



SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River

METALLURGICAL TESTWORK ON MANGANESE ORE FROM VICTORIA RIVER

JOB NO: 0112MP

CLIENT: International Geoscience

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EXECUTIVE SUMMARY

Gravity separation testwork was conducted for International Geoscience on a manganese ore sample from Victoria River in the Northern Territory. The main purpose of the testwork was to establish if a manganese product of at least 38% MnO could be produced.

Testwork comprised size by size analysis, dense media separation (DMS), jigging testwork and shaking table testwork.

Salient results are summarised in the following tables:

Average Head Assay Results

Sample ID	MnO (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	CaO (%)	Fe (%)	MgO (%)	K ₂ O (%)	LOI ₁₀₀₀ (%)
-70 mm +50 mm	5.99	36.1	1.91	28.4	1.07	1.06	0.51	23.9
-50 mm +6.3 mm	6.16	36.3	2.04	27.6	1.22	1.32	0.55	23.6
-6.3 mm +2.0 mm	8.05	36.8	2.31	25.3	1.33	1.56	0.58	22.5

Calculated Head Assay Result: -2.0 mm Fraction

Sample ID	MnO (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	CaO (%)	Fe (%)	MgO (%)
-2.0 mm	7.73	36.2	2.74	24.2	2.34	1.82

As-received Sample Size By Size Analysis Results

Size Fraction (mm)	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
-70 +50	43.0	5.99	38.5	36.1	42.4
-50 +6.3	50.9	7.12	54.2	37.1	51.6
-6.3 +2.0	3.7	8.16	4.5	36.4	3.7
-2.0	2.4	7.73	2.8	36.2	2.4

DMS Results -70 mm +50 mm

DMS Density	Mass Distribution (%)	Grade (%)		Recovery (%)	
		MnO	SiO ₂	MnO	SiO ₂
2.50 Float	24.3	2.62	52.5	10.3	33.3
2.50 Sink	26.5	2.61	40.8	11.2	28.3
2.63 Sink	40.6	6.00	31.0	39.3	32.9
2.80 Sink	8.6	28.2	24.5	39.2	5.5

DMS Results -50 mm +6.3 mm

DMS Density	Mass Distribution (%)	Grade (%)		Recovery (%)	
		MnO	SiO ₂	MnO	SiO ₂
2.50 Float	82.0	3.15	39.7	28.0	93.4
2.50 Sink	7.9	22.3	14.7	19.2	3.3
2.63 Sink	6.2	41.2	13.0	27.5	2.3
2.80 Sink	3.9	59.8	9.03	25.3	1.0

Stratification Jigging Results -6.3 mm +2.0 mm

Sample ID	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
Stratum 1	16.4	2.64	4.9	43.4	19.2
Stratum 2	15.5	3.19	5.6	40.3	16.8
Stratum 3	17.2	3.62	7.0	39.6	18.4
Stratum 4	15.5	3.42	6.0	40.2	16.8
Stratum 5	14.8	3.28	5.5	40.3	16.1
Stratum 6	5.8	6.28	4.1	36.0	5.6
Stratum 7	14.8	40.1	67.0	17.9	7.1

Shaking Table Mass and Elemental Distributions

Sample ID	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
Concentrate 1	22.7	15.7	42.6	28.7	17.8
Concentrate 2	39.4	5.79	27.3	36.7	39.4
Concentrate 3	14.3	3.05	5.2	45.5	17.7
Middlings	6.7	4.15	3.2	42.8	7.8
Tailings	16.9	10.7	21.6	37.6	17.3

The overall material balance is given in the table below and was compiled by only including the -70 mm +50 mm DMS sinks (at a test density of 2.80 kg/m³), -50 mm +6.3 mm DMS sinks (at a test density of 3.0 kg/m³) and the jigging stratum 7 product.

Overall Material Balance

Product	Mass Distribution (%)	Grade (%)		Recovery (%)	
		MnO	SiO ₂	MnO	SiO ₂
-70 mm +50 mm DMS Sinks	3.7	28.2	24.5	13.2	2.5
-50 mm +6.3 mm DMS Sinks	5.1	48.4	11.5	31.5	1.6
-6.30 mm +2.0 mm Jigging Stratum 7 Product	0.6	40.1	17.9	2.8	0.3
Final Tails	90.6	4.57	38.5	52.5	95.6

Salient testwork outcomes are:

- The calculated head assays of the as-received manganese sample were 6.69% MnO, 36.6% SiO₂, 2.01 % Al₂O₃, 1.10% Fe, 27.1% CaO and 1.34% MgO.
- Screening did not realise a significant MnO upgrade to any of the size fractions.
- DMS results for the -70 mm +50 mm size fraction realised a 28.2% MnO sink product at a test density of 2.80 kg/m³. The MnO recovery was very low at 39.2%.
- DMS results for the -50 mm +6.3 mm size fraction realised a 48.4% MnO sink product at a test density of 3.0 kg/m³. The MnO recovery was low at 52.8%.
- Jigging realised a stratum 7 product with a MnO grade and recovery of 40.1% and 67.0% respectively.

- The shaking table concentrate realised a low MnO grade of 15.7% and MnO recovery 42.6%.
- A combined MnO product with grade of 39.9% MnO, a SiO₂ grade of 17.0%, MnO recovery of 47.5% and SiO₂ recovery of 4.37% can be produced by including the -70 mm +50 mm DMS sinks (at a test density of 2.80 kg/m³), -50 mm +6.3 mm DMS sinks (at a test density of 3.0 kg/m³) and the jigging stratum 7 product.

CONCLUSIONS AND RECOMMENDATIONS

Testwork results indicate that it is possible to produce a combined manganese product with a grade of 39.9% MnO. The recovery was however low (47.5% MnO). DMS and jigging sufficiently upgraded the ore, but the shaking table test performed on the -2 mm fraction produced a poor concentrate grade.

DMS cyclone testwork should be performed on the ore to investigate if a product with a grade of at least 38% MnO can be produced via a DMS cyclone.

Further shaking table testwork should be conducted on three grind sizes below 2 mm to assess the MnO grade and recovery versus the grind size.

Consideration should be given to a comprehensive geometallurgical study across the Victoria River manganese deposit. The geometallurgical approach used by SGS integrates geological, mineralogical, geochemical and metallurgical information to develop an enhanced understanding of an ore resource, thereby allowing more informed decisions to be made during the exploration, feasibility and operational phases of a project. This approach leads to increased confidence in metallurgical testwork results, plant design, mine scheduling and project economics. The key benefits being an overall minimisation of risk, and a logical, technically robust, statistically validated process which is easily understood during audits by in-house and external consultants, and reviews by financial institutions.

1. INTRODUCTION

SGS Lakefield Orestest Pty Ltd (SGS) was requested by Mr. Greg Street, representing International Geoscience (the client), to conduct gravity separation testwork on a manganese ore sample from Victoria River in the Northern Territory. The main purpose of the testwork was to establish if a manganese product of at least 38% MnO could be produced.

Testwork comprised:

- Size by size analysis.
- Dense media separation (DMS).
- Jigging testwork.
- Shaking table testwork.

2. SAMPLES RECEIVED

SGS received 792 kg of manganese ore on the 6th of November 2012 for testwork. Images depicting the samples received for testwork are provided on the CD affixed to the back cover of this report.

3. SAMPLE PREPARATION

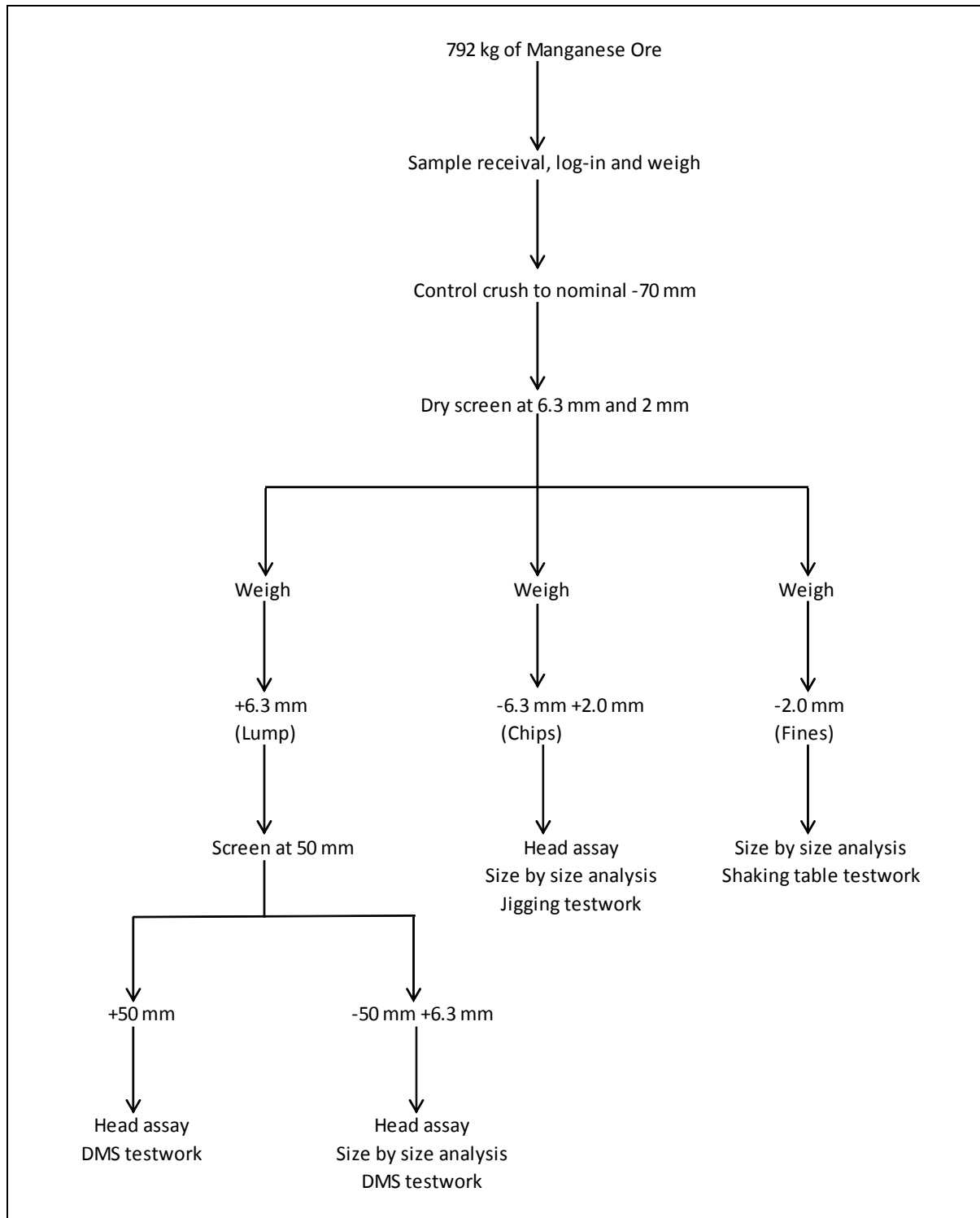
The sample was control crushed to -70 mm and dry screened at 50 mm, 6.3 mm and 2.0 mm. Each size fraction was blended and rotary split to remove sub-samples for testwork. The test matrix for each size fraction are given in Table 3-1:

Table 3-1: Test Matrix

Sample ID	Test				
	Size By Size Analysis	Head Assay	DMS	Jigging	Shaking Table
-70 mm +50 mm		•	•		
-50 mm +6.3 mm	•	•	•		
-6.3 mm +2.0 mm	•	•		•	
-2.0 mm	•				•

The sample processing flowsheet is illustrated in Figure 3-1 overleaf:

Figure 3-1: Sample Processing Flowsheet



4. ANALYTICAL PROCEDURES USED

All assays were conducted by SGS Geochem Newburn using fused bead X-Ray Fluorescence Spectrometry (XRF).

5. HEAD ASSAYS

Duplicate representative sub-samples of each size fraction, except for the -2.0 mm size fraction due to an insufficient sample mass available, was submitted for chemical analysis. The results for the average of the major elements are summarised in Table 5-1:

Table 5-1: Average Head Assay Results

Sample ID	MnO (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	CaO (%)	Fe (%)	MgO (%)	K ₂ O (%)	LOI ₁₀₀₀ (%)
-70 mm +50 mm	5.99	36.1	1.91	28.4	1.07	1.06	0.51	23.9
-50 mm +6.3 mm	6.16	36.3	2.04	27.6	1.22	1.32	0.55	23.6
-6.3 mm +2.0 mm	8.05	36.8	2.31	25.3	1.33	1.56	0.58	22.5

The calculated head assay for the -2.0 mm fraction was determined from the size by size analysis data and is summarised in Table 5-2:

Table 5-2: Calculated Head Assay Results -2.0 mm Fraction

Sample ID	MnO (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	CaO (%)	Fe (%)	MgO (%)
-2.0 mm	7.73	36.2	2.74	24.2	2.34	1.82

Detailed head assay data are presented in Appendix A.

6. TEST PROCEDURES

The following standard testwork procedures were used:

- Size by size analysis.
- Dense media separation (DMS).
- Jigging testwork.
- Shaking table testwork.

These procedures are detailed in Appendix B.

7. TEST RESULTS

7.1 Size By Size Analysis

7.1.1 Individual Size Fractions

Size by size analyses were conducted on the -50 mm +6.3 mm, -6.3 mm +2.0 mm and -2.0 mm size fractions. The mass and elemental distributions of each size fraction are illustrated in Figure 7.1 to Figure 7.3 overleaf:

