



Metallurgical Testwork relating to the Development of the Blötberget Iron Ore Deposit, Sweden

Phase 2 – Bench scale Variability testing

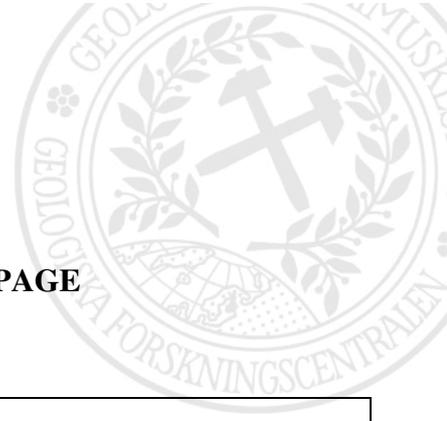
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GEOLOGICAL SURVEY OF FINLAND
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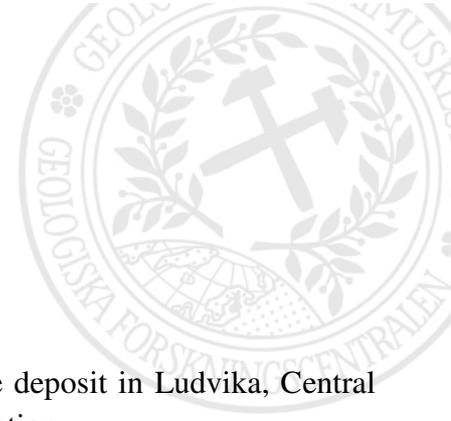


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EXECUTIVE SUMMARY

Nordic Iron Ore AB (NIO) are aiming to redevelop the Blötberget iron ore deposit in Ludvika, Central Sweden, which was the site of a historical underground iron ore mining operation.

This Report presents the results of a series of bench-scale tests aimed at determining the metallurgical response of a range of different ore samples to a proposed flowsheet.

The Table below presents a comprehensive summary of the concentrate data obtained during this phase of the testwork.

| Sample Origin | Feed | Product | | | | | | | |
|-------------------------------------|-------------------|-----------|--------------------|---------|------|-------------------|-------|-------------------|-------|
| | %Fe | Yield wt% | Type | Size | %Fe | %SiO ₂ | %P | %TiO ₂ | %V |
| Kalvgruvan 'BB12015-MET003' | 54.0* (52.2**) | 73.1 | Flot. Conc. | <0.1mm | 71.3 | 1.19 | <0.01 | 0.11 | 0.110 |
| Hugget '2' | 37.2* (35.9**) | 17.0 | ST/LIMS Conc. | <1.18mm | 70.0 | 2.07 | 0.03 | 0.13 | 0.048 |
| | | 5.6 | ST/LIMS Conc. | <0.15mm | 68.7 | 3.78 | 0.013 | 0.09 | 0.041 |
| | | 25.5 | ST/Flot Conc. | <0.1mm | 65.5 | 4.36 | 0.065 | <u>0.37</u> | 0.089 |
| | | 48.1 | <i>Combined</i> | | 67.5 | 3.48 | 0.05 | 0.25 | 0.07 |
| Flygruvan 'Composite L295 436' | 30.4* (27.9**) | 18.8 | ST/LIMS Conc. | <1.18mm | 66.0 | 5.74 | 0.15 | 0.21 | 0.055 |
| | | 13.3 | ST/LIMS Conc. | <0.15mm | 67.5 | 4.78 | 0.05 | 0.19 | 0.056 |
| | | 6.8 | ST/HGMS Conc. | <0.1mm | 66.0 | 2.60 | 0.09 | <u>0.82</u> | 0.072 |
| | | 38.9 | <i>Combined</i> | | 66.5 | 4.86 | 0.11 | 0.31 | 0.06 |
| Flygruvan 'BB12015-MET003' | 35.0* (33.8**) | 33.3 | LIMS Conc. | <0.15mm | 71.2 | 1.59 | <0.01 | <0.01 | 0.020 |
| | | 12.6 | HGMS Conc. | <0.1mm | 64.1 | 4.89 | 0.05 | <u>0.69</u> | 0.042 |
| | | 45.9 | <i>Combined</i> | | 69.3 | 2.50 | <0.02 | <0.2 | 0.03 |
| Kalvgruvan, 'Composite L295 435' | 49.9* (46.1**) | 68.4 | LIMS/Flot Conc. | <0.15mm | 68.9 | 3.49 | 0.017 | 0.23 | 0.114 |
| Guld Kannan, 'Sample L295 444' | 48.2* (45.4**) | 60.8 | LIMS/Flot Conc. | <0.1mm | 70.8 | 1.41 | <0.01 | 0.20 | 0.13 |

* back-calculated, **assayed

Legend:

ST ... Shaking Table

LIMS ... Low Intensity Magnetic Separation

HGMS ... High Gradient Magnetic Separation

Flot ... Flotation

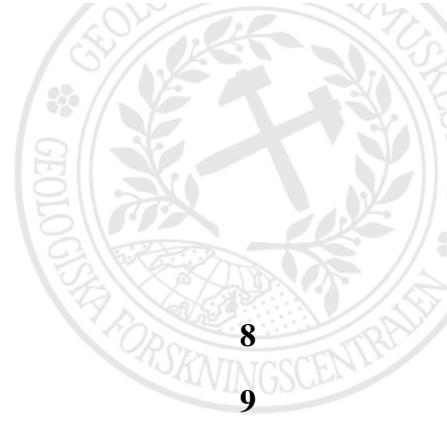
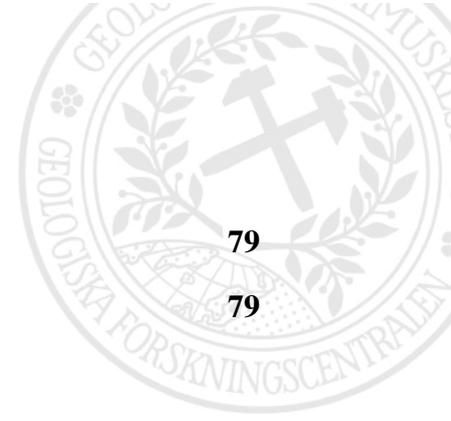


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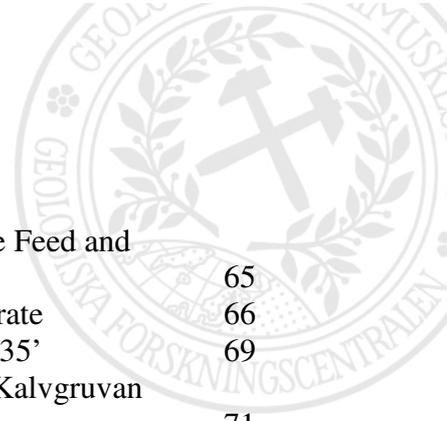


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1 INTRODUCTION

GTK Mintec was appointed by Nordic Iron Ore AB (NIO) to carry out a programme of mineral processing testwork relating to the development of the Blötberget iron ore deposit in Ludvika, Central Sweden.

The GTK Mineral Processing Laboratory (GTK Mintec), located in Outokumpu/Finland, is a renowned test centre specialised in the characterisation and processing of mineral ores. It offers a wide range of services including mineralogical studies, bench scale beneficiation testwork and pilot testing for a wide range of minerals, including iron ores.

This Report presents the results of a series of bench-scale tests aimed at confirming the validity of the proposed flowsheet for a range of different ore types.

Phase 2 of the programme of metallurgical testing commenced in May 2014 and was completed in October 2014. The testwork was overseen by Tata Steel UK Consulting Ltd (TSC) acting on behalf of NIO.



2 SAMPLES FOR TESTING

2.1 Sample Origin

A total of six (6) samples were subjected to bench scale testing as part of this 'variability testwork' programme. These are presented below in the order in which they were tested.

2.1.1 Kalvgruvan, 'BB12015-MET003'

A single composite was formed by combining intersects 420.30m to 452.45m of HQ half core from drill hole 'BB12015-MET003' as provided to GTK Mintec. At this depth interval, the hole is understood to have intercepted the Kalvgruvan ore body.

The composite sample, approximately 294kg in weight, was crushed to <20mm using a laboratory jaw crusher and a representative sub-sample (18kg) split out for metallurgical testing.

The detailed work flow is presented in Section 5.1.

2.1.2 Hugget, '2'

This composite was made up from core 'coarse assay rejects' (crushed to <5mm at ALS as part of assaying methodology) from drill holes intercepting Hugget. No further information was provided. A total of 20kg of composite was prepared by the Client (Nordic Iron Ore) and processed by GTK Mintec 'as received'.

The detailed work flow is presented in Section 5.2.

2.1.3 Flygruvan, 'Drill core composite L295 436'

This composite was made up from core 'coarse assay rejects' (crushed to <5mm at ALS as part of assaying methodology) from drill holes BB12004, BB12005 and BB_67-168. A total of 20kg of composite was prepared by the Client (Nordic Iron Ore) and processed by GTK Mintec 'as received'.

The detailed work flow is presented in Section 5.3.

2.1.4 Flygruvan, 'BB12015-MET003' ('Sandvik rejects')

Material (17kg) which had been sent away for crushing characteristics and abrasion testwork (refer to Section 4.5 of the Phase 1 Report for details) was reclaimed from Sandvik and used for validation of the metallurgical response of this ore sample to a revised flowsheet (no coarse concentrate production, introduction of wet HIMS/HGMS).

The detailed work flow is presented in Section 5.4.

2.1.5 Kalvgruvan, 'Drill core composite L295 435'

This composite was made up from core 'coarse assay rejects' (crushed to <5mm at ALS as part of assaying methodology) from drill holes BB12004, BB12005 and BB_67-168. A total of 20kg of composite was prepared by the Client (Nordic Iron Ore) and processed by GTK Mintec 'as received'.

The detailed work flow is presented in Section 5.5.

2.1.6 Guldkannan, 'Sample L295444'

Guldkannan is believed to be a surface extension of the Sandell ore body.

It is understood that this sample was taken from a larger bulk sample which originated from Guldkannan and was temporarily stored at Iviken.

Guldkannan was received in the form of rock samples. The preparation included jaw crushing followed by roller crushing and screening down to about 5mm top size.

The detailed work flow is presented in Section 5.6.

3 SCOPE OF WORK

For the reader's convenience, a visualisation of the work flows is shown at the beginning of each 'Results' section in Chapter 5. As an example, the detailed work flow for sample 'Kalvgruvan, BB12015-MET003' is presented in Section 5.1.

It must be noted that the methodology was adapted on several occasions throughout the programme to reflect advancements in the understanding of the mineral resource and the associated ore mineralogy as well as the process design prevalent at the time. This included:

- a) Elimination of 'Coarse Concentrate' production
- b) Introduction of wet high intensity magnetic separation (HIMS, or HGMS) for treatment of hematite (pre-)concentrates
- c) Introduction of reverse phosphate flotation for final concentrates (as and when required)
- d) Change of primary grind target size from <1.18mm to <0.7mm

4 TEST METHODOLOGY AND EQUIPMENT

The reader is here referred to Chapter 4 (pages 18-29) of the Phase 1 Report ('Bench scale testing of Flygruvan composite sample originating from BB12015-MET003', dated 03/11/2014) which discusses the analytical methods, sample preparation and test methodology employed by GTK Mintec in great detail.

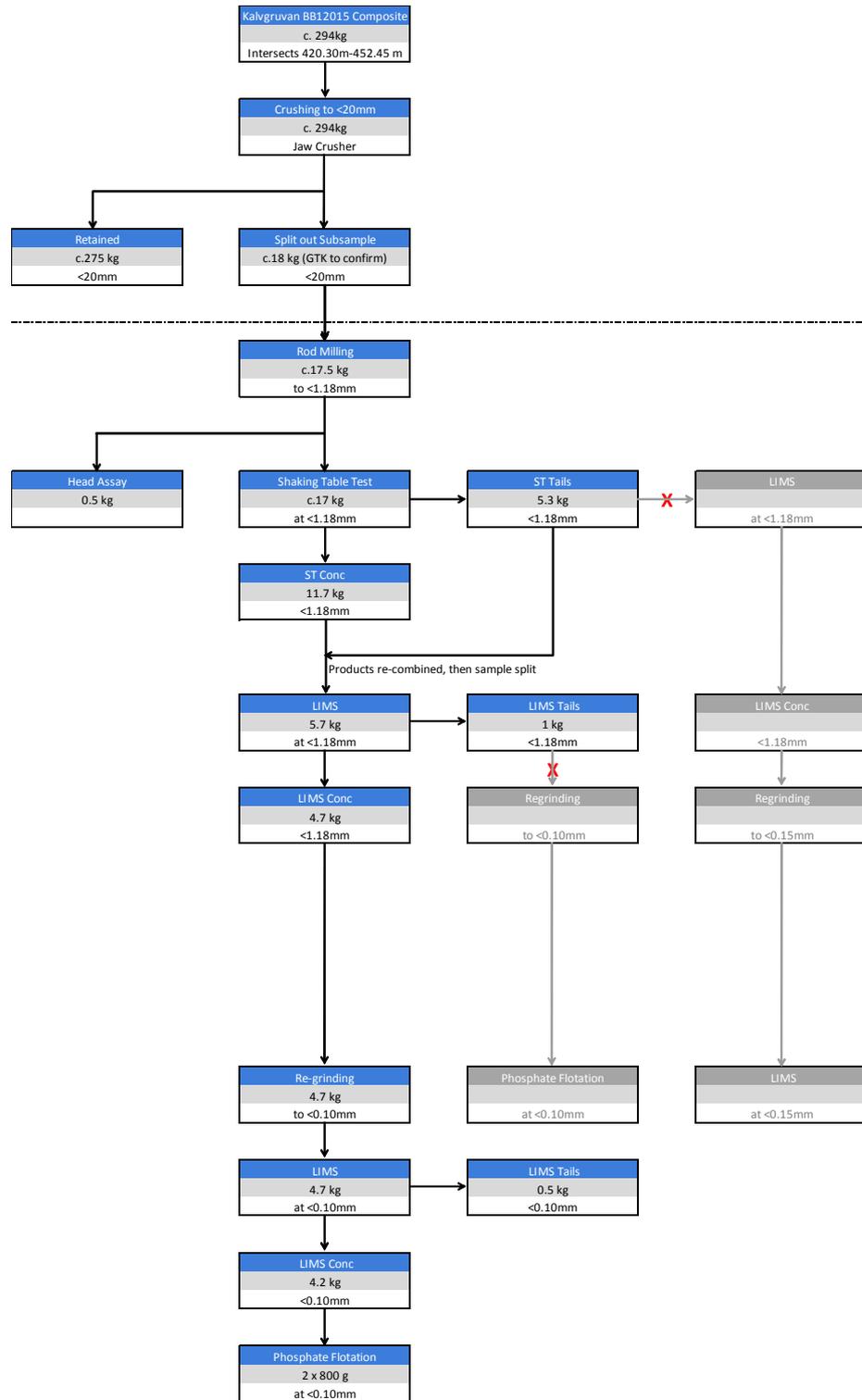
Where additional explanation or commentary was deemed necessary, this was provided in the relevant Sections of the following Chapter 5 'Results'.



