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An Investigation of
THE REMOVAL OF DOLOMITE
 from a magnesite ore sample
 submitted by

GOLDEN TRIANGLE RESOURCES N.L.

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An investigation of 'The Removal of Dolomite' from a magnesite ore sample Golden Triangle Resources NL*; Lakefield Research of 2M/1999; RL2/1988 Anon

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Abstract

This report describes the results of the preliminary testwork designed to determine if dolomite can be removed from a magnesite concentrate prior to hydrometallurgical treatment. Only baseline tests were conducted in this testwork. The results of the preliminary tests have demonstrated that dolomite, which is a calcium carrier, can be removed from the magnesite, to below 1% CaO after development of a commercial beneficiation process. Table 1 shows the results of the batch tests conducted using two different reagent schemes.

Table 1. Preliminary Batch Test Results Obtained on Dolomite Removal

Test No.	Product	Weight %	Assays %			% Distribution		
			MgO	CaO	SiO ₂	MgO	CaO	SiO ₂
8	MgO Cleaner Concentrate	76.32	45.2	1.08	0.73	77.9	45.4	27.9
	MgO Ro + 1 st Cleaner Tails	14.96	44.0	5.49	3.56	13.7	45.3	26.0
	Talc Rougher Concentrate	2.72	39.6	1.08	25.0	2.4	1.6	27.9
	Slimes	6.00	43.8	2.3	3.85	5.9	7.7	11.6
	Head (Calc)	100.00	44.3	1.91	2.00	100.0	100.0	100.0
6	MgO Cleaner Concentrate	67.49	45.2	1.02	0.70	69.9	34.5	23.3
	MgO Ro + 1 st Cleaner Tails	24.63	42.3	4.67	2.55	23.7	53.5	31.2
	Talc Rougher Concentrate	1.88	35.7	0.96	37.6	1.2	1.0	35.1
	Slimes	6.00	43.8	2.30	3.58	5.2	7.0	10.4
	Head (Calc)	100.00	44.1	2.0	2.05	100.0	100.0	100.0

Test 6 was performed using a starch-silicate depressant system for dolomite and a modified tall oil collector. In Test 8, acidified silica with sodium hexametaphosphate as dolomite depressants and modified oleic acid for magnesite flotation, were used.

Introduction

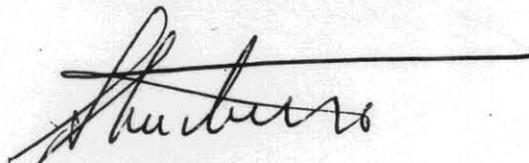
On July 29th, 1999 a meeting was held with the members of Golden Triangle Resources NL and the hydrometallurgical group from Lakefield Research to discuss the magnesite project. Among the items discussed was the removal of dolomite, which is a calcium carrier before the hydrometallurgical treatment. The principle objective of this testwork, therefore, was to establish the feasibility of removing dolomite as a carrier of most of the calcium present in the magnesite.

In order to accomplish the above objective, it was proposed to conduct about 30 flotation tests. This testwork was to include various reagent schemes tested on similar ores, as well as evaluation of the most critical variables (i.e. pH, level of depressants, etc). The testwork was terminated after completion of the baseline tests.

LAKEFIELD RESEARCH LIMITED



for C.A. Fleming, Ph. D.,
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Summary & Discussion

1. Description of the Sample Used in the Laboratory Testwork

An ore sample designated as 'MC36' was composited, crushed to 10 mesh and riffled into 10 kilogram test charges for laboratory testwork. No head sample was removed and analysed.