Figure 7.1: Mass and Elemental Distributions -50 mm +6.3 mm

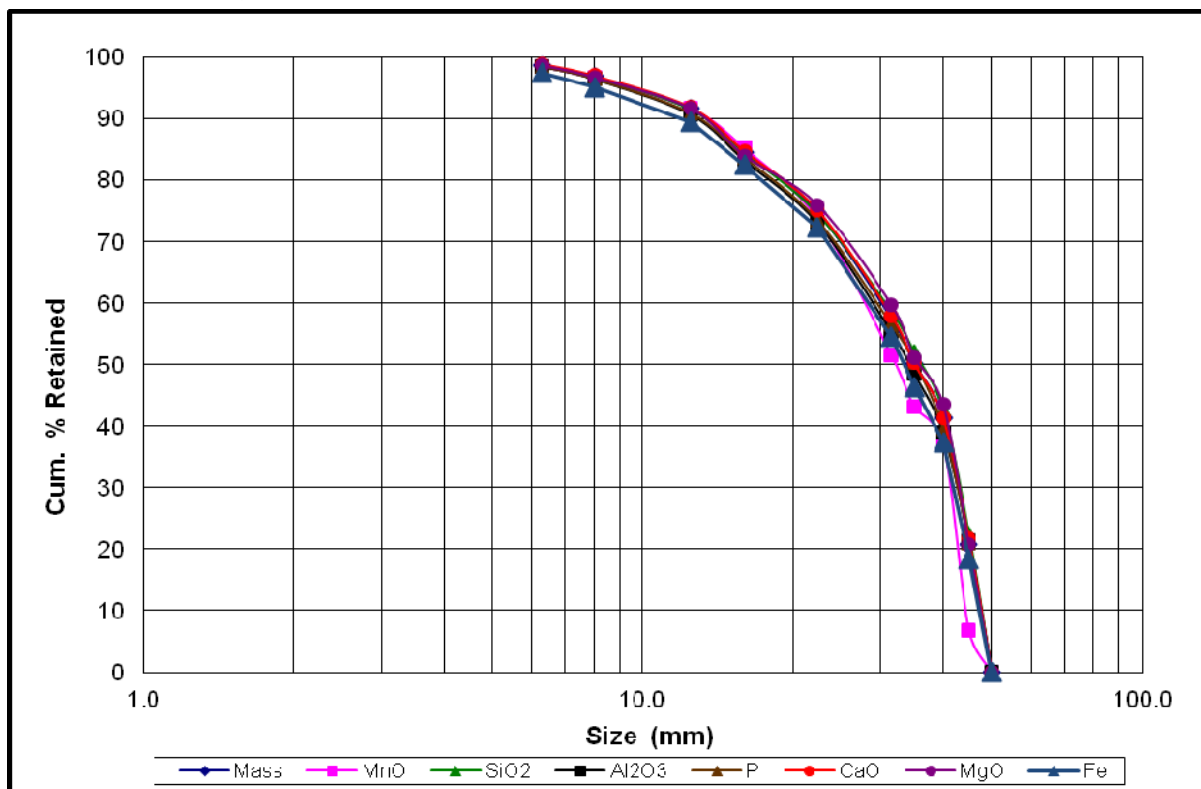


Figure 7.2: Mass and Elemental Distributions -6.3 mm +2.0 mm

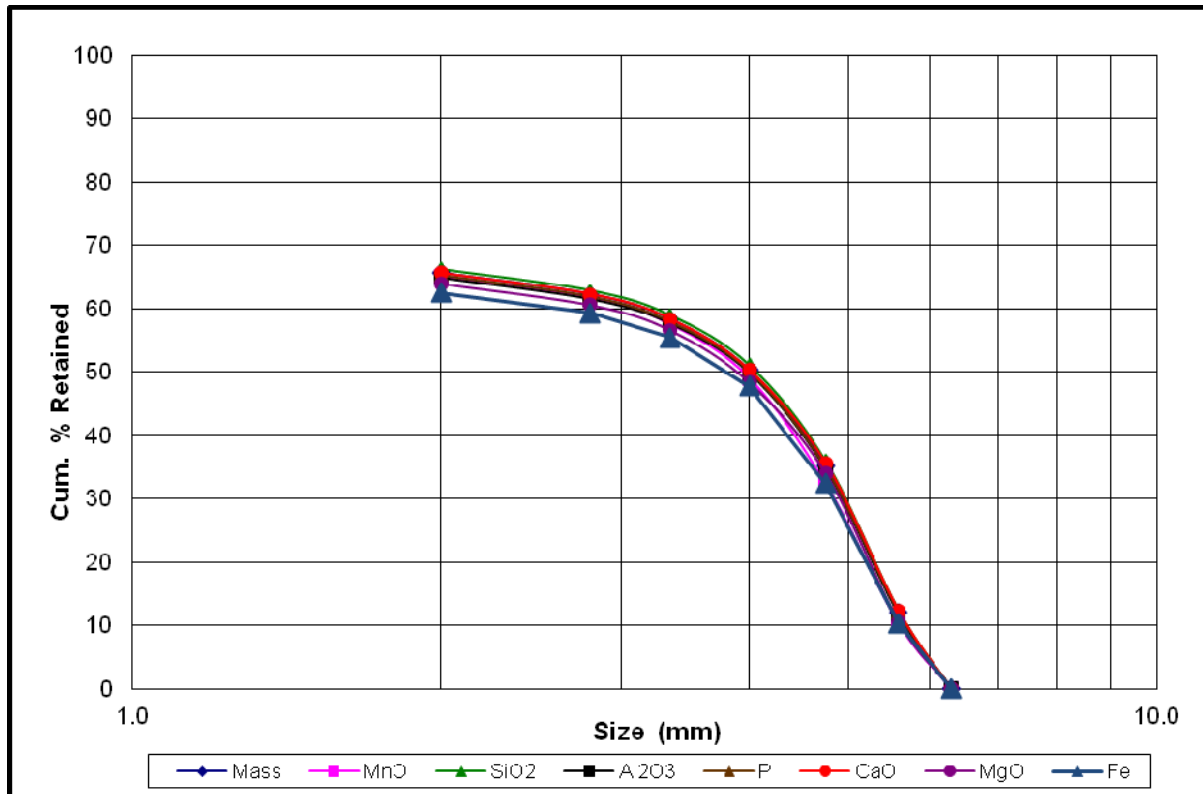
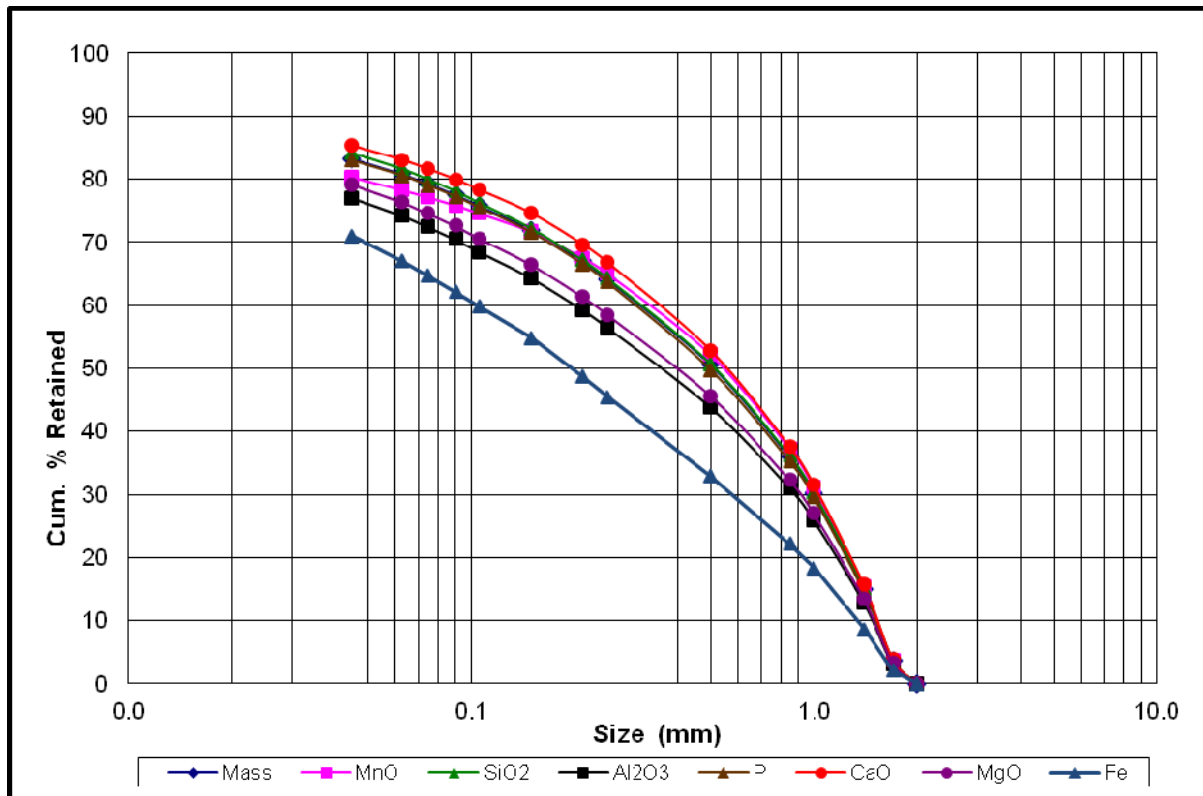


Figure 7.3: Mass and Elemental Distributions -2.0 mm



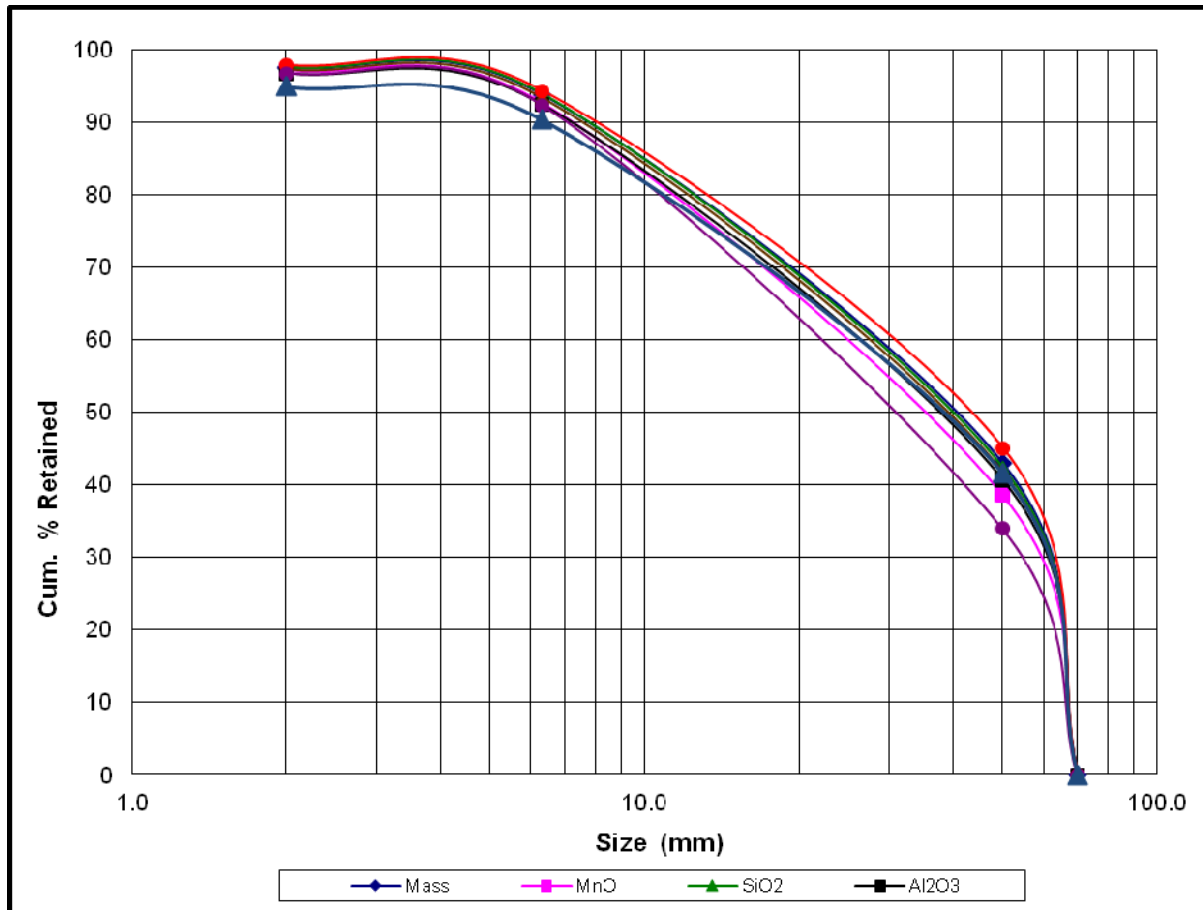
7.1.2 As-received Sample

The size by size analysis for the as-received sample was compiled by using the calculated head values from the size by size analysis data of the individual size fractions (see section 7.1.1). Size by size analysis results for the as-received sample is summarised in Table 7-1 and illustrated in Figure 7.4:

Table 7-1: As-received Sample Size By Size Analysis Results

Size Fraction (mm)	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
-70 +50	43.0	5.99	38.5	36.1	42.4
-50 +6.3	50.9	7.12	54.2	37.1	51.6
-6.3 +2.0	3.7	8.16	4.5	36.4	3.7
-2.0	2.4	7.73	2.8	36.2	2.4

Figure 7.4: Mass and Elemental Distributions – As-received Sample



Detailed size by size analysis test data are presented in Appendix C.

7.2 Dense Media Separation

DMS testwork was conducted on the -70 mm +50 mm and -50 mm +6.3 mm size fractions at three separation densities using the Erickson cone test unit. Results are summarised in Table 7-2 and Table 7-3:

Table 7-2: DMS Results -70 mm +50 mm

DMS Density	Mass Distribution (%)	Grade (%)		Recovery (%)	
		MnO	SiO ₂	MnO	SiO ₂
2.50 Float	24.3	2.62	52.5	10.3	33.3
2.50 Sink	26.5	2.61	40.8	11.2	28.3
2.63 Sink	40.6	6.00	31.0	39.3	32.9
2.80 Sink	8.6	28.2	24.5	39.2	5.5

Table 7-3: DMS Results -50 mm +6.3 mm

DMS Density	Mass Distribution (%)	Grade (%)		Recovery (%)	
		MnO	SiO ₂	MnO	SiO ₂
2.50 Float	82.0	3.15	39.7	28.0	93.4
2.50 Sink	7.9	22.3	14.7	19.2	3.3
2.63 Sink	6.2	41.2	13.0	27.5	2.3
2.80 Sink	3.9	59.8	9.03	25.3	1.0

The cumulative sinks recoveries versus the separation densities are illustrated in Figure 7.5 and Figure 7.6 overleaf:

Figure 7.5: Cumulative Sinks Recovery Versus Separation Density

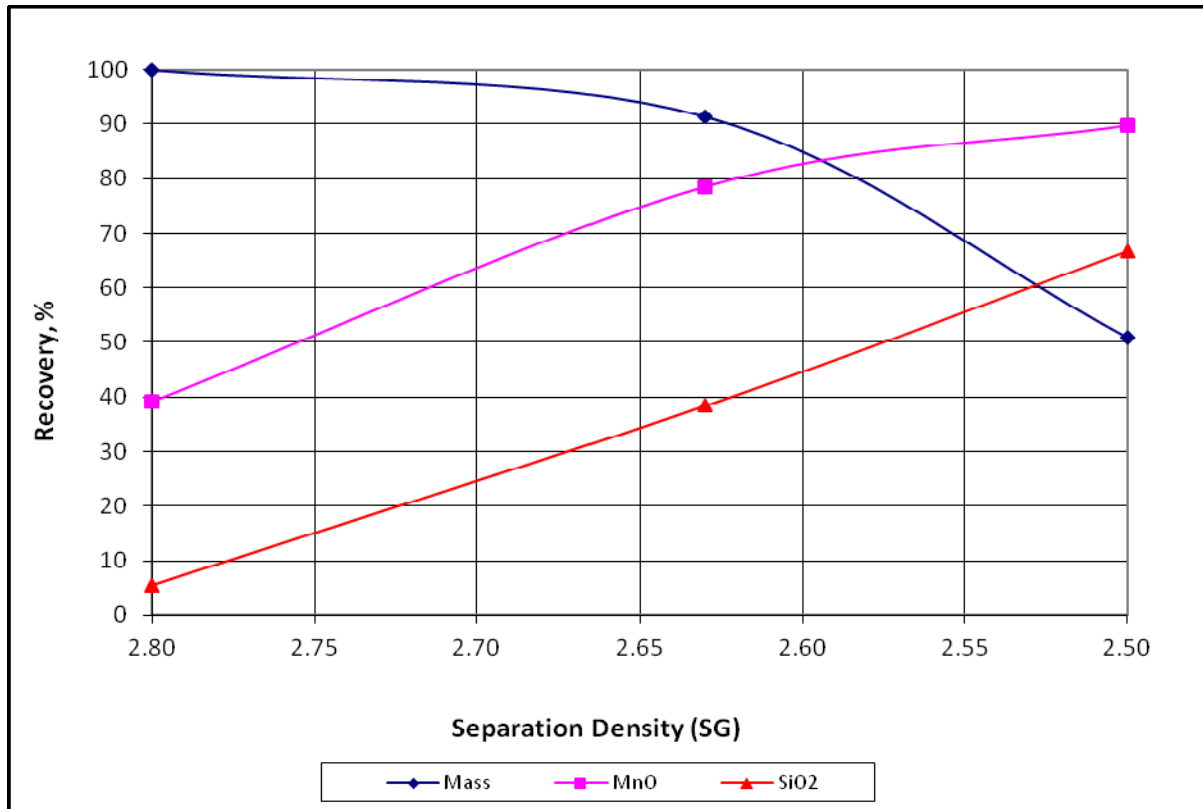
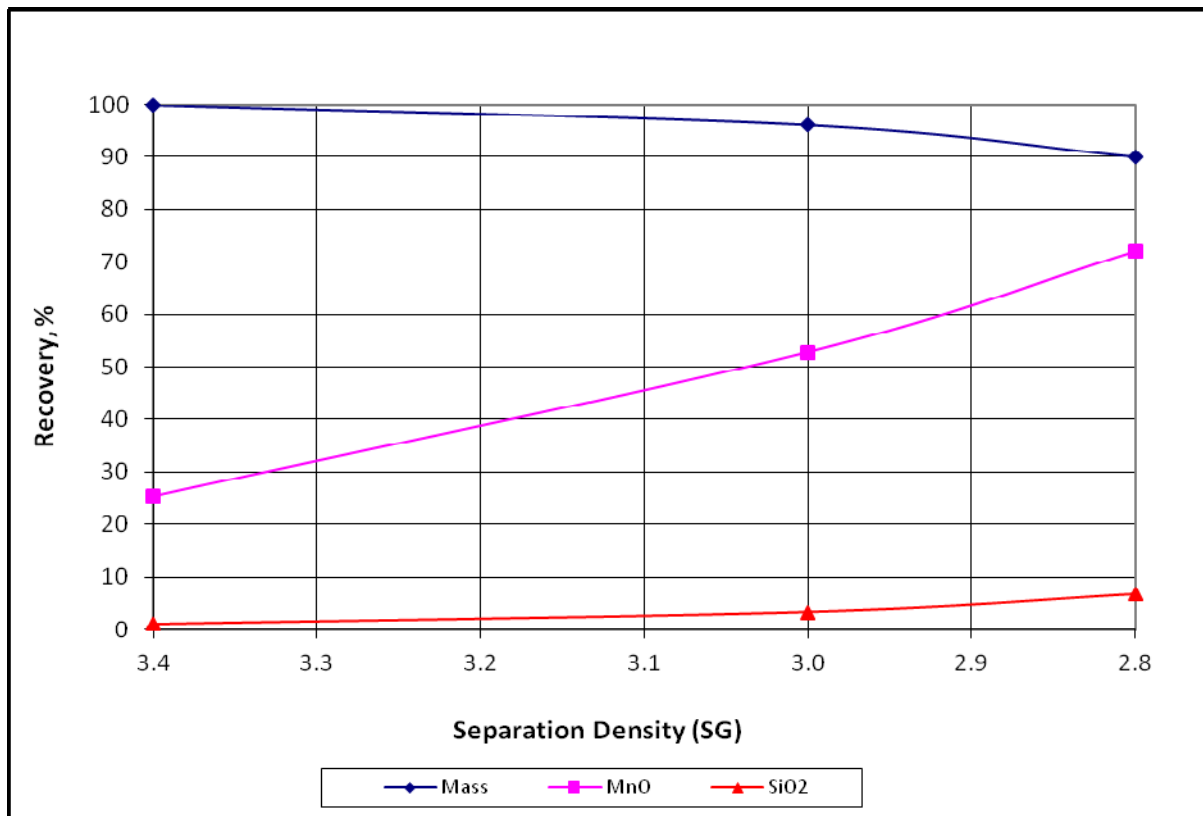


Figure 7.6: Cumulative Sinks Recovery Versus Separation Density



Detailed DMS test data are presented in Appendix D and images depicting the DMS operation and products are provided on the CD affixed to the back cover of this report.

