. 28

NAME: Rio Tinto Technical Services

Resolution MC-1

Conduct cleaner regrind pH test series using scheme from T24; cleaner pH=11.0, targeted regrind P₈₀= 40u

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	106.2	7.09	36.94	0.510	22.70	33.07	2.6176	0.0361	1.6086	2.3434	77.57	64.37	17.53	22.70
No. 2 Cl tail	48.5	3.24	14.09	0.360	27.20	32.42	0.4560	0.0117	0.8802	1.0492	13.51	20.75	9.59	10.16
No. 1 Cl scav conc.	14.2	0.95	10.66	0.280	29.10	36.98	0.1010	0.0027	0.2757	0.3504	2.99	4.73	3.01	3.39
No. 1 Cl scav tail	237.0	15.81	0.68	0.013	33.20	38.89	0.1075	0.0021	5.2502	6.1499	3.19	3.66	57.23	59.57
Scavenger tails	1092.8	72.92	0.127	0.005	1.59	0.59	0.0926	0.0036	1.1594	0.4302	2.74	6.49	12.64	4.17
Head Calculated	1498.7	100.00	3.37	0.056	9.17	10.32	3.3747	0.0561	9.1740	10.323	100.00	100.00	100.00	100.00
Head Assayed	1500.0		3.49	0.052	8.99	9.01								

Combined Products

No. 1 conc.	10.32	29.78	0.463	24.11	32.87	3.074	0.048	2.489	3.393	91.08	85.12	27.13	32.86
No. 1 Cl conc. & Cl scav conc.	11.27	28.17	0.448	24.53	33.21	3.175	0.050	2.765	3.743	94.07	89.84	30.13	36.26
Ro & scav conc.	27.08	12.12	0.194	29.59	36.53	3.282	0.052	8.015	9.893	97.26	93.51	87.36	95.83
No. 1 Cl scav tail & scav tails	88.73	0.226	0.006	7.22	7.42	0.200	0.006	6.410	6.580	5.93	10.16	69.87	63.74

OPERATION TIME	Combine Ro & Scav conc. from T-25 thru 25B and split into 4 charges		Wet screen conc. on 200m RG +200 mesh		Cond.	No. 1 Cl	No. 1 Cl ext	No. Cl scav	Combine the No.1 Cl & No.1 Cl ext conc.	No. 2 Cl	No. 2 Cl ext	Combine the No.2 Cl & No.2 Cl ext conc.	Gri Pr Cl Fd
REAGENTS - LBS PER TON													
Ro & scav conc. wgt (wet) gm	1832.4*	(total)											
1/4 split (wet), gm	450.7*												
Ca(OH) ₂ (@ 50% active) gm			0.80		1.0		0.3	0.2		0.9	-		+10
Burner oil			0.005		0.005								+14
Water, ml			250										+20
NaIPX (@ 0.5%)							0.004	0.0026			0.003		+28
MIBC							0.02				0.02		+35
													+48
													+65
													+100
													+150
													+200
MACHINE					500	500	500	500		500	500		0.6
R.P.M.					900	900	900	900		900	900		5.8
pH			10.9		8.3/11.0		10.8/11.0	10.9/11.0		8.6/11.0	11.0		6.4
% SOLIDS													5.8
													+500
TEMPERATURE													14.6
													-500
													66.8
													Total
													100.0

Remarks: * Removed 29.7 gm (wet) to be used with scav tails for a flotation feed screen analysis. 1802.7 gm remaining.

P₈₀= 37u

NaIPX - 0.05 gm/drop

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-14-02

BY: PGB

TEST No. 29 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct cleaner regrind pH test series using scheme from T24; cleaner pH=11.5, targeted regrind P₈₀= 40u

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	100.6	6.71	37.25	0.370	22.70	31.12	2.5001	0.0248	1.5235	2.0886	74.33	46.25	16.34	20.93
No. 2 Cl tail	46.3	3.09	9.15	0.320	27.10	30.07	0.2826	0.0099	0.8371	0.9288	8.40	18.41	8.98	9.31
No. 1 Cl scav conc.	24.7	1.65	18.79	0.560	26.50	33.88	0.3096	0.0092	0.4367	0.5583	9.21	17.19	4.68	5.59
No. 1 Cl scav tail	234.5	15.64	1.14	0.039	34.30	38.18	0.1784	0.0061	5.3662	5.9732	5.30	11.36	57.56	59.86
Scavenger tails	1092.8	72.91	0.127	0.005	1.59	0.59	0.0926	0.0036	1.1592	0.4302	2.75	6.79	12.43	4.31
Head Calculated	1498.9	100.00	3.36	0.054	9.32	9.98	3.3633	0.0537	9.3227	9.979	100.00	100.00	100.00	100.00
Head Assayed	1500.0		3.49	0.052	8.99	9.01								

Combined Products

No. 1 conc.	9.80	28.39	0.354	24.09	30.79	2.783	0.035	2.361	3.017	82.74	64.66	25.32	30.24
No. 1 Cl conc. & Cl scav conc.	11.45	27.01	0.384	24.43	31.23	3.092	0.044	2.797	3.576	91.94	81.85	30.01	35.83
Ro & scav conc.	27.09	12.07	0.185	30.13	35.24	3.271	0.050	8.163	9.549	97.25	93.21	87.57	95.69
No. 1 Cl scav tail & scav tails	88.55	0.306	0.011	7.37	7.23	0.271	0.010	6.525	6.403	8.06	18.15	69.99	64.17

OPERATION	Combine Ro & Scav conc. from T-25 thru 25B and split into 4 charges			Wet screen conc. on 200m RG +200 mesh			Cond.	No. 1 Cl	No. 1 Cl ext	No. Cl scav	Combine the No.1 Cl & No.1 Cl ext conc.	No. 2 Cl	No. 2 Cl ext	Combine the No.2 Cl & No.2 Cl ext conc.	Gr	
TIME																
REAGENTS - LBS PER TON					20'		1'	5'	3'	3'						
Ro & scav conc. wgt (wet) gm	1832.4* (total)														MESH	
1/4 split (wet), gm	450.7*														+10	
Ca(OH) ₂ (@ 50% active) gm					1.2		2.0		-	-		1.3	-		+14	
Burner oil					0.005		0.005								+20	
Water, ml					250										+28	
NaIPX (@ 0.5%)									0.004	0.0026			0.003		+35	
MIBC									0.02				0.02		+48	
															+65	
															+100	
															+150	
															+200	
MACHINE							500	500	500	500		500	500		+270	
R.P.M.							900	900	900	900		900	900		+325	
pH					11.6		8.9/11.5		11.5	11.5		9.8/11.5	11.5		+400	
% SOLIDS															+500	
															-500	
TEMPERATURE															Total	

Remarks: * Removed 29.7 gm (wet) to be used with scav tails for a flotation feed screen analysis. 1802.7 gm remaining.

NaIPX - 0.05 gm/drop

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-21-02
BY: PGB

TEST No. 30 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat T27, except add BO to No. 1 Cl Scav and add a No. 3 cleaner stage.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 3 Cl conc.	119.6	5.97	34.52	0.510	24.10	33.79	2.0604	0.0304	1.4384	2.0168	62.28	52.80	15.49	20.10
No. 3 Cl tail	30.2	1.51	18.77	0.620	25.60	33.85	0.2829	0.0093	0.3858	0.5102	8.55	16.21	4.16	5.09
No. 2 Cl tail	48.1	2.40	5.38	0.160	25.30	29.53	0.1291	0.0038	0.6073	0.7088	3.90	6.66	6.54	7.07
No. 1 Cl scav conc.	33.9	1.69	32.60	0.430	20.90	30.61	0.5515	0.0073	0.3536	0.5179	16.67	12.62	3.81	5.16
No. 1 Cl scav tail	321.3	16.03	1.23	0.015	32.90	37.44	0.1972	0.0024	5.2754	6.0033	5.96	4.17	56.82	59.84
Scavenger tails	1450.7	72.40	0.120	0.006	1.69	0.38	0.0869	0.0043	1.2235	0.2751	2.63	7.54	13.18	2.74
Head Calculated	2003.8	100.00	3.31	0.058	9.28	10.03	3.3080	0.0576	9.2840	10.032	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 conc.	7.48	31.34	0.532	24.40	33.80	2.343	0.040	1.824	2.527	70.84	69.01	19.65	25.19
No. 1 Cl conc.	9.88	25.03	0.442	24.62	32.76	2.472	0.044	2.432	3.236	74.74	75.67	26.19	32.25
No. 1 Cl conc. & Cl scav conc.	11.57	26.14	0.359	20.74	28.04	3.024	0.042	2.399	3.244	91.41	88.29	30.00	37.42
Ro & scav conc.	27.60	11.67	0.193	29.20	35.35	3.221	0.053	8.061	9.757	97.37	92.46	86.82	97.26
No. 1 Cl scav tail & scav tails	88.43	0.321	0.008	7.35	7.10	0.284	0.007	6.499	6.278	8.59	11.71	70.00	62.58

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext conc.	No. 3 Cl
TIME	19	2	6	1	6	28	5	3	1/3	No. 1 Cl ext	5	3		4
REAGENTS - LBS PER TON														
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.4		0.22		0.8	0.60	0.3	-		0.5	0.15		0.05
Burner oil	0.018			0.005		0.005			0.005					
NaIPX (@ 0.5%)		0.0125						0.004	0.0026			0.003		
MIBC		0.03						0.015				0.015		
MACHINE		2000	2000	2000	2000	500	500	500	500		500	500		500
R.P.M.		900	900	900	900	900	900	900	900		900	900		900
pH	9.0	8.2/9.0		8.4/9.0		10.9	8.6/10.5	9.9/10.5	10.5		8.5/10.5	10.2/10.5		8.4/10.5
% SOLIDS														
TEMPERATURE														

Remarks: No. 2 Cl tails - Some Bn.
No. 3 Cl tails - Pyrite & Cpy, some bornite.
BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-21-02