2. Test Procedure

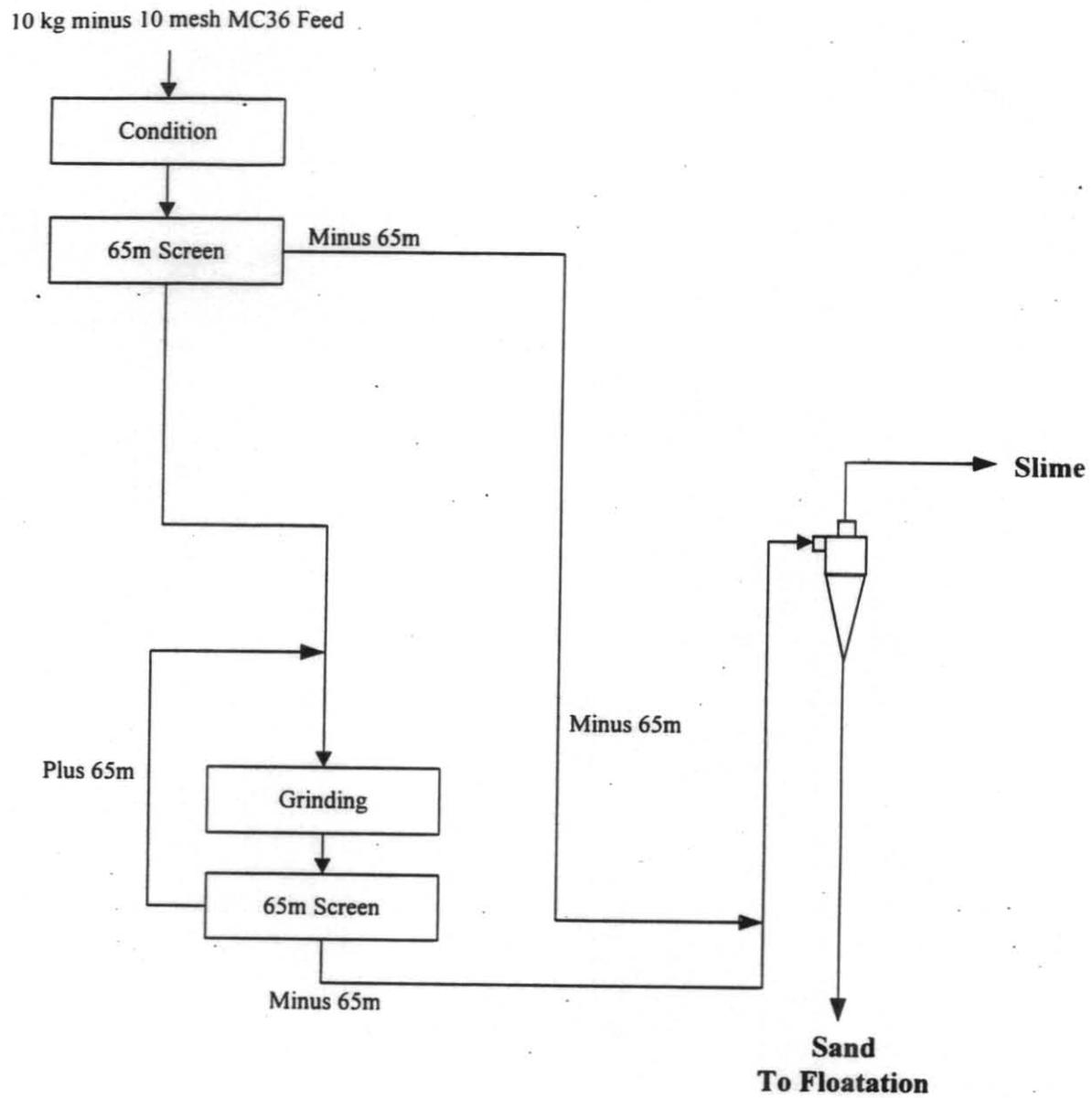
2.1. Large Scale Grinding and Desliming Tests

Large scale (10-kg) grinding tests were performed to produce feed for laboratory flotation tests. The flowsheet used in these tests is shown in Figure 1. The ore was passed over a 65 mesh screen to remove the fines. The sand fraction was stage ground to 65 mesh. The ground product was deslimed in a cyclone rig, equipped with a 50 mm cyclone (6 m apex, 25 m vortex). The slime size was $K_{80}=7 \mu\text{m}$ and the sand fraction was $K_{80}=167 \mu\text{m}$. The deslimed, ground ore was split into 2-kg test charges for flotation work.

2.2. Flotation Test Procedure

The deslimed ore was repulped to 33% solids and conditioned with frother, followed by talc flotation. Talc preflotation, ahead of magnesite flotation was required because the talc would interfere with sequential magnesite-dolomite flotation. The talc rougher tailing was stage conditioned with depressants and collector followed by rougher-scavenger flotation. The combined rougher-scavenger concentrate was cleaned once with the use of depressants. Tests were conducted in a 4 liter Denver cell at 1800 rpm.

Figure 1. Grinding and Desliming Flowsheet



3. Laboratory Testwork

In this testwork, only baseline tests were conducted to determine the processing characteristics of the ore using different reagent schemes. In these tests, it was established that sequential flotation of magnesite from dolomite depended on the type of depressant and collector used. The reagent schemes tested were reported in the literature as a part of the research for beneficiation of magnesite ores.

3.1. Evaluation of Organic Depressant

The initial series of tests was performed to examine the effect of different organic depressants used for the depression of dolomite. The results obtained in these tests are summarized in Table 2.