7.3 Jigging

Jigging was performed on the -6.3 mm +2.0 mm size fraction using a stratification jig. The jig operating conditions are summarised in Table 7-4:

Table 7-4 : Jig Operating Conditions

Parameter	Set Point
Stroke Amplitude (mm)	13
Stroke Frequency (per minute)	90
Water Flow (L/min)	10
Separation Time (minutes)	10
Strata Cut Depth (mm)	40

Summarised stratification jig results are given in Table 7-5:

Table 7-5: Stratification Jigging Results

Sample ID	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
Stratum 1	16.4	2.64	4.9	43.4	19.2
Stratum 2	15.5	3.19	5.6	40.3	16.8
Stratum 3	17.2	3.62	7.0	39.6	18.4
Stratum 4	15.5	3.42	6.0	40.2	16.8
Stratum 5	14.8	3.28	5.5	40.3	16.1
Stratum 6	5.8	6.28	4.1	36.0	5.6
Stratum 7	14.8	40.1	67.0	17.9	7.1

Detailed jigging test data are presented in Appendix E and images depicting the jig products are provided on the CD affixed to the back cover of this report.

7.4 Shaking Table

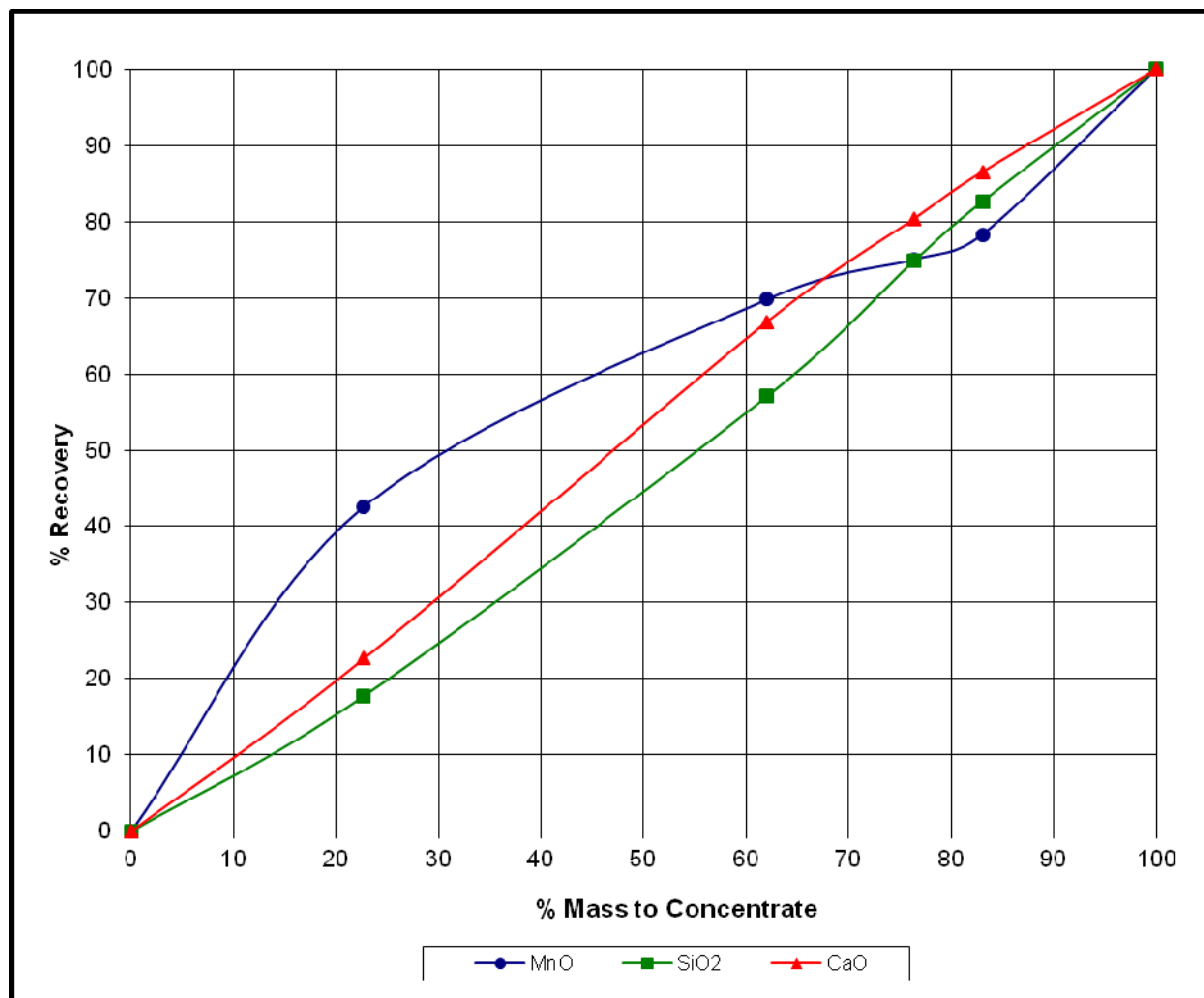
Shaking table testwork was conducted on the -2.00 mm size fraction. The mass distribution of the table products are presented in Table 7-6 overleaf:

Table 7-6 : Shaking Table Mass and Elemental Distributions

Sample ID	Mass (%)	MnO		SiO ₂	
		%	% Dist.	%	% Dist.
Concentrate 1	22.7	15.7	42.6	28.7	17.8
Concentrate 2	39.4	5.79	27.3	36.7	39.4
Concentrate 3	14.3	3.05	5.2	45.5	17.7
Middlings	6.7	4.15	3.2	42.8	7.8
Tailings	16.9	10.7	21.6	37.6	17.3

The shaking tabling release curve for MnO, SiO₂ and CaO is presented in Figure 7-7:

Figure 7-7 : Shaking Table Release Curves



The upgrade ratios realised by wet tabling are presented in Table 7-7 overleaf:

Table 7-7 : Shaking Table Upgrade Ratios

	Upgrade Ratio		
	MnO	SiO ₂	CaO
Concentrate 1	1.88	0.78	1.00
Concentrate 2	0.69	1.00	1.12
Concentrate 2	0.36	1.24	0.94
Middlings	0.50	1.17	0.92
Tailings	1.28	1.02	0.79

Detailed shaking table data are presented in Appendix F and images depicting the shaking table operation and products are provided on the CD affixed to the back cover of this report.

8. DISCUSSION

Salient testwork outcomes are:

- The calculated head assays of the as-received manganese sample were 6.69% MnO, 36.6% SiO₂, 2.01 % Al₂O₃, 1.10% Fe, 27.1% CaO and 1.34% MgO.
- Screening did not realise a significant MnO upgrade to any of the size fractions.
- DMS results for the -70 mm +50 mm size fraction realised a 28.2% MnO sink product at a test density of 2.80 kg/m³. The MnO recovery was very low at 39.2%.
- DMS results for the -50 mm +6.3 mm size fraction realised a 48.4% MnO sink product at a test density of 3.0 kg/m³. The MnO recovery was low at 52.8%.
- Jigging realised a stratum 7 product with a MnO grade and recovery of 40.1% and 67.0% respectively.
- The shaking table concentrate realised a low MnO grade of 15.7% and MnO recovery 42.6%.
- A combined MnO product with grade of 39.9% MnO, a SiO₂ grade of 17.0%, MnO recovery of 47.5% and SiO₂ recovery of 4.37% can be produced by including the -70 mm +50 mm DMS sinks (at a test density of 2.80 kg/m³), -50 mm +6.3 mm DMS sinks (at a test density of 3.0 kg/m³) and the jigging stratum 7 product.

9. CONCLUSIONS AND RECOMMENDATIONS

Testwork results indicate that it is possible to produce a combined manganese product with a grade of 39.9% MnO. The recovery was however low (47.5% MnO). DMS and jigging sufficiently upgraded the ore, but the shaking table test performed on the -2 mm fraction produced a poor concentrate grade.

DMS cyclone testwork should be performed on the ore to investigate if a product with a grade of at least 38% MnO can be produced via a DMS cyclone.

Further shaking table testwork should be conducted on three grind sizes below 2 mm to assess the MnO grade and recovery versus the grind size.

Consideration should be given to a comprehensive geometallurgical study across the Victoria River manganese deposit. The geometallurgical approach used by SGS integrates geological, mineralogical, geochemical and metallurgical information to develop an enhanced understanding of an ore resource, thereby allowing more informed decisions to be made during the exploration, feasibility and operational phases of a project. This approach leads to increased confidence in metallurgical testwork results, plant design, mine scheduling and project economics. The key benefits being an overall minimisation of risk, and a logical, technically robust, statistically validated process which is easily understood during audits by in-house and external consultants, and reviews by financial institutions.

A step by step overview of the SGS geometallurgical service is given below:

1. Inspection of exploration databases
2. Evaluation of metallurgical sample selections
3. Identification of exploitable relationships in geo-metallurgical data.
4. Data analysis.
5. Development of predictive mathematical models using geochemistry, mineralogy, spatial characteristics and geological domains to forecast metal recovery, product quality and consumable usage.
6. Geo-statistical distribution of predictive models into the resource database / block model.
7. Use SGS Minnovex technologies to facilitate mill design (estimation of throughput and power draw), and determine flotation kinetics for flotation circuit design. The following test procedures are incorporated:
 - i. SAG Power Index (SPI) testing for SAG/AG mill modelling.
 - ii. "Full" and "Modified" Bond test for ball mill modelling.
 - iii. Static Pressure Test (SPT) for HPGR mill modelling.
 - iv. Geo-statistical mapping of grinding (hardness) characteristics to individual mining blocks.
 - v. Simulation to determine optimal mill sizing and grinding circuit design (utilising CEET© software).
 - vi. Minnovex flotation testing (MFT) and parameter extractions (flotation kinetics) using SGS Minnovex technology.
 - vii. Supervision of "Routine" and "Complete" Minnovex flotation tests.
 - viii. Calculation of scale-up parameters.
 - ix. Geo-statistical mapping of mineral/metal recovery (and other parameters) to individual mining blocks.
 - x. Simulation to determine optimal flotation circuit design (using FLEET© software).
8. Reconciliations, benchmarking and production optimization.
9. Geometallurgical Project Management during exploration, scoping, feasibility, engineering design, and production.



*SGS Lakefield Orestest Job No: 0112MP
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The SGS geometallurgical approach is a logical, proven, technically robust and statistically validated process, offering “industry best practice” assessment and deliverables.

The procedures are easily understood by personnel involved in peer reviews, audits and reviews by financial institutions.

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*SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River*

Appendix A : Head Assay Results



Head Assay Results

Date:	30/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample:	Manganese Size Fractions

Sample No.	Sample ID	Solids Assays												
		Fe %	MnO %	SiO ₂ %	Al ₂ O ₃ %	TiO ₂ %	CaO %	P %	S %	MgO %	K ₂ O %	Na ₂ O %	Zn %	V %
1	-70 mm +50 mm	1.05	5.80	36.00	1.91	0.06	28.6	0.03	0.02	1.05	0.50	0.03	<0.01	<0.01
2	-70 mm +50 mm	1.08	6.18	36.20	1.90	0.07	28.2	0.03	0.02	1.06	0.51	0.04	<0.01	<0.01
3	-50 mm +6.3 mm	1.21	6.18	36.00	2.00	0.07	27.8	0.03	0.02	1.22	0.55	0.05	<0.01	<0.01
4	-50 mm +6.3 mm	1.23	6.13	36.50	2.08	0.07	27.3	0.03	0.02	1.41	0.54	0.04	<0.01	<0.01
5	-6.3 mm +2.0 mm	1.33	8.01	36.90	2.32	0.07	25.2	0.04	0.02	1.56	0.58	0.03	<0.01	<0.01
6	-6.3 mm +2.0 mm	1.32	8.08	36.70	2.30	0.08	25.3	0.04	0.02	1.56	0.58	0.04	<0.01	<0.01

Sample No.	Sample ID	Solids Assays												
		V %	Zr %	Pb %	Cu %	Cr %	Cl %	As %	Ni %	Co %	Ba %	Sn %	Sr %	LOI %
1	-70 mm +50 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	24.0
2	-70 mm +50 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	23.7
3	-50 mm +6.3 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	23.7
4	-50 mm +6.3 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	23.4
5	-6.3 mm +2.0 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.03	<0.01	0.01	22.5
6	-6.3 mm +2.0 mm	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.01	22.5



SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River

Appendix B : Testwork Procedures

SCREENING AND SIZE-ASSAYING

PROCEDURE No. 1

A representative sub-sample of suitable weight is taken by riffing or rotary splitting.

As a general guide the following weights are used:

- i) Below 150 μm 0.5 kg
- ii) 150 μm - 2 mm 1 kg
- iii) 2 mm - 10 mm 2 kg
- iv) 10 mm - 50 mm 5 - 20 kg

The following screen types are used:

- i) Ro-tap - for sizing in the range below 1 mm.
- ii) 'Cheers' - type vibrating screen for sizing in the range 1 mm - 50 mm.

Wet screening is generally done below 150 μm while dry screening is done above this size.

Individual fractions are dried, weighed and further prepared for assaying if required.

DENSE MEDIUM SEPARATION

ERIKSON CONE

Dense Medium Separation (DMS) is a sink/float gravity separation technique in which individual rocks or minerals are separated according to density.

A dense fluid or medium is prepared by mixing finely milled ferrosilicon or magnetite (or a mixture of the two) in water. The density (SG) of the medium is adjusted by controlling the ratio of medium to water (i.e, the pulp density). The rheological properties of the suspension are important; i.e, a degree of stability is required to ensure that the suspension behaves as a "pseudo-fluid", but the viscosity must not be excessive or inefficient separation will occur.

The medium density is varied to achieve separations at different cut-points and to assess the effect of this on efficiency, etc.

Rocks or particles in the size range 0.5 - 25.0 mm are usually separated in cyclones, where centrifugal forces speed up the separation of the fines.

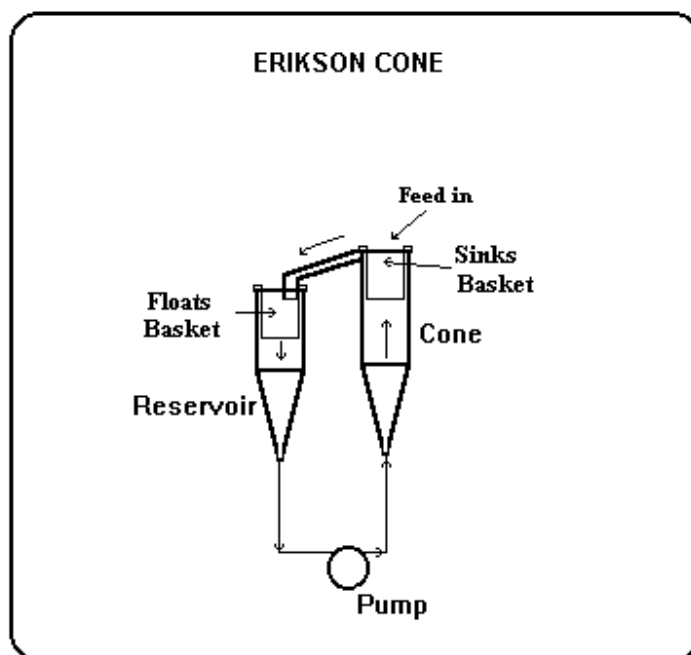
Static bath separators (cones or drums) can operate on rocks from about 6 mm to 150 mm in size (usually the feed would be separated into two or three size fractions, to improve efficiency).