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5 TEST RESULTS AND DISCUSSION

5.1 Kalvgruvan, 'BB12015-MET003'





08.01.2015

5.1.1 Head Assay

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 28.5.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 119902
Method : 180X-O
Date : 28.5.2014
Comment : **NIO, Variability Tests / Kalvgruvan Feed Sample (Magnetite-rich Composite) - analysis request 27.5.2014**

Contents (%)

| | Feed A L14037680 | Feed B L14037681 | Average Feed |
|--------------------------------|---------------------|---------------------|-----------------|
| SiO ₂ | 17.5000 | 16.4000 | 16.9500 |
| TiO ₂ | 0.1670 | 0.1470 | 0.1570 |
| Al ₂ O ₃ | 3.1900 | 2.9200 | 3.0550 |
| Cr ₂ O ₃ | 0.0035 | 0.0048 | 0.0042 |
| V ₂ O ₃ | 0.1420 | 0.1430 | 0.1425 |
| MnO | 0.0710 | 0.0760 | 0.0735 |
| MgO | 3.8600 | 3.8600 | 3.8600 |
| CaO | 2.2500 | 2.2200 | 2.2350 |
| Pb ₂ O | 0.0120 | 0.0120 | 0.0120 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0060 | 0.0080 | 0.0070 |
| Na ₂ O | 0.6900 | 0.5900 | 0.6400 |
| K ₂ O | 0.3310 | 0.2820 | 0.3065 |
| ZrO ₂ | 0.0060 | 0.0060 | 0.0060 |
| P ₂ O ₅ | 1.1900 | 1.2600 | 1.2250 |
| Cu | 0.0000 | 0.0010 | 0.0005 |
| Ni | 0.0080 | 0.0070 | 0.0075 |
| Co | 0.0130 | 0.0080 | 0.0105 |
| Zn | 0.0090 | 0.0090 | 0.0090 |
| Pb | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0030 | 0.0035 |
| S | 0.0060 | 0.0040 | 0.0050 |
| As | 0.0000 | 0.0000 | 0.0000 |
| Sb | 0.0090 | 0.0090 | 0.0090 |
| Bi | 0.0030 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0058 | 0.0056 | 0.0057 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0030 | 0.0025 |
| W | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0120 | 0.0080 | 0.0100 |
| Th | 0.0040 | 0.0050 | 0.0045 |
| U | 0.0067 | 0.0069 | 0.0068 |
| Cs | 0.0020 | 0.0020 | 0.0020 |
| La | 0.0110 | 0.0130 | 0.0120 |
| Ce | 0.0210 | 0.0210 | 0.0210 |
| Ta | 0.0070 | 0.0060 | 0.0065 |
| Ga | 0.0047 | 0.0043 | 0.0045 |
| Si | 8.1800 | 7.6700 | 7.9250 |
| Ti | 0.1000 | 0.0880 | 0.0940 |
| Cr | 0.0024 | 0.0033 | 0.0029 |
| V | 0.0960 | 0.0970 | 0.0965 |
| Fe | 51.6000 | 52.7000 | 52.1500 |
| Eltra S | 0.0159 | 0.0179 | 0.0169 |
| Satmagan | 71.67 | 73.44 | 72.56 |

5.1.2 Shaking Table Test, <1.18mm

Table 1: Metallurgical Balance, Shaking Table Test on <1.18mm 'Kalvgruvan BB12015-MET003' sample

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|-----------------------|-------|--|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | | |
| Concentrate | | 11708.4 | 68.7 | 67.0 | 87.0 | 4.38 | 18.3 | 0.69 | 38.0 | 1.24 | 24.3 | 0.059 | 58.2 | 0.77 | 18.3 | 0.91 | 27.1 | 0.05 | 6.3 | 0.043 | 8.8 | 0.003 | 39.2 | 94.1 | 88.1 |
| Middling | | 3969.8 | 23.3 | 20.7 | 9.1 | 44.8 | 63.6 | 2.42 | 45.1 | 7.96 | 52.8 | 0.085 | 28.4 | 7.67 | 62.0 | 5.51 | 55.7 | 1.84 | 78.9 | 0.95 | 66.1 | 0.010 | 44.3 | 26.7 | 8.5 |
| (Conc + Middling) | | 15678.2 | 92.0 | 55.3 | 96.1 | 14.6 | 81.9 | 1.13 | 83.1 | 2.94 | 77.1 | 0.066 | 86.7 | 2.52 | 80.3 | 2.07 | 82.8 | 0.50 | 85.3 | 0.273 | 74.9 | 0.005 | 83.5 | 77.0 | 96.6 |
| Tailing 1 | | 1314.0 | 7.7 | 25.8 | 3.8 | 37.2 | 17.5 | 2.63 | 16.2 | 10.0 | 22.0 | 0.115 | 12.7 | 7.11 | 19.0 | 4.93 | 16.5 | 1.01 | 14.3 | 1.06 | 24.4 | 0.010 | 14.7 | 31.4 | 3.3 |
| Conc + Middl. + Tails 1 | | 16992.2 | 99.7 | 53.0 | 99.9 | 16.4 | 99.4 | 1.24 | 99.3 | 3.49 | 99.1 | 0.069 | 99.4 | 2.87 | 99.3 | 2.30 | 99.3 | 0.54 | 99.6 | 0.334 | 99.4 | 0.005 | 98.2 | 73.5 | 99.9 |
| Tailing 2 | | 44.6 | 0.3 | 23.7 | 0.1 | 36.2 | 0.6 | 3.25 | 0.7 | 12.1 | 0.9 | 0.154 | 0.6 | 7.36 | 0.7 | 5.89 | 0.7 | 0.81 | 0.4 | 0.83 | 0.6 | 0.036 | 1.8 | 26.4 | 0.1 |
| Calc'd Feed | | 17036.8 | 100.0 | 52.9 | 100.0 | 16.4 | 100.0 | 1.25 | 100.0 | 3.51 | 100.0 | 0.070 | 100.0 | 2.88 | 100.0 | 2.30 | 100.0 | 0.54 | 100.0 | 0.335 | 100.0 | 0.005 | 100.0 | 73.4 | 100.0 |
| Feed Assays | | | | 52.2 | | 17.0 | | 1.23 | | 3.86 | | 0.074 | | 3.06 | | 2.24 | | 0.64 | | 0.307 | | 0.017 | | 72.6 | |

A concentrate sub-sample was screened into the following size fractions, sampled and submitted for the chemistry:

- +0.63mm;
- -0.63+0.5mm;
- -0.5mm+0.315mm;
- -0.315mm+0.1mm;
- -0.1mm.

The results are presented in Table 2.

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 9.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 119999
Method : 180X-O
Date : 9.6.2014
Comment : NIO Variability / Kalvgruvan / Shaking table test; analysis request 9.6.2014

Contents (%)

| | Conc L14040029 | Middling L14040030 | Tails-1 L14040031 | Tails-2 L14040032 |
|--------------------------------|-------------------|-----------------------|----------------------|----------------------|
| SiO ₂ | 4.3800 | 44.8000 | 37.2000 | 36.2000 |
| TiO ₂ | 0.1210 | 0.2380 | 0.2620 | 0.3190 |
| Al ₂ O ₃ | 0.7700 | 7.6700 | 7.1100 | 7.3600 |
| Cr ₂ O ₃ | 0.0060 | 0.0140 | 0.0320 | 0.0440 |
| V ₂ O ₃ | 0.1630 | 0.0600 | 0.0740 | 0.0720 |
| MnO | 0.0590 | 0.0850 | 0.1150 | 0.1540 |
| MgO | 1.2400 | 7.9600 | 10.0000 | 12.1000 |
| CaO | 0.9100 | 5.5100 | 4.9300 | 5.8900 |
| Rb ₂ O | 0.0110 | 0.0110 | 0.0140 | 0.0120 |
| SrO | 0.0000 | 0.0021 | 0.0000 | 0.0012 |
| BaO | 0.0040 | 0.0160 | 0.0110 | 0.0190 |
| Na ₂ O | 0.0500 | 1.8400 | 1.0100 | 0.8100 |
| K ₂ O | 0.0430 | 0.9500 | 1.0600 | 0.8300 |
| ZrO ₂ | 0.0010 | 0.0110 | 0.0170 | 0.0170 |
| P ₂ O ₅ | 0.6900 | 2.4200 | 2.6300 | 3.2500 |
| Cu | 0.0020 | 0.0030 | 0.0020 | 0.0150 |
| Ni | 0.0100 | 0.0070 | 0.0160 | 0.0230 |
| Co | 0.0010 | 0.0040 | 0.0040 | 0.0070 |
| Zn | 0.0090 | 0.0050 | 0.0100 | 0.0270 |
| Pb | 0.0000 | 0.0040 | 0.0020 | 0.0110 |
| Ag | 0.0050 | 0.0040 | 0.0030 | 0.0040 |
| S | 0.0040 | 0.0100 | 0.0110 | 0.0500 |
| As | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| Sb | 0.0050 | 0.0110 | 0.0100 | 0.0160 |
| Bi | 0.0020 | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0021 | 0.0130 | 0.0160 | 0.0200 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0015 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0180 |
| Sn | 0.0000 | 0.0040 | 0.0040 | 0.0070 |
| W | 0.0000 | 0.0000 | 0.0010 | 0.0010 |
| Cl | 0.0040 | 0.0220 | 0.0250 | 0.0240 |
| Th | 0.0042 | 0.0040 | 0.0046 | 0.0044 |
| U | 0.0081 | 0.0012 | 0.0031 | 0.0016 |
| Cs | 0.0020 | 0.0010 | 0.0030 | 0.0020 |
| La | 0.0080 | 0.0150 | 0.0260 | 0.0390 |
| Ce | 0.0130 | 0.0290 | 0.0490 | 0.0750 |
| Ta | 0.0030 | 0.0000 | 0.0000 | 0.0000 |
| Ga | 0.0039 | 0.0017 | 0.0024 | 0.0020 |
| Si | 2.0500 | 21.0000 | 17.4000 | 16.9000 |
| Ti | 0.0720 | 0.1430 | 0.1570 | 0.1910 |
| Cr | 0.0041 | 0.0095 | 0.0220 | 0.0300 |
| V | 0.1110 | 0.0410 | 0.0500 | 0.0490 |
| Fe | 67.0000 | 20.7000 | 25.8000 | 23.7000 |
| Satmagan | 94.72 | 26.67 | 31.44 | 26.36 |
| Eltra S | 0.003 | 0.010 | 0.010 | 0.036 |

Table 2: Size-by-size Chemical Analysis, <1.18mm Shaking Table Concentrate

| Sieve fraction µm | | Weight g wt.-% | | Grades & Distributions (XRF MP-10, Eltra S and Satmagan) | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------------|--------|---|--------|------------------|--------|-------------------------------|--------|------|--------|-------|--------|--------------------------------|--------|------|--------|-------------------|--------|------------------|--------|---------|--------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | | |
| Sample: NIO, Kalvgruvan, Shaking table Conc (< 1.18 mm) | | | | Notes: | | | | | | | | | | | | | | | | | | | | | |
| Project: 1281272 / 2402 | | | | Product fineness P(80) = 369 microns | | | | | | | | | | | | | | | | | | | | | |
| Date: 11.6.2014 | | | | Sieve fractions of the ST Conc product to chemical assaying | | | | | | | | | | | | | | | | | | | | | |
| Test: Shaking table test 6.6.2014 | | | | | | | | | | | | | | | | | | | | | | | | | |
| By: M. Kuusisto | | | | | | | | | | | | | | | | | | | | | | | | | |
| + 630 | | 15.6 | 4.19 | 60.30 | 3.8 | 10.40 | 10.2 | 0.92 | 5.6 | 2.55 | 9.0 | 0.064 | 4.4 | 1.47 | 8.3 | 1.40 | 6.3 | 0.14 | 13.0 | 0.125 | 12.0 | 0.010 | 4.2 | 79.89 | 3.6 |
| - 630 | | 356.6 | 95.81 | 67.33 | 96.2 | 4.01 | 89.8 | 0.68 | 94.4 | 1.12 | 91.0 | 0.060 | 95.6 | 0.71 | 91.7 | 0.91 | 93.7 | 0.04 | 87.0 | 0.040 | 88.0 | 0.010 | 95.8 | 94.41 | 96.4 |
| 500/630 | | 14.4 | 3.87 | 63.10 | 3.6 | 8.12 | 7.3 | 0.65 | 3.7 | 1.93 | 6.3 | 0.058 | 3.7 | 1.25 | 6.5 | 0.95 | 3.9 | 0.08 | 6.9 | 0.095 | 8.4 | 0.012 | 4.6 | 83.27 | 3.4 |
| + 500 | | 30.0 | 8.06 | 61.64 | 7.4 | 9.31 | 17.5 | 0.79 | 9.3 | 2.25 | 15.3 | 0.061 | 8.1 | 1.36 | 14.8 | 1.18 | 10.2 | 0.11 | 19.9 | 0.111 | 20.3 | 0.011 | 8.8 | 81.51 | 7.0 |
| - 500 | | 342.2 | 91.94 | 67.50 | 92.6 | 3.84 | 82.5 | 0.68 | 90.7 | 1.09 | 84.7 | 0.060 | 91.9 | 0.69 | 85.2 | 0.91 | 89.8 | 0.04 | 80.1 | 0.038 | 79.7 | 0.010 | 91.2 | 94.88 | 93.0 |
| 315/500 | | 62.8 | 16.87 | 65.40 | 16.5 | 6.05 | 23.9 | 0.55 | 13.5 | 1.48 | 21.1 | 0.058 | 16.2 | 0.98 | 22.2 | 0.82 | 14.8 | 0.07 | 26.2 | 0.069 | 26.6 | 0.012 | 20.2 | 89.59 | 16.1 |
| + 315 | | 92.8 | 24.93 | 64.19 | 23.9 | 7.10 | 41.4 | 0.63 | 22.8 | 1.73 | 36.4 | 0.059 | 24.3 | 1.10 | 37.0 | 0.94 | 25.0 | 0.08 | 46.0 | 0.082 | 46.9 | 0.012 | 29.0 | 86.98 | 23.1 |
| - 315 | | 279.4 | 75.07 | 67.98 | 76.1 | 3.34 | 58.6 | 0.71 | 77.2 | 1.00 | 63.6 | 0.061 | 75.7 | 0.625 | 63.0 | 0.93 | 75.0 | 0.03 | 54.0 | 0.031 | 53.1 | 0.010 | 71.0 | 96.07 | 76.9 |
| 100/315 | | 209.3 | 56.23 | 67.50 | 56.6 | 3.83 | 50.4 | 0.70 | 57.2 | 1.11 | 52.7 | 0.061 | 56.7 | 0.67 | 50.6 | 0.94 | 56.6 | 0.04 | 49.8 | 0.035 | 44.9 | 0.008 | 44.8 | 95.33 | 57.1 |
| + 100 | | 302.1 | 81.17 | 66.48 | 80.5 | 4.84 | 91.8 | 0.68 | 80.0 | 1.30 | 89.2 | 0.060 | 81.0 | 0.80 | 87.6 | 0.94 | 81.6 | 0.05 | 95.8 | 0.050 | 91.8 | 0.009 | 73.7 | 92.76 | 80.3 |
| - 100 | | 70.1 | 18.83 | 69.40 | 19.5 | 1.87 | 8.2 | 0.73 | 20.0 | 0.68 | 10.8 | 0.061 | 19.0 | 0.49 | 12.4 | 0.91 | 18.4 | 0.01 | 4.2 | 0.019 | 8.2 | 0.014 | 26.3 | 98.29 | 19.7 |
| Calc.Bulk | | 372.2 | 100.00 | 67.03 | 100.0 | 4.28 | 100.0 | 0.69 | 100.0 | 1.18 | 100.0 | 0.061 | 100.0 | 0.74 | 100.0 | 0.93 | 100.0 | 0.05 | 100.0 | 0.044 | 100.0 | 0.010 | 100.0 | 93.81 | 100.0 |
| Bulk Assay | | | | 67.00 | | 4.38 | | 0.69 | | 1.24 | | 0.059 | | 0.77 | | 0.91 | | 0.05 | | 0.043 | | 0.003 | | 94.72 | |

The results demonstrate the presence of interlocked iron oxide particles at particle sizes >0.1mm. The finest fraction (<0.1mm) shows satisfactory levels of Fe (69.4%) and silica (<2%) but %phosphorus is high at 0.32% (0.73% P₂O₅).