Table No. 2: Preliminary Silica and Calcite Removal Test Results

Test No.	Depressant	Product	Wt. %	Assays %				% Distribution		
				MgO	CaO	SiO ₂	LOI	MgO	CaO	SiO ₂
3	Corn Starch = 600	MgO Cl Conc	71.48	44.1	1.68	0.56	57.0	72.3	62.1	18.6
		MgO Ro Conc	79.75	44.0	1.78	0.73	50.9	80.4	73.1	27.1
		MgO Ro Tail	10.42	42.5	3.57	3.25	49.1	10.2	17.7	15.7
		SiO ₂ Ro Conc	3.83	38.9	1.29	26.2	32.4	3.4	2.4	46.5
		Slimes	6.00	43.8	2.3	3.85	48.6	6.0	6.8	10.7
		Head (Calc.)	100.0	43.63	2.15	2.16	49.85	100.0	100.0	100.0
4	Gum Arabic = 600	MgO Cl Conc	82.72	44.6	1.90	0.87	51.0	83.5	80.2	31.5
		MgO Ro Conc	89.07	44.53	2.00	0.99	50.91	89.7	89.9	40.1
		MgO Ro Tail	2.10	40.8	3.3	3.85	48.6	2.0	1.7	8.5
		SiO ₂ Ro Conc	2.79	37.3	1.37	32.4	27.5	2.9	1.7	40.9
		Slimes	6.00	43.8	2.3	3.85	48.6	5.9	6.7	105
		Head (Calc.)	100.0	43.8	2.10	2.21	49.6	100.0	100.0	100.0
5	Cornstarch/E7 80:20 = 800	MgO Cl Conc	73.70	44.6	1.90	0.62	51.3	74.3	70.6	21.9
		MgO Ro Conc	85.96	44.0	2.0	0.76	51.2	86.5	80.5	31.3
		MgO Ro Tail	5.05	41.3	3.03	6.14	47.7	4.9	11.1	14.9
		SiO ₂ Ro Conc	2.99	33.9	1.08	29.8	29.0	2.4	1.6	42.8
		Slimes	6.00	43.8	2.30	3.85	48.6	6.2	6.9	11.1
		Head (Calc.)	100.0	42.27	2.03	2.08	49.8	100.0	100.0	100.0

In these tests, corn starch, gum arabic and modified corn starch with acrylic acid (E7) were tested. The best metallurgical results were obtained using corn starch. However, satisfactory dolomite depression was not achieved in any of the tests.

3.2. Evaluation of Different Depressant Combinations

A series of three tests was conducted in which different reagent schemes were evaluated.

The conditions and results of these tests are shown in Table 3.

Table 3. Effect of Different Reagent Schemes on Dolomite/Magnesite Separation

Test No.	Reagent Scheme	Product	Weight %	Assays %			% Distribution		
				MgO	CaO	SiO ₂	MgO	CaO	SiO ₂
6	Na ₂ SiO ₃ modified starch modified tall oil	MgO Cl Conc	67.49	45.2	1.02	0.70	69.9	34.5	23.3
		MgO Ro Conc	75.30	44.9	1.26	0.89	77.4	47.5	33.2
		MgO Ro Tail	16.82	42.5	5.29	28.8	16.2	44.5	21.3
		Talc Ro Conc	1.88	35.7	0.96	37.6	1.2	1.0	35.1
		Slimes	6.00	43.8	2.3	3.58	5.2	7.0	10.4
		Head (Calc)	100.00	44.1	2.0	2.05	100.0	100.0	100.0
7	Acidified silicate modified oleic acid	MgO Cl Conc	71.69	45.0	1.53	0.80	73.4	53.2	28.1
		MgO Ro Conc	78.74	44.6	1.87	0.90	80.0	71.2	35.1
		MgO Ro Tail	12.41	40.7	3.41	3.44	11.5	20.5	20.9
		Talc Ro Conc	2.85	39.7	1.17	23.4	2.6	1.6	32.7
		Slimes	6.00	43.8	2.30	3.85	6.0	6.7	11.3
		Head (Calc)	100.00	44.0	2.07	2.04	100.0	100.0	100.0
8	Acidified silicate modified oleic acid	MgO Cl Conc	76.32	45.2	1.08	0.73	77.9	45.4	27.9
		MgO Ro Conc	83.46	44.8	1.57	0.88	84.4	72.1	36.6
		MgO Ro Tail	7.82	41.0	4.32	4.55	7.2	18.6	17.8
		Talc Ro Conc	2.72	39.6	1.08	25.0	2.4	1.6	34.0
		Slimes	6.00	43.8	2.3	3.85	5.9	7.7	11.6
		Head (Calc)	100.00	44.3	1.91	2.00	100.0	100.0	100.0

In Test 6, acid modified starch + sodium silicate was used as a dolomite depressant with modified tall oil as the magnesite collector. Test 7 was performed with acidified silicate + Calgon as the dolomite depressant and modified oleic acid as the magnesite collector. Test 8 was similar to Test 7 but a different oleic acid modification was used. From the results obtained, the following conclusions are made:

- Good magnesite-dolomite separation was achieved using acid treated starch + silicate (Test 6) and acidified silicate + Calgon (Test 8).
- When using acidified silicate + Calgon, selectivity between dolomite and magnesite was dependent on the type of oleic acid modification.

4. Conclusions

- The results of this preliminary testwork demonstrated that selective removal of dolomite from magnesite is possible and with more development work an effective commercial process can be developed.
- So far, there is indication that selective flotation of magnesite from dolomite is dependent on the type of collector used.