The Erikson Cone is a laboratory device which is used to test the potential of treating material by DMS. It can treat feed from about 6 mm to 60 mm in size (testing is carried out on narrower individual size ranges; eg, 6 - 15 mm, 15 - 25 mm, etc).

The layout of the device is shown in the diagram below. Dense medium is pumped upwards through a cone (200 mm diameter) at a suitable velocity. The medium overflows to a second cone which acts as a small reservoir, which in turn feeds the circulation pump. The density of the circulating medium is adjusted to the desired value and about 1 kg of the sample (which is previously prepared by crushing, washing and screening) is added to the main cone. Material more dense than the medium sinks in the cone and is trapped in a bucket, while the less dense material 'floats' over to the reservoir and is trapped in a second bucket.

The buckets containing sinks and floats are removed and the samples washed, dried, weighed and assayed.

The test is then repeated with different samples, or the medium density adjusted as required before feeding further sample. The usual practice is to commence testing at the lowest density (SG) of the anticipated density range, and then to re-feed sinks at progressively higher densities. In this way a grade / recovery relationship as a function of separation density is established.



GRAVITY SEPARATION

JIGGING

A jig is a device in which the separation of minerals of different specific gravity is accomplished in a bed which is fluidised by a pulsating current of water which produces stratification. The bed of material is dilated in a controlled manner so that heavier, smaller particles penetrate the bed and move downwards, in a condition similar to that found in hindered settling.

The main variables (parameters) which can be altered to control and optimise the separation in a jig are:

- 1) Pulse magnitude.
- 2) Pulse frequency.
- 3) Water flowrate through the hutch.
- 4) Retention time.
- 5) Nature of the bed; ie, the ragging.

Oretest has a specially adapted jig for carrying out stratification tests. About 20 kg of sample are placed in a cylindrical hutch which is then jigged for a specified time. Each single test examines the effect on the efficiency of separation of one of the above parameters. The equipment is versatile and can be used to optimise jigging conditions for any particular type of feed.

GRAVITY SEPARATION

SHAKING TABLE

The shaking table consists of a near-horizontal deck of trapezoidal shape over which the feed solids in a slurry form are allowed to flow. Several riffles are attached to the deck which trap the more dense particles and assist with the separation. The deck is shaken along its horizontal axis which opens the bed of particles and allows dense particles to sink. The shaking action also helps transport material across the deck. High density minerals are separated from low density minerals and discharge at different positions on the deck.

A sub-sample of the ore is ground to the desired size. The ground ore is then mechanically fed to the table and water added to form a slurry. A laboratory-sized table can treat about 50-100 kg per hour. Additional wash water is added down the length of the deck to promote washing and separation.

Parameters which are adjusted to optimise the separation are:

- slope of deck
- feed rate
- water flow
- stroke frequency and length

Several fractions are usually collected and then combined to result in concentrate, middlings and tailings fractions. Each fraction is dried, weighed and assayed as appropriate for the testwork programme.



*SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River*

Appendix C : Size By Size Analysis Data

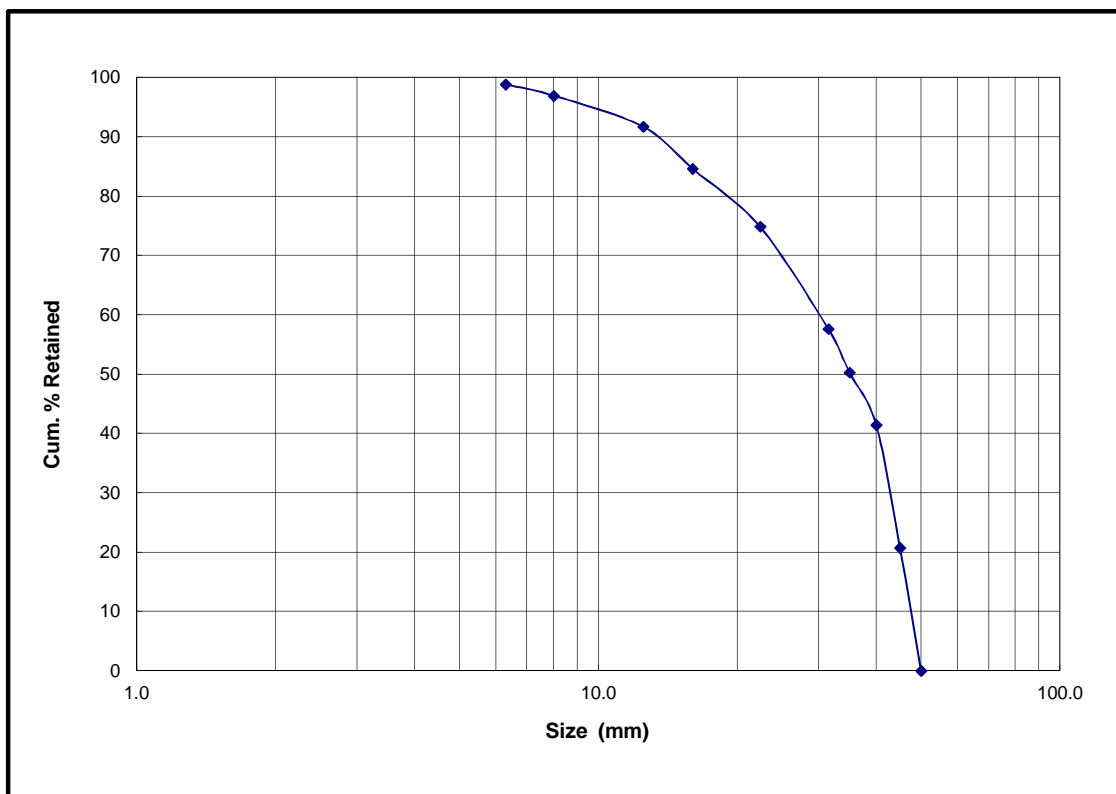


Particle Size Distribution

Date:	15/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-50.0 mm +6.30 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass	
	g	%	U/S	O/S
-70.0 +50.0	0.00	0.00	100.0	0.00
-50.0 +45.0	4,075.0	20.7	79.3	20.7
-45.0 +40.0	4,081.0	20.7	58.6	41.4
-40.0 +35.0	1,739.0	8.84	49.7	50.3
-35.0 +31.5	1,444.0	7.34	42.4	57.6
-31.5 +22.4	3,391.0	17.2	25.2	74.8
-22.4 +16.0	1,927.0	9.79	15.4	84.6
-16.0 +12.5	1,394.0	7.08	8.29	91.7
-12.5 +8.00	1,027.0	5.22	3.07	96.9
-8.00 +6.30	374.0	1.90	1.17	98.8
-6.30	230.0	1.17	0.00	100.0
Total	19,682.0	100.0		

P₈₀ (mm) = 45.2





Head Mass and Elemental Distribution

Date:	03/12/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-50.0 mm +6.30 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass		MnO				SiO ₂			
	g	%	U/S	O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S
-70.0+50.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.0+45.0	4,075.0	20.7	79.3	20.7	2.35	6.84	2.35	6.84	40.5	22.6	40.5	22.6
-45.0+40.0	4,081.0	20.7	58.6	41.4	10.5	30.6	6.43	37.4	35.8	20.0	38.1	42.6
-40.0+35.0	1,739.0	8.84	49.7	50.3	4.64	5.76	6.11	43.2	39.8	9.48	38.4	52.1
-35.0+31.5	1,444.0	7.34	42.4	57.6	8.15	8.40	6.37	51.6	33.3	6.59	37.8	58.7
-31.5+22.4	3,391.0	17.2	25.2	74.8	9.17	22.2	7.02	73.8	34.4	16.0	37.0	74.7
-22.4+16.0	1,927.0	9.79	15.4	84.6	8.34	11.5	7.17	85.3	37.4	9.87	37.1	84.5
-16.0+12.5	1,394.0	7.08	8.29	91.7	6.49	6.46	7.12	91.7	37.0	7.07	37.0	91.6
-12.5+8.00	1,027.0	5.22	3.07	96.9	6.72	4.93	7.10	96.7	37.8	5.32	37.1	96.9
-8.00+6.30	374.0	1.90	1.17	98.8	7.25	1.94	7.10	98.6	36.8	1.89	37.1	98.8
-6.30	230.0	1.17	0.00	100.0	8.56	1.41		100.0	37.9	1.19		100.0
Total	19,682.0	100.0				100.0				100.0		
Calculated Head					7.12				37.1			
Assayed Head					6.16				36.3			

41.9

SIZE, mm	Mass		Cum. % Mass		Al ₂ O ₃				TiO ₂			
	kg	%	U/S	O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S
-70.0+50.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.0+45.0	4,075.0	20.7	79.3	20.7	2.12	21.4	2.12	21.4	0.07	21.0	0.07	21.0
-45.0+40.0	4,081.0	20.7	58.6	41.4	1.73	17.5	1.92	39.0	0.06	18.1	0.06	39.1
-40.0+35.0	1,739.0	8.84	49.7	50.3	2.22	9.58	1.98	48.5	0.08	10.3	0.07	49.4
-35.0+31.5	1,444.0	7.34	42.4	57.6	1.90	6.81	1.97	55.3	0.07	7.46	0.07	56.8
-31.5+22.4	3,391.0	17.2	25.2	74.8	2.11	17.8	2.00	73.1	0.07	17.5	0.07	74.4
-22.4+16.0	1,927.0	9.79	15.4	84.6	2.13	10.2	2.01	83.3	0.07	9.95	0.07	84.3
-16.0+12.5	1,394.0	7.08	8.29	91.7	2.16	7.47	2.03	90.7	0.06	6.17	0.07	90.5
-12.5+8.00	1,027.0	5.22	3.07	96.9	2.27	5.78	2.04	96.5	0.08	6.06	0.07	96.5
-8.00+6.30	374.0	1.90	1.17	98.8	2.19	2.03	2.04	98.6	0.07	1.93	0.07	98.5
-6.30	230.0	1.17	0.00	100.0	2.5	1.44		100.0	0.09	1.53		100.0
Total	19,682.0	100.0				100.0				100.0		
Calculated Head					2.05				0.07			
Assayed Head					2.04				0.07			

SIZE, mm	Mass		Cum. % Mass		Fe				P			
	kg	%	U/S	O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S
-70.0+50.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.0+45.0	4,075.0	20.7	79.3	20.7	0.94	18.4	0.94	18.4	0.03	21.0	0.03	21.0
-45.0+40.0	4,081.0	20.7	58.6	41.4	0.97	19.1	0.96	37.5	0.03	18.6	0.03	39.6
-40.0+35.0	1,739.0	8.84	49.7	50.3	1.06	8.87	0.97	46.4	0.04	10.8	0.03	50.5
-35.0+31.5	1,444.0	7.34	42.4	57.6	1.18	8.20	1.00	54.6	0.03	6.14	0.03	56.6
-31.5+22.4	3,391.0	17.2	25.2	74.8	1.09	17.8	1.02	72.3	0.03	17.0	0.03	73.6
-22.4+16.0	1,927.0	9.79	15.4	84.6	1.10	10.2	1.03	82.5	0.04	10.2	0.03	83.8
-16.0+12.5	1,394.0	7.08	8.29	91.7	1.04	6.98	1.03	89.5	0.03	7.20	0.03	91.0
-12.5+8.00	1,027.0	5.22	3.07	96.9	1.16	5.73	1.04	95.3	0.04	5.61	0.03	96.6
-8.00+6.30	374.0	1.90	1.17	98.8	1.26	2.27	1.04	97.5	0.04	1.99	0.03	98.6
-6.30	230.0	1.17	0.00	100.0	2.24	2.48		100.0	0.04	1.36		100.0
Total	19,682.0	100.0				100.0				100.0		
Calculated Head					1.06				0.03			
Assayed Head					1.22				0.03			

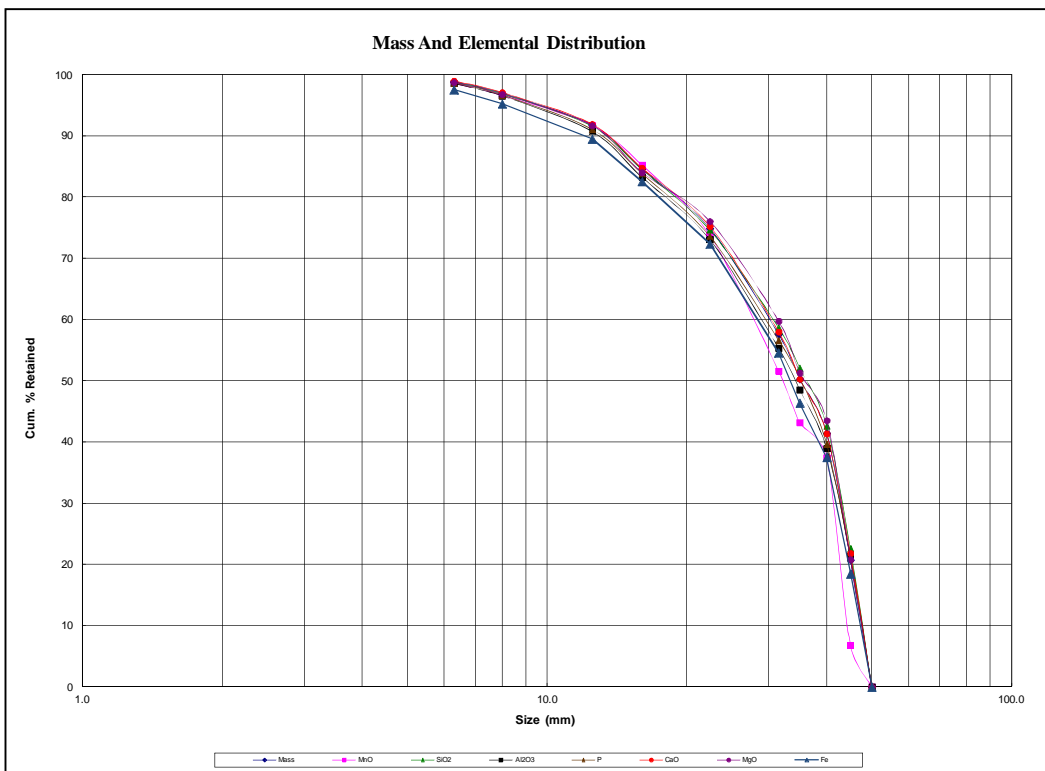
SIZE, mm	Mass		Cum. % Mass		CaO				MgO			
	kg	%	U/S	O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S	Assay %	Dist %	Cum Grade O/S	Cum Rec. O/S
-70.0+50.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.0+45.0	4,075.0	20.7	79.3	20.7	27.6	21.8	27.6	21.8	1.54	20.8	1.54	20.8
-45.0+40.0	4,081.0	20.7	58.6	41.4	24.7	19.5	26.1	41.4	1.68	22.7	1.61	43.5
-40.0+35.0	1,739.0	8.84	49.7	50.3	26.5	8.94	26.2	50.3	1.35	7.78	1.56	51.3
-35.0+31.5	1,444.0	7.34	42.4	57.6	27.5	7.70	26.4	58.0	1.77	8.47	1.59	59.7
-31.5+22.4	3,391.0	17.2	25.2	74.8	26.2	17.2	26.3	75.2	1.45	16.3	1.56	76.0
-22.4+16.0	1,927.0	9.79	15.4	84.6	25.5	9.53	26.2	84.8	1.25	7.98	1.52	84.0
-16.0+12.5	1,394.0	7.08	8.29	91.7	26.5	7.16	26.3	91.9	1.66	7.67	1.53	91.7
-12.5+8.00	1,027.0	5.22	3.07	96.9	25.9	5.16	26.2	97.1	1.50	5.10	1.53	96.8
-8.00+6.30	374.0	1.90	1.17	98.8	26.1	1.89	26.2	99.0	1.57	1.95	1.53	98.7
-6.30	230.0	1.17	0.00	100.0	23.2	1.03		100.0	1.68	1.28		100.0
Total	19,682.0	100.0				100.0				100.0		
Calculated Head					26.2				1.53			
Assayed Head					27.6				1.32			