Labtium Oy
REPORT OF XRF ANALYSIS 11.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120011
Method : 180X-O
Date : 11.6.2014
Comment : NIO Variability / Kalvgruvan / Shaking table test Conc Size Fractions; analysis request 10.6.2014

Contents (%)

| | +630µm L14040456 | 500/630µm L14040457 | 315/500µm L14040458 | 100/315µm L14040459 | -100µm L14040460 |
|--------------------------------|---------------------|------------------------|------------------------|------------------------|---------------------|
| SiO ₂ | 10.4000 | 8.1200 | 6.0500 | 3.8300 | 1.8700 |
| TiO ₂ | 0.1600 | 0.1660 | 0.1500 | 0.1160 | 0.1150 |
| Al ₂ O ₃ | 1.4700 | 1.2500 | 0.9800 | 0.6700 | 0.4900 |
| Cr ₂ O ₃ | 0.0110 | 0.0120 | 0.0048 | 0.0041 | 0.0050 |
| V ₂ O ₃ | 0.1540 | 0.1570 | 0.1640 | 0.1670 | 0.1710 |
| MnO | 0.0640 | 0.0580 | 0.0580 | 0.0610 | 0.0610 |
| MgO | 2.5500 | 1.9300 | 1.4800 | 1.1100 | 0.6800 |
| CaO | 1.4000 | 0.9500 | 0.8200 | 0.9400 | 0.9100 |
| Rb ₂ O | 0.0120 | 0.0120 | 0.0120 | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0050 | 0.0050 | 0.0030 | 0.0040 | 0.0040 |
| Na ₂ O | 0.1400 | 0.0800 | 0.0700 | 0.0400 | 0.0100 |
| K ₂ O | 0.1250 | 0.0950 | 0.0690 | 0.0350 | 0.0190 |
| ZrO ₂ | 0.0040 | 0.0020 | 0.0040 | 0.0030 | 0.0020 |
| P ₂ O ₅ | 0.9200 | 0.6500 | 0.5500 | 0.7000 | 0.7300 |
| Cu | 0.0070 | 0.0020 | 0.0030 | 0.0000 | 0.0030 |
| Ni | 0.0090 | 0.0090 | 0.0100 | 0.0100 | 0.0090 |
| Co | 0.0070 | 0.0050 | 0.0040 | 0.0030 | 0.0030 |
| Zn | 0.0090 | 0.0120 | 0.0150 | 0.0080 | 0.0070 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0030 | 0.0040 | 0.0030 | 0.0040 | 0.0020 |
| S | 0.0050 | 0.0020 | 0.0020 | 0.0020 | 0.0040 |
| As | 0.0010 | 0.0000 | 0.0030 | 0.0020 | 0.0010 |
| Sb | 0.0070 | 0.0060 | 0.0060 | 0.0070 | 0.0070 |
| Bi | 0.0020 | 0.0020 | 0.0030 | 0.0040 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| Y | 0.0041 | 0.0033 | 0.0027 | 0.0025 | 0.0032 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0020 | 0.0020 | 0.0010 | 0.0020 |
| W | 0.0010 | 0.0000 | 0.0010 | 0.0010 | 0.0000 |
| Cl | 0.0060 | 0.0050 | 0.0030 | 0.0060 | 0.0040 |
| Th | 0.0047 | 0.0044 | 0.0038 | 0.0039 | 0.0050 |
| U | 0.0082 | 0.0077 | 0.0087 | 0.0089 | 0.0095 |
| Cs | 0.0040 | 0.0020 | 0.0030 | 0.0010 | 0.0030 |
| La | 0.0110 | 0.0060 | 0.0070 | 0.0070 | 0.0100 |
| Ce | 0.0170 | 0.0130 | 0.0110 | 0.0130 | 0.0210 |
| Ta | 0.0020 | 0.0000 | 0.0040 | 0.0020 | 0.0000 |
| Ga | 0.0047 | 0.0038 | 0.0037 | 0.0013 | 0.0039 |
| Si | 4.8600 | 3.8000 | 2.8300 | 1.7900 | 0.8700 |
| Ti | 0.0960 | 0.0990 | 0.0900 | 0.0700 | 0.0690 |
| Cr | 0.0078 | 0.0081 | 0.0033 | 0.0028 | 0.0034 |
| V | 0.1050 | 0.1070 | 0.1120 | 0.1130 | 0.1160 |
| Fe | 60.3000 | 63.1000 | 65.4000 | 67.5000 | 69.4000 |
| Satmagan | 79.89 | 83.27 | 89.59 | 95.33 | 98.29 |
| Eltra S | 0.010 | 0.012 | 0.012 | 0.008 | 0.014 |



5.1.3 Wet LIMS

Table 3: Metallurgical Balance, Wet LIMS on <1.18mm 'Kalygruvan BB12015-MET003' sample

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | |
|------------------------------|--------|-------------------------|-------|--|-------|------------------|-------|-------------------------------|-------|-------|-------|-------|-------|--------------------------------|-------|-------|-------|-------------------|-------|------------------|-------|---------|-------|----------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | |
| Mags 3 magnetite con. | 4223.2 | 74.16 | 70.80 | 97.2 | 1.40 | 6.8 | 0.217 | 12.0 | 0.38 | 9.5 | 0.052 | 54.3 | 0.42 | 11.8 | 0.258 | 7.6 | 0.01 | 1.7 | 0.014 | 3.0 | 0.019 | 64.9 | 97.91 | 99.8 |
| Non-Mags 2+3 | 502.7 | 8.83 | 6.52 | 1.1 | 53.20 | 30.8 | 6.36 | 42.0 | 11.10 | 32.9 | 0.152 | 18.9 | 7.02 | 23.5 | 10.30 | 36.2 | 0.87 | 17.9 | 0.96 | 24.1 | 0.041 | 16.6 | 0.78 | 0.1 |
| (Mags 1) | 4725.9 | 82.99 | 63.96 | 98.3 | 6.91 | 37.7 | 0.87 | 54.1 | 1.52 | 42.3 | 0.063 | 73.2 | 1.12 | 35.4 | 1.33 | 43.8 | 0.10 | 19.6 | 0.115 | 27.0 | 0.021 | 81.5 | 87.58 | 99.9 |
| Non-Mags 1 | 968.5 | 17.01 | 5.52 | 1.7 | 55.80 | 62.3 | 3.61 | 45.9 | 10.10 | 57.7 | 0.112 | 26.8 | 10.00 | 64.6 | 8.30 | 56.2 | 2.03 | 80.4 | 1.51 | 73.0 | 0.024 | 18.5 | 0.58 | 0.1 |
| Calc'd Feed | 5694.4 | 100.00 | 54.02 | 100.0 | 15.23 | 100.0 | 1.34 | 100.0 | 2.98 | 100.0 | 0.071 | 100.0 | 2.63 | 100.0 | 2.51 | 100.0 | 0.43 | 100.0 | 0.352 | 100.0 | 0.022 | 100.0 | 72.78 | 100.0 |
| Feed Assays | | | 52.15 | | 16.95 | | 1.23 | | 3.86 | | 0.074 | | 3.06 | | 2.24 | | 0.64 | | 0.307 | | 0.017 | | 72.56 | |

Multi-stage grinding and wet LIMS produced a magnetite concentrate grading 70.8% Fe and 1.4% SiO₂. Overall magnetite recovery was excellent (99.8%, see 'Satmagan' recovery figure).

The phosphorus content of the final LIMS concentrate was slightly elevated at 0.1% P (equivalent to 0.22% P₂O₅).

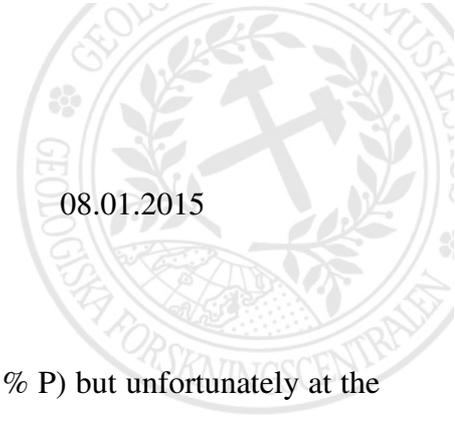
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Labtium Oy
REPORT OF XRF ANALYSIS 17.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120064
Method : 180X-O
Date : 17.6.2014
Comment : NIO Variability / Kalvgruvan / WLIMS Roughing-Cleaning; analysis request 17.6.2014

Contents (%)

| | Non-Mags 1 L14042069 | Non-Mags 2+3 L14042070 | Mags 3 L14042071 |
|----------|-------------------------|---------------------------|---------------------|
| SiO2 | 55.8000 | 53.2000 | 1.4000 |
| TiO2 | 0.2900 | 0.3080 | 0.1090 |
| Al2O3 | 10.0000 | 7.0200 | 0.4200 |
| Cr2O3 | 0.0170 | 0.0041 | 0.0058 |
| V2O3 | 0.0150 | 0.0180 | 0.1610 |
| MnO | 0.1120 | 0.1520 | 0.0520 |
| MgO | 10.1000 | 11.1000 | 0.3800 |
| CaO | 8.3000 | 10.3000 | 0.2580 |
| Rb2O | 0.0120 | 0.0098 | 0.0110 |
| SrO | 0.0066 | 0.0045 | 0.0000 |
| BaO | 0.0200 | 0.0150 | 0.0030 |
| Na2O | 2.0300 | 0.8700 | 0.0100 |
| K2O | 1.5100 | 0.9600 | 0.0140 |
| ZrO2 | 0.0190 | 0.0200 | 0.0020 |
| P2O5 | 3.6100 | 6.3600 | 0.2170 |
| Cu | 0.0020 | 0.0050 | 0.0020 |
| Ni | 0.0080 | 0.0100 | 0.0080 |
| Co | 0.0060 | 0.0090 | 0.0040 |
| Zn | 0.0080 | 0.0090 | 0.0080 |
| Pb | 0.0080 | 0.0070 | 0.0000 |
| Ag | 0.0020 | 0.0030 | 0.0030 |
| S | 0.0170 | 0.0340 | 0.0030 |
| As | 0.0000 | 0.0000 | 0.0000 |
| Sb | 0.0120 | 0.0120 | 0.0070 |
| Bi | 0.0030 | 0.0030 | 0.0020 |
| Te | 0.0020 | 0.0010 | 0.0000 |
| Y | 0.0200 | 0.0340 | 0.0001 |
| Nb | 0.0023 | 0.0022 | 0.0000 |
| Mo | 0.0005 | 0.0001 | 0.0000 |
| Sn | 0.0040 | 0.0050 | 0.0020 |
| W | 0.0000 | 0.0010 | 0.0000 |
| Cl | 0.0360 | 0.0370 | 0.0030 |
| Th | 0.0030 | 0.0048 | 0.0041 |
| U | 0.0000 | 0.0000 | 0.0084 |
| Cs | 0.0000 | 0.0010 | 0.0030 |
| La | 0.0250 | 0.0500 | 0.0030 |
| Ce | 0.0480 | 0.0970 | 0.0060 |
| Ta | 0.0010 | 0.0000 | 0.0000 |
| Ga | 0.0013 | 0.0019 | 0.0050 |
| Si | 26.1000 | 24.9000 | 0.6600 |
| Ti | 0.1740 | 0.1850 | 0.0660 |
| Cr | 0.0120 | 0.0028 | 0.0040 |
| V | 0.0100 | 0.0120 | 0.1100 |
| Fe | 5.5200 | 6.5200 | 70.8000 |
| Satmagan | 0.58 | 0.78 | 97.91 |
| Eltra S | 0.0238 | 0.0411 | 0.0191 |



08.01.2015

5.1.4 Reverse Flotation

Test No. 1 produced a concentrate with very low phosphorus content (<0.01% P) but unfortunately at the expense of product yield (c.81.4wt-% yield after first stage).

Table 4: Metallurgical Balance, Reverse Phosphate Flotation Test No. 1, <0.1mm LIMS Concentrate

| FLOTATION TEST REPORT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-------------|--------------------------------|--------------------|--------------------------|-----|---|-----------|-----------|--------------------|------------|------------|--------------|-------|--|--------------------|---------------------------------|-------|-------|----------------------------------|-------|---------------------|--------------------|-----------|------------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| | | Sample : WLIMS Magnetite Conc. | | Grinding : Mill : | | Remarks : Kalvgruvan magnetite rich ore sample | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Project : 1281272 / 2402 | | Charge : | | WLIMS cleaned magnetite product concentrate as the feed to flotation (batch size 800 g) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Date : 19/06/2014 | | Water : | | Apatite removal by reverse flotation (at pH9.0 to 9.5, plus close to 40 wt.-% feed solids at start) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Done by : MFK, MEK | | Fineness : P100 = 100 µm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test No. : 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Feed size < 100 µm | Condit. min | Reagents (g/t) | | | | Cell I | Air l/min | Rotor rpm | pH | Flot'n min | Product | Weight | | Grades and Recoveries (by XRF, Eltra S and Satmagan) | | | | | | | | | | | | | | | | | | | | | | |
| | | Water glass (5-%) | Atrac 1563 (100-%) | | | | | | | | | g | wt.-% | Fe % | SiO ₂ % | P ₂ O ₅ % | MgO % | MnO % | Al ₂ O ₃ % | CaO % | Na ₂ O % | K ₂ O % | Eltra S % | Satmagan % | | | | | | | | | | | | |
| | 10 | 500 | | | 1.5 | | 1100 | 7.5 | natural | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | | 50 | | | | | 9.6 | due to water glass | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | | 9.3 | | 2 | RF1 | 148.4 | 18.61 | 67.90 | 17.8 | 2.50 | 35.9 | 1.24 | 95.9 | 0.72 | 44.2 | 0.063 | 23.3 | 0.59 | 29.3 | 1.59 | 89.7 | 0.02 | 82.1 | 0.029 | 41.2 | 0.024 | 24.1 | 93.52 | 17.7 | |
| | | | | | | | | 9.3 | | | (RT1) | 648.9 | 81.39 | 71.58 | 82.2 | 1.02 | 64.1 | 0.012 | 4.1 | 0.21 | 55.8 | 0.047 | 76.7 | 0.33 | 70.7 | 0.042 | 10.3 | 0.00 | 17.9 | 0.009 | 58.8 | 0.017 | 75.9 | 99.59 | 82.3 | |
| | 2 | | 25 | | | | | 9.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | | 9.3 | | 2 | RF2 | 93.9 | 11.78 | 70.90 | 11.8 | 1.43 | 13.0 | 0.042 | 2.1 | 0.43 | 16.7 | 0.056 | 13.1 | 0.42 | 13.2 | 0.105 | 3.7 | 0.00 | 2.6 | 0.018 | 16.2 | 0.023 | 14.5 | 97.15 | 11.6 | |
| | | | | | | | | 9.3 | | | (RF1+2) | 242.3 | 30.39 | 69.06 | 29.6 | 2.09 | 48.9 | 0.78 | 98.0 | 0.61 | 60.9 | 0.060 | 36.4 | 0.52 | 42.5 | 1.01 | 93.5 | 0.01 | 84.7 | 0.025 | 57.4 | 0.023 | 38.6 | 94.93 | 29.3 | |
| | | | | | | | | 9.3 | | | Cell Conc. | 555.0 | 69.61 | 71.70 | 70.4 | 0.85 | 51.1 | 0.007 | 2.0 | 0.17 | 39.1 | 0.046 | 63.6 | 0.31 | 57.5 | 0.031 | 6.5 | 0.00 | 15.3 | 0.006 | 42.6 | 0.016 | 61.4 | 100.0 | 70.7 | |
| Totals | 17 | | 500 | 75 | | | | | | Total | 4 | Calc'd Head | 797.3 | 100.00 | 70.90 | 100.0 | 1.30 | 100.0 | 0.241 | 100.0 | 0.30 | 100.0 | 0.050 | 100.0 | 0.38 | 100.0 | 0.330 | 100.0 | 0.00 | 100.0 | 0.013 | 100.0 | 0.018 | 100.0 | 98.46 | 100.0 |
| | | | | | | | | | | | | Assayed Head | | | 70.80 | 1.40 | | 0.217 | | 0.38 | | 0.052 | | 0.42 | | 0.258 | | 0.01 | | 0.014 | | 0.019 | | 97.91 | | |



Labtium Oy
REPORT OF XRF ANALYSIS 23.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120087
Method : 180X-O
Date : 23.6.2014
Comment : NIO Variability / Kalvgruvan / Apatite removal from "Mags 3" concentrate; analysis request 19.6.2014