Recommendations

The recommendations proposed are based on the initial separation test results. It has been demonstrated that sequential flotation of magnesite from dolomite is feasible. Based on this, the following recommendations are made:

- Conduct laboratory testwork to develop a reagent scheme for removal of dolomite from magnesite. Development testwork should be based on the conditions from Tests 6 and 8.
- Conduct optimization testwork on the selected reagent scheme.
- Conduct testwork to determine an optimum flowsheet configuration.

Appx. 1

Details of Tests

Test No. G-1

Purpose: To produce -65 mesh sand for flotation testwork.

Feed: 10 kilograms of minus 10 mesh MC36 ore.

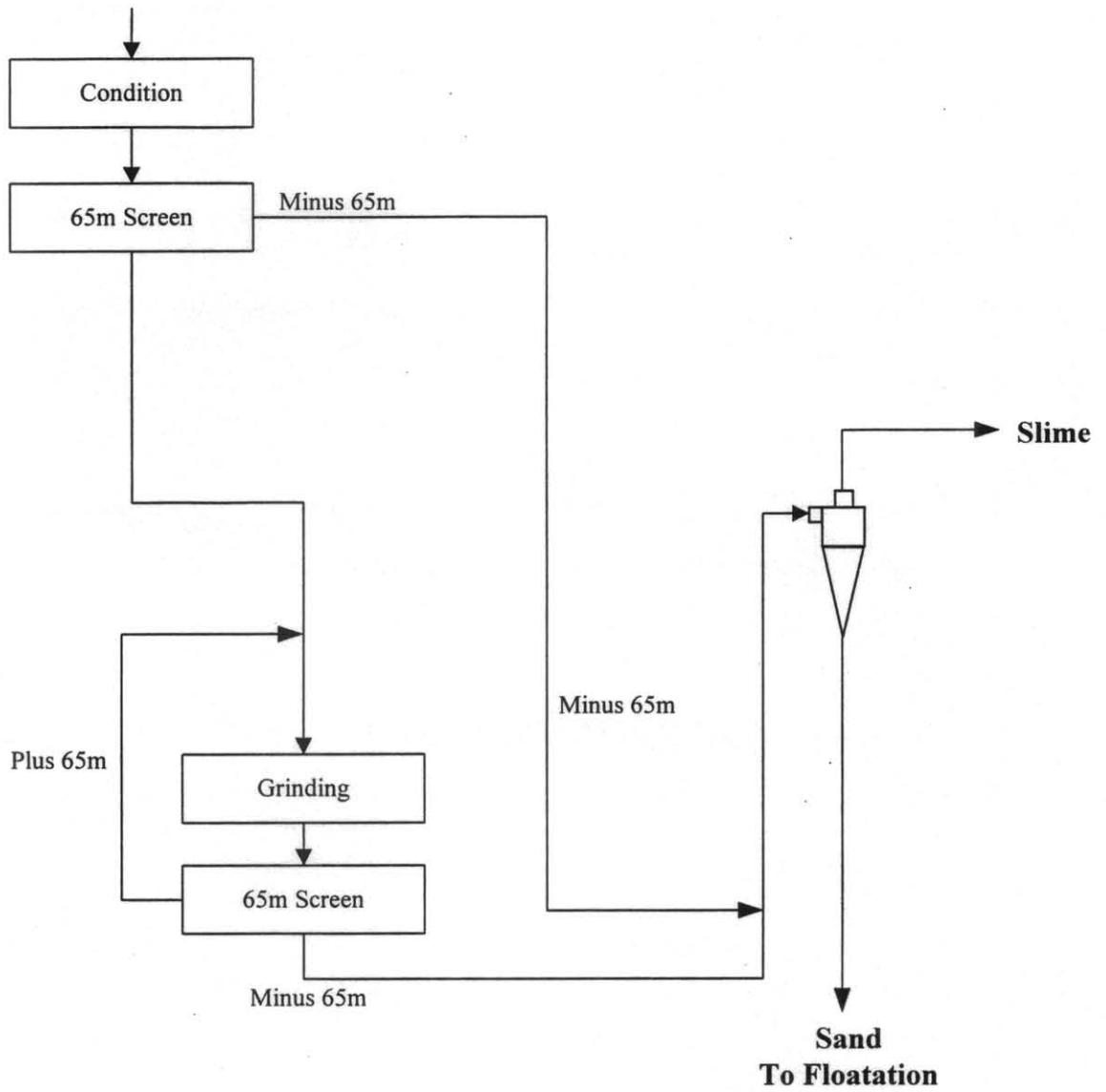
Procedure: The 10-kg sample was passed over a 65 mesh screen. The plus fraction was ground in a large laboratory rod mill for 10 minutes, then repassed over the 65 mesh screen. The plus fraction was ground for 6 minutes in a large laboratory rod mill, then repassed over the 65 mesh screen to ensure the sample passed 65 mesh.