SIZE, mm	Mass		Cum. % Mass		Upgrade Ratio					
	kg	%	U/S	O/S	MnO	SiO ₂	Al ₂ O ₃	P	CaO	MgO
-70.0+50.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.0+45.0	4,075.0	20.7	79.3	20.7	0.33	1.09	1.04	1.02	1.05	1.00
-45.0+40.0	4,081.0	20.7	58.6	41.4	1.48	0.97	0.84	0.90	0.94	1.10
-40.0+35.0	1,739.0	8.84	49.7	50.3	0.65	1.07	1.08	1.23	1.01	0.88
-35.0+31.5	1,444.0	7.34	42.4	57.6	1.15	0.90	0.93	0.84	1.05	1.15
-31.5+22.4	3,391.0	17.2	25.2	74.8	1.29	0.93	1.03	0.99	1.00	0.95
-22.4+16.0	1,927.0	9.79	15.4	84.6	1.17	1.01	1.04	1.05	0.97	0.81
-16.0+12.5	1,394.0	7.08	8.29	91.7	0.91	1.00	1.05	1.02	1.01	1.08
-12.5+8.00	1,027.0	5.22	3.07	96.9	0.94	1.02	1.11	1.08	0.99	0.98
-8.00+6.30	374.0	1.90	1.17	98.8	1.02	0.99	1.07	1.05	1.00	1.02
-6.30	230.0	1.17	0.00	100.0	1.20	1.02	1.23	1.17	0.89	1.10
Total	19,682.0	100.0								



Head Mass and Elemental Distribution

Date: 03/12/2012
SGS Job No: 0112MP
Client: International Geoscience
Sample ID: -50.0 mm +6.30 mm Size Fraction



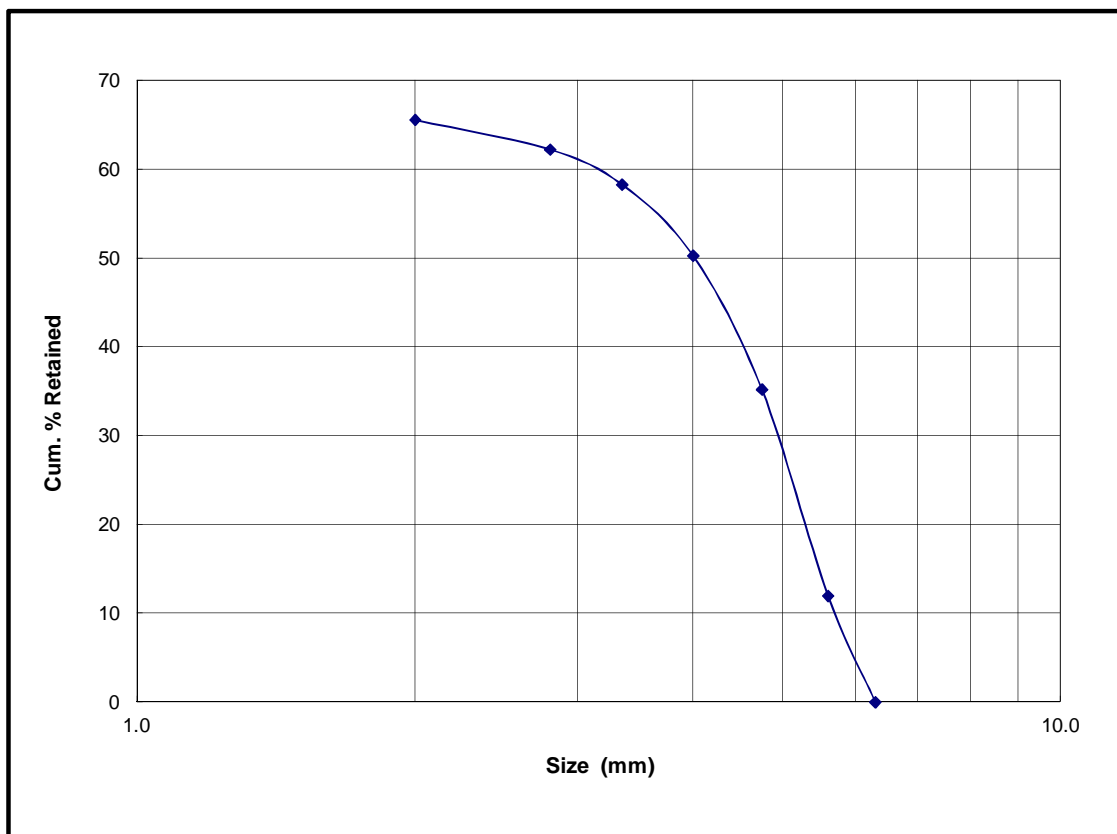


Particle Size Distribution

Date:	15/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-6.3 mm +2.0 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass	
	g	%	U/S	O/S
+6.30	0.0	0.00	100.0	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0
-5.60 +4.75	199.3	23.2	64.8	35.2
-4.75 +4.00	129.3	15.1	49.7	50.3
-4.00 +3.35	68.6	8.00	41.7	58.3
-3.35 +2.80	33.8	3.94	37.8	62.2
-2.80 +2.00	28.7	3.35	34.4	65.6
-2.00	295.1	34.4	0.00	100.0
Total	857.3	100.0		

P₈₀ (mm) = 5.31





Mass and Elemental Distribution

Date:	27/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-6.3 mm +2.0 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass		MnO				SiO ₂			
	g	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+6.30	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0	7.01	10.3	7.01	10.3	37.3	12.2	37.3	12.2
-5.60 +4.75	199.3	23.2	64.8	35.2	7.74	22.1	7.49	32.3	37.0	23.6	37.1	35.9
-4.75 +4.00	129.3	15.1	49.7	50.3	9.03	16.7	7.95	49.0	36.6	15.2	37.0	51.0
-4.00 +3.35	68.6	8.00	41.7	58.3	8.65	8.48	8.05	57.5	35.8	7.87	36.8	58.9
-3.35 +2.80	33.8	3.94	37.8	62.2	8.60	4.16	8.08	61.7	36.2	3.92	36.8	62.8
-2.80 +2.00	28.7	3.35	34.4	65.6	8.22	3.37	8.09	65.0	36.6	3.36	36.7	66.2
-2.00	295.1	34.4	0.00	100.0	8.29	35.0		100.0	35.8	33.8		100.0
Total	857.3	100.0				100.0				100.0		
Calculated Head					8.16				36.4			
Assayed Head					8.05				36.8			

6.9

SIZE, mm	Mass		Cum. % Mass		Al ₂ O ₃				TiO ₂			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+6.30	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0	2.27	11.7	2.27	11.7	0.07	10.2	0.07	10.2
-5.60 +4.75	199.3	23.2	64.8	35.2	2.30	23.0	2.29	34.6	0.08	22.6	0.08	32.8
-4.75 +4.00	129.3	15.1	49.7	50.3	2.34	15.2	2.30	49.8	0.08	14.7	0.08	47.5
-4.00 +3.35	68.6	8.00	41.7	58.3	2.27	7.80	2.30	57.6	0.08	7.78	0.08	55.2
-3.35 +2.80	33.8	3.94	37.8	62.2	2.27	3.84	2.30	61.4	0.08	3.83	0.08	59.1
-2.80 +2.00	28.7	3.35	34.4	65.6	2.35	3.38	2.30	64.8	0.08	3.26	0.08	62.3
-2.00	295.1	34.4	0.00	100.0	2.4	35.2		100.0	0.09	37.7		100.0
Total	857.3	100.0				100.0				100.0		
Calculated Head					2.33				0.08			
Assayed Head					2.31				0.08			

SIZE, mm	Mass		Cum. % Mass		Fe				P			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+6.30	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0	1.14	10.2	1.14	10.2	0.04	12.1	0.04	12.1
-5.60 +4.75	199.3	23.2	64.8	35.2	1.27	22.2	1.23	32.4	0.03	22.8	0.03	34.9
-4.75 +4.00	129.3	15.1	49.7	50.3	1.35	15.3	1.26	47.7	0.04	15.2	0.03	50.1
-4.00 +3.35	68.6	8.00	41.7	58.3	1.28	7.70	1.27	55.4	0.03	7.84	0.03	57.9
-3.35 +2.80	33.8	3.94	37.8	62.2	1.32	3.91	1.27	59.3	0.04	3.98	0.03	61.9
-2.80 +2.00	28.7	3.35	34.4	65.6	1.26	3.17	1.27	62.5	0.04	3.38	0.03	65.3
-2.00	295.1	34.4	0.00	100.0	1.45	37.5		100.0	0.04	34.7		100.0
Total	857.3	100.0				100.0				100.0		
Calculated Head					1.33				0.03			
Assayed Head					1.33				0.04			

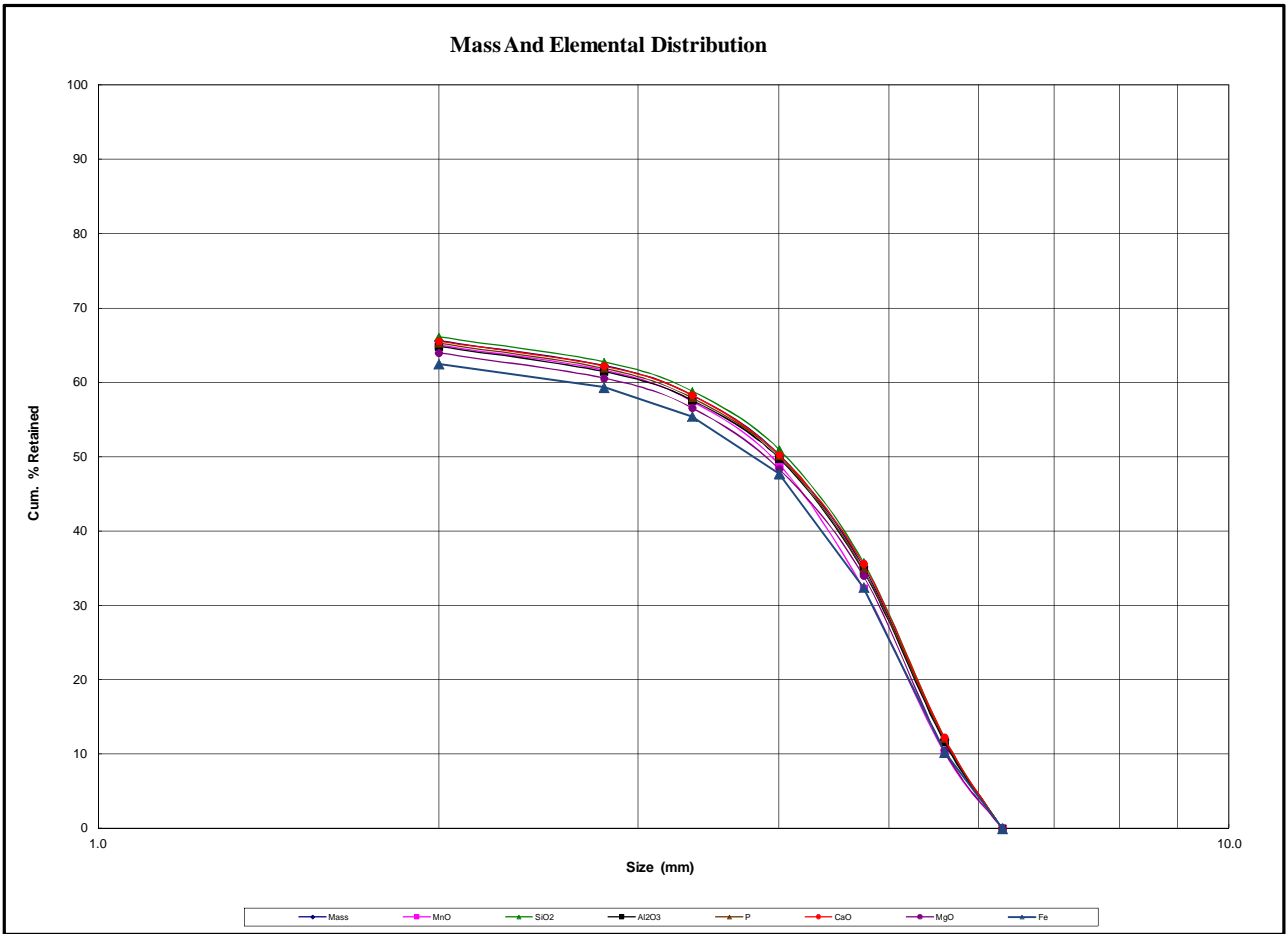
SIZE, mm	Mass		Cum. % Mass		CaO				MgO			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+6.30	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0	26.0	12.2	26.0	12.2	1.39	10.5	1.39	10.5
-5.60 +4.75	199.3	23.2	64.8	35.2	25.5	23.4	25.7	35.6	1.59	23.5	1.52	34.0
-4.75 +4.00	129.3	15.1	49.7	50.3	24.7	14.7	25.4	50.3	1.50	14.4	1.52	48.4
-4.00 +3.35	68.6	8.00	41.7	58.3	25.5	8.04	25.4	58.3	1.62	8.23	1.53	56.6
-3.35 +2.80	33.8	3.94	37.8	62.2	25.2	3.91	25.4	62.2	1.59	3.98	1.53	60.6
-2.80 +2.00	28.7	3.35	34.4	65.6	25.2	3.32	25.4	65.6	1.60	3.40	1.54	64.0
-2.00	295.1	34.4	0.00	100.0	25.4	34.4		100.0	1.65	36.0		100.0
Total	857.3	100.0				100.0				100.0		
Calculated Head					25.4				1.58			
Assayed Head					25.3				1.56			

SIZE, mm	Mass		Cum. % Mass		Upgrade Ratio					
	kg	%	U/S	O/S	MnO	SiO ₂	Al ₂ O ₃	P	CaO	MgO
					%	%	%	%	%	%
+6.30	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-6.30 +5.60	102.5	12.0	88.0	12.0	0.86	1.02	0.98	1.01	1.02	0.88
-5.60 +4.75	199.3	23.2	64.8	35.2	0.95	1.02	0.99	0.98	1.00	1.01
-4.75 +4.00	129.3	15.1	49.7	50.3	1.11	1.00	1.01	1.01	0.97	0.95
-4.00 +3.35	68.6	8.00	41.7	58.3	1.06	0.98	0.98	0.98	1.00	1.03
-3.35 +2.80	33.8	3.94	37.8	62.2	1.05	0.99	0.98	1.01	0.99	1.01
-2.80 +2.00	28.7	3.35	34.4	65.6	1.01	1.00	1.01	1.01	0.99	1.02
-2.00	295.1	34.4	0.00	100.0	1.02	0.98	1.02	1.01	1.00	1.05
Total	857.3	100.0								



Mass and Elemental Distribution

Date: 27/11/2012
SGS Job No: 0112MP
Client: International Geoscience
Sample ID: -6.3 mm +2.0 mm Size Fraction