BY: PGB

TEST No. 30 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat T27, except add BO to No. 1 Cl Scav and add a No. 3 cleaner stage.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 3 Cl conc.	119.6	5.97	34.52	0.510	24.10	33.79	2.0604	0.0304	1.4384	2.0168	62.28	52.80	15.49	20.10
No. 3 Cl tail	30.2	1.51	18.77	0.620	25.60	33.85	0.2829	0.0093	0.3858	0.5102	8.55	16.21	4.16	5.09
No. 2 Cl tail	48.1	2.40	5.38	0.160	25.30	29.53	0.1291	0.0038	0.6073	0.7088	3.90	6.66	6.54	7.07
No. 1 Cl scav conc.	33.9	1.69	32.60	0.430	20.90	30.61	0.5515	0.0073	0.3536	0.5179	16.67	12.62	3.81	5.16
No. 1 Cl scav tail	321.3	16.03	1.23	0.015	32.90	37.44	0.1972	0.0024	5.2754	6.0033	5.96	4.17	56.82	59.84
Scavenger tails	1450.7	72.40	0.120	0.006	1.69	0.38	0.0869	0.0043	1.2235	0.2751	2.63	7.54	13.18	2.74
Head Calculated	2003.8	100.00	3.31	0.058	9.28	10.03	3.3080	0.0576	9.2840	10.032	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 conc.	7.48	31.34	0.532	24.40	33.80	2.343	0.040	1.824	2.527	70.84	69.01	19.65	25.19
No. 1 Cl conc.	9.88	25.03	0.442	24.62	32.76	2.472	0.044	2.432	3.236	74.74	75.67	26.19	32.25
No. 1 Cl conc. & Cl scav conc.	11.57	26.14	0.359	20.74	28.04	3.024	0.042	2.399	3.244	91.41	88.29	30.00	37.42
Ro & scav conc.	27.60	11.67	0.193	29.20	35.35	3.221	0.053	8.061	9.757	97.37	92.46	86.82	97.26
No. 1 Cl scav tail & scav tails	88.43	0.321	0.008	7.35	7.10	0.284	0.007	6.499	6.278	8.59	11.71	70.00	62.58

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	No. 1 Cl	No 1 Cl ext	No 1 Cl Scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No.2 Cl & No.2 Cl ext conc.	No. 3 Cl	No. 3 Cl ext	Combine No. 3 Cl & No. 3 Cl ext for final conc.
TIME	19	2	6	1	6	28	5	3	1/3		5	3		4	3	
REAGENTS - LBS PER TON																
Ore (-10 m), gm	2000															
Water (DML tap), gm	2000					250										
Ca(OH) ₂ (@ 50% active) gm	1.25	0.4		0.22		0.8	0.60	0.3	-		0.5	0.15		0.05	-	
Burner oil	0.018			0.005		0.005			0.005							
NaIPX (@ 0.5%)		0.0125						0.004	0.0026			0.003			0.0017	
MIBC		0.03						0.015				0.015			0.015	
MACHINE		2000	2000	2000	2000	500	500	500	500		500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900		900	900		900	900	
pH	9.0	8.2/9.0		8.4/9.0		10.9	8.6/10.5	9.9/10.5	10.5		8.5/10.5	10.2/10.5		8.4/10.5	10.5	
% SOLIDS																
TEMPERATURE																

Remarks: No. 2 Cl tails - Some Bn.

No. 3 Cl tails - Pyrite & Cpy, some bornite.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-21-02

BY: PGB

TEST No. 31 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat T2 on Ro/Scav flotation (5415/3477), then repeat T27 cleaner procedure substituting 5415 and 3477 for NaIPX. Add a No. 3 cleaner stage.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 3 Cl conc.	138.2	6.90	38.60	0.510	23.20	32.37	2.6645	0.0352	1.6014	2.2344	78.17	60.13	17.22	22.20
No. 3 Cl tail	24.9	1.24	15.28	0.710	25.60	32.59	0.1900	0.0088	0.3184	0.4053	5.58	15.08	3.42	4.03
No. 2 Cl tail	57.1	2.85	3.41	0.120	25.80	27.95	0.0973	0.0034	0.7358	0.7971	2.85	5.85	7.91	7.92
No. 1 Cl scav conc.	31.3	1.56	16.42	0.370	26.90	33.07	0.2567	0.0058	0.4205	0.5170	7.53	9.88	4.52	5.14
No. 1 Cl scav tail	312.2	15.59	0.73	0.011	31.70	35.26	0.1138	0.0017	4.9432	5.4983	3.34	2.93	53.16	54.64
Scavenger tails	1438.4	71.84	0.120	0.005	1.78	0.85	0.0862	0.0036	1.2788	0.6107	2.53	6.14	13.75	6.07
Head Calculated	2002.1	100.00	3.41	0.059	9.30	10.06	3.4085	0.0585	9.2982	10.063	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 conc.	8.15	35.04	0.541	23.57	32.40	2.854	0.044	1.920	2.640	83.75	75.21	20.65	26.23
No. 1 Cl conc.	11.00	26.84	0.431	24.15	31.25	2.952	0.047	2.656	3.437	86.60	81.06	28.56	34.15
No. 1 Cl conc. & Cl scav conc.	12.56	25.54	0.354	21.95	28.25	3.208	0.044	2.758	3.549	94.13	90.93	33.08	39.29
Ro & scav conc.	28.16	11.80	0.195	28.48	33.57	3.322	0.055	8.019	9.452	97.47	93.86	86.25	93.93
No. 1 Cl scav tail & scav tails	87.44	0.229	0.006	7.12	6.99	0.200	0.005	6.222	6.109	5.87	9.07	66.92	60.71

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext conc.	No. 3 Cl	No. 3 Cl ext	Combine No. 3 Cl & No. 3 Cl ext for final conc.
TIME	19	2	6	1	6		1/5	3	1/3		5	3		4	3	
REAGENTS - LBS PER TON						28										
Ore (-10 m), gm	2000															
Water (DML tap), gm	2000					250										
Ca(OH) ₂ (@ 50% active) gm	1.25	0.3		0.2		0.7	0.60	0.3	0.2		0.7	-		0.4	-	
Burner oil	0.018			0.005		0.005	0.005									
5415 (1% in methanol)		0.02		0.004				0.004	0.0026			0.003			0.0017	
3477 (0.5%)		0.02		0.004				0.004	0.0026			0.003			0.0017	
MIBC		0.03						0.015				0.015			0.015	
MACHINE		2000	2000	2000	2000	500	500	500	500		500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900		900	900		900	900	
pH	9.0	8.2/9.0		8.3/9.0		10.2	8.5/10.5	9.6/10.5	10.2/10.5		8.5/10.5	10.5		9.2/10.5	10.5	
% SOLIDS																
TEMPERATURE																

Remarks: No. 2 Cl tails - Clean, minor Bn.

No. 3 Cl tails - Pyrite & Cpy, some bornite.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-21-02
BY: PGB

TEST No. 32 NAME: Rio Tinto Technical Services Resolution MC-1

Repeat T30, except substitute 5415 and 3477 for NaIPX.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 3 Cl conc.	137.4	6.85	37.42	0.520	23.10	34.96	2.5619	0.0356	1.5815	2.3935	75.96	61.28	17.95	23.66
No. 3 Cl tail	19.6	0.98	15.56	0.470	24.80	31.78	0.1520	0.0046	0.2422	0.3104	4.51	7.90	2.75	3.07
No. 2 Cl tail	71.6	3.57	6.03	0.160	27.10	28.79	0.2151	0.0057	0.9668	1.0271	6.38	9.83	10.98	10.15
No. 1 Cl scav conc.	29.5	1.47	14.90	0.440	28.40	35.25	0.2190	0.0065	0.4175	0.5181	6.49	11.13	4.74	5.12
No. 1 Cl scav tail	306.7	15.28	0.86	0.014	29.50	36.09	0.1314	0.0021	4.5083	5.5154	3.90	3.68	51.18	54.52
Scavenger tails	1442.1	71.86	0.130	0.005	1.52	0.49	0.0934	0.0036	1.0922	0.3521	2.77	6.18	12.40	3.48
Head Calculated	2006.9	100.00	3.37	0.058	8.81	10.12	3.3729	0.0581	8.8085	10.117	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 conc.	7.82	34.69	0.514	23.31	34.56	2.714	0.040	1.824	2.704	80.46	69.18	20.70	26.73
No. 1 Cl conc.	11.39	25.71	0.403	24.50	32.75	2.929	0.046	2.791	3.731	86.84	79.00	31.68	36.88
No. 1 Cl conc. & Cl scav conc.	12.86	24.48	0.407	24.94	33.04	3.148	0.052	3.208	4.249	93.33	90.13	36.42	42.00
Ro & scav conc.	28.14	11.65	0.194	27.42	34.70	3.279	0.055	7.716	9.765	97.23	93.82	87.60	96.52
No. 1 Cl scav tail & scav tails	87.14	0.258	0.007	6.43	6.73	0.225	0.006	5.600	5.867	6.67	9.87	63.58	58.00

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext conc.	No. 3 Cl	No. 3 Cl ext	Combine No. 3 Cl & No. 3 Cl ext for final conc.
TIME	19	2	6	1	6		5	3	1/3	Cl	5	3		4	3	
REAGENTS - LBS PER TON						28				and						
Ore (-10 m), gm	2000									No. 1 Cl ext						
Water (DML tap), gm	2000					250										
Ca(OH) ₂ (@ 50% active) gm	1.25	0.4		0.2		0.75	0.6	0.3	0.1		0.4	0.15		0.4	0.1	
Burner oil	0.018			0.005		0.005			0.005							
5415 (1% in methanol)		0.02		0.004				0.004	0.0026			0.003			0.0017	
3477 (0.5%)		0.02		0.004				0.004	0.0026			0.003			0.0017	
MIBC		0.03		0.015				0.015				0.015			0.015	
MACHINE		2000	2000	2000	2000	500	500	500	500		500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900		900	900		900	900	
pH	9.0	8.3/9.0		8.4/9.0		10.3	8.6/10.5	9.6/10.5	10.0/10.5		8.5/10.5	9.5/10.5		8.4/10.5	10.0/10.5	
% SOLIDS																
TEMPERATURE																

Remarks: No. 1 Cl scav - Good pyrite relection. No. 2 Cl tails - Clean, minor Bn.