Contents (%)

| | RF1 L14042279 | RF2 L14042280 | Cell Conc. L14042281 |
|----------|------------------|------------------|-------------------------|
| SiO2 | 2.5000 | 1.4300 | 0.9500 |
| TiO2 | 0.1710 | 0.1260 | 0.0910 |
| Al2O3 | 0.5900 | 0.4200 | 0.3100 |
| Cr2O3 | 0.0110 | 0.0088 | 0.0069 |
| V2O3 | 0.1720 | 0.1600 | 0.1600 |
| MnO | 0.0630 | 0.0560 | 0.0460 |
| MgO | 0.7200 | 0.4300 | 0.1700 |
| CaO | 1.5900 | 0.1050 | 0.0310 |
| Rb2O | 0.0110 | 0.0100 | 0.0100 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0070 | 0.0040 | 0.0030 |
| Na2O | 0.0200 | 0.0000 | 0.0000 |
| K2O | 0.0290 | 0.0180 | 0.0080 |
| ZrO2 | 0.0040 | 0.0010 | 0.0010 |
| P2O5 | 1.2400 | 0.0420 | 0.0070 |
| Cu | 0.0010 | 0.0030 | 0.0010 |
| Ni | 0.0110 | 0.0120 | 0.0070 |
| Co | 0.0000 | 0.0020 | 0.0040 |
| Zn | 0.0110 | 0.0060 | 0.0090 |
| Pb | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0030 | 0.0030 | 0.0030 |
| S | 0.0070 | 0.0030 | 0.0010 |
| As | 0.0000 | 0.0000 | 0.0000 |
| Sb | 0.0090 | 0.0070 | 0.0070 |
| Bi | 0.0040 | 0.0030 | 0.0010 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0054 | 0.0003 | 0.0000 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0020 | 0.0010 |
| W | 0.0050 | 0.0000 | 0.0010 |
| Cl | 0.0040 | 0.0020 | 0.0020 |
| Th | 0.0043 | 0.0048 | 0.0034 |
| U | 0.0093 | 0.0083 | 0.0088 |
| Cs | 0.0000 | 0.0020 | 0.0020 |
| La | 0.0110 | 0.0060 | 0.0020 |
| Ce | 0.0180 | 0.0060 | 0.0040 |
| Ta | 0.0020 | 0.0040 | 0.0020 |
| Ga | 0.0026 | 0.0034 | 0.0031 |
| Si | 1.1700 | 0.6700 | 0.4500 |
| Ti | 0.1030 | 0.0760 | 0.0550 |
| Cr | 0.0073 | 0.0060 | 0.0047 |
| V | 0.1170 | 0.1090 | 0.1090 |
| Fe | 67.9000 | 70.9000 | 71.7000 |
| Satmagan | 93.52 | 97.15 | 100.0 |
| Eltra S | 0.0236 | 0.0225 | 0.0161 |





08.01.2015

The following modifications were made for Test No. 2:

- the initial collector dosage was reduced to 25g/t (ppm),
- froth was collected at reduced time intervals (after 1min and 3min respectively).

Table 5: Metallurgical Balance, Reverse Phosphate Flotation Test No. 2, <0.1mm LIMS Concentrate

| FLOTATION TEST REPORT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|-------------|--------------------------|--------------------|--|-----|--------|--------------|--------------------|------------------|------------|---------|----------|--|--------------------|---------------------------------|-------|-------|----------------------------------|-------|---------------------|--------------------|-----------|------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|--|
| Sample : WILMS Magnetite Conc. | | Grinding : Mill : | | Remarks : Kalvgruvan magnetite rich ore sample | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project : 1281272 / 2402 | | Charge : | | WILMS cleaned magnetite product concentrate as the feed to flotation (batch size ca. 800 g) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date : 20/08/2014 | | Water : | | Apatite removal by reverse flotation (at pH around 9.5, plus close to 40 wt.-% feed solids at start) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Done by : MFK, MEK | | Fineness : P100 = 100 µm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test No. : 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Feed size < 100 µm | Condit. min | Reagents (g/l) | | | | Cell I | Air l/min | Rotor rpm | pH | Flot'n min | Product | Weight g | Grades and Recoveries (by XRF, Eltra S and Salmagan) | | | | | | | | | | | | | | | | | | | | | |
| | | Water glass (5-%) | Atrac 1563 (100-%) | | | | | | | | | | Fe % | SiO ₂ % | P ₂ O ₅ % | MgO % | MnO % | Al ₂ O ₃ % | CaO % | Na ₂ O % | K ₂ O % | Eltra S % | Salmagan % | | | | | | | | | | | |
| | 10 | | 500 | | 1.5 | 1100 | 7.9 | natural | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | | 25 | | 1.5 | | 9.8 | due to water glass | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | 9.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | 9.6 | 0.5 | RF1-RF2 (RT2) | 6.0 | 0.74 | 29.40 | 0.3 | 3.41 | 2.0 | 24.60 | 80.5 | 1.14 | 2.9 | 0.062 | 0.8 | 0.69 | 1.4 | 30.50 | 72.3 | 0.06 | 22.5 | 0.057 | 3.2 | 0.061 | 2.0 | 38.27 | 0.3 | |
| | | | | | 1.5 | | 9.6 | | | 802.4 | 99.26 | 71.20 | 99.7 | 1.24 | 98.0 | 0.044 | 19.5 | 0.29 | 97.1 | 0.054 | 99.2 | 0.36 | 98.6 | 0.087 | 27.7 | 0.00 | 77.5 | 0.013 | 96.8 | 0.022 | 98.0 | 96.74 | 99.7 | |
| | 2 | | 25 | | 1.5 | | 9.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | 9.5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | 9.4 | 1 | RF3-RF4 (RF1..4) | 6.3 | 0.78 | 58.50 | 0.6 | 7.74 | 4.8 | 3.01 | 10.3 | 2.76 | 7.3 | 0.084 | 1.2 | 1.60 | 3.4 | 3.91 | 9.7 | 0.07 | 27.6 | 0.146 | 8.5 | 0.062 | 2.1 | 78.95 | 0.6 | |
| | | | | | 1.5 | | 9.4 | | | 12.3 | 1.52 | 43.82 | 0.9 | 5.63 | 6.8 | 13.54 | 90.9 | 1.97 | 10.1 | 0.073 | 2.1 | 1.16 | 4.9 | 16.88 | 82.1 | 0.07 | 50.2 | 0.103 | 11.7 | 0.062 | 4.1 | 59.11 | 0.9 | |
| | | | | | | | 9.4 | | Cell Conc. | 796.1 | 98.48 | 71.30 | 99.1 | 1.19 | 93.2 | 0.021 | 9.1 | 0.27 | 89.9 | 0.054 | 97.9 | 0.35 | 95.1 | 0.057 | 17.9 | 0.00 | 49.8 | 0.012 | 88.3 | 0.022 | 95.9 | 96.88 | 99.1 | |
| Totals | 17 | | 500 | 50 | | | Total | 3 | Calc'd Head | 808.4 | 100.00 | 70.88 | 100.0 | 1.26 | 100.0 | 0.227 | 100.0 | 0.30 | 100.0 | 0.054 | 100.0 | 0.36 | 100.0 | 0.313 | 100.0 | 0.00 | 100.0 | 0.013 | 100.0 | 0.023 | 100.0 | 96.31 | 100.0 | |
| | | | | | | | Assayed Head | | | | | | | | | | | | | | | | | | | | | | | | | | | |

These adjustments increased flotation yield to 99% whilst maintaining a low content of phosphorus in the concentrate (<0.02% P).

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 26.8.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120461
Method : 180X-O
Date : 26.8.2014
Comment : NIO Variability Tests, Kalvgruvan / Apatite removal flotation from Mags 3, Test 2 --- analysis request 20.8.2014

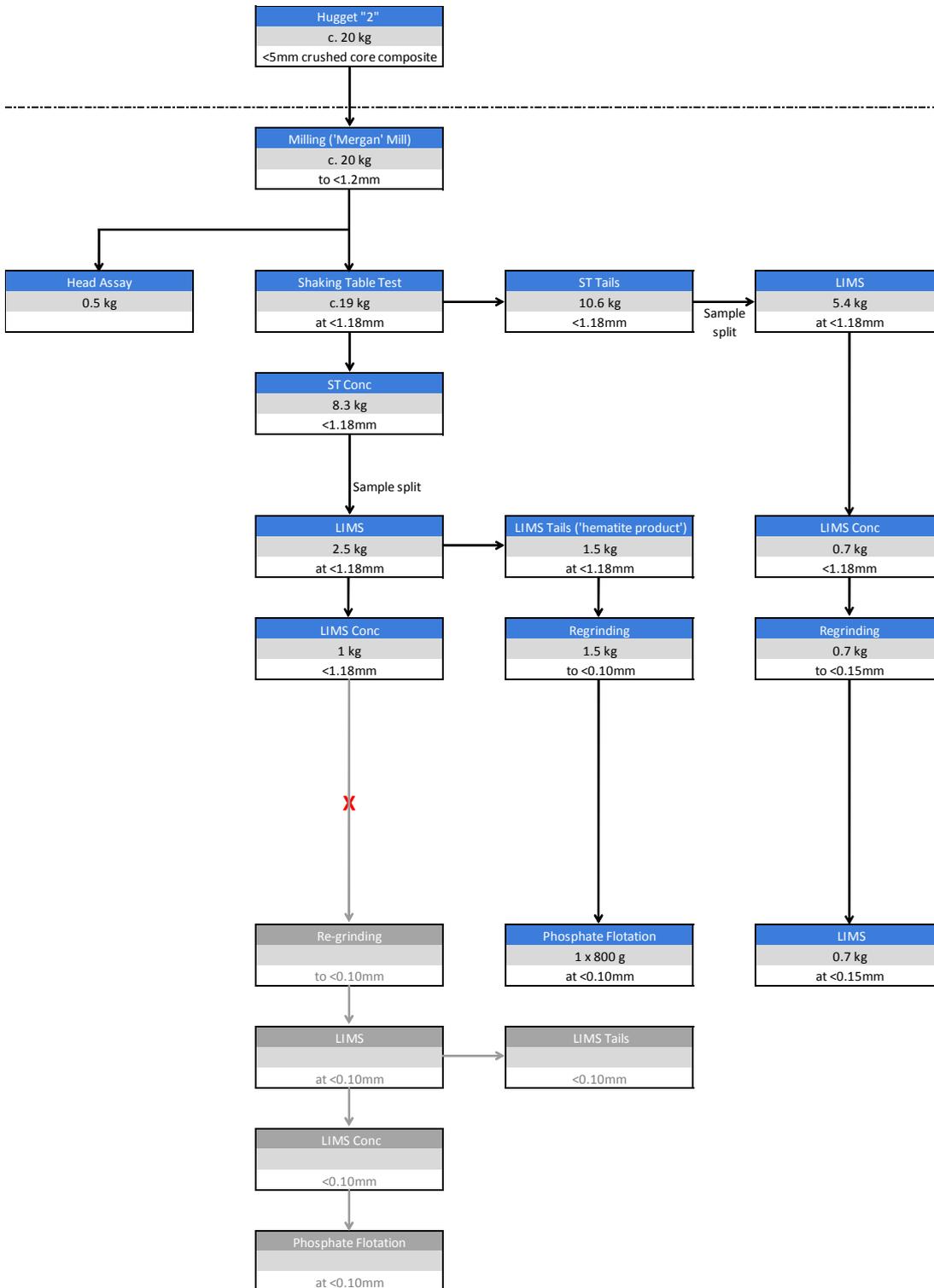
Contents (%)

| | RF1+RF2 L14054128 | RF3+RF4 L14054129 | Cell Conc L14054130 |
|----------|----------------------|----------------------|------------------------|
| SiO2 | 3.4100 | 7.7400 | 1.1900 |
| TiO2 | 0.0870 | 0.2290 | 0.1130 |
| Al2O3 | 0.6900 | 1.6000 | 0.3500 |
| Cr2O3 | 0.0056 | 0.0120 | 0.0075 |
| V2O3 | 0.0850 | 0.1580 | 0.1620 |
| MnO | 0.0620 | 0.0840 | 0.0540 |
| MgO | 1.1400 | 2.7600 | 0.2700 |
| CaO | 30.5000 | 3.9100 | 0.0570 |
| Rb2O | 0.0065 | 0.0140 | 0.0100 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0080 | 0.0040 | 0.0050 |
| Na2O | 0.0600 | 0.0700 | 0.0000 |
| K2O | 0.0570 | 0.1460 | 0.0120 |
| ZrO2 | 0.0030 | 0.0060 | 0.0010 |
| P2O5 | 24.6000 | 3.0100 | 0.0210 |
| Cu | 0.0000 | 0.0060 | 0.0000 |
| Ni | 0.0090 | 0.0170 | 0.0090 |
| Co | 0.0130 | 0.0120 | 0.0040 |
| Zn | 0.0070 | 0.0140 | 0.0090 |
| Pb | 0.0010 | 0.0000 | 0.0000 |
| Ag | 0.0060 | 0.0060 | 0.0040 |
| S | 0.0230 | 0.0220 | 0.0020 |
| As | 0.0030 | 0.0000 | 0.0000 |
| Sb | 0.0150 | 0.0110 | 0.0060 |
| Bi | 0.0020 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0960 | 0.0160 | 0.0000 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0060 | 0.0040 | 0.0010 |
| W | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0610 | 0.0110 | 0.0020 |
| Th | 0.0099 | 0.0082 | 0.0050 |
| U | 0.0045 | 0.0078 | 0.0097 |
| Cs | 0.0030 | 0.0020 | 0.0020 |
| La | 0.0720 | 0.0440 | 0.0040 |
| Ce | 0.1610 | 0.0830 | 0.0040 |
| Ta | 0.0030 | 0.0000 | 0.0030 |
| Ga | 0.0024 | 0.0015 | 0.0020 |
| Si | 1.6000 | 3.6200 | 0.5600 |
| Ti | 0.0520 | 0.1370 | 0.0680 |
| Cr | 0.0038 | 0.0081 | 0.0051 |
| V | 0.0580 | 0.1070 | 0.1100 |
| Fe | 28.4000 | 58.5000 | 71.3000 |
| Eltra S | 0.061 | 0.062 | 0.022 |
| Satmagan | 38.27 | 78.95 | 96.88 |



08.01.2015

5.2 Hugget, '2'



5.2.1 Head assay



Labtium Oy
REPORT OF XRF ANALYSIS 26.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120127
Method : 180X-O
Date : 26.6.2014
Comment : NIO, Variability tests / Hugget 2 Feeds - analysis request 26.6.2014

Contents (%)

| | Feed A L14043396 | Feed B L14043397 | Average Feed |
|--------------------------------|---------------------|---------------------|-----------------|
| SiO ₂ | 35.2000 | 36.0000 | 35.6000 |
| TiO ₂ | 0.2460 | 0.2500 | 0.2480 |
| Al ₂ O ₃ | 6.0500 | 6.2200 | 6.1350 |
| Cr ₂ O ₃ | 0.0039 | 0.0038 | 0.0039 |
| V ₂ O ₃ | 0.0660 | 0.0660 | 0.0660 |
| MnO | 0.0330 | 0.0320 | 0.0325 |
| MgO | 1.9600 | 2.0000 | 1.9800 |
| CaO | 1.7500 | 1.7600 | 1.7550 |
| Rb ₂ O | 0.0110 | 0.0120 | 0.0115 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0300 | 0.0330 | 0.0315 |
| Na ₂ O | 1.5800 | 1.6000 | 1.5900 |
| K ₂ O | 0.8600 | 0.9000 | 0.8800 |
| ZrO ₂ | 0.0100 | 0.0110 | 0.0105 |
| P ₂ O ₅ | 1.1700 | 1.1700 | 1.1700 |
| Cu | 0.0010 | 0.0020 | 0.0015 |
| Ni | 0.0040 | 0.0060 | 0.0050 |
| Co | 0.0130 | 0.0000 | 0.0065 |
| Zn | 0.0040 | 0.0040 | 0.0040 |
| Pb | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0030 | 0.0030 | 0.0030 |
| S | 0.0100 | 0.0090 | 0.0095 |
| As | 0.0010 | 0.0000 | 0.0005 |
| Sb | 0.0110 | 0.0100 | 0.0105 |
| Bi | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0076 | 0.0065 | 0.0071 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0060 | 0.0050 | 0.0055 |
| W | 0.0000 | 0.0000 | 0.0000 |
| Cl | 0.0060 | 0.0070 | 0.0065 |
| Th | 0.0031 | 0.0034 | 0.0033 |
| U | 0.0050 | 0.0047 | 0.0049 |
| Cs | 0.0010 | 0.0020 | 0.0015 |
| La | 0.0300 | 0.0260 | 0.0280 |
| Ce | 0.0510 | 0.0470 | 0.0490 |
| Ta | 0.0020 | 0.0000 | 0.0010 |
| Ga | 0.0018 | 0.0006 | 0.0012 |
| Si | 16.5000 | 16.8000 | 16.6500 |
| Ti | 0.1480 | 0.1500 | 0.1490 |
| Cr | 0.0027 | 0.0026 | 0.0027 |
| V | 0.0450 | 0.0450 | 0.0450 |
| Fe | 36.2000 | 35.5000 | 35.8500 |
| Satmagan | 18.07 | 17.33 | 17.70 |