The sample was deslimed on a cyclone rig equipped with a Mozley 25 mm cyclone with a 3.2 mm apex. The sand fraction was filtered and split into 5 equal charges for flotation testwork. The slime was filtered and submitted for assay and size analysis.

Grind: 10 + 6 minutes in the large laboratory rod mill.

Figure No. Grinding and Desliming Flowsheet

10 kg minus 10 mesh MC36 Feed



Company

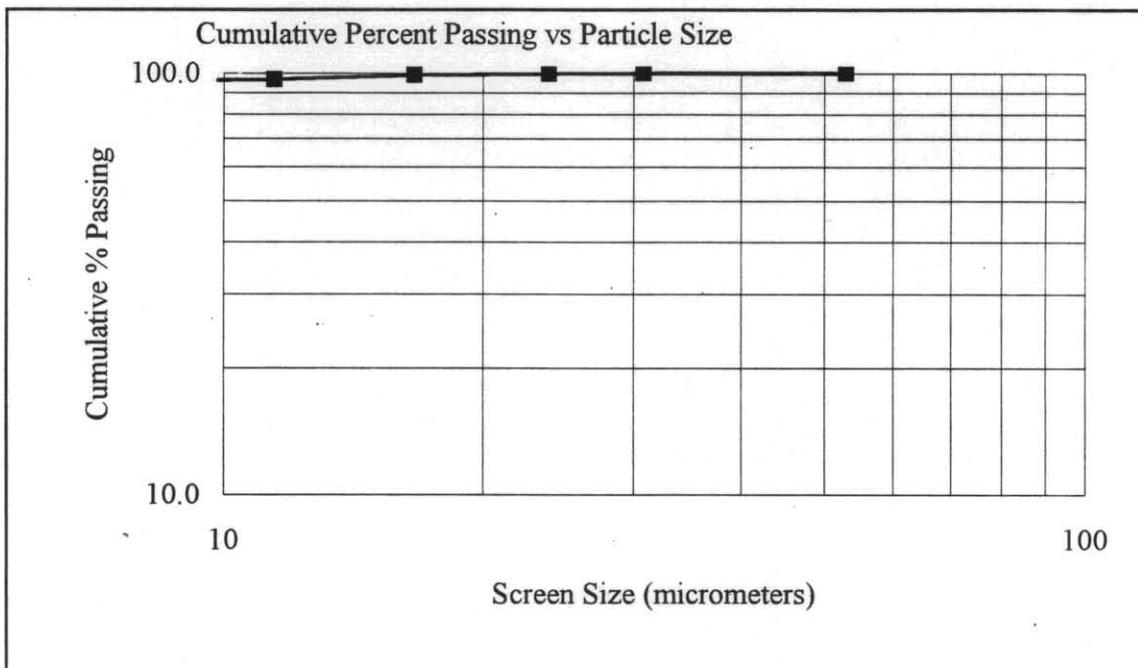
Lakefield Research
Size Distribution Analysis

LR-5519

Sample: Slime

Test No.: G 1

Dry Solids S.G. =		3.24	Water Temperature =		24.00 C°
Mesh	Size µm	Weight grams	% Retained		% Passing Cumulative
			Individual	Cumulative	
270	53	0.00	0.0	0.0	100.0
	31	0.04	0.1	0.1	99.9
	24	0.09	0.2	0.2	99.8
	17	0.47	0.9	1.2	98.8
	11	1.12	2.2	3.3	96.7
	9	0.44	0.8	4.2	95.8
	-9	49.87	95.8	100.0	0.0
Total	-	52.03	100.0	-	-
K80 = #DIV/0!					



5 cm

Test No. 1

Purpose: A preliminary flotation test on sand from Test G-1 to investigate different dolomite collectors.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne				Time, minutes			pH
	Corn Starch	Na ₂ S	TC5	MIBC	Grind	Cond.	Froth	
Talc Rougher	-	-	-	30	-	-	2	8.7
Condition 1	800	500	-	-	-	2	-	10.4
2	-	-	50	-	-	2	-	-
CaO Rougher	-	-	-	-	-	-	4	-
CaO Cleaner	200	100	-	-	-	1	2	-