No. 3 Cl tails - Significant Bn, more than T31.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-21-02
BY: PGB

TEST No. 33 NAME: Rio Tinto Technical Services Resolution MC-1
Repeat T27, except add NaCN to the No. 1 cleaner (to depress pyrite) and add a No. 3 cleaner.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 3 Cl conc.	125.0	6.26	39.23	0.540	21.10	33.28	2.4549	0.0338	1.3204	2.0826	71.66	59.57	14.91	21.02
No. 3 Cl tail	35.1	1.76	23.86	0.470	20.50	30.62	0.4193	0.0083	0.3602	0.5381	12.24	14.56	4.07	5.43
No. 2 Cl tail	54.4	2.72	6.71	0.280	22.80	28.51	0.1827	0.0076	0.6209	0.7764	5.33	13.44	7.01	7.84
No. 1 Cl scav conc.	26.5	1.33	13.23	0.160	25.20	36.09	0.1755	0.0021	0.3343	0.4788	5.12	3.74	3.78	4.83
No. 1 Cl pyrite conc.	197.8	9.90	0.62	0.007	43.30	50.26	0.0614	0.0007	4.2877	4.9769	1.79	1.22	48.42	50.24
No. 1 Cl pyrite tail	102.4	5.13	0.50	0.013	14.80	15.19	0.0256	0.0007	0.7587	0.7787	0.75	1.17	8.57	7.86
Pyrite scav conc.	31.2	1.56	2.23	0.046	6.16	5.32	0.0348	0.0007	0.0962	0.0831	1.02	1.27	1.09	0.84
Pyrite scavenger tails	1425.1	71.34	0.100	0.004	1.51	0.27	0.0713	0.0029	1.0773	0.1926	2.08	5.03	12.16	1.94
Head Calculated	1997.5	100.00	3.43	0.057	8.86	9.91	3.4257	0.0567	8.8558	9.907	100.00	100.00	100.00	100.00
Head Assayed	2000.0		3.49	0.052	8.99	9.01								

Combined Products

No. 2 conc.	8.02	35.86	0.525	20.97	32.70	2.874	0.042	1.681	2.621	83.90	74.12	18.98	26.45
No. 1 Cl conc.	10.74	28.47	0.463	21.43	31.63	3.057	0.050	2.302	3.397	89.24	87.56	25.99	34.29
No. 1 Cl conc. & Cl scav conc.	12.07	26.79	0.429	21.85	32.12	3.232	0.052	2.636	3.876	94.36	91.31	29.76	39.12
No. 1 Cl scav tail	15.03	0.58	0.009	33.58	38.297	0.087	0.001	5.046	5.756	2.54	2.40	56.98	58.10
Ro & scav conc.	27.09	12.25	0.196	28.35	35.55	3.319	0.053	7.682	9.632	96.90	93.70	86.75	97.22
No. 1 Cl pyrite & pyrite scav conc.	11.46	0.839	0.012	38.24	44.137	0.096	0.001	4.384	5.060	2.81	2.49	49.50	51.07
No. 1 Cl pyrite & pyrite scav tails	76.47	0.127	0.005	2.401	1.270	0.097	0.004	1.836	0.971	2.83	6.21	20.73	9.80
Scavenger tails	72.91	0.146	0.005	1.610	0.378	0.106	0.004	1.174	0.276	3.10	6.30	13.25	2.78
Scav + No. 1 Cl scav tail	87.93	0.220	0.006	7.073	6.859	0.1932	0.0049	6.2200	6.0314	5.64	8.69	70.24	60.88

No. 1 Cl scav tailings													
OPERATION	BM	Cond	Ro	Cond	Scav	Pyrite Scav	Combine Ro & Scav conc.	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl	No. 1 Cl scav
TIME	19	2	6	1	6	5	wet screen @ 200m RG +200m	1	5	3	1/3	Cl and No. 1 Cl ext	(pyrite)
REAGENTS - LBS PER TON							28min						0
Ore (-10 m), gm	2000						250						2
Water (DML tap), gm	2000												2
Ca(OH) ₂ (@ 50% active) gm	1.25	0.5		0.2			0.75	0.5		0.15	0.15		2
Burner oil	0.018			0.005			0.005	0.005					2
NaCN								0.01					
NaIPX (0.5%)		0.0125		0.005		0.01				0.004	0.0026		0.005
MIBC		0.03							2.5 ml*	0.5 ml*	1.0 ml*		0.015
H ₂ SO ₄ (10%)						0.21							15drops
													15drops
													15drops
													15drops
MACHINE	2000	2000	2000	2000				500	500	500	500		500
R.F.M.	900	900	900	900				900	900	900	900		900
pH	9.0	8.3/9.0		8.4/9.0		8.4/7.5		8.6/10.5	8.6/10.5	9.6/10.5	10.0/10.5		9.5/8.8
% SOLIDS													8.8/7.8
TEMPERATURE													8.0/7.7

Remarks: No. 1 Cl scav - Good pyrite relection. No. 2 Cl tails - Clean, minor Bn.

No. 3 Cl tails - Significant Bn, more than T31. some bornite.

* Mix 2 drops MIBC in 10 ml water.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-21-02

BY: PGB

TEST No. 33 cont. NAME: Rio Tinto Technical Services Resolution MC-1

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)

OPERATION														Grinding
TIME	No. 2 Cl	No. 2 Cl ext	Combine the	No. 3 Cl	No. 3 Cl ext	Combine								Product
REAGENTS - LBS PER TON	5	3	No.2 Cl & No.2 Cl ext conc.	4	3	No. 3 Cl & No. 3 Cl ext for final conc.								
Ca(OH) ₂ (@ 50% active) gm	0.35	0.15		0.3	0.1									
NaIPX (0.5%)		0.003			0.0017									
MIBC		1 ml*			1.5 ml*									
MACHINE	500	500		500	500									
R.P.M.	900	900		900	900									
pH	8.2/10.5	9.2/10.5		8.2/10.5	9.7/10.5									
% SOLIDS														
TEMPERATURE														

Remarks: No. 2 Cl tails - clean, minor Bn.

No. 3 Cl tails - Too much Cpy, Bn and moly.....not enough collector.

* Mix 2 drops MIBC in 10 ml water.



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PROJECT No. P-2694E
DATE: 8-29-02
BY: PCB & MT

TEST No. 34-1 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG $P_{80}=40\mu$, cleaner pH=10.5

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	177.3	9.16	33.75	0.520	23.70	33.81	3.0910	0.0476	2.1706	3.0965	93.06	85.56	26.00	33.81
No. 1 Cl scav tail	298.4	15.41	0.86	0.013	32.30	36.20	0.1326	0.0020	4.9787	5.5799	3.99	3.60	59.64	60.92
Scavenger tails	1460.2	75.43	0.130	0.008	1.59	0.64	0.0981	0.0060	1.1993	0.4827	2.95	10.84	14.37	5.27
Head Calculated	1935.9	100.00	3.32	0.056	8.35	9.16	3.3216	0.0557	8.3486	9.159	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 90.84 0.254 0.009 6.80 6.67 0.231 0.008 6.178 6.063 6.94 14.44 74.00 66.19

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.
TIME	19	2	6	1	6	28	1	5	3	3		5	3	
REAGENTS - LBS PER TON														
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.55		0.25		0.7	0.55		0.25	0.2		0.45	0.15	
Burner oil	0.018			0.005		0.005	0.005							
NaCN (1%)							0.01							
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003	
MIBC		0.03						0.003*	0.006*	0.005*		0.003*	0.003*	
MACHINE		2000	2000	2000	2000	500	500	500	500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900	900		900	900	
pH	9.0	8.0/9.0		8.3/9.0		10.8	8.2/10.5		9.3/10.5	9.5/10.5		8.3/10.5	9.8/10.5	
% SOLIDS														
TEMPERATURE														

Remarks: No. 1 Cl scav tails - Trace Bn.

No. 2 Cl tails - Some bornite, coarse/liberated.

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-29-02

BY: PGB & MT

TEST No. 34-2 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG $P_{80}=40\mu$, cleaner pH=10.5

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	182.4	9.18	33.79	0.530	23.60	33.55	3.1006	0.0486	2.1655	3.0785	92.08	85.96	24.21	30.51
No. 1 Cl scav tail	350.7	17.64	0.89	0.016	31.70	37.91	0.1570	0.0028	5.5927	6.6883	4.66	4.99	62.53	66.29
Scavenger tails	1454.7	73.18	0.150	0.007	1.62	0.44	0.1098	0.0051	1.1855	0.3220	3.26	9.05	13.26	3.19
Head Calculated	1987.8	100.00	3.37	0.057	8.94	10.09	3.3674	0.0566	8.9438	10.089	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 90.82 0.294 0.009 7.46 7.72 0.267 0.008 6.778 7.010 7.92 14.04 75.79 69.49

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.
TIME	19	2	6	1	6		1	5	3	3		5	3	
REAGENTS - LBS PER TON						28								
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.3		0.2		0.72	0.70		0.25	0.1		0.3	0.1	
Burner oil	0.018			0.005		0.005	0.005							
NaCN (1%)							0.01							
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003	
MIBC		0.03						0.005*	0.005*	0.003*		0.005*	0.005*	
MACHINE		2000	2000	2000	2000		500	500	500	500		500	500	
R.P.M.		900	900	900	900		900	900	900	900		900	900	
pH	9.0	8.5/9.0		8.5/9.0			10.3	8.5/10.5		9.5/10.5	10.0/10.5	8.3/10.5	9.5/10.5	
% SOLIDS														
TEMPERATURE														

Remarks: No. 1 Cl scav tails - Minor Bn.

No. 2 Cl tails - Significantly more bornite than T34-1.