08.01.2015

5.2.2 Shaking Table, <1.18mm

Table 6: Metallurgical Balance, Shaking Table Test on <1.18mm 'Hugget 2' sample

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|-----------------------|--------|--|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| Concentrate | | 8320.4 | 44.07 | 65.50 | 77.7 | 3.88 | 5.0 | 0.99 | 38.1 | 0.29 | 7.1 | 0.023 | 30.0 | 0.85 | 6.5 | 1.16 | 28.3 | 0.08 | 2.7 | 0.046 | 2.1 | 0.026 | 48.4 | 28.53 | 72.3 |
| Middling | | 8175.1 | 43.30 | 13.10 | 15.3 | 61.60 | 77.3 | 1.18 | 44.6 | 2.70 | 65.1 | 0.036 | 46.2 | 9.49 | 71.8 | 2.19 | 52.5 | 2.38 | 79.0 | 1.69 | 76.3 | 0.022 | 40.9 | 7.77 | 19.3 |
| (Conc + Middling) | | 16495.5 | 87.37 | 39.53 | 92.9 | 32.49 | 82.2 | 1.08 | 82.7 | 1.48 | 72.3 | 0.029 | 76.2 | 5.13 | 78.3 | 1.67 | 80.8 | 1.22 | 81.7 | 0.86 | 78.4 | 0.024 | 89.4 | 18.24 | 91.6 |
| Tailing 1 | | 2246.2 | 11.90 | 20.70 | 6.6 | 49.00 | 16.9 | 1.49 | 15.5 | 3.94 | 26.1 | 0.063 | 22.2 | 9.82 | 20.4 | 2.65 | 17.4 | 1.90 | 17.3 | 1.65 | 20.5 | 0.019 | 9.7 | 11.64 | 8.0 |
| Conc + Middl. + Tails 1 | | 18741.7 | 99.27 | 37.27 | 99.5 | 34.47 | 99.1 | 1.13 | 98.2 | 1.78 | 98.4 | 0.033 | 98.5 | 5.69 | 98.8 | 1.79 | 98.2 | 1.30 | 99.0 | 0.96 | 98.9 | 0.024 | 99.0 | 17.45 | 99.6 |
| Tailing 2 | | 138.1 | 0.73 | 23.30 | 0.5 | 42.20 | 0.9 | 2.87 | 1.8 | 3.96 | 1.6 | 0.071 | 1.5 | 9.78 | 1.2 | 4.40 | 1.8 | 1.71 | 1.0 | 1.49 | 1.1 | 0.031 | 1.0 | 9.73 | 0.4 |
| Calc'd Feed | | 18879.8 | 100.00 | 37.17 | 100.0 | 34.52 | 100.0 | 1.15 | 100.0 | 1.79 | 100.0 | 0.034 | 100.0 | 5.72 | 100.0 | 1.81 | 100.0 | 1.30 | 100.0 | 0.96 | 100.0 | 0.024 | 100.0 | 17.39 | 100.0 |
| Feed Assays | | | | 35.85 | | 35.60 | | 1.17 | | 1.98 | | 0.033 | | 6.14 | | 1.76 | | 1.59 | | 0.88 | | 0.016 | | 17.70 | |

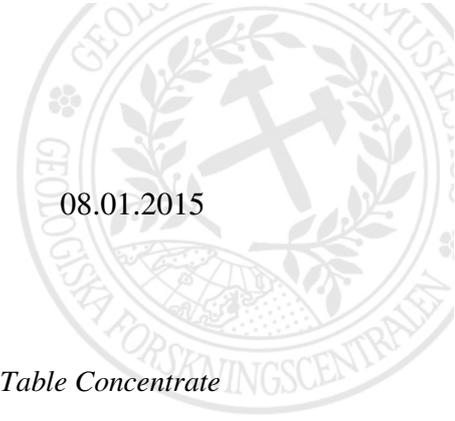
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 27.6.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120146
Method : 180X-O
Date : 27.6.2014
Comment : NIO / Variability tests - Hugget 2 - Shaking table test; analysis request 27.6.2014

Contents (%)

| | Conc L14044095 | Middling L14044096 | Tails 1 L14044097 | Tails 2 L14044098 |
|----------|-------------------|-----------------------|----------------------|----------------------|
| SiO2 | 3.8800 | 61.6000 | 49.0000 | 42.2000 |
| TiO2 | 0.2720 | 0.2050 | 0.2630 | 0.3090 |
| Al2O3 | 0.8500 | 9.4900 | 9.8200 | 9.7800 |
| Cr2O3 | 0.0088 | 0.0072 | 0.0063 | 0.0095 |
| V2O3 | 0.1080 | 0.0240 | 0.0360 | 0.0430 |
| MnO | 0.0230 | 0.0360 | 0.0630 | 0.0710 |
| MgO | 0.2900 | 2.7000 | 3.9400 | 3.9600 |
| CaO | 1.1600 | 2.1900 | 2.6500 | 4.4000 |
| Rb2O | 0.0120 | 0.0110 | 0.0150 | 0.0130 |
| SrO | 0.0000 | 0.0030 | 0.0022 | 0.0025 |
| BaO | 0.0070 | 0.0550 | 0.0560 | 0.0510 |
| Na2O | 0.0800 | 2.3800 | 1.9000 | 1.7100 |
| K2O | 0.0460 | 1.6900 | 1.6500 | 1.4900 |
| ZrO2 | 0.0060 | 0.0160 | 0.0220 | 0.0230 |
| P2O5 | 0.9900 | 1.1800 | 1.4900 | 2.8700 |
| Cu | 0.0000 | 0.0000 | 0.0010 | 0.0040 |
| Ni | 0.0070 | 0.0040 | 0.0070 | 0.0090 |
| Co | 0.0000 | 0.0010 | 0.0100 | 0.0060 |
| Zn | 0.0040 | 0.0030 | 0.0050 | 0.0100 |
| Pb | 0.0000 | 0.0040 | 0.0040 | 0.0050 |
| Ag | 0.0030 | 0.0030 | 0.0030 | 0.0040 |
| S | 0.0100 | 0.0060 | 0.0120 | 0.0310 |
| As | 0.0000 | 0.0000 | 0.0010 | 0.0000 |
| Sb | 0.0080 | 0.0080 | 0.0090 | 0.0100 |
| Bi | 0.0020 | 0.0020 | 0.0030 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0054 | 0.0083 | 0.0130 | 0.0200 |
| Nb | 0.0000 | 0.0012 | 0.0003 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0027 |
| Sn | 0.0050 | 0.0030 | 0.0040 | 0.0050 |
| W | 0.0180 | 0.0010 | 0.0000 | 0.0000 |
| Cl | 0.0050 | 0.0060 | 0.0090 | 0.0090 |
| Th | 0.0051 | 0.0031 | 0.0033 | 0.0043 |
| U | 0.0090 | 0.0002 | 0.0024 | 0.0037 |
| Cs | 0.0020 | 0.0000 | 0.0000 | 0.0000 |
| La | 0.0280 | 0.0260 | 0.0350 | 0.0530 |
| Ce | 0.0510 | 0.0430 | 0.0630 | 0.0950 |
| Ta | 0.0050 | 0.0030 | 0.0020 | 0.0030 |
| Ga | 0.0033 | 0.0011 | 0.0023 | 0.0014 |
| Si | 1.8100 | 28.8000 | 22.9000 | 19.7000 |
| Ti | 0.1630 | 0.1230 | 0.1580 | 0.1850 |
| Cr | 0.0060 | 0.0049 | 0.0043 | 0.0065 |
| V | 0.0730 | 0.0160 | 0.0250 | 0.0290 |
| Fe | 65.5000 | 13.1000 | 20.7000 | 23.3000 |
| Satmagan | 28.53 | 7.77 | 11.64 | 9.73 |
| Eltra S | 0.026 | 0.022 | 0.019 | 0.031 |



08.01.2015

5.2.3 Wet LIMS, <1.18mm Shaking Table Concentrate

Table 7: Metallurgical Balance, LIMS, <1.18mm 'Hugget 2' Shaking Table Concentrate



Sala Ø 200 mm 'Blue Ribbon' Wet LIMS Separator. Re-cleaning / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10, Eltra S and Satmagan analyses of products

Client(s) : TSC / M. Reisinger
NIO / P. Marsden

Project : 1281272 / 2402

Test Feed : 'Hugget 2'
Shaking table (ST) concentrate product at 100% minus 1.18 mm

Target : Decreasing the apatite load in the (magnetitic) WLIMS product

Test Conditions : One-stage WLIMS re-treatment using feed solids at 17-18 wt.-%
Nominal magnetic field strength ca. 0.07 Tesla
Basin bottom flow restrictor dia. 5 mm
Volumetric slurry feed rate ca. 1.3 liter/min

Date : June 30th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10, Eltra S and Satmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|-------------------------|--------|--------|--|-------|------|-------|------------------|-------|-------------------------------|-------|-------|-------|------|-------|--------------------------------|-------|------------------|-------|------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | g | | % | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | g | Wt.-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| WLIMS | WLIMS Mags | 962.2 | 38.54 | 70.00 | 41.0 | 2.07 | 22.1 | 0.070 | 2.7 | 0.28 | 38.5 | 0.042 | 79.0 | 0.55 | 26.6 | 0.126 | 17.7 | 0.092 | 3.1 | 0.03 | 15.8 | 0.034 | 29.9 | 0.013 | 29.4 | 77.27 | 98.5 | | |
| | WLIMS NM | 1534.3 | 61.46 | 63.10 | 59.0 | 4.57 | 77.9 | 1.56 | 97.3 | 0.28 | 61.5 | 0.007 | 21.0 | 0.95 | 73.4 | 0.367 | 82.3 | 1.83 | 96.9 | 0.10 | 84.2 | 0.050 | 70.1 | 0.020 | 70.6 | 0.74 | 1.5 | | |
| | [Calc.Feed] | 2496.5 | 100.00 | 65.76 | 100.0 | 3.61 | 100.0 | 0.99 | 100.0 | 0.28 | 100.0 | 0.020 | 100.0 | 0.80 | 100.0 | 0.274 | 100.0 | 1.16 | 100.0 | 0.07 | 100.0 | 0.044 | 100.0 | 0.018 | 100.0 | 30.24 | 100.0 | | |
| | Feed Assay [ST Conc.] | | | 65.50 | | 3.88 | | 0.99 | | 0.29 | | 0.023 | | 0.85 | | 0.272 | | 1.16 | | 0.08 | | 0.046 | | 0.026 | | 28.53 | | | |

Note : Iron assay results are Satmagan corrected values

The combination of gravity separation (shaking table) and wet LIMS produced a 'Coarse Concentrate', predominantly composed of magnetite (77% Fe₃O₄, see Satmagan figure), assaying 70% Fe, 2.1% SiO₂ and 0.03% P (0.07% P₂O₅). A screen analysis of the <1.18mm LIMS concentrate is presented in Table 8.

The non-magnetic fraction, carrying the majority of the hematite, contained 63.1% Fe and 4.6% SiO₂. Owing to its high content of phosphorus (0.68% P, or 1.56% P₂O₅), the hematite concentrate, however, required regrinding followed by reverse flotation for removal of phosphates (see Section 5.2.5.).

Table 8: Screen Analysis, <1.18mm 'Hugget 2' LIMS Concentrate



Project name : NIO Variability
Code : 1281272 / 2402

Date : 3.7.2014
By : MPK

Note : Combination of elutriation screening and
Ro-Tap dry screening for 10 min

Sample data : NIO Variability / 'Hugget 2' composite - Coarse magnetite product screen check

| Screen opening (µm) | NIO - Hugget 2 Coarse magnetite Conc. | | | | | | | | | | | | | | | | | |
|---------------------|---------------------------------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 630 | 0.0 | 100.0 | 0.0 | | | | | | | | | | | | | | | |
| 500 | 0.6 | 99.5 | 0.5 | | | | | | | | | | | | | | | |
| 355 | 3.0 | 96.8 | 2.6 | | | | | | | | | | | | | | | |
| 250 | 14.5 | 84.2 | 12.7 | | | | | | | | | | | | | | | |
| 125 | 48.6 | 41.6 | 42.6 | | | | | | | | | | | | | | | |
| 75 | 29.1 | 16.1 | 25.5 | | | | | | | | | | | | | | | |
| - 75 | 18.4 | | 16.1 | | | | | | | | | | | | | | | |
| Total | 114.2 | | 100.0 | | | | | | | | | | | | | | | |

Calc'd

P 80 (µm)

237.8



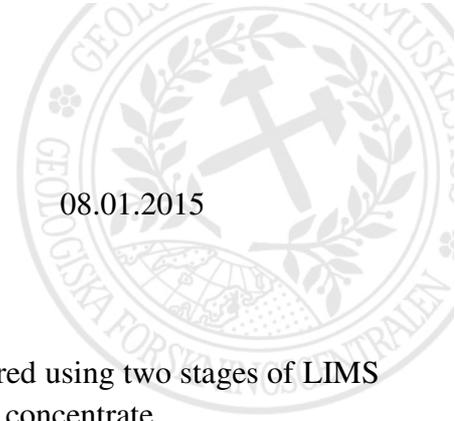


Labtium Oy
REPORT OF XRF ANALYSIS 1.7.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120159
Method : 180X-O
Date : 01.07.2014
Comment : NIO / Variability tests - Hugget 2 ST Conc - WLIMS Test; analysis request 1.7.2014

Contents (%)

| | Mags L14044411 | Non-Mags L14044412 |
|--------------------------------|-------------------|-----------------------|
| SiO ₂ | 2.0700 | 4.5700 |
| TiO ₂ | 0.1260 | 0.3670 |
| Al ₂ O ₃ | 0.5500 | 0.9500 |
| Cr ₂ O ₃ | 0.0041 | 0.0042 |
| V ₂ O ₃ | 0.0700 | 0.1290 |
| MnO | 0.0420 | 0.0070 |
| MgO | 0.2800 | 0.2800 |
| CaO | 0.0920 | 1.8300 |
| Rb ₂ O | 0.0120 | 0.0110 |
| SrO | 0.0000 | 0.0000 |
| BaO | 0.0060 | 0.0050 |
| Na ₂ O | 0.0300 | 0.1000 |
| K ₂ O | 0.0340 | 0.0500 |
| ZrO ₂ | 0.0030 | 0.0060 |
| P ₂ O ₅ | 0.0700 | 1.5600 |
| Cu | 0.0000 | 0.0010 |
| Ni | 0.0060 | 0.0060 |
| Co | 0.0050 | 0.0000 |
| Zn | 0.0090 | 0.0030 |
| Pb | 0.0000 | 0.0000 |
| Ag | 0.0020 | 0.0040 |
| S | 0.0060 | 0.0140 |
| As | 0.0020 | 0.0000 |
| Sb | 0.0070 | 0.0080 |
| Bi | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0010 | 0.0100 |
| Nb | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0080 |
| W | 0.0000 | 0.0260 |
| Cl | 0.0010 | 0.0040 |
| Th | 0.0042 | 0.0053 |
| U | 0.0088 | 0.0092 |
| Cs | 0.0010 | 0.0000 |
| La | 0.0070 | 0.0420 |
| Ce | 0.0120 | 0.0760 |
| Ta | 0.0000 | 0.0030 |
| Ga | 0.0025 | 0.0035 |
| Si | 0.9700 | 2.1400 |
| Ti | 0.0760 | 0.2200 |
| Cr | 0.0028 | 0.0029 |
| V | 0.0480 | 0.0880 |
| Fe | 70.0000 | 63.1000 |
| Satmagan | 77.27 | 0.74 |
| Eltra S | 0.013 | 0.020 |



08.01.2015

5.2.4 Wet LIMS (‘Scavenger’), Shaking Table Tailings

Interlocked magnetite rejected in the gravity concentration stage was recovered using two stages of LIMS (at <1.18mm and <0.15mm respectively) with intermediate regrinding of the concentrate.