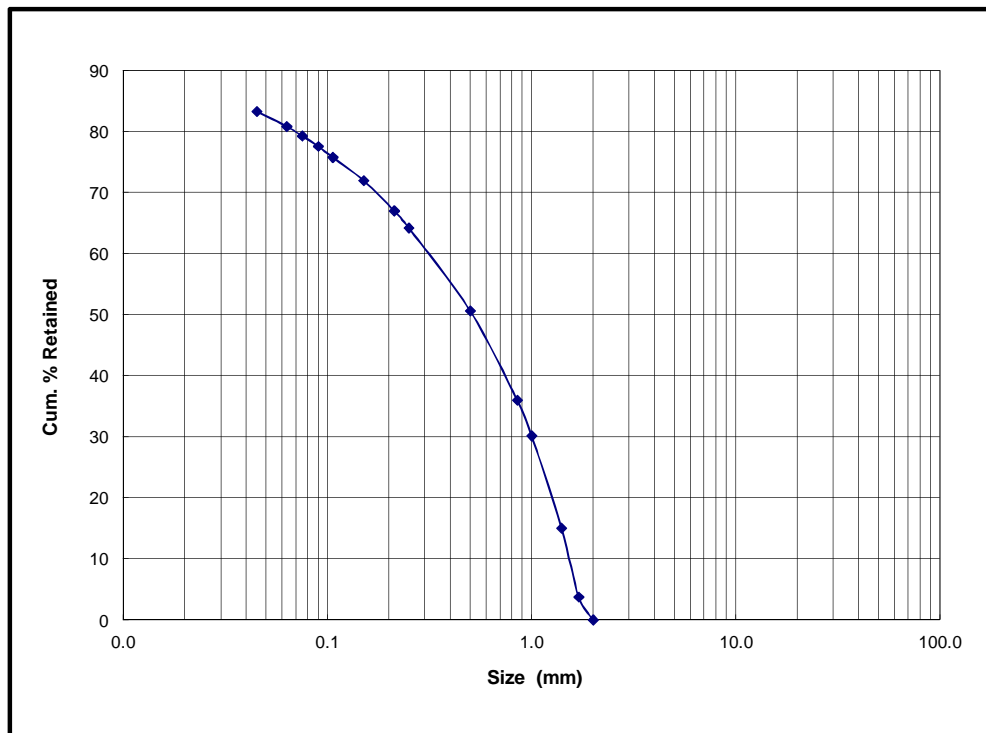


Particle Size Distribution

Date:	19/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-2.00 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass	
	g	%	U/S	O/S
+2.00	0.00	0.00	100.0	0.00
-2.00 +1.70	179.6	3.74	96.3	3.74
-1.70 +1.40	542.1	11.3	85.0	15.0
-1.40 +1.00	724.9	15.1	69.8	30.2
-1.00 +0.850	280.3	5.84	64.0	36.0
-0.850 +0.500	701.8	14.6	49.4	50.6
-0.500 +0.250	652.1	13.6	35.8	64.2
-0.250 +0.212	134.3	2.80	33.0	67.0
-0.212 +0.150	237.5	4.95	28.0	72.0
-0.150 +0.106	183.6	3.83	24.2	75.8
-0.106 +0.090	85.6	1.78	22.4	77.6
-0.090 +0.075	82.4	1.72	20.7	79.3
-0.075 +0.063	74.0	1.54	19.2	80.8
-0.063 +0.045	118.2	2.46	16.7	83.3
-0.045	801.5	16.71	0.00	100.0
Total	4,797.8	100.0		

P₈₀ (mm) = 1.27





Head Mass and Elemental Distribution

Date:	30/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	-2.00 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass		MnO				SiO ₂			
	g	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+2.00	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.00+1.70	179.6	3.74	96.3	3.74	7.57	3.67	7.57	3.67	37.4	3.86	37.4	3.86
-1.70+1.40	542.1	11.3	85.0	15.0	8.08	11.8	7.95	15.5	36.5	11.4	36.7	15.2
-1.40+1.00	724.9	15.1	69.8	30.2	8.04	15.7	8.00	31.2	36.2	15.1	36.5	30.3
-1.00+0.850	280.3	5.84	64.0	36.0	8.02	6.06	8.00	37.3	36.2	5.84	36.4	36.2
-0.850+0.500	701.8	14.6	49.4	50.6	7.89	14.9	7.97	52.2	36.1	14.6	36.3	50.7
-0.500+0.250	652.1	13.59	35.8	64.2	7.32	12.9	7.83	65.1	36.2	13.6	36.3	64.3
-0.250+0.212	134.3	2.80	33.0	67.0	6.69	2.42	7.78	67.5	36.6	2.83	36.3	67.2
-0.212+0.150	237.5	4.95	28.0	72.0	6.49	4.16	7.69	71.7	37.0	5.05	36.4	72.2
-0.150+0.106	183.6	3.83	24.2	75.8	5.88	2.91	7.60	74.6	38.2	4.03	36.5	76.2
-0.106+0.090	85.6	1.78	22.4	77.6	5.65	1.30	7.56	75.9	38.6	1.90	36.5	78.1
-0.090+0.075	82.4	1.72	20.7	79.3	5.67	1.26	7.52	77.1	38.9	1.84	36.6	80.0
-0.075+0.063	74.0	1.54	19.2	80.8	5.76	1.15	7.48	78.3	38.7	1.65	36.6	81.6
-0.063+0.045	118.2	2.46	16.7	83.3	6.40	2.04	7.45	80.3	37.6	2.56	36.6	84.2
-0.045	801.5	16.7	0.00	100.0	9.10	19.7		100.0	34.3	15.8		100.0
Total	4,797.8	100.0				100.0				100.0		
Calculated Head					7.73				36.2			
Assayed Head					N/A				N/A			

SIZE, mm	Mass		Cum. % Mass		Al ₂ O ₃				TiO ₂			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+2.00	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.00+1.70	179.6	3.74	96.3	3.74	2.30	3.15	2.30	3.15	0.08	2.26	0.08	2.26
-1.70+1.40	542.1	11.3	85.0	15.0	2.35	9.71	2.34	12.9	0.08	6.81	0.08	9.06
-1.40+1.00	724.9	15.1	69.8	30.2	2.37	13.1	2.35	25.9	0.08	9.10	0.08	18.2
-1.00+0.850	280.3	5.84	64.0	36.0	2.38	5.08	2.36	31.0	0.09	3.96	0.08	22.1
-0.850+0.500	701.8	14.6	49.4	50.6	2.40	12.8	2.37	43.9	0.09	9.92	0.08	32.0
-0.500+0.250	652.1	13.6	35.8	64.2	2.55	12.7	2.41	56.5	0.11	11.3	0.09	43.3
-0.250+0.212	134.3	2.80	33.0	67.0	2.69	2.75	2.42	59.3	0.14	2.95	0.09	46.3
-0.212+0.150	237.5	4.95	28.0	72.0	2.79	5.05	2.45	64.3	0.16	5.97	0.10	52.2
-0.150+0.106	183.6	3.83	24.2	75.8	2.97	4.15	2.47	68.5	0.16	4.61	0.10	56.8
-0.106+0.090	85.6	1.78	22.4	77.6	3.05	1.99	2.49	70.5	0.16	2.15	0.10	59.0
-0.090+0.075	82.4	1.72	20.7	79.3	3.11	1.95	2.50	72.4	0.17	2.20	0.10	61.2
-0.075+0.063	74.0	1.54	19.2	80.8	3.18	1.79	2.51	74.2	0.19	2.21	0.10	63.4
-0.063+0.045	118.2	2.46	16.7	83.3	3.15	2.84	2.53	77.0	0.21	3.90	0.11	67.3
-0.045	801.5	16.7	0.00	100.0	3.76	23.0		100.0	0.26	32.7		100.0
Total	4,797.8	100.0				100.0				100.0		
Calculated Head					2.74				0.13			
Assayed Head					N/A				N/A			

SIZE, mm	Mass		Cum. % Mass		Fe				P			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+2.00	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.00+1.70	179.6	3.74	96.3	3.74	1.33	2.13	1.33	2.13	0.04	3.72	0.04	3.72
-1.70+1.40	542.1	11.3	85.0	15.0	1.35	6.52	1.35	8.64	0.04	10.9	0.04	14.6
-1.40+1.00	724.9	15.1	69.8	30.2	1.51	9.74	1.43	18.4	0.04	15.0	0.04	29.6
-1.00+0.850	280.3	5.84	64.0	36.0	1.51	3.77	1.44	22.2	0.04	5.64	0.04	35.3
-0.850+0.500	701.8	14.6	49.4	50.6	1.72	10.7	1.52	32.9	0.04	14.5	0.04	49.8
-0.500+0.250	652.1	13.6	35.8	64.2	2.17	12.6	1.66	45.5	0.04	13.9	0.04	63.7
-0.250+0.212	134.3	2.80	33.0	67.0	2.69	3.22	1.70	48.7	0.04	2.86	0.04	66.5
-0.212+0.150	237.5	4.95	28.0	72.0	2.89	6.11	1.78	54.8	0.04	5.05	0.04	71.6
-0.150+0.106	183.6	3.83	24.2	75.8	3.01	4.92	1.85	59.7	0.04	3.91	0.04	75.5
-0.106+0.090	85.6	1.78	22.4	77.6	3.14	2.39	1.88	62.1	0.04	1.77	0.04	77.2
-0.090+0.075	82.4	1.72	20.7	79.3	3.40	2.49	1.91	64.6	0.04	1.75	0.04	79.0
-0.075+0.063	74.0	1.54	19.2	80.8	3.60	2.37	1.94	67.0	0.04	1.57	0.04	80.6
-0.063+0.045	118.2	2.46	16.7	83.3	3.83	4.03	2.00	71.0	0.04	2.38	0.04	83.0
-0.045	801.5	16.7	0.00	100.0	4.06	29.0		100.0	0.04	17.0		100.0
Total	4,797.8	100.0				100.0				100.0		
Calculated Head					2.34				0.04			
Assayed Head					N/A				N/A			

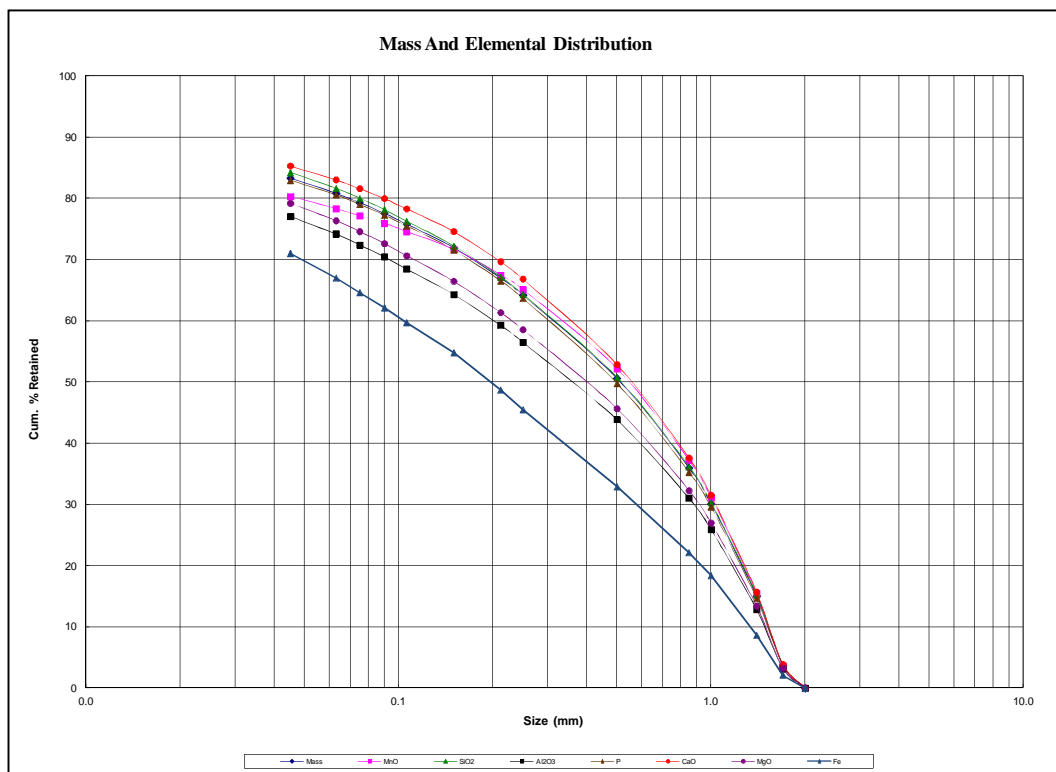
SIZE, mm	Mass		Cum. % Mass		CaO				MgO			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+2.00	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.00+1.70	179.6	3.74	96.3	3.74	25.1	3.87	25.1	3.87	1.59	3.26	1.59	3.26
-1.70+1.40	542.1	11.3	85.0	15.0	25.4	11.8	25.3	15.7	1.64	10.2	1.63	13.4
-1.40+1.00	724.9	15.1	69.8	30.2	25.4	15.8	25.4	31.5	1.64	13.6	1.63	27.0
-1.00+0.850	280.3	5.8	64.0	36.0	25.2	6.07	25.3	37.6	1.65	5.28	1.64	32.3
-0.850+0.500	701.8	14.6	49.4	50.6	25.3	15.3	25.3	52.9	1.67	13.4	1.65	45.7
-0.500+0.250	652.1	13.6	35.8	64.2	24.9	14.0	25.2	66.8	1.73	12.9	1.66	58.6
-0.250+0.212	134.3	2.80	33.0	67.0	24.6	2.84	25.2	69.7	1.83	2.81	1.67	61.4
-0.212+0.150	237.5	4.95	28.0	72.0	24.2	4.94	25.1	74.6	1.88	5.10	1.69	66.5
-0.150+0.106	183.6	3.83	24.2	75.8	23.4	3.69	25.1	78.3	1.98	4.15	1.70	70.6
-0.106+0.090	85.6	1.78	22.4	77.6	23.0	1.69	25.0	80.0	2.05	2.00	1.71	72.6
-0.090+0.075	82.4	1.72	20.7	79.3	22.7	1.61	25.0	81.6	2.08	1.96	1.72	74.6
-0.075+0.063	74.0	1.54	19.2	80.8	22.5	1.43	24.9	83.0	2.10	1.78	1.72	76.4
-0.063+0.045	118.2	2.46	16.7	83.3	22.4	2.28	24.8	85.3	2.11	2.85	1.73	79.2
-0.045	801.5	16.7	0.00	100.0	21.3	14.7		100.0	2.27	20.8		100.0
Total	4,797.8	100.0				100.0				100.0		
Calculated Head					24.2				1.82			
Assayed Head					N/A				N/A			



Head Mass and Elemental Distribution

Date: 30/11/2012
 SGS Job No: 0112MP
 Client: International Geoscience
 Sample ID: -2.00 mm Size Fraction

SIZE, mm	Mass		Cum. % Mass		Upgrade Ratio					
	kg	%	U/S	O/S	MnO	SiO ₂	Al ₂ O ₃	P	CaO	MgO
+2.00	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.00+1.70	179.6	3.74	96.3	3.74	0.98	1.03	0.84	0.99	1.04	0.87
-1.70+1.40	542.1	11.3	85.0	15.0	1.05	1.01	0.86	0.97	1.05	0.90
-1.40+1.00	724.9	15.1	69.8	30.2	1.04	1.00	0.87	0.99	1.05	0.90
-1.00+0.850	280.3	5.84	64.0	36.0	1.04	1.00	0.87	0.97	1.04	0.90
-0.850+0.500	701.8	14.6	49.4	50.6	1.02	1.00	0.88	0.99	1.04	0.92
-0.500+0.250	652.1	13.6	35.8	64.2	0.95	1.00	0.93	1.02	1.03	0.95
-0.250+0.212	134.3	2.80	33.0	67.0	0.87	1.01	0.98	1.02	1.01	1.00
-0.212+0.150	237.5	4.95	28.0	72.0	0.84	1.02	1.02	1.02	1.00	1.03
-0.150+0.106	183.6	3.83	24.2	75.8	0.76	1.05	1.09	1.02	0.97	1.09
-0.106+0.090	85.6	1.78	22.4	77.6	0.73	1.07	1.11	0.99	0.95	1.12
-0.090+0.075	82.4	1.72	20.7	79.3	0.73	1.07	1.14	1.02	0.94	1.14
-0.075+0.063	74.0	1.54	19.2	80.8	0.75	1.07	1.16	1.02	0.93	1.15
-0.063+0.045	118.2	2.46	16.7	83.3	0.83	1.04	1.15	0.97	0.92	1.16
-0.045	801.5	16.7	0.00	100.0	1.18	0.95	1.37	1.02	0.88	1.24
Total	4,797.8	100.0								