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-29-02
BY: PGB & MT

TEST No. 34-3 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG P₈₀=40μ, cleaner pH=10.5

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	142.0	7.15	37.01	0.510	23.40	35.13	2.6476	0.0365	1.6740	2.5131	85.93	76.65	18.68	24.36
No. 1 Cl scav tail	381.9	19.24	1.68	0.031	31.40	38.81	0.3232	0.0060	6.0411	7.4668	10.49	12.53	67.43	72.36
Scavenger tails	1461.1	73.61	0.150	0.007	1.69	0.46	0.1104	0.0052	1.2440	0.3386	3.58	10.82	13.88	3.28
Head Calculated	1985.0	100.00	3.08	0.048	8.96	10.32	3.0812	0.0476	8.9591	10.318	100.00	####	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 92.85 0.467 0.012 7.85 8.41 0.434 0.011 7.285 7.805 14.07 23.35 81.32 75.64

						Combine Ro &			No. 1	No. 1	No. 1	Combine	No. 2	No. 2	Combine the
OPERATION	BM	Cond	Ro	Cond	Scav	Scav conc. wet screen		Cond	Cl	Cl ext	Cl scav	No. 1 Cl and	2 Cl	Cl ext	No.2 Cl &
TIME	19	2	6	1	6	@ 200m, RG +200m		1	5	3	3	No. 1 Cl ext	5	3	No.2 Cl ext
REAGENTS - LBS PER TON						28									for final conc.
Ore (-10 m), gm	2000														
Water (DML tap), gm	2000					250									
Ca(OH) ₂ (@ 50% active) gm	1.25	0.4		0.2		0.75		0.75		0.2	0.15		0.35	0.1	
Burner oil	0.018			0.005		0.005		0.005							
NaCN (1%)								0.01							
NaIPX (@ 0.5%)		0.0125								0.004	0.0026			0.003	
MIBC		0.03							0.006*	0.003*	0.003*		0.003*	0.003*	
MACHINE		2000	2000	2000	2000	500		500	500	500	500		500	500	
R.P.M.		900	900	900	900	900		900	900	900	900		900	900	
pH	9.0	8.0/9.0		8.4/9.0		10.5		8.3/10.5		9.5/10.5	10.0/10.5		8.5/10.5	10.1/10.5	
% SOLIDS															
TEMPERATURE															

Remarks: No. 1 Cl scav tails - Slightly more Bn than T34-2.

No. 2 Cl tails - Significantly more bornite than T34-2. Will add minor amount of NaCN in the next cycle. Hopefully NaCN will depress pyrite and NaIPX in No. 2 Cl ext will activate Bn.

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-29-02
BY: PGB & MT

TEST No. 34-4 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG P₈₀=40μ, cleaner pH=10.5. Add minor amount of NaCN (0.0015 #/ton NaCN) to the No. 2 Cl.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	131.6	6.53	36.73	0.540	23.60	32.79	2.3991	0.0353	1.5415	2.1417	74.01	56.46	16.29	21.21
No. 1 Cl scav tail	426.1	21.15	3.47	0.091	31.10	35.95	0.7339	0.0192	6.5772	7.6029	22.64	30.81	69.50	75.28
Scavenger tails	1457.1	72.32	0.150	0.011	1.86	0.49	0.1085	0.0080	1.3451	0.3544	3.35	12.73	14.21	3.51
Head Calculated	2014.8	100.00	3.24	0.062	9.46	10.10	3.2414	0.0625	9.4638	10.099	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 93.47 0.901 0.029 8.48 8.51 0.842 0.027 7.922 7.957 25.99 43.54 83.71 78.79

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.
TIME	19	2	6	1	6		1	5	3	3		5	3	
REAGENTS - LBS PER TON						28								
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.4		0.15		0.75	0.75		0.2	0.1		0.4	0.1	
Burner oil	0.018			0.005		0.005	0.005							
NaCN (1%)							0.01					0.0015		
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003	
MIBC		0.03						0.005*	0.005*	0.005*		0.003*	0.003*	
MACHINE		2000	2000	2000	2000	500	500	500	500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900	900		900	900	
pH	9.0	8.3/9.0		8.5/9.0		10.5	8.4/10.5		9.6/10.5	10.0/10.5		8.4/10.5	10.1/10.5	
% SOLIDS														
TEMPERATURE														

Remarks: No. 1 Cl scav tails - Some Bn. More than T34-3.

No. 2 Cl tails - Minor coarse (+150μ) sulfides. Appears to have less Bn than T34-3. Will continue to add NaCN to No. 2 Cl for the rest of the test series.

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-29-02

BY: PA & SH

TEST No. 34-5 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG $P_{80}=40\mu$, cleaner pH=10.5. Add minor amount of NaCN (0.0015 #/ton NaCN) to the No. 2 Cl.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	157.5	7.88	36.90	0.560	23.20	33.46	2.9070	0.0441	1.8277	2.6360	86.09	80.81	19.75	25.92
No. 1 Cl scav tail	380.8	19.05	1.89	0.032	32.40	37.56	0.3600	0.0061	6.1714	7.1543	10.66	11.16	66.67	70.34
Scavenger tails	1460.9	73.07	0.150	0.006	1.72	0.52	0.1096	0.0044	1.2569	0.3800	3.25	8.03	13.58	3.74
Head Calculated	1999.2	100.00	3.38	0.055	9.26	10.17	3.3766	0.0546	9.2560	10.170	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 92.12 0.510 0.011 8.06 8.18 0.470 0.010 7.428 7.534 13.91 19.19 80.25 74.08

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.
TIME	19	2	6	1	6		1	5	3	3		5	3	
REAGENTS - LBS PER TON						28								
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.45		0.1		0.75	0.80		0.1	0.1		0.3	0.1	
Burner oil	0.018			0.005		0.005	0.005							
NaCN (1%)							0.01					0.0015		
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003	
MIBC		0.03						0.005*	0.005*	0.005*		0.003*	0.003*	
MACHINE		2000	2000	2000	2000	500	500	500	500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900	900		900	900	
pH	9.0	8.3/9.0		8.7/9.0		10.6	8.3/10.5		9.8/10.5	10.0/10.5		8.4/10.5	10.6/10.5	
% SOLIDS														
TEMPERATURE														

Remarks: No. 1 Cl scav tails - Minor coarse Bn. Slightly more than T34-4.

No. 2 Cl tails - Comparable to T34-4.

No. 2 Cl conc. - Looks very good; Cpy and BN. No noticable gangue.

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-29-02
BY: PA & SH

TEST No. 34-6 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG P₈₀=40μ, cleaner pH=10.5. Add minor amount of NaCN (0.0015 #/ton NaCN) to the No. 2 Cl.

Product	Weight	Percent Weight	Assay, %				Units				Distribution			
			Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	208.8	10.43	36.32	0.540	23.10	32.84	3.7899	0.0563	2.4104	3.4268	93.81	88.94	26.78	34.11
No. 1 Cl scav tail	326.7	16.33	0.86	0.016	33.10	38.43	0.1404	0.0026	5.4042	6.2744	3.48	4.12	60.04	62.46
Scavenger tails	1465.5	73.24	0.150	0.006	1.62	0.47	0.1099	0.0044	1.1865	0.3442	2.72	6.94	13.18	3.43
Head Calculated	2001.0	100.00	4.04	0.063	9.00	10.05	4.0402	0.0634	9.0011	10.045	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl scav tail & scav tails 89.57 0.279 0.008 7.36 7.39 0.250 0.007 6.591 6.619 6.19 11.06 73.22 65.89

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.
TIME	19	2	6	1	6		1	5	3	3		5	3	
REAGENTS - LBS PER TON						28								
Ore (-10 m), gm	2000													
Water (DML tap), gm	2000					250								
Ca(OH) ₂ (@ 50% active) gm	1.25	0.6		0.15		0.75	0.90		0.2	0.15		0.3	0.15	
Burner oil	0.018			0.005		0.005	0.005							
NaCN (1%)							0.01					0.0015		
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003	
MIBC		0.03						0.005*	0.005*	0.005*		0.003*	0.003*	
								**						
MACHINE		2000	2000	2000	2000	500	500	500	500	500		500	500	
R.P.M.		900	900	900	900	900	900	900	900	900		900	900	
pH	9.0	8.2/9.0		8.6/9.0		10.6	8.3/10.5		9.7/10.5	10.0/10.5		8.4/10.5	9.8/10.5	
% SOLIDS														
TEMPERATURE														

Remarks:

* - Using 0.3% MIBC

** - Weak explosive froth (froth dispersed). 8/30/02 - The dilute MIBC mixture was not made fresh before this cycle. MIBC possibly dissipated.

BO - 0.0024 gm/drop



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PROJECT No. P-2694E

DATE: 8-29-02

BY: PA & SH

TEST No. 34-7 NAME: Rio Tinto Technical Services Resolution MC-1

Conduct locked cycle test using basic reagent scheme from T33. Targeted RG $P_{80}=40\mu$, cleaner pH=10.5. Add minor amount of NaCN (0.0015 #/ton NaCN) to the No. 2 Cl.