Metallurgical Results

Product	Weight		Assays, %				% Distribution			
	g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1 Talc Rougher Conc.	79.5	4.05	38.90	1.37	24.30	34.00	3.6	2.7	44.9	2.7
2 CaO Cleaner Conc.	406.0	20.69	44.90	0.52	0.98	52.00	21.0	5.2	9.3	21.3
3 CaO 1st Cl. Tail	355.8	18.13	45.30	1.00	1.02	51.80	18.6	8.7	8.4	18.6
4 CaO Ro. Tail	1003.0	51.12	44.10	3.14	1.15	51.10	50.9	76.8	26.8	51.7
5 Slime		6.00	43.80	2.3	3.85	48.60	5.9	6.7	10.5	5.8
Head (calc.)	1844.3	100.0	44.25	2.09	2.19	50.57	100.0	100.0	100.0	100.0
Combined Products										
2-3 CaO Ro. Conc.		38.83	45.09	0.74	1.00	51.91	39.6	13.8	17.7	39.9
2-4 CaO Ro. Feed		89.95	44.53	2.11	1.08	51.45	90.5	90.7	44.5	91.5
1-4 Talc Ro. Feed		94.00	44.28	2.07	2.09	50.70	94.1	93.3	89.5	94.2

Test No. 2

Purpose: To repeat Test 1, but replace TC5 with collector TC7 and reduce the addition to 20 g/t.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne				Time, minutes			pH
	Corn Starch	Na ₂ S	TC7	MIBC	Grind	Cond.	Froth	
Talc Rougher	-	-	-	30	-	-	2	8.7
Condition 1	800	500	-	-	-	2	-	10.4
2	-	-	20	-	-	2	-	-
CaO Rougher	-	-	-	-	-	-	4	-
CaO Cleaner	200	100	-	-	-	1	2	-

Metallurgical Results

Product	Weight		Assays, %				% Distribution			
	g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1 Talc Rougher Conc.	73.2	3.89	43.80	0.62	25.80	32.80	3.9	1.2	46.8	2.5
2 CaO Cleaner Conc.	77.3	4.11	38.40	1.33	1.79	51.90	3.6	2.6	3.4	4.2
3 CaO 1st Cl. Tail	313.7	16.66	44.10	0.69	0.73	51.50	16.7	5.6	5.7	17.0
4 CaO Ro. Tail	1305.7	69.35	44.30	2.50	1.03	51.30	69.9	83.9	33.3	70.5
5 Slime		6.00	43.80	2.3	3.85	48.60	6.0	6.7	10.8	5.8
Head (calc.)	1769.9	100.0	43.98	2.07	2.14	50.48	100.0	100.0	100.0	100.0

Combined Products

2-3 CaO Ro. Conc.	20.77	42.97	0.82	0.94	51.58	20.3	8.2	9.1	21.2
2-4 CaO Ro. Feed	90.11	43.99	2.11	1.01	51.36	90.2	92.1	42.4	91.7
1-4 Talc Ro. Feed	94.00	43.99	2.05	2.03	50.60	94.0	93.3	89.2	94.2

Test No. 3

Purpose: To investigate MgO flotation using the conditions shown below.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne			Time, minutes			pH
	Corn Starch	TC7	MIBC	Grind	Cond.	Froth	
Talc Rougher	-	-	30	-	-	2	8.7
Condition 1	600	-	-	-	2	-	-
2	-	100	-	-	2	-	-
MgO Rougher 1	-	-	-	-	-	3	8.6
2	-	50	-	-	1	2	-
3	-	50	-	-	1	2	-
MgO Cleaner	200	-	-	-	1	4	-

Metallurgical Results

Product	Weight		Assays, %				% Distribution			
	g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1 Talc Rougher Conc.	74.1	3.83	38.90	1.29	26.20	32.40	3.4	2.4	46.5	2.5
2 MgO Cleaner Conc.	1384.4	71.48	44.10	1.78	0.56	51.00	72.3	62.1	18.6	73.1
3 MgO 1st Cl. Tail	160.2	8.27	43.00	2.73	2.22	49.80	8.2	11.0	8.5	8.3
4 MgO Ro. Tail	201.9	10.42	42.50	3.47	3.25	49.10	10.2	17.7	15.7	10.3
5 Slime		6.00	43.80	2.3	3.85	48.60	6.0	6.8	10.7	5.8
Head (calc.)	1820.6	100.0	43.63	2.05	2.16	49.85	100.0	100.0	100.0	100.0
Combined Products										
2-3 MgO Ro. Conc.		79.75	43.99	1.88	0.73	50.88	80.4	73.1	27.1	81.4
2-4 MgO Ro. Feed		90.17	43.81	2.06	1.02	50.67	90.6	90.8	42.8	91.7
1-4 Talc Ro. Feed		94.00	43.61	2.03	2.05	49.93	94.0	93.2	89.3	94.2

Test No. 4

Purpose: To repeat the general conditions of Test 3, but replace boiled corn starch with Gum Arabic.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne			Time, minutes			pH
	Gum Arabic	TC7	MIBC	Grind	Cond.	Froth	
Talc Rougher	-	-	30	-	-	2	8.7
Talc Cleaner	-	-	-	-	1	2	-
<i>Combined the Talc Ro + Cleaner Tails for MgO flotation.</i>							
Condition 1	600	-	-	-	2	-	-
2	-	100	-	-	2	-	-
MgO Rougher 1	-	-	-	-	-	3	8.6
2	-	100	-	-	1	2	-
3	-	50	-	-	1	2	-
MgO Cleaner	200	-	-	-	1	4	-