The final LIMS concentrate assayed 68.7% Fe, 3.8% SiO₂ and <0.015% P (0.03% P₂O₅). The content of total alkali oxides was slightly elevated (Na₂O + K₂O should typically be <0.10%).

Magnetite recovery in the scavenger stage was excellent at 95%. A screen analysis of the <1.18mm LIMS concentrate is presented in Table 10.

Table 9: Metallurgical Balance, LIMS, Shaking Table Tailings

| Grade-Recovery Balance Calculation for the WLIMS Beneficiation test | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------|--|-------|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|--|-------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | Sample: NIO, 'Hugget 2' composite | | | | | | | | | | | | Notes: Sala "Blue Ribbon" permanent ferrite magnet Wet LIMS | | | | | | | | | | |
| | | Project: 1281272 / 2402 | | | | | | | | | | | | Nominal magnetic field strength ca. 0.07 Tesla | | | | | | | | | | |
| | | Date: 1.-2.7.2014 | | | | | | | | | | | | Basin bottom flow restrictor dia. 5 mm (Rgh) / 4 mm (Cln) | | | | | | | | | | |
| | | Test: WLIMS Test for fine magnetite conc. prod'n | | | | | | | | | | | | Volumetric slurry feed rate ca. 1.3 liter/min | | | | | | | | | | |
| | | By: M. Kuusisto | | | | | | | | | | | | Preparations: For Rougher WLIMS - None | | | | | | | | | | |
| | | Feed batch: 5.12 kg; shaking table Midds + Tails 1-2 | | | | | | | | | | | | For Cleaner WLIMS - Screenings & SS Ball Milling of "Mags 1" | | | | | | | | | | |
| | | Top sizes: 1.18 mm in one-stage Roughing | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.150 mm in three-stage Cleaning (steps 2 to 4) | | | | | | | | | | | | | | | | | | | | | | |
| XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | | | | |
| Test product(s) | Weight | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | grams | wt-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| Mags 1 magnetite conc. | 511.0 | 10.05 | 68.70 | 44.7 | 3.78 | 0.7 | 0.030 | 0.2 | 0.41 | 1.4 | 0.053 | 12.7 | 0.85 | 0.9 | 0.061 | 0.3 | 0.09 | 0.4 | 0.066 | 0.4 | 0.007 | 6.8 | 86.87 | 94.8 |
| Non-Mags 2...4 | 219.5 | 4.32 | 14.00 | 3.9 | 62.10 | 4.6 | 0.62 | 2.0 | 3.49 | 5.1 | 0.051 | 5.3 | 8.68 | 4.0 | 1.30 | 2.4 | 1.86 | 3.7 | 1.22 | 3.1 | 0.012 | 4.9 | 0.72 | 0.3 |
| (Mags 1) | 730.5 | 14.36 | 52.26 | 48.7 | 21.30 | 5.3 | 0.207 | 2.2 | 1.34 | 6.5 | 0.052 | 18.0 | 3.20 | 4.9 | 0.433 | 2.7 | 0.62 | 4.1 | 0.413 | 3.5 | 0.009 | 11.7 | 60.98 | 95.2 |
| Non-Mags 1 | 4356.1 | 85.64 | 9.25 | 51.3 | 64.10 | 94.7 | 1.53 | 97.8 | 3.22 | 93.5 | 0.040 | 82.0 | 10.40 | 95.1 | 2.66 | 97.3 | 2.45 | 95.9 | 1.92 | 96.5 | 0.011 | 88.3 | 0.52 | 4.8 |
| Calc'd Feed | 5086.6 | 100.00 | 15.43 | 100.0 | 57.95 | 100.0 | 1.34 | 100.0 | 2.95 | 100.0 | 0.042 | 100.0 | 9.37 | 100.0 | 2.34 | 100.0 | 2.19 | 100.0 | 1.70 | 100.0 | 0.010 | 100.0 | 9.20 | 100.0 |
| Feed Assays | | | 14.85 | | 58.67 | | 1.27 | | 2.98 | | 0.042 | | 9.56 | | 2.32 | | 2.27 | | 1.68 | | 0.022 | | 8.62 | |
| (Shaking table rejects) | | | | | | | | | | | | | | | | | | | | | | | | |

Table 10: Screen Analysis, <0.15mm 'Hugget 2' LIMS Concentrate



Project name : NIO Variability
Code : 1281272 / 2402

Date : 3.7.2014
By : MPK

Note : Combination of elutriation screening and Ro-Tap dry screening for 10 min

Sample data : NIO Variability / 'Hugget 2' composite - Fine magnetite product screen check

| Screen opening (µm) | NIO Variability - Hugget 2 | | | | | | | | | | | | | | | | | |
|---------------------|----------------------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 150 | 0.0 | 100.0 | 0.0 | | | | | | | | | | | | | | | |
| 125 | 0.2 | 99.3 | 0.7 | | | | | | | | | | | | | | | |
| 90 | 1.0 | 95.8 | 3.5 | | | | | | | | | | | | | | | |
| 75 | 0.6 | 93.8 | 2.1 | | | | | | | | | | | | | | | |
| 45 | 7.5 | 67.8 | 26.0 | | | | | | | | | | | | | | | |
| 20 | 11.4 | 28.4 | 39.4 | | | | | | | | | | | | | | | |
| - 20 | 8.2 | | 28.4 | | | | | | | | | | | | | | | |
| Total | 28.9 | | 100.0 | | | | | | | | | | | | | | | |

Calc'd
P 80
(µm) 59.1





Labtium Oy
REPORT OF XRF ANALYSIS 2.7.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120171
Method : 180X-O
Date : 2.7.2014
Comment : NIO / Variability tests - Hugget 2 - Scavenger WLIMS test for fine magnetite concentrate

Contents (%)

| | Mags 4 L14044523 | NM2-4 L14044524 | NM1 L14044525 |
|----------|---------------------|--------------------|------------------|
| SiO2 | 3.7800 | 62.1000 | 64.1000 |
| TiO2 | 0.0930 | 0.3620 | 0.2290 |
| Al2O3 | 0.8500 | 8.6800 | 10.4000 |
| Cr2O3 | 0.0770 | 0.0330 | 0.0037 |
| V2O3 | 0.0610 | 0.0330 | 0.0210 |
| MnO | 0.0530 | 0.0510 | 0.0400 |
| MgO | 0.4100 | 3.4900 | 3.2200 |
| CaO | 0.0610 | 1.3000 | 2.6600 |
| Rb2O | 0.0130 | 0.0100 | 0.0120 |
| SrO | 0.0000 | 0.0018 | 0.0039 |
| BaO | 0.0080 | 0.0520 | 0.0640 |
| Na2O | 0.0900 | 1.8600 | 2.4500 |
| K2O | 0.0660 | 1.2200 | 1.9200 |
| ZrO2 | 0.0040 | 0.0190 | 0.0180 |
| P2O5 | 0.0300 | 0.6200 | 1.5300 |
| Cu | 0.0010 | 0.0020 | 0.0010 |
| Ni | 0.0430 | 0.0200 | 0.0040 |
| Co | 0.0050 | 0.0110 | 0.0090 |
| Zn | 0.0080 | 0.0060 | 0.0040 |
| Pb | 0.0000 | 0.0050 | 0.0050 |
| Ag | 0.0020 | 0.0010 | 0.0020 |
| S | 0.0020 | 0.0110 | 0.0090 |
| As | 0.0020 | 0.0000 | 0.0000 |
| Sb | 0.0060 | 0.0110 | 0.0110 |
| Bi | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0010 |
| Y | 0.0007 | 0.0073 | 0.0110 |
| Nb | 0.0000 | 0.0012 | 0.0015 |
| Mo | 0.0015 | 0.0026 | 0.0001 |
| Sn | 0.0020 | 0.0060 | 0.0030 |
| W | 0.0000 | 0.0010 | 0.0010 |
| Cl | 0.0030 | 0.0090 | 0.0100 |
| Th | 0.0039 | 0.0025 | 0.0022 |
| U | 0.0086 | 0.0005 | 0.0000 |
| Cs | 0.0010 | 0.0030 | 0.0020 |
| La | 0.0050 | 0.0290 | 0.0310 |
| Ce | 0.0060 | 0.0500 | 0.0500 |
| Ta | 0.0020 | 0.0020 | 0.0010 |
| Ga | 0.0031 | 0.0010 | 0.0016 |
| Si | 1.7700 | 29.0000 | 30.0000 |
| Ti | 0.0560 | 0.2170 | 0.1370 |
| Cr | 0.0520 | 0.0230 | 0.0025 |
| V | 0.0410 | 0.0230 | 0.0140 |
| Fe | 68.7000 | 14.0000 | 9.2500 |
| Satmagan | 86.87 | 0.72 | 0.52 |
| Eltra S | 0.007 | 0.012 | 0.011 |





Labtium Oy
REPORT OF XRF ANALYSIS 4.7.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120186
Method : 180X-O
Date : 4.7.2014
Comment : NIO / Variability tests - Hugget 2 - Apatite removal flotation test for hematite concentrate

Contents (%)

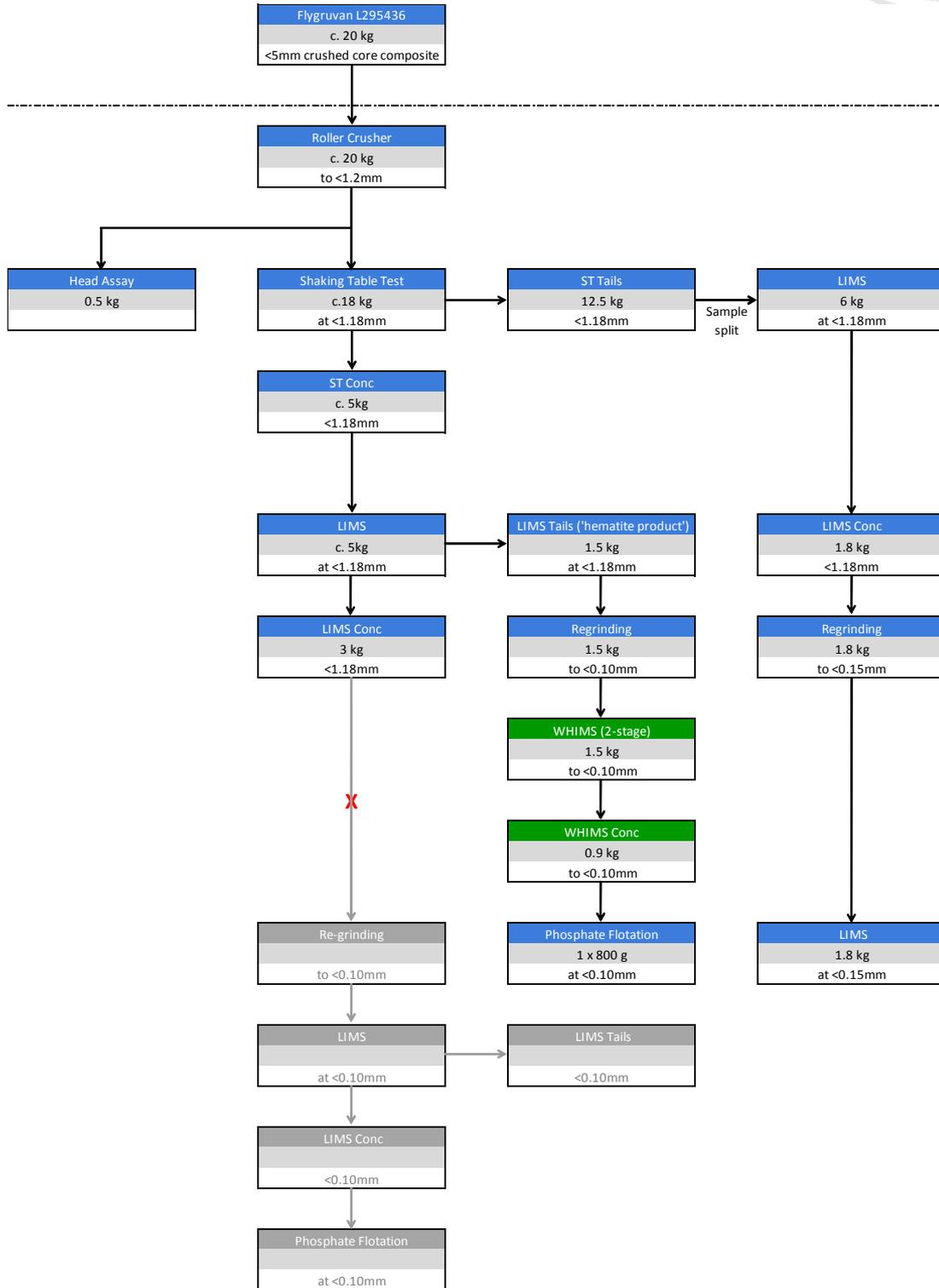
| | RF1 L14044663 | RF2 L14044664 | RF3 L14044665 | RF4 L14044666 | Cell Conc. L14044667 |
|----------|------------------|------------------|------------------|------------------|-------------------------|
| SiO2 | 1.1700 | 2.5400 | 4.8700 | 6.1100 | 4.3600 |
| TiO2 | 0.0470 | 0.1080 | 0.2150 | 0.2980 | 0.3720 |
| Al2O3 | 0.2800 | 0.5100 | 1.0500 | 1.7300 | 0.8300 |
| Cr2O3 | 0.0400 | 0.0810 | 0.1670 | 0.1460 | 0.0760 |
| V2O3 | 0.0220 | 0.0390 | 0.0760 | 0.1050 | 0.1310 |
| MnO | 0.0610 | 0.0570 | 0.0500 | 0.0380 | 0.0090 |
| MgO | 0.1600 | 0.2600 | 0.5000 | 0.8600 | 0.2200 |
| CaO | 45.4000 | 39.2000 | 24.5000 | 11.5000 | 0.2710 |
| Rb2O | 0.0014 | 0.0025 | 0.0074 | 0.0083 | 0.0120 |
| SrO | 0.0067 | 0.0051 | 0.0020 | 0.0000 | 0.0000 |
| BaO | 0.0360 | 0.0300 | 0.0230 | 0.0220 | 0.0050 |
| Na2O | 0.0800 | 0.1000 | 0.1300 | 0.1300 | 0.0900 |
| K2O | 0.0130 | 0.0310 | 0.0690 | 0.1110 | 0.0420 |
| ZrO2 | 0.0030 | 0.0050 | 0.0080 | 0.0090 | 0.0070 |
| P2O5 | 35.1000 | 31.2000 | 20.7000 | 10.2000 | 0.1480 |
| Cu | 0.0010 | 0.0020 | 0.0020 | 0.0040 | 0.0030 |
| Ni | 0.0220 | 0.0400 | 0.0830 | 0.0780 | 0.0420 |
| Co | 0.0140 | 0.0100 | 0.0110 | 0.0040 | 0.0010 |
| Zn | 0.0020 | 0.0030 | 0.0020 | 0.0030 | 0.0040 |
| Pb | 0.0040 | 0.0040 | 0.0020 | 0.0010 | 0.0000 |
| Ag | 0.0100 | 0.0130 | 0.0200 | 0.0260 | 0.0050 |
| S | 0.0400 | 0.0350 | 0.0320 | 0.0280 | 0.0130 |
| As | 0.0150 | 0.0130 | 0.0100 | 0.0110 | 0.0010 |
| Sb | 0.0150 | 0.0180 | 0.0130 | 0.0130 | 0.0080 |
| Bi | 0.0030 | 0.0020 | 0.0030 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.1240 | 0.1120 | 0.0900 | 0.0840 | 0.0031 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0047 | 0.0092 | 0.0160 | 0.0130 | 0.0017 |
| Sn | 0.0040 | 0.0070 | 0.0060 | 0.0100 | 0.0090 |
| W | 0.0010 | 0.0000 | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0440 | 0.0380 | 0.0230 | 0.0140 | 0.0020 |
| Th | 0.0076 | 0.0095 | 0.0120 | 0.0190 | 0.0059 |
| U | 0.0020 | 0.0039 | 0.0077 | 0.0110 | 0.0094 |
| Cs | 0.0020 | 0.0000 | 0.0000 | 0.0000 | 0.0020 |
| La | 0.2730 | 0.2980 | 0.3810 | 0.4720 | 0.0250 |
| Ce | 0.4970 | 0.5500 | 0.6900 | 0.8400 | 0.0410 |
| Ta | 0.0030 | 0.0020 | 0.0060 | 0.0000 | 0.0040 |
| Ga | 0.0007 | 0.0005 | 0.0006 | 0.0007 | 0.0036 |
| Si | 0.5500 | 1.1900 | 2.2800 | 2.8600 | 2.0400 |
| Ti | 0.0280 | 0.0650 | 0.1290 | 0.1790 | 0.2230 |
| Cr | 0.0280 | 0.0560 | 0.1150 | 0.1000 | 0.0520 |
| V | 0.0150 | 0.0260 | 0.0520 | 0.0710 | 0.0890 |
| Fe | 7.5700 | 15.6000 | 32.1000 | 46.7000 | 65.5000 |
| Satmagan | 0.34 | 0.48 | 0.74 | 0.76 | 0.80 |
| Eltra S | 0.035 | 0.029 | 0.024 | 0.033 | 0.021 |