Product	Percent		Assay, %				Units				Distribution			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 2 Cl conc.	175.1	8.33	35.67	0.550	23.20	32.90	2.9701	0.0458	1.9318	2.7395	79.35	76.44	19.55	25.13
No. 2 Cl tail	48.3	2.30	5.79	0.250	24.50	28.38	0.1330	0.0057	0.5627	0.6518	3.55	9.58	5.69	5.98
No. 1 Cl scav conc	54.4	2.59	14.65	0.048	26.60	34.21	0.3790	0.0012	0.6881	0.8850	10.12	2.07	6.96	8.12
No. 1 Cl scav tail	366.7	17.44	1.02	0.021	32.10	36.43	0.1779	0.0037	5.5975	6.3526	4.75	6.11	56.64	58.28
Scavenger tails	1458.4	69.35	0.120	0.005	1.59	0.39	0.0832	0.0035	1.1027	0.2705	2.22	5.79	11.16	2.48
Head Calculated	2102.9	100.00	3.74	0.060	9.88	10.90	3.7432	0.0599	9.8828	10.899	100.00	100.00	100.00	100.00
Head Assay			3.49	0.052	8.99	9.01								

Combined Products

No. 1 Cl conc.	10.62	29.21	0.485	23.48	31.92	3.103	0.052	2.494	3.391	82.90	86.03	25.24	31.11
No. 1 Cl scav tail & scav tails	86.79	0.301	0.008	7.72	7.63	0.261	0.007	6.700	6.623	6.98	11.90	67.80	60.77

OPERATION	BM	Cond	Ro	Cond	Scav	Combine Ro & Scav conc. wet screen @ 200m, RG +200m	Cond	No. 1 1 Cl	No. 1 Cl ext	No. 1 Cl scav	Combine No. 1 Cl and No. 1 Cl ext	No. 2 2 Cl	No. 2 Cl ext	Combine the No. 2 Cl & No. 2 Cl ext for final conc.	Grinding	
															Product	
REAGENTS - LBS PER TON						28		5	3	3		5	3		CI.Fd	Cum %
Ore (-10 m), gm	2000														MESH	
Water (DML tap), gm	2000					250									+10	
Ca(OH) ₂ (@ 50% active)gm	1.25	0.6		0.15		0.75	1.10		0.2	0.1		0.4	0.1		+14	
Burner oil	0.018			0.005		0.005	0.005								+20	
															+28	
NaCN (1%)							0.01					0.0015			+35	
NaIPX (@ 0.5%)		0.0125							0.004	0.0026			0.003		+48	
MIBC		0.03						0.005*	0.005*	0.005*		0.003*	0.003*		+65	
															+100	
															+150	
															+200	1.0
MACHINE		2000	2000	2000	2000	500	500	500	500	500		500	500		+270	9.2
R.P.M.		900	900	900	900	900	900	900	900	900		900	900		+325	5.4
pH	9.0	8.2/9.0		8.7/9.0		10.6	8.2/10.5		10.0/10.5	10.2/10.5		8.4/10.5	10.1/10.5		+400	5.6
% SOLIDS															+500	10.0
															-500	68.8
TEMPERATURE															Total	100.0

Remarks: $P_{80} = 39\mu$

* - Using 0.3% MIBC

BO - 0.0024 gm/drop



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PROJECT No. P-2694E
DATE: 8-29-02
BY: PGB & MT

TEST No. 34-5, 6 & 7 NAME: Rio Tinto Technical Services Resolution MC-1

Au and Ag balance from the locked cycle test (cycles 5, 6 and 7)

Note: All products were weight averaged from the three cycles.

Combined Products

[illegible]



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PROJECT No. P-2694E
DATE: 8/29/02
BY: PGB, PA, MT & SH

TEST No. 34-1-7 overall NAME: Rio Tinto Technical Services Resolution MC-1

Overall Metallurgical Balance : Locked-cycle test using basis test 33 conditions.. burner oil to No. 1 Cl, & minor NaCN to No. 2 Cl (cycles No. 4-7).

Product	Cycle	Percent		Assay				Units				Distribution			
		Weight	Weight	%Cu	%Mo	%Fe	%St	Cu	Mo	Fe	St	Cu	Mo	Fe	St
Cleaner #2 Conc	1	177.3	1.26	33.75	0.520	23.70	33.81	0.4266	0.0066	0.2996	0.4274	12.34	11.47	3.28	4.22
	2	182.4	1.30	33.79	0.530	23.60	33.55	0.4394	0.0069	0.3069	0.4363	12.71	12.03	3.36	4.31
	3	142.0	1.01	37.01	0.510	23.40	35.13	0.3747	0.0052	0.2369	0.3556	10.84	9.01	2.59	3.51
	4	131.6	0.94	36.73	0.540	23.60	32.79	0.3446	0.0051	0.2214	0.3076	9.97	8.84	2.43	3.04
	5	157.5	1.12	36.90	0.560	23.20	33.46	0.4143	0.0063	0.2605	0.3757	11.99	10.97	2.85	3.71
	6	208.8	1.49	36.32	0.540	23.10	32.84	0.5407	0.0080	0.3439	0.4889	15.64	14.03	3.77	4.83
	7	175.1	1.25	35.67	0.550	23.20	32.90	0.4453	0.0069	0.2896	0.4107	12.88	11.98	3.17	4.06
Cleaner #1 Scav Tail	1	298.4	2.13	0.86	0.013	32.20	36.20	0.0183	0.0003	0.6850	0.7701	0.53	0.48	7.50	7.61
	2	350.7	2.50	0.89	0.016	31.70	37.91	0.0223	0.0004	0.7926	0.9478	0.64	0.70	8.68	9.36
	3	381.9	2.72	1.68	0.031	31.40	38.81	0.0457	0.0008	0.8549	1.0567	1.32	1.47	9.36	10.44
	4	426.1	3.04	3.47	0.091	31.10	35.95	0.1054	0.0028	0.9448	1.0921	3.05	4.82	10.35	10.79
	5	380.8	2.71	1.89	0.032	32.40	37.56	0.0513	0.0009	0.8796	1.0197	1.48	1.52	9.64	10.07
	6	326.7	2.33	0.86	0.016	33.10	38.43	0.0200	0.0004	0.7709	0.8951	0.58	0.65	8.45	8.84
	7	366.7	2.61	1.02	0.021	32.10	36.43	0.0267	0.0005	0.8392	0.9524	0.77	0.96	9.19	9.41
Scavenger Tails	1	1460.2	10.41	0.13	0.008	1.59	0.64	0.0135	0.0008	0.1655	0.0666	0.39	1.45	1.81	0.66
	2	1454.7	10.37	0.15	0.007	1.62	0.44	0.0156	0.0007	0.1680	0.0456	0.45	1.27	1.84	0.45
	3	1461.1	10.42	0.15	0.007	1.69	0.46	0.0156	0.0007	0.1760	0.0479	0.45	1.27	1.93	0.47
	4	1457.1	10.39	0.15	0.011	1.86	0.49	0.0156	0.0011	0.1932	0.0509	0.45	1.99	2.12	0.50
	5	1460.9	10.42	0.15	0.006	1.72	0.52	0.0156	0.0006	0.1791	0.0542	0.45	1.09	1.96	0.54
	6	1465.5	10.45	0.15	0.006	1.62	0.47	0.0157	0.0006	0.1693	0.0491	0.45	1.09	1.85	0.49
	7	1458.4	10.40	0.12	0.005	1.59	0.39	0.0125	0.0005	0.1653	0.0405	0.36	0.91	1.81	0.40
Cleaner #2 Tails	7	48.3	0.34	5.79	0.048	26.60	28.38	0.0199	0.0002	0.0916	0.0977	0.58	0.29	1.00	0.97
Cleaner #1 Scav Conc	7	54.4	0.39	14.65	0.250	24.50	34.21	0.0568	0.0010	0.0950	0.1327	1.64	1.69	1.04	1.31
Total (Calc)		14026.6	100.00	3.46	0.057	9.13	10.12	3.4561	0.0573	9.1289	10.121	100.00	100.00	100.00	100.00
Total (Assay)		14000		3.49	0.052	8.99	9.01								
Balanced Cycles:															
Cleaner #2 Conc	5,6,7	541.4	9.02	36.28	0.549	23.16	33.04	3.2733	0.0495	2.0898	2.9811	90.81	85.61	22.94	29.75
Cleaner #1 Scav Tail	5,6,7	1074.2	17.90	1.28	0.023	32.51	37.44	0.2291	0.0042	5.8201	6.7024	6.36	7.23	63.88	66.89
Scavenger Tails	5,6,7	4384.8	73.08	0.140	0.006	1.64	0.46	0.1023	0.0041	1.2009	0.3362	2.84	7.16	13.18	3.36
Total (Calc)		6000.4	100.00	3.60	0.058	9.11	10.02	3.6047	0.0579	9.1107	10.0196	100.00	100.00	100.00	100.00
Total (Assay)				3.49	0.052	8.99	9.01								
Comb Cl Scav & Scav Tails	5,6,7		90.98	0.364	0.009	7.72	7.74	0.3314	0.0083	7.0209	7.0385	9.19	14.39	77.06	70.25
Recycle Streams as % of balanced cycles 5,6,7															
Cleaner #2 Tails	7	48.3	2.41	5.79	0.048	26.60	28.38					3.88	2.00	7.05	6.84
Cleaner #1 Scav Conc	7	54.4	2.72	14.65	0.250	24.50	34.21					11.05	11.75	7.31	9.29



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PROJECT No. P-2694E

DATE:

BY: PGB & PT

TEST Nos. 35(1), 35(2) and 35(4) NAME: Rio Tinto Technical Services Resolution MC-1

Conduct flotation tests using procedure from T34 LC test to generate concentrate for Mo separation work.