Metallurgical Results

Product	Weight		Assays, %				% Distribution			
	g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1 Talc Rougher Conc.	54.5	2.79	37.30	1.27	32.40	27.50	2.4	1.7	40.9	1.5
2 MgO Cleaner Conc.	1617.7	82.72	44.60	2.14	0.84	51.00	83.5	85.2	31.5	84.3
3 MgO 1st Cl. Tail	124.0	6.34	43.60	1.54	3.01	49.80	6.3	4.7	8.7	6.3
4 MgO Ro. Tail	42.0	2.15	40.80	1.62	8.68	46.20	2.0	1.7	8.5	2.0
5 Slime		6.00	43.80	2.3	3.85	48.60	5.9	6.7	10.5	5.8
Head (calc.)	1838.2	100.0	44.20	2.08	2.21	50.02	100.0	100.0	100.0	100.0
Combined Products										
2-3 MgO Ro. Conc.		89.07	44.53	2.10	0.99	50.91	89.7	89.9	40.1	90.7
2-4 MgO Ro. Feed		91.21	44.44	2.09	1.18	50.80	91.7	91.6	48.6	92.6
1-4 Talc Ro. Feed		94.00	44.23	2.06	2.10	50.11	94.1	93.3	89.5	94.2

Test No. 5

Purpose: To repeat the general conditions of Test 3 but replace boiled corn starch with corn starch/E7 mixture.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne				Time, minutes			pH
	Corn Starch E7 (80:20)	TC7	MIBC	Na ₂ SiO ₃	Grind	Cond.	Froth	
Talc Rougher	-	-	30	-	-	1	2	8.7
Talc Cleaner	-	-	-	-	-	1	2	-
<i>Combine Talc Rougher + Cleaner Tails for MgO flotation.</i>								
Condition 1	800	-	-	-	-	2	-	-
2	-	100	-	-	-	2	-	-
MgO Rougher 1	-	-	-	-	-	-	3	8.6
2	-	100	-	-	-	1	2	-
3	-	100	-	-	-	1	2	-
MgO Cleaner	-	-	-	200	-	1	4	-

Metallurgical Results

Product		Weight		Assays, %				% Distribution			
		g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1	Talc Rougher Conc.	58.1	2.99	33.90	1.08	29.80	29.00	2.4	1.6	42.8	1.7
2	MgO Cleaner Conc.	1431.2	73.70	42.60	2.05	0.62	51.30	74.3	74.6	21.9	75.3
3	MgO 1st Cl. Tail	238.1	12.26	42.00	1.97	1.59	50.50	12.2	11.9	9.4	12.3
4	MgO Ro. Tail	98.0	5.05	41.30	2.03	6.14	47.70	4.9	5.1	14.9	4.8
5	Slime		6.00	43.80	2.3	3.85	48.60	6.2	6.9	11.1	5.8
Head (calc.)		1825.4	100.0	42.27	2.03	2.08	50.19	100.0	100.0	100.0	100.0
Combined Products											
2-3	MgO Ro. Conc.		85.96	42.51	2.04	0.76	51.19	86.5	86.5	31.3	87.7
2-4	MgO Ro. Feed		91.01	42.45	2.04	1.06	50.99	91.4	91.5	46.1	92.5
1-4	Talc Ro. Feed		94.00	42.18	2.01	1.97	50.29	93.8	93.1	88.9	94.2

Test No. 6

Purpose: To repeat the general conditions of Test 3, but add 600 g/t of Na₂SiO₃ to the rougher conditioner and 100 g/t to the cleaning. Use acidified corn starch.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

Stage	Reagents Added, grams per tonne				Time, minutes			pH
	Modified Corn Starch	Na ₂ SiO ₃	TC7	MIBC	Grind	Cond.	Froth	
Talc Rougher	-	-	-	30	-	1	2	3.7
Talc Cleaner	-	-	-	-	-	1	2	-
<i>Combine Talc rougher + cleaner tails for MgO flotation.</i>								
Condition 1	600	600	-	-	-	2	-	10.3
2	-	-	100	-	-	2	-	-
MgO Rougher 1	-	-	-	-	-	-	3	-
2	-	-	50	-	-	1	2	-
3	-	-	50	-	-	1	2	-
MgO Cleaner	200	-	-	-	-	1	4	9.9
	-	-	50	-	-	1	2	-
	-	-	50	-	-	1	2	-