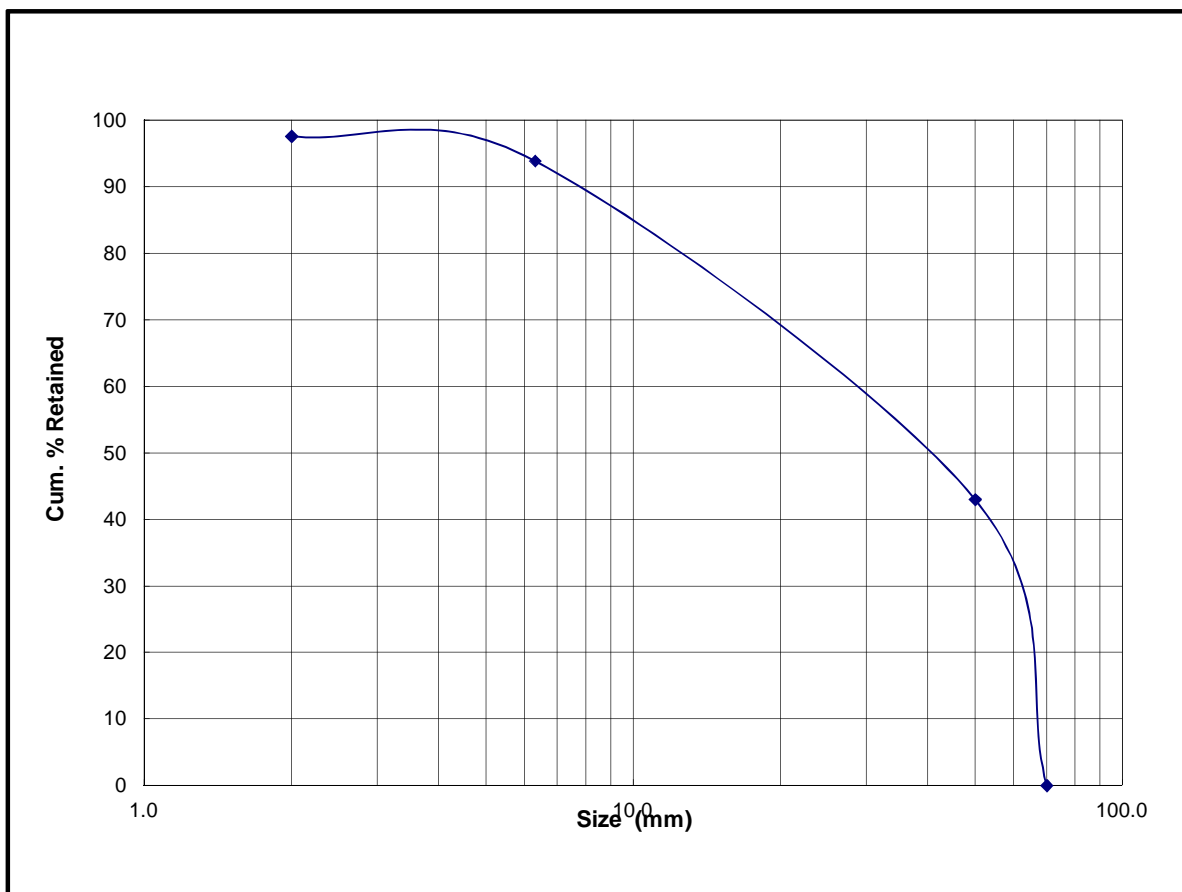


Head Particle Size Distribution

Date:	9/11/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	Head Composite

SIZE, mm	Mass		Cum. % Mass	
	kg	%	U/S	O/S
+70.0	0.00	0.00	100.0	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0
-50.0 +6.30	402.5	50.9	6.11	93.9
-6.30 +2.00	29.4	3.72	2.39	97.6
-2.00	18.9	2.39	0.00	100.0
Total	790.8	100.0		

P₈₀ (mm) = 60.7





Head Mass and Elemental Distribution

Date:	04/12/2012
SGS Job No:	0112MP
Client:	International Geoscience
Sample ID:	Head Composite

SIZE, mm	Mass		Cum. % Mass		MnO				SiO ₂			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+70.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0	5.99	38.5	5.99	38.5	36.1	42.4	36.1	42.4
-50.0 +6.30	402.5	50.9	6.11	93.9	7.12	54.2	6.60	92.7	37.1	51.6	36.6	93.9
-6.30 +2.00	29.4	3.72	2.39	97.6	8.16	4.54	6.66	97.2	36.4	3.70	36.6	97.6
-2.00	18.9	2.39	0.00	100.0	7.73	2.76		100.0	36.2	2.36		100.0
Total	790.8	100.0				100.0				100.0		
Calculated Head					6.69				36.6			
Assayed Head					N/A				N/A			

57.9

SIZE, mm	Mass		Cum. % Mass		Al ₂ O ₃				TiO ₂			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+70.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0	1.91	40.7	1.91	40.7	0.07	40.4	0.07	40.4
-50.0 +6.30	402.5	50.9	6.11	93.9	2.05	51.8	1.98	92.5	0.07	50.6	0.07	91.0
-6.30 +2.00	29.4	3.72	2.39	97.6	2.33	4.30	2.00	96.8	0.08	4.42	0.07	95.4
-2.00	18.9	2.39	0.00	100.0	2.74	3.25		100.0	0.13	4.58		100.0
Total	790.8	100.0				100.0				100.0		
Calculated Head					2.01				0.07			
Assayed Head					N/A				N/A			

SIZE, mm	Mass		Cum. % Mass		Fe				P			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+70.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0	1.07	41.6	1.07	41.6	0.03	41.8	0.03	41.8
-50.0 +6.30	402.5	50.9	6.11	93.9	1.06	48.8	1.06	90.4	0.03	51.7	0.03	93.5
-6.30 +2.00	29.4	3.72	2.39	97.6	1.33	4.50	1.07	94.9	0.03	3.91	0.03	97.4
-2.00	18.9	2.39	0.00	100.0	2.34	5.08		100.0	0.04	2.63		100.0
Total	790.8	100.0				100.0				100.0		
Calculated Head					1.10				0.03			
Assayed Head					N/A				N/A			

SIZE, mm	Mass		Cum. % Mass		CaO				MgO			
	kg	%	U/S	O/S	Assay	Dist	Cum Grade	Cum Rec.	Assay	Dist	Cum Grade	Cum Rec.
					%	%	O/S	O/S	%	%	O/S	O/S
+70.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0	28.4	45.1	28.4	45.1	1.06	33.9	1.06	33.9
-50.0 +6.30	402.5	50.9	6.11	93.9	26.2	49.3	27.2	94.4	1.53	58.4	1.31	92.4
-6.30 +2.00	29.4	3.72	2.39	97.6	25.4	3.49	27.1	97.9	1.58	4.38	1.32	96.7
-2.00	18.9	2.39	0.00	100.0	24.2	2.14		100.0	1.82	3.26		100.0
Total	790.8	100.0				100.0				100.0		
Calculated Head					27.1				1.34			
Assayed Head					N/A				N/A			

SIZE, mm	Mass		Cum. % Mass		Upgrade Ratio					
	kg	%	U/S	O/S	MnO	SiO ₂	Al ₂ O ₃	P	CaO	MgO
					%	%	%	%	%	%
+70.0	0.00	0.00	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-70.0 +50.0	340.0	43.0	57.0	43.0	0.90	0.99	0.95	0.97	1.05	0.79
-50.0 +6.30	402.5	50.9	6.11	93.9	1.06	1.01	1.02	1.02	0.97	1.15
-6.30 +2.00	29.4	3.72	2.39	97.6	1.22	0.99	1.16	1.05	0.94	1.18
-2.00	18.9	2.39	0.00	100.0	1.16	0.99	1.36	1.10	0.89	1.37
Total	790.8	100.0								



Head Mass and Elemental Distribution

Date: 04/12/2012
SGS Job No: 0112MP
Client: International Geoscience
Sample ID: Head Composite





*SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River*

Appendix D : DMS Test Data



Dense Media Separation Results

Client:	International Geoscience
Job No:	0112MP
Sample ID:	Manganese Composite
Size Fraction:	-70.0 mm +50.0 mm
Date:	29/11/2011

MASS AND METAL BALANCES

DMS DENSITY	Mass	Mass	Cum	MnO				SiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.50 Float	4.45	24.3	24.3	2.62	10.3	6.19	100.0	52.5	33.3	38.3	100.0
2.50 Sink	4.87	26.6	50.8	2.61	11.2	7.33	89.7	40.8	28.3	33.7	66.7
2.63 Sink	7.44	40.6	91.4	6.00	39.3	9.88	78.5	31.0	32.9	29.9	38.4
2.80 Sink	1.58	8.61	100.0	28.2	39.2	28.2	39.2	24.5	5.51	24.5	5.51
Calc'd Head	18.3	100.0		6.19	100.0			38.3	100.0		
Assay Head				N/A				N/A			

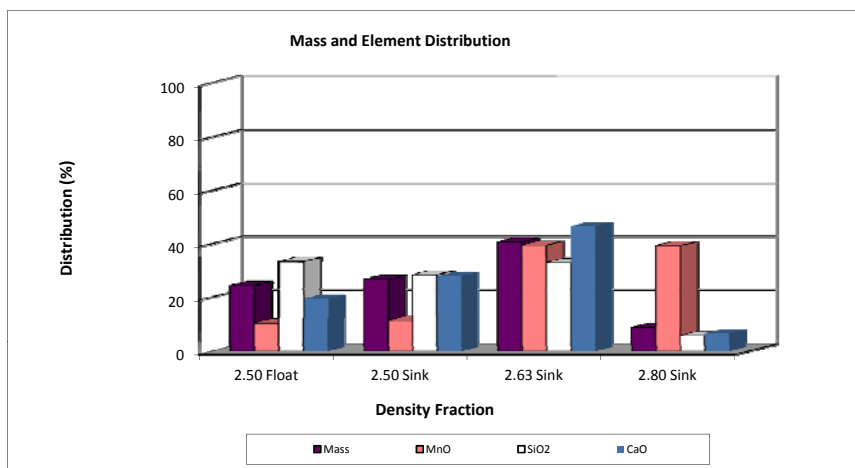
DMS DENSITY	Mass	Mass	Cum	Al ₂ O ₃				TiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.50 Float	4.45	24.3	24.3	2.17	27.6	1.91	100.0	0.07	29.1	0.06	100.0
2.50 Sink	4.87	26.6	50.8	1.97	27.4	1.83	72.4	0.06	27.3	0.05	70.9
2.63 Sink	7.44	40.6	91.4	1.75	37.2	1.75	45.1	0.05	34.8	0.05	43.6
2.80 Sink	1.58	8.61	100.0	1.75	7.88	1.75	7.88	0.06	8.85	0.06	8.85
Calc'd Head	18.3	100.0		1.91	100.0			0.06	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	Fe				CaO			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.50 Float	4.45	24.3	24.3	1.12	24.3	1.12	100.0	21.3	19.4	26.7	100.0
2.50 Sink	4.87	26.6	50.8	1.28	30.4	1.12	75.7	27.9	27.7	28.4	80.6
2.63 Sink	7.44	40.6	91.4	0.97	35.2	1.03	45.4	30.6	46.5	28.7	52.9
2.80 Sink	1.58	8.61	100.0	1.33	10.2	1.33	10.22	19.8	6.38	19.8	6.38
Calc'd Head	18.3	100.0		1.12	100.0			26.7	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	P				S			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.50 Float	4.45	24.3	24.3	0.03	30.1	0.03	100.0	0.01	16.0	0.01	100.0
2.50 Sink	4.87	26.6	50.8	0.03	28.0	0.02	69.9	0.01	27.3	0.02	84.0
2.63 Sink	7.44	40.6	91.4	0.02	35.1	0.02	41.9	0.02	53.6	0.02	56.7
2.80 Sink	1.58	8.61	100.0	0.02	6.80	0.02	6.80	0.01	3.16	0.01	3.16
Calc'd Head	18.3	100.0		0.03	100.0			0.01	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	MgO				K ₂ O			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.50 Float	4.45	24.3	24.3	0.89	17.6	1.23	100.0	0.63	28.9	0.53	100.0
2.50 Sink	4.87	26.6	50.8	0.98	21.2	1.33	82.4	0.56	28.1	0.50	71.1
2.63 Sink	7.44	40.6	91.4	1.68	55.7	1.52	61.1	0.46	35.3	0.46	43.1
2.80 Sink	1.58	8.61	100.0	0.78	5.48	0.78	5.48	0.48	7.80	0.48	7.80
Calc'd Head	18.3	100.0		1.23	100.0			0.53	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	Na ₂ O				LOI
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	1000°
2.50 Float	4.45	24.3	24.3	0.02	23.8	0.02	100.0	18.0
2.50 Sink	4.87	26.6	50.8	0.04	52.1	0.02	76.2	23.2
2.63 Sink	7.44	40.6	91.4	0.01	19.9	0.01	24.1	26.4
2.80 Sink	1.58	8.61	100.0	0.01	4.22	0.01	4.22	20.1
Calc'd Head	18.3	100.0		0.02	100.0			23.0
Assay Head				N/A				N/A





Dense Media Separation Results

Client:	International Geoscience
Job No:	0112MP
Sample ID:	Manganese Composite
Size Fraction:	-50.0 mm +6.30 mm
Date:	29/11/2011

MASS AND METAL BALANCES

DMS DENSITY	Mass	Mass	Cum	MnO				SiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.80 Float	7.69	82.0	82.0	3.15	28.0	9.22	100.0	39.7	93.3	34.9	100.0
2.80 Sink	0.74	7.93	89.9	22.3	19.2	36.9	72.0	14.7	3.34	12.9	6.65
3.00 Sink	0.58	6.16	96.1	41.2	27.5	48.4	52.8	13.0	2.30	11.5	3.31
3.40 Sink	0.37	3.90	100.0	59.8	25.3	59.8	25.3	9.03	1.01	9.03	1.01
Calc'd Head	9.38	100.0		9.22	100.0			34.9	100.0		
Assay Head				N/A				N/A			

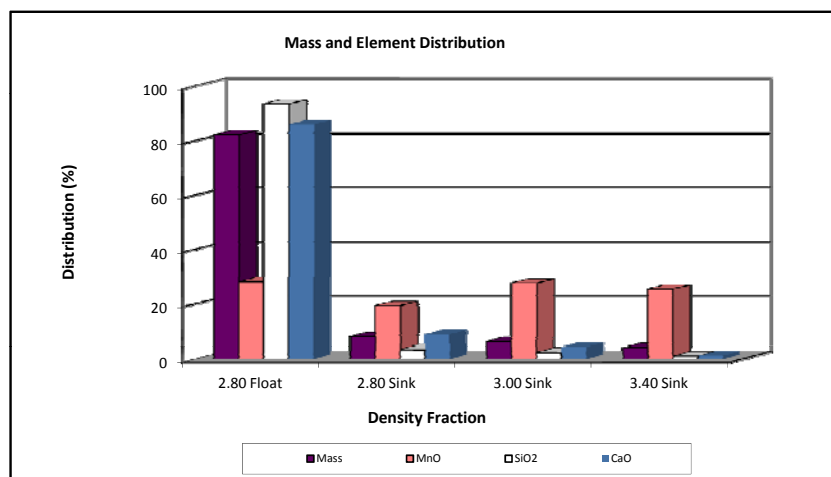
DMS DENSITY	Mass	Mass	Cum	Al ₂ O ₃				TiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.80 Float	7.69	82.0	82.0	2.16	87.4	2.03	100.0	0.06	83.7	0.06	100.0
2.80 Sink	0.74	7.93	89.9	1.61	6.30	1.42	12.6	0.07	9.45	0.05	16.3
3.00 Sink	0.58	6.16	96.1	1.31	3.98	1.27	6.31	0.04	4.19	0.04	6.85
3.40 Sink	0.37	3.90	100.0	1.21	2.33	1.21	2.33	0.04	2.66	0.04	2.66
Calc'd Head	9.38	100.0		2.03	100.0			0.06	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	Fe				CaO			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.80 Float	7.69	82.0	82.0	1.11	83.2	1.09	100.0	27.6	85.8	26.4	100.0
2.80 Sink	0.74	7.93	89.9	1.10	7.97	1.02	16.8	29.1	8.75	20.8	14.2
3.00 Sink	0.58	6.16	96.1	1.01	5.69	0.96	8.86	18.2	4.25	14.2	5.42
3.40 Sink	0.37	3.90	100.0	0.89	3.17	0.89	3.17	7.86	1.16	7.86	1.16
Calc'd Head	9.38	100.0		1.09	100.0			26.4	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	P				S			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.80 Float	7.69	82.0	82.0	0.03	89.2	0.03	100.0	0.01	91.5	0.01	100.0
2.80 Sink	0.74	7.93	89.9	0.02	4.76	0.02	10.8	0.01	5.69	0.01	8.47
3.00 Sink	0.58	6.16	96.1	0.02	4.39	0.02	6.00	0.00	1.23	0.00	2.78
3.40 Sink	0.37	3.90	100.0	0.01	1.61	0.01	1.61	0.01	1.56	0.01	1.56
Calc'd Head	9.38	100.0		0.03	100.0			0.01	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	MgO				K ₂ O			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
2.80 Float	7.69	82.0	82.0	1.31	86.0	1.25	100.0	0.60	87.6	0.56	100.0
2.80 Sink	0.74	7.93	89.9	1.45	9.20	0.98	14.0	0.47	6.63	0.39	12.4
3.00 Sink	0.58	6.16	96.1	0.66	3.25	0.60	4.85	0.32	3.51	0.32	5.80
3.40 Sink	0.37	3.90	100.0	0.51	1.59	0.51	1.59	0.33	2.29	0.33	2.29
Calc'd Head	9.38	100.0		1.25	100.0			0.56	100.0		
Assay Head				N/A				N/A			