Product	Percent		Assay, %				Units			
	Weight	Weight	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
T-35(1) No. 2 Cl tails	54.1	34.11	5.08	0.180	24.60	30.13	1.7328	0.0614	8.3913	10.2776
T-35(2) No. 2 Cl tails	48.1	30.33	9.11	0.260	24.30	29.79	2.7629	0.0789	7.3697	9.0347
T-35(4) No. 2 Cl tails	56.4	35.56	11.60	0.380	23.60	31.25	4.1251	0.1351	8.3924	11.1129
Head Calculated	158.6	100.00	8.62	0.275	24.15	30.43	8.6208	0.2754	24.1534	30.425
T-35(1) No. 1 Cl scav conc.	29.1	31.09	7.64	0.190	27.40	32.89	2.3753	0.0591	8.5186	10.2254
T-35(2) No. 1 Cl scav conc.	28.5	30.45	16.20	0.280	25.10	32.33	4.9327	0.0853	7.6426	9.8441
T-35(4) No. 1 Cl scav conc.	36.0	38.46	12.90	0.440	23.60	33.33	4.9615	0.1692	9.0769	12.8192
Head Calculated	93.6	100.00	12.27	0.314	25.24	32.89	12.2695	0.3136	25.2381	32.889
T-35(1) No. 1 Cl scav tail	296.3	31.62	0.49	0.007	32.60	35.29	0.1549	0.0022	10.3066	11.1571
T-35(2) No. 1 Cl scav tail	318.0	33.93	0.92	0.011	31.40	37.23	0.3122	0.0037	10.6543	12.6325
T-35(4) No. 1 Cl scav tail	322.9	34.45	0.97	0.019	31.90	38.33	0.3342	0.0065	10.9907	13.2061
Head Calculated	937.2	100.00	0.80	0.012	31.95	37.00	0.8013	0.0125	31.9517	36.9957
T-35(1) scav tail	1447.1	33.35	0.14	0.006	1.66	0.35	0.0467	0.0020	0.5535	0.1167
T-35(2) scav tail	1441.6	33.22	0.13	0.006	1.68	0.34	0.0432	0.0020	0.5581	0.1129
T-35(4) scav tail	1451.0	33.44	0.17	0.008	1.78	0.36	0.0568	0.0027	0.5952	0.1204
Head Calculated	4339.7	100.00	0.15	0.007	1.71	0.35	0.1467	0.0067	1.7068	0.3500

Weighted average of flotation products

No. 2 Cl tails	158.6	8.62	0.275	24.15	30.43	8.6208	0.2754	24.1534	30.4252
No. 1 Cl scav conc.	93.6	12.27	0.314	25.24	32.89	12.2695	0.3136	25.2381	32.8887
No. 1 Cl scav tail	937.2	0.80	0.012	31.95	37.00	0.8013	0.0125	31.9517	36.9957
Scav tails	4339.7	0.15	0.007	1.71	0.35	0.1467	0.0067	1.7068	0.3500
Total	5529.1								

OPERATION	BM	Cond.	Ro	Cond.	Scav	Combine Ro & Scav conc. screen @ 200 m RG +200m		Cond.	No. Cl	No. 1 Cl ext
TIME	19'	2'	6'	1'	6'	28 min		1'	5'	3'
REAGENTS - LBS PER TON						per test				
Ore (-10 m) gm 3x	2000									
Water (DML tap) gm 3x	2000									
Ca(OH) ₂ (@ 50% active) gm 3x	1.25	0.5		0.2				1.2		0.1
Burner oil, 3x	0.018			0.005				0.005		
NaIPX (0.5%)		0.0125		0.005						0.004
MIBC		0.03							0.003	0.003
NaCN (1%)								0.01		
MACHINE		2000	2000	2000	2000			500	500	500
R.P.M.		900	900	900	900			800	800	800
pH (all tests)	9.0	8.3/9.0		8.4/9.0				8.0/10.5		10.3/10.5
% SOLIDS	50									
TEMPERATURE										

Remarks: Scav tails - clean, trace sulfides (fine bornite few pieces coarse pyrite), trace magnetics.



DATE: 9/11/2002

BY: PGB & PT

Conduct flotation tests using procedure from T34 LC test to generate concentrate for Mo separation work.

Weighted average of flotation products

No. 2 Cl tails	158.6
No. 1 Cl scav conc.	93.6
No. 1 Cl scav tail	937.2
Scav tails	4339.7
Total	5529.1

[illegible]

TEMPERATURE					
Remarks: Scav tails - clean, trace sulfides (fine bornite few pieces coarse pyrite), trace magnetics.					

$$P_{\text{gas}} = 120 \text{ u}$$

BO = 0.0024 gm/drop



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TEST No. 36

NAME:

Rio Tinto Technical Services

Resolution MC-1

Conduct Moly separation test on combined No. 2 Cl Conc. from T35 (1), (2) and (4).

Product	Weight	Percent Weight	Assay, %					Units				Distribution, % (Mo rougher Fd)			
			Cu	Mo	Fe	S(tot)	Insol	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 5 Mo Cl conc.	2.5	0.538	3.19	43.80	4.71	37.64	6.59	0.0172	0.2356	0.0253	0.2024	0.05	46.57	0.11	0.61
No. 5 Mo Cl tail	0.28	0.060	8.98	32.10	9.81	na		0.0054	0.0191	0.0058		0.02	3.78	0.03	
No. 4 Mo Cl tail	0.32	0.069	14.10	19.90	14.50	na		0.0097	0.0137	0.0100		0.03	2.71	0.04	
No. 3 Mo Cl tail	1.3	0.288	19.30	8.89	18.20	na		0.0556	0.0256	0.0525		0.16	5.07	0.23	
No. 2 Mo Cl tail	3.5	0.753	17.50	13.70	16.80	na		0.1318	0.1032	0.1265		0.38	20.39	0.57	
No. 1 Mo Cl tail	31.4	6.76	28.60	1.040	24.30	36.09		1.9319	0.0703	1.6415	2.4379	5.56	13.89	7.34	7.34
Mo Ro tail (final Cu conc.)	425.5	91.54	35.60	0.042	22.40	33.39		32.5873	0.0384	20.5044	30.5644	93.81	7.60	91.68	92.05
Head Calculated	464.8	100.00	34.74	0.506	22.37			34.7389	0.5059	22.3660	33.205	100.00	100.00	100.00	100.00
Head Assayed															

na - There wasn't enough sample to conduct a S(tot) analysis.

Combined Products

No. 4 Mo Cl conc.	0.597	3.77	42.63	5.22				0.023	0.2547	0.0312	0.202	0.06	50.35	0.14	0.16
No. 3 Mo Cl conc.	0.666	4.84	40.28	6.18				0.032	0.2684	0.0412		0.09	53.06	0.18	
No. 2 Mo Cl conc.	0.955	9.20	30.80	9.81				0.088	0.2940	0.0936		0.25	58.12	0.42	
No. 1 Mo Cl conc.	1.707	12.86	23.26	12.89				0.220	0.3972	0.2201		0.63	78.51	0.98	
Mo Rougher conc.	8.463	25.42	5.52	22.00				2.152	0.467	1.862		6.19	92.40	8.32	

Moly Flotation											Grinding	
OPERATION	Cond	Cond*	Cond	Ro	Cond	No. 1 Cl	No. 2 Cl	No. 3 Cl	No. 4 Cl	No. 5 Cl	Product	
TIME	2'	10.5'	5'	5'	5'-10'	5'	5'	1'	1'	1'		
REAGENTS - LBS PER TON Conc.												
No. 2 Cl conc (T35 1, 2 & 4)	500											
Filtrate											MESH	
Emulsified BO	0.20						10drops				+10	
NaHS (45.4%)	5**	5**	5**		33**						+14	
MIBC (1 drop/10 cc H ₂ O)							1ml	1ml	1ml	1ml	+20	
											+28	
											+48	
											+65	
											+100	
											+150	
											+200	
MACHINE	500	1000	1000	1000	500	500	500	150	150	150	+270	
R.P.M.		900	900	900	900	900	900	250	250	250	+325	
pH	8.3	11.5	11.5	11.5	10.0	11.4	11.0	8.8			+400	
% SOLIDS											+500	
EMF, mv	96	-370	-370	-350	-254	-533	-433	-412			-500	
TEMPERATURE											Total	

Remarks:

* At 6.5 min the froth was completely dead, emf -270mv. At 8.5 min the froth was back; emf -116 mv. Agitator shut off after 10.5 min of conditioning.

** Over reagentized.

No. 2 Cl tail - Significant Mo, will refloat w/addition of emulsified BO.



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PROJECT No. P-2694E
DATE: 9-12-02
BY: PGB

TEST No. 36 NAME: Rio Tinto Technical Services Resolution MC-1
Conduct Moly separation test on combined No. 2 Cl Conc. from T35 (1), (2) and (4).

Product	Weight	Percent Weight	Assay, %					Units				Distribution, % (of ore)			
			Cu	Mo	Fe	S(tot)	Insol	Cu	Mo	Fe	S(tot)	Cu	Mo	Fe	S(tot)
No. 5 Mo Cl conc.	2.5	0.042	3.19	43.80	4.71	37.64	6.59	0.0013	0.0183	0.0020	0.0157	0.04	31.43	0.02	0.16
No. 5 Mo Cl tail	0.28	0.005	8.98	32.10	9.81	na		0.0004	0.0015	0.0005		0.01	2.55	0.01	
No. 4 Mo Cl tail	0.32	0.005	14.10	19.90	14.50	na		0.0008	0.0011	0.0008		0.02	1.83	0.01	
No. 3 Mo Cl tail	1.3	0.022	19.30	8.89	18.20	na		0.0043	0.0020	0.0041		0.13	3.42	0.05	
No. 2 Mo Cl tail	3.5	0.058	17.50	13.70	16.80	na		0.0102	0.0080	0.0098		0.31	13.76	0.11	
No. 1 Mo Cl tail	31.4	0.52	28.60	1.040	24.30	36.09		0.1498	0.0054	0.1273	0.1891	4.48	9.37	1.41	1.90
Mo Ro tail (final Cu conc.)	425.5	7.10	35.60	0.042	22.40	33.39		2.5272	0.0030	1.5901	2.3703	75.55	5.13	17.67	23.87
No. 2 Cl tails	158.6	2.65	8.62	0.275	24.15	30.43		0.2281	0.0073	0.6391	0.8051	6.82	12.54	7.10	8.11
No. 1 Cl scav conc.	93.6	1.56	12.27	0.314	25.24	32.89		0.1916	0.0049	0.3941	0.5136	5.73	8.42	4.38	5.17
No. 1 Cl scav tail	937.2	15.64	0.80	0.012	31.95	37.00		0.1253	0.0019	4.9959	5.7846	3.75	3.23	55.51	58.24
Scav tails	4339.7	72.40	0.147	0.007	1.71	0.35		0.1062	0.0048	1.2357	0.2534	3.18	8.31	13.73	2.55
Head Calculated	5993.9	100.00	3.35	0.058	9.00			3.3453	0.0581	8.9993	9.932	100.00	100.00	100.00	100.00
Head Assayed	6000.0		3.49	0.052	8.99	9.01									

na - There wasn't enough sample to conduct a S(tot) analysis.