Metallurgical Results

Product		Weight		Assays, %				% Distribution		
		g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂
1	MgO Cleaner Conc.	1304.2	67.49	45.2	1.02	0.70	51.6	69.9	34.5	23.3
2	MgO 1st Cleaner Tail	150.9	7.81	42.2	3.34	2.61	49.9	7.5	13.0	9.9
3	MgO Rougher Tail	325.0	16.82	42.5	5.29	2.58	49.7	16.2	44.5	21.3
4	Talc Rougher Conc	36.3	1.88	35.7	0.96	37.6	24.0	1.2	1.0	35.1
5	Slime		6.00	43.8	2.3	3.58	48.6	5.2	7.0	10.4
Head (calc.)		1816.4	100.0	44.1	2.00	2.05		100.0	100.0	100.0

Combined Products

1+2	MgO Rougher Conc	75.30	44.9	1.26	0.87	51.0	77.4	47.5	33.2
2+3	MgO Combined Tails	24.63	42.3	4.67	2.55	49.8	23.7	53.5	31.2

Test No. 7

Purpose: To investigate MgO flotation using the conditions outlined below.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

	Reagents Added, grams per tonne					Time, minutes			pH
	MgCl ₂	SHMP	AOS	MIBC	OA-1*	Grind	Cond.	Froth	
Talc Rougher	-	-	-	30	-	-	1	2	8.7
Talc Cleaner	-	-	-	-	-	-	1	2	-
Condition 1	150	100	200	-	-	-	2	-	9.5
2	-	-	-	-	400	-	2	-	-
MgO Rougher	-	-	-	-	-	-	-	4	-
MgO Cleaner	75	50	100	-	-	-	1	3	9.0
	-	-	-	-	50	-	1	1	-

*acidified silicate

Metallurgical Results

Product		Weight		Assays, %				% Distribution			
		g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1	Talc Rougher Conc.	52.7	2.85	39.70	1.17	23.40	35.00	2.6	1.6	32.7	2.0
2	MgO Cleaner Conc.	1325.2	71.69	45.00	1.53	0.80	51.70	73.4	53.1	28.1	73.1
3	MgO 1st Cl. Tail	130.3	7.05	40.90	5.31	2.02	50.30	6.6	18.1	7.0	7.0
4	MgO Ro. Tail	229.3	12.41	40.70	3.41	3.44	49.70	11.5	20.5	20.9	12.2
5	Slime		6.00	43.80	2.3	3.85	48.60	6.0	6.7	11.3	5.8
Head (calc.)		1737.5	100.0	43.95	2.07	2.04	50.69	100.0	100.0	100.0	100.0
Combined Products											
2-3	MgO Ro. Conc.		78.74	44.63	1.87	0.91	51.57	80.0	71.2	35.1	80.1
2-4	MgO Ro. Feed		91.15	44.10	2.08	1.25	51.32	91.4	91.7	56.0	92.3
1-4	Talc Ro. Feed		94.00	43.96	2.05	1.93	50.82	94.0	93.3	88.7	94.2

Test No. 8

Purpose: To investigate MgO flotation using the conditions outlined below.

Procedure: As shown below.

Feed: ~2000 grams of sand from Test G-1.

Conditions:

	Reagents Added, grams per tonne					Time, minutes			pH
	MgCl ₂	SHMP	AOS*	MIBC	OA-2**	Grind	Cond.	Froth	
Talc Rougher	-	-	-	30	-	-	1	2	8.7
Talc Cleaner	-	-	-	-	-	-	1	2	-
Condition 1	150	100	200	-	-	-	2	-	9.5
2	-	-	-	-	-	-	2	-	-
MgO Rougher	-	-	-	-	-	-	-	4	-
MgO Cleaner	75	50	100	-	-	-	1	3	9.0
	-	-	-	-	50	-	1	1	-

*acidified silicate

**modified oleic acid

Metallurgical Results

Product		Weight		Assays, %				% Distribution			
		g	%	MgO	CaO	SiO ₂	L.O.I.	MgO	CaO	SiO ₂	L.O.I.
1	Talc Rougher Conc.	52.0	2.72	39.60	1.08	25.00	33.40	2.4	1.6	34.0	1.8
2	MgO Cleaner Conc.	1458.8	76.32	45.20	1.08	0.73	51.50	77.9	45.4	27.9	77.8
3	MgO 1st Cl. Tail	136.4	7.14	40.50	6.78	2.46	49.80	6.5	26.7	8.8	7.0
4	MgO Ro. Tail	149.5	7.82	41.00	4.32	4.55	48.90	7.2	18.6	17.8	7.6
5	Slime		6.00	43.80	2.3	3.85	48.60	5.9	7.7	11.6	5.8
Head (calc.)		1796.7	100.0	44.30	1.81	2.00	50.51	100.0	100.0	100.0	100.0

Combined Products

2-3	MgO Ro. Conc.	83.46	44.80	1.57	0.88	51.35	84.4	72.1	36.6	84.9
2-4	MgO Ro. Feed	91.28	44.47	1.80	1.19	51.14	91.6	90.7	54.4	92.4
1-4	Talc Ro. Feed	94.00	44.33	1.78	1.88	50.63	94.1	92.3	88.4	94.2