DMS DENSITY	Mass	Mass	Cum	Na ₂ O				LOI
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	1000°
2.80 Float	7.69	82.0	82.0	0.02	87.8	0.02	100.0	23.4
2.80 Sink	0.74	7.93	89.9	0.02	8.49	0.01	12.2	26.8
3.00 Sink	0.58	6.16	96.1	0.01	1.65	0.01	3.74	20.4
3.40 Sink	0.37	3.90	100.0	0.01	2.09	0.01	2.09	15.2
Calc'd Head	9.38	100.0		0.02	100.0			23.2
Assay Head				N/A				N/A





*SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River*

Appendix E : Jigging Test Data



Jigging Results

Client: International Geoscience
 Job No: 0112MP
 Sample ID: **Manganese Composite**
 Size Fraction: -6.3 mm +2.0 mm
 Date: 06/12/2012

MASS AND METAL BALANCES

Jig Product	Mass	Mass	Cum	MnO				SiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
Stratum 1	3.32	16.4	16.4	2.64	4.89	8.87	100.0	43.4	19.2	37.1	100.0
Stratum 2	3.14	15.5	31.9	3.19	5.58	10.1	95.1	40.3	16.8	35.9	80.8
Stratum 3	3.48	17.2	49.1	3.62	7.03	11.7	89.5	39.6	18.4	34.9	64.0
Stratum 4	3.13	15.5	64.6	3.42	5.97	14.4	82.5	40.2	16.8	33.3	45.6
Stratum 5	3.00	14.8	79.4	3.28	5.48	19.2	76.5	40.3	16.1	30.2	28.8
Stratum 6	1.16	5.75	85.2	6.28	4.08	30.6	71.1	36.0	5.58	23.0	12.7
Stratum 7	3.00	14.8	100.0	40.1	67.0	40.1	67.0	17.9	7.14	17.9	7.14
Calc'd Head	20.2	100.0		8.87	100.0			37.1	100.0		
Assay Head				8.16				36.4			

Jig Product	Mass	Mass	Cum	Al ₂ O ₃				TiO ₂			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
Stratum 1	3.32	16.4	16.4	2.60	18.8	2.27	100.0	0.08	18.7	0.07	100.0
Stratum 2	3.14	15.5	31.9	2.29	15.6	2.21	81.2	0.07	15.4	0.07	81.3
Stratum 3	3.48	17.2	49.1	2.35	17.8	2.19	65.6	0.08	19.6	0.07	65.9
Stratum 4	3.13	15.5	64.6	2.45	16.7	2.14	47.8	0.07	15.4	0.06	46.4
Stratum 5	3.00	14.8	79.4	2.36	15.4	2.00	31.1	0.07	14.7	0.06	31.0
Stratum 6	1.16	5.75	85.2	2.20	5.57	1.74	15.7	0.07	5.72	0.06	16.2
Stratum 7	3.00	14.8	100.0	1.56	10.2	1.56	10.2	0.05	10.5	0.05	10.5
Calc'd Head	20.2	100.0		2.27	100.0			0.07	100.0		
Assay Head				2.33				0.08			

Jig Product	Mass	Mass	Cum	Fe				CaO			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
Stratum 1	3.32	16.4	16.4	1.21	16.1	1.24	100.0	25.1	16.6	24.8	100.0
Stratum 2	3.14	15.5	31.9	1.18	14.8	1.24	83.9	26.6	16.6	24.7	83.4
Stratum 3	3.48	17.2	49.1	1.15	16.0	1.26	69.2	27.0	18.8	24.3	66.7
Stratum 4	3.13	15.5	64.6	1.21	15.1	1.29	53.2	26.6	16.6	23.4	48.0
Stratum 5	3.00	14.8	79.4	1.13	13.5	1.33	38.0	26.7	16.0	22.0	31.3
Stratum 6	1.16	5.75	85.2	1.21	5.62	1.48	24.5	27.1	6.29	18.5	15.4
Stratum 7	3.00	14.8	100.0	1.58	18.9	1.58	18.9	15.2	9.09	15.2	9.09
Calc'd Head	20.2	100.0		1.24	100.0			24.8	100.0		
Assay Head				1.33				25.3			

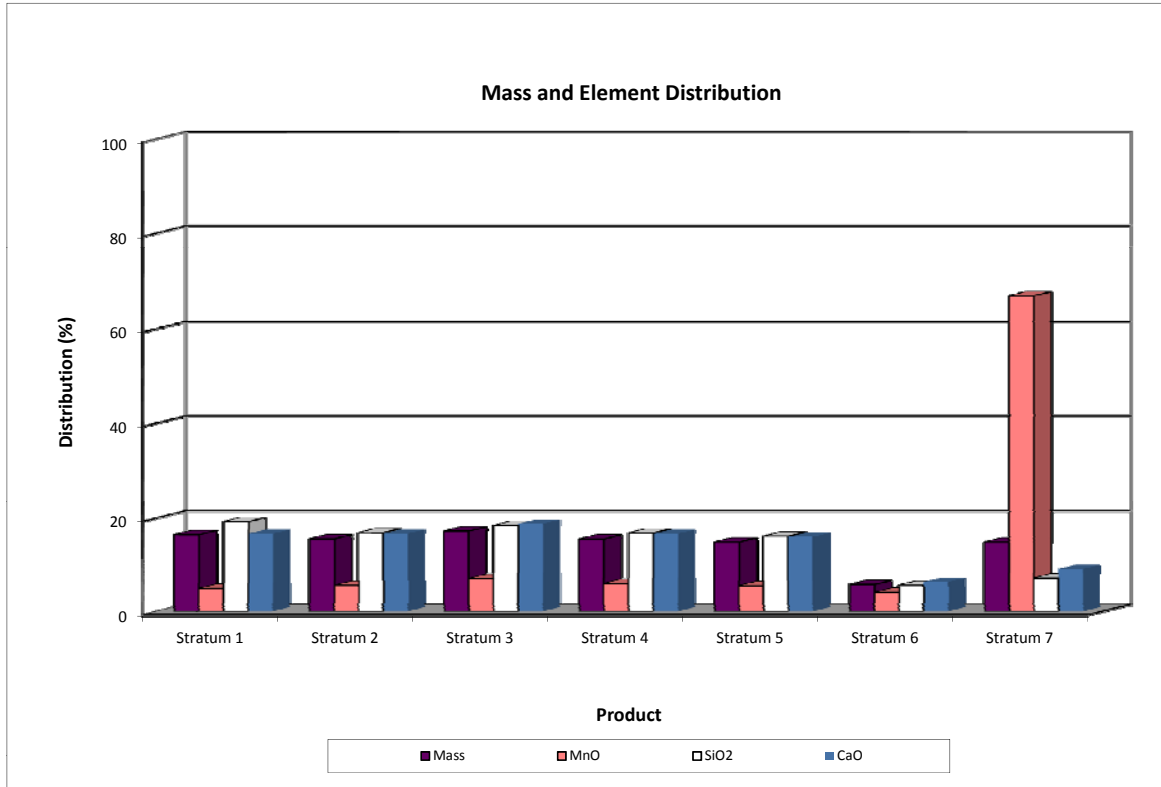
Jig Product	Mass	Mass	Cum	P				S			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
Stratum 1	3.32	16.4	16.4	0.04	19.0	0.04	100.0	0.02	17.2	0.02	100.0
Stratum 2	3.14	15.5	31.9	0.04	16.2	0.03	81.0	0.02	16.3	0.02	82.8
Stratum 3	3.48	17.2	49.1	0.04	17.5	0.03	64.8	0.02	19.1	0.02	66.5
Stratum 4	3.13	15.5	64.6	0.04	16.2	0.03	47.3	0.02	16.3	0.02	47.4
Stratum 5	3.00	14.8	79.4	0.04	15.9	0.03	31.1	0.02	15.6	0.01	31.1
Stratum 6	1.16	5.75	85.2	0.03	5.53	0.03	15.2	0.02	6.40	0.01	15.5
Stratum 7	3.00	14.8	100.0	0.02	9.63	0.02	9.63	0.01	9.15	0.01	9.15
Calc'd Head	20.2	100.0		0.04	100.0			0.02	100.0		
Assay Head				0.03				0.02			

Jig Product	Mass	Mass	Cum	MgO				K ₂ O			
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	%	Dist.	Cum.%	Cum. Dist
Stratum 1	3.32	16.4	16.4	1.61	17.4	1.52	100.0	0.64	18.4	0.57	100.0
Stratum 2	3.14	15.5	31.9	1.58	16.1	1.50	82.6	0.58	15.7	0.56	81.6
Stratum 3	3.48	17.2	49.1	1.64	18.6	1.48	66.5	0.60	18.0	0.55	65.9
Stratum 4	3.13	15.5	64.6	1.61	16.4	1.43	47.9	0.62	16.8	0.54	47.9
Stratum 5	3.00	14.8	79.4	1.63	15.9	1.35	31.5	0.60	15.5	0.50	31.1
Stratum 6	1.16	5.75	85.2	1.62	6.14	1.15	15.6	0.57	5.73	0.43	15.6
Stratum 7	3.00	14.8	100.0	0.97	9.46	0.97	9.46	0.38	9.83	0.38	9.83
Calc'd Head	20.2	100.0		1.52	100.0			0.57	100.0		
Assay Head				1.58				N/A			

Jig Product	Mass	Mass	Cum	Cl				LOI
	kg	%	%	%	Dist.	Cum. %	Cum. Dist	1000°
Stratum 1	3.32	16.4	16.4	0.02	16.5	0.02	100.0	21.9
Stratum 2	3.14	15.5	31.9	0.01	13.6	0.02	83.5	23.1
Stratum 3	3.48	17.2	49.1	0.02	18.4	0.02	69.8	23.3
Stratum 4	3.13	15.5	64.6	0.02	14.6	0.02	51.5	23.1
Stratum 5	3.00	14.8	79.4	0.02	14.9	0.02	36.9	23.2
Stratum 6	1.16	5.75	85.2	0.02	6.15	0.02	22.0	23.8
Stratum 7	3.00	14.8	100.0	0.02	15.8	0.02	15.8	18.4
Calc'd Head	20.2	100.0		0.02	100.0			22.3
Assay Head				N/A				N/A

Jigging Results

Client:	International Geoscience
Job No:	0112MP
Sample ID:	Manganese Composite
Size Fraction:	-6.3 mm +2.0 mm
Date:	06/12/2012





*SGS Lakefield Orestest Job No: 0112MP
Client : International Geoscience
Project: Metallurgical Testwork On Manganese Ore From
Victoria River*

Appendix F : Shaking Table Test Data



Wet Shaking Table Test Results

Client:	International Geoscience
Job No:	0112MP
Sample ID:	Mn Composite
Crush/Grind Size:	-2 mm Fraction
Date:	20/11/2012

OBJECTIVES
Sighter wet table test.
Assess potential for manganese recovery and removal of waste by gravity separation.

MASS AND METAL BALANCES

PRODUCT	MASS			MnO				SiO ₂				Al ₂ O ₃				TiO ₂			
	g	%	Cum%	%	%dist	Cum %	Cum %dist	%	%dist	Cum%	Cum%dist	%	%dist	Cum%	Cum%dist	%	%dist	Cum %	Cum%dist
Concentrate 1	3,150.6	22.7	22.7	15.7	42.6	15.7	42.6	28.7	17.7	28.7	17.7	2.11	17.1	2.11	17.1	0.11	20.1	0.11	20.1
Concentrate 2	5,469.9	39.4	62.1	5.79	27.3	9.41	69.8	36.7	39.4	33.8	57.1	2.39	33.6	2.29	50.7	0.08	25.3	0.09	45.4
Concentrate 3	1,987.6	14.3	76.4	3.05	5.22	8.22	75.0	45.5	17.7	36.0	74.9	3.16	16.1	2.45	66.8	0.13	15.0	0.10	60.4
Middlings	929.3	6.69	83.1	4.15	3.32	7.89	78.4	42.8	7.80	36.5	82.7	3.49	8.34	2.53	75.2	0.18	9.69	0.10	70.1
Tailings	2,349.9	16.9	100.0	10.7	21.6	8.37	100.0	37.6	17.3	36.7	100.0	4.11	24.8	2.80	100.0	0.22	29.9	0.12	100.0
Calc'd Head	13,887.3	100.0		8.37	100.0			36.7	100.0			2.80	100.0			0.12	100.0		
Assay Head				7.73				36.2				2.74				0.13			

PRODUCT	MASS			Fe				CaO				P				S			
	g	%	Cum%	%	%dist	Cum %	Cum %dist	%	%dist	Cum %	Cum%dist	%	%dist	Cum %	Cum%dist	%	%dist	Cum %	Cum%dist
Concentrate 1	3,150.6	22.7	22.7	3.01	30.3	3.01	30.3	23.6	22.6	23.6	22.6	0.03	17.2	0.03	17.2	0.02	24.2	0.02	24.2
Concentrate 2	5,469.9	39.4	62.1	1.61	28.1	2.12	58.4	26.6	44.3	25.5	66.9	0.03	36.7	0.03	53.9	0.02	38.4	0.02	62.7
Concentrate 3	1,987.6	14.3	76.4	1.74	11.0	2.05	69.4	22.3	13.5	24.9	80.4	0.04	17.5	0.03	71.5	0.02	11.3	0.02	74.0
Middlings	929.3	6.69	83.1	2.26	6.70	2.07	76.1	21.8	6.16	24.7	86.6	0.04	7.80	0.03	79.3	0.02	5.60	0.02	79.6
Tailings	2,349.9	16.9	100.0	3.19	23.9	2.26	100.0	18.8	13.4	23.7	100.0	0.04	20.7	0.03	100.0	0.03	20.4	0.02	100.0
Calc'd Head	13,887.3	100.0		2.26	100.0			23.7	100.0			0.03	100.0			0.02	100.0		
Assay Head				2.34				24.20				0.04				0.02			

PRODUCT	MASS			MgO				K ₂ O				Na ₂ O				LOI
	g	%	Cum%	%	%dist	Cum %	Cum %dist	%	%dist	Cum%	Cum%dist	%	%dist	Cum%	Cum%dist	1000°
Concentrate 1	3,150.6	22.7	22.7	1.56	19.7	1.56	19.7	0.52	18.6	0.52	18.6	0.03	15.4	0.03	15.4	21.9
Concentrate 2	5,469.9	39.4	62.1	1.65	36.2	1.62	55.8	0.60	37.2	0.57	55.8	0.01	8.92	0.02	24.3	23.2
Concentrate 3	1,987.6	14.3	76.4	1.88	15.0	1.67	70.8	0.69	15.6	0.59	71.4	0.04	13.0	0.02	37.3	20.5
Middlings	929.3	6.69	83.1	2.20	8.19	1.71	79.0	0.69	7.28	0.60	78.7	0.11	16.7	0.03	54.0	20.8
Tailings	2,349.9	16.9	100.0	2.23	21.0	1.80	100.0	0.80	21.3	0.63	100.0	0.12	46.0	0.04	100.0	19.7
Calc'd Head	13,887.3	100.0		1.80	100.0			0.63	100.00			0.04	100.0			21.8
Assay Head				1.82				N/A				N/A				N/A

PRODUCT	MASS			UPGRADE RATIO										
	g	%	Cum%	MnO	SiO ₂	Al ₂ O ₃	TiO ₂	Fe	CaO	P	S	MgO	K ₂ O	Na ₂ O
Concentrate 1	3,150.6	22.7	22.7	1.88	0.78	0.75	0.88	1.33	1.00	0.76	1.07	0.87	0.82	0.68
Concentrate 2	5,469.9	39.4	62.1	0.69	1.00	0.85	0.64	0.71	1.12	0.93	0.98	0.92	0.95	0.23
Concentrate 3	1,987.6	14.3	76.4	0.36	1.24	1.13	1.05	0.77	0.94	1.22	0.79	1.05	1.09	0.91
Middlings	929.3	6.69	83.1	0.50	1.17	1.25	1.45	1.00	0.92	1.17	0.84	1.22	1.09	2.49
Tailings	2,349.9	16.9	100.0	1.28	1.02	1.47	1.77	1.41	0.79	1.22	1.21	1.24	1.26	2.72



Wet Shaking Table Test Results

Client: International Geoscience
Job No: 0112MP
Sample ID: **Mn Composite**
Crush/Grind Size: **-2 mm Fraction**
Date: 20/11/2012

OBJECTIVES
Sighter wet table test.
Assess potential for manganese recovery and removal of waste by gravity separation.



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