Combined Products

No. 4 Mo Cl conc.	0.046	3.77	42.63	5.22				0.002	0.0198	0.0024	0.016	0.05	33.99	0.03	0.16
No. 3 Mo Cl conc.	0.052	4.84	40.28	6.18				0.002	0.0208	0.0032		0.07	35.81	0.04	
No. 2 Mo Cl conc.	0.074	9.20	30.80	9.81				0.007	0.0228	0.0073		0.20	39.23	0.08	
No. 1 Mo Cl conc.	0.132	12.86	23.26	12.89				0.017	0.0308	0.0171		0.51	53.00	0.19	
Mo Rougher conc.	0.656	25.42	5.52	22.00				0.167	0.036	0.144		4.99	62.37	1.60	
Mo Rougher Fd (No. 2 Cl conc)	7.76	34.74	0.51	22.37	9.330			2.694	0.0392	1.7345	2.575	80.53	67.50	19.27	25.93
Rougher + Scav conc.	27.60	11.74	0.19	28.13	35.068			3.239	0.0533	7.7636	9.678	96.82	91.69	86.27	97.45

OPERATION	Cond	Cond*	Cond	Ro	Cond	Moly Flotation					Grinding	Product
						No. 1 Cl	No. 2 Cl	No. 3 Cl	No. 4 Cl	No. 5 Cl		
TIME	2'	10.5'	5'	5'	5'-10'	5'	5'	1'	1'	1'		
REAGENTS - LBS PER TON Conc.												
No. 2 Cl conc (T35 1, 2 & 4)	500											
Filtrate												MESH
Emulsified BO	0.20						10drops					+10
NaHS (45.4%)	5**	5**	5**		33**							+14
MIBC (1 drop/10 cc H ₂ O)							1ml	1ml	1ml	1ml		+20
												+28
												+48
												+65
												+100
												+150
												+200
MACHINE	500	1000	1000	1000	500	500	500	150	150	150		+270
R.P.M.		900	900	900	900	900	900	250	250	250		+325
pH	8.3	11.5	11.5	11.5	10.0	11.4	11.0	8.8				+400
% SOLIDS												+500
EMF, mv	96	-370	-370	-350	-254	-533	-433	-412				-500
TEMPERATURE												Total

Remarks:

* At 6.5 min the froth was completely dead, emf -270mv. At 8.5 min the froth was back; emf -116 mv. Agitator shut off after 10.5 min of conditioning.

** Over reagentized.

No. 2 Cl tail - Significant Mo, will refloat w/addition of emulsified BO.



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PROJECT No. P-2694
DATE: 3/15/2002
BY: GSN & PT

TEST No. 24 NAME: Rio Tinto -- Resolution RES3-1

Repeat test 18 with regrind-cleaning at pH 11

Product	Percent		Assay				Units				Distribution			
	Weight	Weight	% Cu	% Mo	% Fe	% S	Cu	Mo	Fe	S	Cu	Mo	Fe	S
Cl. #2 Conc	125.9	6.28	39.10	0.625	20.00	31.60	2.454	0.039	1.255	1.983	85.94	69.70	11.58	17.05
Cl. #2 Tail	34.1	1.70	11.82	0.257	31.30	37.30	0.201	0.004	0.532	0.634	7.04	7.76	4.91	5.45
Cl. #1 Scav Conc	13.7	0.68	4.56	0.284	38.15	43.10	0.031	0.002	0.261	0.294	1.09	3.45	2.40	2.53
Cl. #1 Scav Tail	237.7	11.85	0.49	0.037	38.30	39.35	0.058	0.004	4.538	4.662	2.03	7.79	41.87	40.10
Scav Tail	1594.9	79.49	0.14	0.008	5.35	5.10	0.111	0.006	4.253	4.054	3.90	11.30	39.24	34.87
Head Calculated	2006.3	100.00	2.85	0.056	10.84	11.63	2.855	0.056	10.838	11.628	100.00	100.00	100.00	100.00
Head Assayed			2.86	0.059	10.40	12.25								
Cl. #1 Conc.		7.97	33.29	0.547	22.41	32.81	2.655	0.044	1.787	2.617	92.98	77.46	16.49	22.51
Cl. #1 & Cl. #1 Scav Conc		8.66	31.02	0.526	23.65	33.63	2.686	0.046	2.048	2.911	94.07	80.91	18.89	25.04
Ro. & Scav Conc		20.51	13.38	0.243	32.11	36.93	2.744	0.050	6.585	7.573	96.10	88.70	60.76	65.13
Scav Tail & Cl. #1 Scav Tail		91.34	0.19	0.012	9.62	9.54	0.169	0.011	8.791	8.716	5.93	19.09	81.11	74.96

OPERATION	RM	cond	Ro	combined ro & scav Conc										Grinding	
				Cond	Scav	RG+200	Cl. #1	Cl#1 ext	Cl scav	Cl #2				Product	
TIME	37	2	5	1	4	20	1-5	3	3	6				Con	
REAGENTS - LBS PER TON														RG	
Ore gm	2000													MESH	%
SLC Tap Water gm	2000													+10	
Ca(OH)2 gm	3.0	0.6		0.5		0.5	0.5	0.3	0	0.4				+14	
Burner Oil	0.018			0.005		0.0023	0.0023							+20	
NaIPX		0.0125		0.005			0.0045	0.003	0.0015					+28	
MIBC			0.03		0.015		0.0015	0.0015	0.0015					+35	
														+48	
														+65	0.0
														+100	0.0
														+150	0.0
MACHINE		2000	2000	2000	2000		500	500	500	500				+200	1.0 P80
R.P.M.		800	800	800	800		800	800	800	800				+325	12.8 41 μ
pH	11.0	10.0/11.0	11	10.8		11.0	8.5/11.0	11.0	8.4/11.2	11				+400	10.4
% SOLIDS	50	29				50								-400	75.8
TEMPERATURE														Total	100.0

Remarks:



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PROJECT No. P-2694A
DATE: 5/10/2002
BY: GSN & PT

TEST No. 30 NAME: Rio Tinto -- Resolution RES3A-1
Repeat test 29, regrind and clean ro-scav con twice and pH 11.0

Product	Percent		Assay				Units				Distribution			
	Weight	Weight	% Cu	% Mo	% Fe	% S	Cu	Mo	Fe	S	Cu	Mo	Fe	S
Cl. #2 Conc	263.5	13.12	37.00	0.330	23.60	31.85	4.853	0.043	3.095	4.177	89.05	75.53	38.71	44.95
Cl. #2 Tail	53.2	2.65	14.52	0.220	27.30	33.06	0.385	0.006	0.723	0.875	7.06	10.17	9.04	9.42
Cl. #1 Scav Conc	11.3	0.56	6.34	0.190	31.15	36.05	0.036	0.001	0.175	0.203	0.65	1.86	2.19	2.18
Cl. #1 Scav Tail	254.9	12.69	0.635	0.017	28.30	31.32	0.081	0.002	3.591	3.974	1.48	3.76	44.91	42.76
Scav Tail	1426.1	70.99	0.135	0.007	0.58	0.09	0.096	0.005	0.412	0.064	1.76	8.67	5.15	0.69
Head Calculated	2009.0	100.00	5.45	0.057	8.00	9.29	5.449	0.057	7.996	9.293	100.00	100.00	100.00	100.00
Head Assayed			5.55	0.053	8.10	9.55								
Cl. #1 Conc.		15.76	33.22	0.312	24.22	32.05	5.237	0.049	3.818	5.053	96.11	85.70	47.75	54.37
Cl. #1 & Cl. #1 Scav Conc		16.33	32.30	0.307	24.46	32.19	5.273	0.050	3.994	5.256	96.76	87.56	49.94	56.55
Ro. & Scav Conc		29.01	18.45	0.180	26.14	31.81	5.354	0.052	7.584	9.230	98.24	91.33	94.85	99.31
Scav Tail & Cl. #1 Scav Tail		83.67	0.21	0.009	4.78	4.83	0.176	0.007	4.002	4.038	3.24	12.44	50.06	43.45

OPERATION	RM	cond	Ro	combined ro & scav Conc										Grinding	
				Cond	Scav	RG+200	Cl. #1	Cl#1 ext	Cl scav	Cl #2				Product	
TIME	23	2	5	1	5	20	1-5	3	2	6				Con	
REAGENTS - LBS PER TON														RG	
Ore gm	2000												MESH	%	%
SLC Tap Water gm	2000												+10		
Ca(OH)2 gm	1.5	0.4		0.47		0.5	0.9		0	0.3			+14		
Burner Oil	0.018			0.005		0.0023	0.0023						+20		
NaIPX		0.0125		0.005			0.0045	0.003	0.0015				+28		
MIBC			0.03		0.015		0.0015	0.0015	0.0015				+35		
													+48		
													+65	0.0	
													+100	0.0	
													+150	0.0	
MACHINE		2000	2000	2000	2000		500	500	500	500			+200	1.0	P80
R.P.M.		800	800	800	800		800	800	800	800			+325	12.8	41 μ
pH	10.2	9.5-10.2	10	9.5-10.2	10	11.0	9.5/11.0	11.0	9.8/11.0	11			+400	10.4	
% SOLIDS	50	29				50							-400	75.8	
TEMPERATURE													Total	100.0	

Remarks:



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PROJECT No. P-2694D
DATE: 5/30/2002
BY: GSN & PT