08.01.2015

5.3 Flygruvan, ‘Drill core composite L295 436’





5.3.1 Head Assay

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 26.8.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120462
Method : 180X-O
Date : 26.8.2014
Comments : NIO Variability Tests --- analysis request 21.8.2014
: Flygruvan Composite (FC)
Codes : L295436

Contents (%)

| | FC Feed A L14054231 | FC Feed B L14054232 | FC Feed Average L295436 |
|----------|------------------------|------------------------|-------------------------------|
| SiO2 | 43.5000 | 44.7000 | 44.1000 |
| TiO2 | 0.2770 | 0.2730 | 0.2750 |
| Al2O3 | 6.9300 | 7.2300 | 7.0800 |
| Cr2O3 | 0.0047 | 0.0034 | 0.0041 |
| V2O3 | 0.0460 | 0.0440 | 0.0450 |
| MnO | 0.0520 | 0.0500 | 0.0510 |
| MgO | 3.1000 | 3.2200 | 3.1600 |
| CaO | 2.3500 | 2.3600 | 2.3550 |
| Rb2O | 0.0110 | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0240 | 0.0280 | 0.0260 |
| Na2O | 1.9600 | 2.0500 | 2.0050 |
| K2O | 1.2500 | 1.2900 | 1.2700 |
| ZrO2 | 0.0120 | 0.0110 | 0.0115 |
| P2O5 | 0.9200 | 0.9800 | 0.9500 |
| Cu | 0.0010 | 0.0000 | 0.0005 |
| Ni | 0.0040 | 0.0040 | 0.0040 |
| Co | 0.0030 | 0.0030 | 0.0030 |
| Zn | 0.0060 | 0.0040 | 0.0050 |
| Pb | 0.0010 | 0.0010 | 0.0010 |
| Ag | 0.0030 | 0.0040 | 0.0035 |
| S | 0.0040 | 0.0050 | 0.0045 |
| As | 0.0000 | 0.0000 | 0.0000 |
| Sb | 0.0080 | 0.0100 | 0.0090 |
| Bi | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0091 | 0.0087 | 0.0089 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0040 | 0.0050 | 0.0045 |
| W | 0.0000 | 0.0010 | 0.0005 |
| Cl | 0.0090 | 0.0100 | 0.0095 |
| Th | 0.0036 | 0.0035 | 0.0036 |
| U | 0.0036 | 0.0034 | 0.0035 |
| Cs | 0.0040 | 0.0010 | 0.0025 |
| La | 0.0310 | 0.0320 | 0.0315 |
| Ce | 0.0530 | 0.0540 | 0.0535 |
| Ta | 0.0020 | 0.0010 | 0.0015 |
| Ga | 0.0025 | 0.0010 | 0.0018 |
| Si | 20.4000 | 20.9000 | 20.6500 |
| Ti | 0.1660 | 0.1630 | 0.1645 |
| Cr | 0.0032 | 0.0023 | 0.0028 |
| V | 0.0320 | 0.0300 | 0.0310 |
| Fe | 28.5000 | 27.3000 | 27.9000 |
| Eltra S | 0.010 | 0.037 | 0.024 |
| Satmagan | 25.01 | 25.47 | 25.24 |

5.3.2 Shaking Table, <1.18mm

Table 12: Metallurgical Balance, Shaking Table, <1.18mm 'Flygruvan Composite L295 436'

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|--|-----------------------|--------|--|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | | |
| Concentrate | | 4972.1 | 28.38 | 61.00 | 57.0 | 9.73 | 6.6 | 0.68 | 22.6 | 1.16 | 11.8 | 0.055 | 28.8 | 1.24 | 5.5 | 1.46 | 17.5 | 0.23 | 3.8 | 0.095 | 2.2 | 0.024 | 44.5 | 51.77 | 56.9 |
| Middling | | 10931.8 | 62.41 | 18.60 | 38.2 | 54.70 | 81.5 | 0.90 | 65.8 | 3.26 | 72.8 | 0.050 | 57.6 | 8.25 | 80.9 | 2.61 | 68.9 | 2.32 | 84.3 | 1.67 | 83.3 | 0.011 | 44.8 | 15.80 | 38.2 |
| (Conc + Middling) | | 15903.9 | 90.79 | 31.86 | 95.2 | 40.64 | 88.0 | 0.83 | 88.4 | 2.60 | 84.5 | 0.052 | 86.4 | 6.06 | 86.4 | 2.25 | 86.5 | 1.67 | 88.1 | 1.18 | 85.4 | 0.015 | 89.2 | 27.05 | 95.1 |
| Tailing 1 | | 1370.4 | 7.82 | 15.50 | 4.0 | 55.10 | 10.3 | 1.04 | 9.5 | 4.74 | 13.3 | 0.079 | 11.4 | 9.41 | 11.6 | 3.39 | 11.2 | 2.23 | 10.2 | 2.01 | 12.6 | 0.017 | 8.7 | 13.40 | 4.1 |
| (Conc + Middl. + Tails 1) | | 17274.3 | 98.62 | 30.56 | 99.1 | 41.79 | 98.3 | 0.85 | 98.0 | 2.77 | 97.8 | 0.054 | 97.8 | 6.32 | 98.0 | 2.34 | 97.7 | 1.71 | 98.3 | 1.24 | 98.0 | 0.015 | 97.9 | 25.96 | 99.2 |
| Tailing 2 | | 242.5 | 1.38 | 18.80 | 0.9 | 50.60 | 1.7 | 1.25 | 2.0 | 4.43 | 2.2 | 0.088 | 2.2 | 9.10 | 2.0 | 3.95 | 2.3 | 2.17 | 1.7 | 1.80 | 2.0 | 0.023 | 2.1 | 15.54 | 0.8 |
| Calc'd Feed | | 17516.8 | 100.00 | 30.40 | 100.0 | 41.91 | 100.0 | 0.85 | 100.0 | 2.80 | 100.0 | 0.054 | 100.0 | 6.36 | 100.0 | 2.36 | 100.0 | 1.72 | 100.0 | 1.25 | 100.0 | 0.015 | 100.0 | 25.82 | 100.0 |
| Feed Assays | | | | 27.90 | | 44.10 | | 0.95 | | 3.16 | | 0.051 | | 7.08 | | 2.36 | | 2.01 | | 1.27 | | 0.024 | | 25.24 | |

The results presented in Table 12 suggest that Flygruvan Composite L295 436 was much finer grained than the sample tested earlier (please refer to the Phase 1 Report for details), resulting in high levels of gangue (9.7% SiO₂, 1.2% Al₂O₃) and low %Fe in the gravity concentrate.

A concentrate sub-sample was screened into the following size fractions, sampled and submitted for the chemistry:

- +0.80mm;
- -0.80+0.63mm;
- -0.63+0.5mm;
- -0.5mm+0.315mm;
- -0.315mm+0.18mm;
- -0.18mm.

The results, which are presented overleaf, indicate that grinding to a size substantially finer than 0.18mm would be required to obtain products with satisfactory Fe grade.

Table 13: Size-by-size Chemical Analysis, <1.18mm Shaking Table Concentrate

| Sieve fraction µm | | Weight g wt.-% | | Grades & Distributions (XRF MP-10, Eltra S and Satmagan) | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------------------------------|--------|--|--------|------------------|--------|-------------------------------|--------|------|--------|-------|--------|--------------------------------|--------|------|--------|-------------------|--------|------------------|--------|---------|--------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | | |
| Sample: NIO, Flygruvan Composite, Table Conc (< 1.18 mm) | | Project: 1281277 / 2402 | | Notes: Product fineness P(80) = 419 microns Sieve fractions of the product to chemical assaying | | | | | | | | | | | | | | | | | | | | | |
| Date: 2.9.2014 | | Test: Shaking table test 28.8.2014 | | By: M. Kuusisto | | | | | | | | | | | | | | | | | | | | | |
| + 800 | | 13.4 | 4.45 | 55.80 | 4.1 | 15.00 | 7.0 | 0.85 | 5.5 | 1.98 | 7.3 | 0.067 | 5.6 | 1.68 | 6.2 | 1.81 | 5.5 | 0.19 | 3.8 | 0.115 | 5.4 | 0.045 | 5.8 | 44.93 | 3.8 |
| - 800 | | 287.9 | 95.55 | 61.35 | 95.9 | 9.33 | 93.0 | 0.68 | 94.5 | 1.16 | 92.7 | 0.052 | 94.4 | 1.19 | 93.8 | 1.44 | 94.5 | 0.23 | 96.2 | 0.094 | 94.6 | 0.034 | 94.2 | 52.44 | 96.2 |
| 630/800 | | 9.3 | 3.09 | 60.10 | 3.0 | 10.80 | 3.5 | 0.61 | 2.7 | 1.45 | 3.7 | 0.056 | 3.3 | 1.26 | 3.2 | 1.31 | 2.8 | 0.13 | 1.8 | 0.078 | 2.5 | 0.040 | 3.6 | 43.71 | 2.6 |
| + 630 | | 22.7 | 7.53 | 57.56 | 7.1 | 13.28 | 10.4 | 0.75 | 8.2 | 1.76 | 11.1 | 0.062 | 8.9 | 1.51 | 9.4 | 1.61 | 8.3 | 0.17 | 5.5 | 0.100 | 7.9 | 0.043 | 9.4 | 44.43 | 6.4 |
| - 630 | | 278.6 | 92.47 | 61.39 | 92.9 | 9.28 | 89.6 | 0.68 | 91.8 | 1.15 | 88.9 | 0.052 | 91.1 | 1.19 | 90.6 | 1.45 | 91.7 | 0.23 | 94.5 | 0.095 | 92.1 | 0.034 | 90.6 | 52.73 | 93.6 |
| 500/630 | | 12.7 | 4.22 | 61.70 | 4.3 | 9.18 | 4.0 | 0.51 | 3.1 | 1.19 | 4.2 | 0.051 | 4.1 | 1.12 | 3.9 | 1.12 | 3.2 | 0.11 | 2.1 | 0.070 | 3.1 | 0.027 | 3.3 | 43.04 | 3.5 |
| + 500 | | 35.4 | 11.75 | 59.05 | 11.4 | 11.81 | 14.5 | 0.66 | 11.3 | 1.56 | 15.2 | 0.058 | 12.9 | 1.37 | 13.3 | 1.43 | 11.5 | 0.15 | 7.6 | 0.089 | 11.0 | 0.037 | 12.6 | 43.93 | 9.9 |
| - 500 | | 265.9 | 88.25 | 61.38 | 88.6 | 9.29 | 85.5 | 0.69 | 88.7 | 1.15 | 84.8 | 0.052 | 87.1 | 1.19 | 86.7 | 1.46 | 88.5 | 0.24 | 92.4 | 0.096 | 89.0 | 0.034 | 87.4 | 53.20 | 90.1 |
| 315/500 | | 56.9 | 18.88 | 62.70 | 19.4 | 8.24 | 16.2 | 0.431 | 11.8 | 1.02 | 16.0 | 0.046 | 16.4 | 1.08 | 16.8 | 0.94 | 12.2 | 0.16 | 13.4 | 0.080 | 15.9 | 0.035 | 19.1 | 45.50 | 16.5 |
| + 315 | | 92.3 | 30.63 | 61.30 | 30.7 | 9.61 | 30.7 | 0.52 | 23.1 | 1.23 | 31.3 | 0.051 | 29.3 | 1.19 | 30.1 | 1.13 | 23.7 | 0.15 | 21.0 | 0.084 | 26.9 | 0.036 | 31.7 | 44.90 | 26.4 |
| - 315 | | 209.0 | 69.37 | 61.02 | 69.3 | 9.57 | 69.3 | 0.76 | 76.9 | 1.19 | 68.7 | 0.054 | 70.7 | 1.22 | 69.9 | 1.60 | 76.3 | 0.26 | 79.0 | 0.100 | 73.1 | 0.034 | 68.3 | 55.29 | 73.6 |
| 180/315 | | 90.4 | 30.00 | 59.20 | 29.1 | 11.70 | 36.6 | 0.65 | 28.3 | 1.28 | 32.0 | 0.050 | 28.3 | 1.49 | 36.8 | 1.41 | 29.0 | 0.33 | 44.0 | 0.136 | 42.9 | 0.042 | 36.4 | 49.02 | 28.2 |
| + 180 | | 182.7 | 60.64 | 60.26 | 59.8 | 10.64 | 67.3 | 0.58 | 51.4 | 1.25 | 63.3 | 0.050 | 57.7 | 1.34 | 66.9 | 1.27 | 52.7 | 0.24 | 65.0 | 0.109 | 69.8 | 0.039 | 68.2 | 46.94 | 54.6 |
| - 180 | | 118.6 | 39.36 | 62.40 | 40.2 | 7.95 | 32.7 | 0.85 | 48.6 | 1.12 | 36.7 | 0.057 | 42.3 | 1.02 | 33.1 | 1.75 | 47.3 | 0.20 | 35.0 | 0.073 | 30.2 | 0.028 | 31.8 | 60.07 | 45.4 |
| Calc.Bulk | | 301.3 | 100.00 | 61.10 | 100.0 | 9.58 | 100.0 | 0.69 | 100.0 | 1.20 | 100.0 | 0.053 | 100.0 | 1.21 | 100.0 | 1.46 | 100.0 | 0.23 | 100.0 | 0.095 | 100.0 | 0.035 | 100.0 | 52.11 | 100.0 |
| Bulk Assay | | | | 61.00 | | 9.73 | | 0.68 | | 1.16 | | 0.055 | | 1.24 | | 1.46 | | 0.23 | | 0.095 | | 0.024 | | 51.77 | |

Table 14: Screen Analysis, 'Flygruvan Composite L295 436' Shaking Table Feed and Concentrate