TEST No. 35 NAME: Rio Tinto -- Resolution RES2C-2

Repeat test 34 on RES2C-2 Composite

Product	Percent		Assay				Units				Distribution			
	Weight	Weight	% Cu	% Mo	% Fe	% S	Cu	Mo	Fe	S	Cu	Mo	Fe	S
Cl. #2 Conc	133.4	6.71	22.28	0.590	25.60	28.40	1.495	0.040	1.718	1.906	77.18	68.00	17.43	28.55
Cl. #2 Tail	42.7	2.15	5.35	0.200	20.65	20.00	0.115	0.004	0.444	0.430	5.93	7.38	4.50	6.43
Cl. #1 Scav Conc	35.0	1.76	8.55	0.335	21.10	21.60	0.151	0.006	0.371	0.380	7.77	10.13	3.77	5.70
Cl. #1 Scav Tail	277.7	13.97	0.670	0.028	28.40	27.00	0.094	0.004	3.967	3.771	4.83	6.72	40.25	56.50
Scav Tail	1499.3	75.41	0.110	0.006	4.45	0.25	0.083	0.005	3.356	0.189	4.28	7.77	34.05	2.82
Head Calculated	1988.1	100.00	1.94	0.058	9.86	6.68	1.937	0.058	9.856	6.675	100.00	100.00	100.00	100.00
Head Assayed			1.94	0.064	9.75	7.25								
Cl. #1 Conc.		8.86	18.17	0.495	24.40	26.36	1.610	0.044	2.161	2.335	83.11	75.38	21.93	34.98
Cl. #1 & Cl. #1 Scav Conc		10.62	16.58	0.469	23.85	25.57	1.760	0.050	2.533	2.715	90.89	85.51	25.70	40.68
Ro. & Scav Conc		24.59	7.54	0.218	26.44	26.38	1.854	0.054	6.500	6.487	95.72	92.23	65.95	97.18
Scav Tail & Cl. #1 Scav Tail		89.38	0.20	0.009	8.19	4.43	0.177	0.008	7.323	3.960	9.11	14.49	74.30	59.32

OPERATION	RM	cond	Ro	Cond	Scav	combined ro & scav Conc								Grinding	
						RG+200	Cond	Cl. #1	Cl scav	Cl #2				Product	
TIME	23	2	5	1	5	12	1	5	3	5				Con	Scav
REAGENTS - LBS PER TON														RG	Tails
Ore -10 mesh gm	2000													MESH	%
SLC Tap Water gm	2000														
Ca(OH)2 gm	2.5	0.25		0.25		0.5	0.7			0.2					
Burner Oil	0.018			0.005		0.003	0.003								
NaIPX		0.0125		0.005					0.0015						
MIBC			0.03		0.015				0.0015						
														+65	0 6.0
														+100	0.0 14.6
														+150	0.4 13.1
														+200	3.0 12.3
MACHINE		2000	2000	2000	2000		1000	1000	1000	500				+270	10.4 10.2
R.P.M.		800	800	800	800		800	800	800	800				+325	11.2 5.5
pH	10.5	9.6-10.5	10.5	9.6-10.5	10.1	11.2	10.0-11.0	11	10.7	9.2-11.0				+400	5.2 2.7
% SOLIDS	50	29				50								-400	69.8 35.6
TEMPERATURE														Total	100.0 100

Remarks:

Very slimey, foamy float....too much collector? Excessive clays floating
Minor pyrite and magnetite in scav tails

P80 44 µ 152 µ



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PROJECT No. P-2694D
DATE: 6/11/2002
BY: GSN & PT

TEST No. 36

NAME: Rio Tinto -- Resolution

RES2C-2

Repeat test 35, except reduce NaIPX to 0.0125 lb/ton total (ro) and reduce Ro pH to 9.5

Product	Percent		Assay				Units				Distribution			
	Weight	Weight	% Cu	% Mo	% Fe	% S	Cu	Mo	Fe	S	Cu	Mo	Fe	S
Cl. #2 Conc	135.8	6.82	22.54	0.640	25.20	28.54	1.536	0.044	1.717	1.945	79.69	72.59	18.70	25.93
Cl. #2 Tail	46.2	2.32	6.47	0.260	22.20	23.02	0.150	0.006	0.515	0.534	7.78	10.03	5.61	7.11
Cl. #1 Scav Conc	25.7	1.29	6.96	0.270	20.40	20.95	0.090	0.003	0.263	0.270	4.66	5.80	2.87	3.60
Cl. #1 Scav Tail	243.3	12.21	0.450	0.019	31.20	34.94	0.055	0.002	3.810	4.266	2.85	3.86	41.49	56.86
Scav Tail	1541.6	77.37	0.125	0.006	3.72	0.63	0.097	0.005	2.878	0.487	5.02	7.73	31.34	6.50
Head Calculated	1992.6	100.00	1.93	0.060	9.18	7.50	1.928	0.060	9.183	7.503	100.00	100.00	100.00	100.00
Head Assayed			1.94	0.064	9.75	7.25								
Cl. #1 Conc.		9.13	18.46	0.544	24.44	27.14	1.686	0.050	2.232	2.479	87.48	82.62	24.31	33.04
Cl. #1 & Cl. #1 Scav Conc		10.42	17.04	0.510	23.94	26.37	1.776	0.053	2.495	2.749	92.13	88.41	27.17	36.64
Ro. & Scav Conc		22.63	8.09	0.245	27.86	30.99	1.831	0.055	6.305	7.015	94.98	92.27	68.66	93.50
Scav Tail & Cl. #1 Scav Tail		89.58	0.17	0.008	7.47	5.31	0.152	0.007	6.688	4.754	7.87	11.59	72.83	63.36

OPERATION	RM	cond	Ro	Cond	Scav	combined ro & scav Conc								Grinding	
						RG+200	Cond	Cl. #1	Cl scav	Cl #2				Product	
TIME	23	2	5	1	5	12	1	5	3	5				Con	Scav
REAGENTS - LBS PER TON														RG	Tails
Ore -10 mesh gm	2000													MESH	%
SLC Tap Water gm	2000														
Ca(OH) ₂ gm	1.5	0.2		0.25		0.6	0.5			0.5					
Burner Oil	0.018			0.005		0.003	0.003								
NaIPX		0.0075		0.005					0.0015						
MIBC			0.015		0.015			0.015	0.007						
														+65	0 6.0
														+100	0.0 14.6
														+150	0.4 13.1
														+200	3.0 12.3
MACHINE		2000	2000	2000	2000		1000	1000	1000	500				+270	10.4 10.2
R.P.M.		800	800	800	800		800	800	800	800				+325	11.2 5.5
pH	9.5	9.0-9.5	9	8.7-9.5	9	11.4	10.4-11.0	10.9	10.4	10-10.4				+400	5.2 2.7
% SOLIDS	50	29				50								-400	69.8 35.6
TEMPERATURE														Total	100.0 100

Remarks:

Very slimy, foamy float....too much collector? Excessive clays floating
Thick, matted froth in #2 Cl.

P80 44 μ 152 μ



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PROJECT No. P-2694D
DATE: 6/11/2002
BY: GSN & PT

TEST No. 37

NAME: Rio Tinto -- Resolution

RES2C-2

Repeat test 35, except reduce NaIPX to 0.0100 lb/ton total (ro) and increase Ro pH to 10.5

Product	Percent		Assay				Units				Distribution			
	Weight	Weight	% Cu	% Mo	% Fe	% S	Cu	Mo	Fe	S	Cu	Mo	Fe	S
Cl. #2 Conc	100.9	5.06	25.60	0.610	25.70	29.03	1.294	0.031	1.299	1.468	67.82	52.44	14.20	19.97
Cl. #2 Tail	32.3	1.62	8.44	0.350	21.50	23.06	0.137	0.006	0.348	0.373	7.16	9.63	3.80	5.08
Cl. #1 Scav Conc	29.3	1.47	13.20	0.560	21.80	24.67	0.194	0.008	0.320	0.362	10.16	13.98	3.50	4.93
Cl. #1 Scav Tail	189.3	9.48	1.340	0.053	30.20	32.21	0.127	0.005	2.864	3.055	6.66	8.55	31.31	41.56
Scav Tail	1644.1	82.37	0.190	0.011	5.24	2.54	0.157	0.009	4.316	2.092	8.20	15.41	47.18	28.47
Head Calculated	1995.9	100.00	1.91	0.059	9.15	7.35	1.908	0.059	9.148	7.350	100.00	100.00	100.00	100.00
Head Assayed			1.94	0.064	9.75	7.25								
Cl. #1 Conc.		6.67	21.44	0.547	24.68	27.58	1.431	0.037	1.647	1.841	74.98	62.07	18.01	25.04
Cl. #1 & Cl. #1 Scav Conc		8.14	19.95	0.549	24.16	27.06	1.625	0.045	1.967	2.203	85.14	76.05	21.50	29.97
Ro. & Scav Conc		17.63	9.94	0.282	27.41	29.83	1.752	0.050	4.831	5.258	91.80	84.59	52.82	71.53
Scav Tail & Cl. #1 Scav Tail		91.86	0.31	0.015	7.82	5.60	0.284	0.014	7.181	5.147	14.86	23.95	78.50	70.03

OPERATION	RM	cond	Ro	Cond	Scav	combined ro & scav Conc								Grinding	
						RG+200	Cond	Cl. #1	Cl scav	Cl #2				Product	
TIME	23	2	5	1	5	12	1	5	3	5				Con	Scav
REAGENTS - LBS PER TON														RG	Tails
Ore -10 mesh gm	2000													MESH	%
SLC Tap Water gm	2000														
Ca(OH)2 gm	1.5	1		0.5		0.5	0.7			0.35					
Burner Oil	0.018			0.005		0.003	0.003								
NaIPX		0.0075		0.0025					0.0015						
MIBC			0.0075												
														+65	0 6.0
														+100	0.0 14.6
														+150	0.4 13.1
														+200	3.0 12.3
MACHINE		2000	2000	2000	2000		1000	1000	1000	500				+270	10.4 10.2
R.P.M.		800	800	800	800		800	800	800	800				+325	11.2 5.5
pH	10.5	9.0-10.5	10	9.5-10.5	10.1	11.2	10.0-11	10.8	10.6	10.4-11				+400	5.2 2.7
% SOLIDS	50	29				50								-400	69.8 35.6
TEMPERATURE														Total	100.0 100

Remarks:

Float much less foamy in both ro-scav and cleaners
Still a thick, matted froth in #2 Cl

P80 44 μ 152 μ