Eastern Finland office
Mintec

Project name : NIO Variability
Code : 1281272 / 2402

Date : 21.8.2014 / 1.9.2014
By : ANS

Note : Combination of elutriation screening and
Ro-Tap dry screening for 10 min

Sample data : NIO Variability / 'Flygruvan Composite' - Screen checks

Code : L295436

| Screen opening (µm) | NIO Variability Flygruvan Comp Shaking Table Feed | | | Screen opening (µm) | NIO Variability Flygruvan Comp Feed Shaking Table Conc | | | | | | | | | | | | | | |
|------------------------|---|-----------|-----------|------------------------|--|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Weight (g) | Pass. (%) | Frac. (%) | | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 1180 | 0.0 | 100.0 | 0.0 | 1180 | 0.0 | 100.0 | 0.0 | | | | | | | | | | | | |
| 1000 | 9.3 | 93.0 | 7.0 | 1000 | 3.6 | 98.8 | 1.2 | | | | | | | | | | | | |
| 710 | 23.7 | 75.1 | 17.9 | 800 | 9.8 | 95.6 | 3.3 | | | | | | | | | | | | |
| 500 | 16.5 | 62.7 | 12.4 | 630 | 9.3 | 92.5 | 3.1 | | | | | | | | | | | | |
| 250 | 27.7 | 41.8 | 20.9 | 500 | 12.7 | 88.3 | 4.2 | | | | | | | | | | | | |
| 125 | 22.6 | 24.8 | 17.0 | 315 | 56.9 | 69.4 | 18.9 | | | | | | | | | | | | |
| 75 | 11.1 | 16.4 | 8.3 | 180 | 90.4 | 39.4 | 30.0 | | | | | | | | | | | | |
| - 75 | 21.8 | | 16.4 | - 180 | 118.6 | 0.0 | 39.4 | | | | | | | | | | | | |
| Total | 132.8 | | 100.0 | Total | 301.3 | | 100.0 | | | | | | | | | | | | |

Calc'd
P 80
(µm)

789

419





Labtium Oy
REPORT OF XRF ANALYSIS 29.8.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120529
Method : 180X-O
Date : 29.8.2014
Comment : NIO Variability, 'Flygruvan Composite' / Shaking table test, Feed fineness < 1.18 mm - analysis request 28.8.2014

Contents (%)

| | ST Conc. L14057139 | ST Midds L14057140 | ST Tails 1 L14057141 | ST Tails 2 L14057142 |
|----------|-----------------------|-----------------------|-------------------------|-------------------------|
| SiO2 | 9.7300 | 54.7000 | 55.1000 | 50.6000 |
| TiO2 | 0.3750 | 0.2330 | 0.2220 | 0.2690 |
| Al2O3 | 1.2400 | 8.2500 | 9.4100 | 9.1000 |
| Cr2O3 | 0.0075 | 0.0110 | 0.0048 | 0.0069 |
| V2O3 | 0.0850 | 0.0300 | 0.0180 | 0.0250 |
| MnO | 0.0550 | 0.0500 | 0.0790 | 0.0880 |
| MgO | 1.1600 | 3.2600 | 4.7400 | 4.4300 |
| CaO | 1.4600 | 2.6100 | 3.3900 | 3.9500 |
| Rb2O | 0.0120 | 0.0100 | 0.0130 | 0.0120 |
| SrO | 0.0000 | 0.0015 | 0.0022 | 0.0028 |
| BaO | 0.0070 | 0.0350 | 0.0510 | 0.0440 |
| Na2O | 0.2300 | 2.3200 | 2.2300 | 2.1700 |
| K2O | 0.0950 | 1.6700 | 2.0100 | 1.8000 |
| ZrO2 | 0.0060 | 0.0140 | 0.0190 | 0.0190 |
| P2O5 | 0.6800 | 0.9000 | 1.0400 | 1.2500 |
| Cu | 0.0000 | 0.0000 | 0.0000 | 0.0020 |
| Ni | 0.0040 | 0.0040 | 0.0040 | 0.0040 |
| Co | 0.0060 | 0.0070 | 0.0080 | 0.0090 |
| Zn | 0.0070 | 0.0040 | 0.0060 | 0.0070 |
| Pb | 0.0000 | 0.0040 | 0.0040 | 0.0060 |
| Ag | 0.0050 | 0.0030 | 0.0030 | 0.0030 |
| S | 0.0130 | 0.0130 | 0.0180 | 0.0250 |
| As | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Sb | 0.0090 | 0.0110 | 0.0120 | 0.0130 |
| Bi | 0.0030 | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0064 | 0.0110 | 0.0130 | 0.0150 |
| Nb | 0.0000 | 0.0005 | 0.0005 | 0.0013 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0060 | 0.0040 | 0.0050 | 0.0060 |
| W | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| Cl | 0.0050 | 0.0080 | 0.0110 | 0.0100 |
| Th | 0.0051 | 0.0031 | 0.0038 | 0.0044 |
| U | 0.0083 | 0.0017 | 0.0018 | 0.0027 |
| Cs | 0.0030 | 0.0020 | 0.0000 | 0.0020 |
| La | 0.0280 | 0.0360 | 0.0290 | 0.0340 |
| Ce | 0.0490 | 0.0570 | 0.0510 | 0.0610 |
| Ta | 0.0000 | 0.0000 | 0.0020 | 0.0020 |
| Ga | 0.0025 | 0.0018 | 0.0021 | 0.0023 |
| Si | 4.5500 | 25.6000 | 25.8000 | 23.6000 |
| Ti | 0.2250 | 0.1400 | 0.1330 | 0.1610 |
| Cr | 0.0051 | 0.0075 | 0.0033 | 0.0047 |
| V | 0.0580 | 0.0200 | 0.0120 | 0.0170 |
| Fe | 61.0000 | 18.6000 | 15.5000 | 18.8000 |
| Eltra S | 0.024 | 0.011 | 0.017 | 0.023 |
| Satmagan | 51.77 | 15.80 | 13.40 | 15.54 |



LABTIUM

Labtium Oy
REPORT OF XRF-ANALYSIS 1.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120563
Method : 180X-O
Date : 1.9.2014
Comment : NIO Variability II, 'Flygruvan Composite', ST Concentrate sieve fractions - analysis request 1.9.2014

Contents (%)

| | + 800 µm L14057699 | 630/800 µm L14057700 | 500/630 µm L14057701 | 315/500 µm L14057702 | 180/315 µm L14057703 | - 180 µm L14057704 |
|--------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|
| SiO ₂ | 15.0000 | 10.8000 | 9.1800 | 8.2400 | 11.7000 | 7.9500 |
| TiO ₂ | 0.3620 | 0.3330 | 0.3470 | 0.3750 | 0.3980 | 0.3820 |
| Al ₂ O ₃ | 1.6800 | 1.2600 | 1.1200 | 1.0800 | 1.4900 | 1.0200 |
| Cr ₂ O ₃ | 0.0037 | 0.0035 | 0.0042 | 0.0031 | 0.0041 | 0.0038 |
| V ₂ O ₃ | 0.0980 | 0.1010 | 0.1010 | 0.0980 | 0.0890 | 0.0750 |
| MnO | 0.0670 | 0.0560 | 0.0510 | 0.0460 | 0.0500 | 0.0570 |
| MgO | 1.9800 | 1.4500 | 1.1900 | 1.0200 | 1.2800 | 1.1200 |
| CaO | 1.8100 | 1.3100 | 1.1200 | 0.9400 | 1.4100 | 1.7500 |
| Rb ₂ O | 0.0100 | 0.0100 | 0.0110 | 0.0120 | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0070 | 0.0070 | 0.0060 | 0.0060 | 0.0060 | 0.0060 |
| Na ₂ O | 0.1900 | 0.1300 | 0.1100 | 0.1600 | 0.3300 | 0.2000 |
| K ₂ O | 0.1150 | 0.0780 | 0.0700 | 0.0800 | 0.1360 | 0.0730 |
| ZrO ₂ | 0.0040 | 0.0040 | 0.0040 | 0.0040 | 0.0050 | 0.0080 |
| P ₂ O ₅ | 0.8500 | 0.6100 | 0.5100 | 0.4310 | 0.6500 | 0.8500 |
| Cu | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 0.0030 | 0.0010 |
| Ni | 0.0050 | 0.0080 | 0.0040 | 0.0040 | 0.0070 | 0.0070 |
| Co | 0.0140 | 0.0080 | 0.0010 | 0.0020 | 0.0020 | 0.0010 |
| Zn | 0.0090 | 0.0070 | 0.0090 | 0.0100 | 0.0070 | 0.0050 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0050 | 0.0030 | 0.0040 | 0.0030 | 0.0030 | 0.0050 |
| S | 0.0020 | 0.0040 | 0.0030 | 0.0030 | 0.0020 | 0.0050 |
| As | 0.0000 | 0.0020 | 0.0010 | 0.0020 | 0.0000 | 0.0010 |
| Sb | 0.0070 | 0.0070 | 0.0090 | 0.0090 | 0.0080 | 0.0060 |
| Bi | 0.0020 | 0.0040 | 0.0020 | 0.0030 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0100 | 0.0075 | 0.0071 | 0.0058 | 0.0077 | 0.0090 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0050 | 0.0050 | 0.0060 | 0.0050 | 0.0040 | 0.0040 |
| W | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0030 | 0.0050 | 0.0030 | 0.0040 | 0.0040 | 0.0060 |
| Th | 0.0045 | 0.0039 | 0.0054 | 0.0050 | 0.0052 | 0.0054 |
| U | 0.0085 | 0.0084 | 0.0092 | 0.0083 | 0.0086 | 0.0090 |
| Cs | 0.0030 | 0.0030 | 0.0030 | 0.0010 | 0.0030 | 0.0010 |
| La | 0.0390 | 0.0290 | 0.0290 | 0.0180 | 0.0220 | 0.0350 |
| Ce | 0.0750 | 0.0570 | 0.0490 | 0.0400 | 0.0370 | 0.0620 |
| Ta | 0.0010 | 0.0000 | 0.0010 | 0.0010 | 0.0060 | 0.0000 |
| Ga | 0.0008 | 0.0023 | 0.0001 | 0.0020 | 0.0026 | 0.0042 |
| Si | 7.0000 | 5.0300 | 4.2900 | 3.8500 | 5.4900 | 3.7200 |
| Ti | 0.2170 | 0.2000 | 0.2080 | 0.2250 | 0.2380 | 0.2290 |
| Cr | 0.0025 | 0.0024 | 0.0029 | 0.0021 | 0.0028 | 0.0026 |
| V | 0.0660 | 0.0690 | 0.0690 | 0.0670 | 0.0600 | 0.0510 |
| Fe | 55.8000 | 60.1000 | 61.7000 | 62.7000 | 59.2000 | 62.4000 |
| Eltra S | 0.045 | 0.040 | 0.027 | 0.035 | 0.042 | 0.028 |
| Satmagan | 44.93 | 43.71 | 43.04 | 45.50 | 49.02 | 60.07 |

5.3.3 Wet LIMS, <1.18mm Shaking Table Concentrate

Table 15: Metallurgical Balance, LIMS, <1.18mm 'Flygruvan Composite L295 436' Shaking Table Concentrate

Sala Ø 200 mm 'Blue Ribbon' Wet LIMS Separator, Re-cleaning / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10 and Salmagan analyses of products

Client(s) : TSC / M. Reisinger
NIO / P. Marsden

Project : 1281277 / 2402

Test Feed : 'Flygruvan Composite' L295436
Shaking table (ST) concentrate product at 100% minus 1.18 mm

Test Conditions : One-stage WLIMS re-treatment using feed solids at 17-18 wt.-%
Nominal magnetic field strength ca. 0.07 Tesla
Basin bottom flow restrictor dia. 5 mm
Volumetric slurry feed rate ca. 1.3 liter/min

Date : Sept. 8th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Salmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|----------|----------------------------|--------|--------|---|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------------------|-------|------|-------|-------------------|-------|------------------|-------|-------|-------|----------|-------|
| | | g | Wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | V | | Salmagan | |
| | | | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| WLIMS | WLIMS Mags | 2996.9 | 66.08 | 66.00 | 71.3 | 5.74 | 40.8 | 0.342 | 30.2 | 0.99 | 57.6 | 0.068 | 85.8 | 0.76 | 37.7 | 0.212 | 36.5 | 0.93 | 41.1 | 0.04 | 12.4 | 0.023 | 15.7 | 0.055 | 63.0 | 80.68 | 99.6 |
| | WLIMS NM | 1538.4 | 33.92 | 51.80 | 28.7 | 16.20 | 59.2 | 1.54 | 69.8 | 1.42 | 42.4 | 0.022 | 14.2 | 2.45 | 62.3 | 0.72 | 63.5 | 2.60 | 58.9 | 0.55 | 87.6 | 0.241 | 84.3 | 0.063 | 37.0 | 0.68 | 0.4 |
| | [Calc.Feed] | 4535.3 | 100.00 | 61.18 | 100.0 | 9.29 | 100.0 | 0.75 | 100.0 | 1.14 | 100.0 | 0.052 | 100.0 | 1.33 | 100.0 | 0.384 | 100.0 | 1.50 | 100.0 | 0.21 | 100.0 | 0.097 | 100.0 | 0.058 | 100.0 | 53.54 | 100.0 |
| | Feed Assay [ST Conc.] | | | 61.00 | | 9.73 | | 0.68 | | 1.16 | | 0.055 | | 1.24 | | 0.375 | | 1.46 | | 0.23 | | 0.095 | | 0.058 | | 51.77 | |

The LIMS concentrate (80% composed of magnetite) graded 66% Fe but still contained relatively high levels of silica (5.7%) and phosphorus (0.15%, or 0.34% P₂O₅).

The hematite fraction (i.e. the LIMS Non-magnetics) was entirely unsatisfactory in terms of the content of gangue (16.2% SiO₂, 2.45% Al₂O₃) and thus was subjected to further treatment by wet HIMS/HGMS followed by reverse flotation for phosphate removal.

08.01.2015

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 8.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120633
Method : 180X-O
Date : 8.9.2014
Comment : NIO Variability (II), 'Flygruvan Composite' / ST Concentrate - Wet LIMS products

Contents (%)

| | Mags L14059981 | NM L14059982 |
|----------|-------------------|-----------------|
| SiO2 | 5.7400 | 16.2000 |
| TiO2 | 0.2120 | 0.7200 |
| Al2O3 | 0.7600 | 2.4500 |
| Cr2O3 | 0.0041 | 0.0035 |
| V2O3 | 0.0810 | 0.0920 |
| MnO | 0.0680 | 0.0220 |
| MgO | 0.9900 | 1.4200 |
| CaO | 0.9300 | 2.6000 |
| Rb2O | 0.0110 | 0.0120 |
| SrO | 0.0000 | 0.0000 |
| BaO | 0.0040 | 0.0110 |
| Na2O | 0.0400 | 0.5500 |
| K2O | 0.0230 | 0.2410 |
| ZrO2 | 0.0030 | 0.0110 |
| P2O5 | 0.3420 | 1.5400 |
| Cu | 0.0000 | 0.0000 |
| Ni | 0.0050 | 0.0040 |
| Co | 0.0120 | 0.0000 |
| Zn | 0.0090 | 0.0010 |
| Pb | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0060 |
| S | 0.0030 | 0.0090 |
| As | 0.0000 | 0.0000 |
| Sb | 0.0070 | 0.0080 |
| Bi | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0026 | 0.0180 |
| Nb | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0100 |
| W | 0.0000 | 0.0140 |
| Cl | 0.0020 | 0.0070 |
| Th | 0.0057 | 0.0059 |
| U | 0.0099 | 0.0077 |
| Cs | 0.0030 | 0.0000 |
| La | 0.0100 | 0.0590 |
| Ce | 0.0180 | 0.1140 |
| Ta | 0.0080 | 0.0040 |
| Ga | 0.0038 | 0.0039 |
| Si | 2.6900 | 7.5900 |
| Ti | 0.1270 | 0.4320 |
| Cr | 0.0028 | 0.0024 |
| V | 0.0550 | 0.0630 |
| Fe | 66.0000 | 51.8000 |
| Satmagan | 80.68 | 0.68 |

5.3.4 Wet LIMS ('Scavenger'), Shaking Table Tailings

Interlocked magnetite rejected in the gravity concentration stage was recovered using two stages of LIMS (at <1.18mm and <0.15mm respectively) with intermediate regrinding of the concentrate.

The final LIMS concentrate assayed 67.5% Fe, 4.8% SiO₂ and 0.05% P (0.12% P₂O₅) and recovered 97% of the magnetite contained in the gravity concentration tailings.

Table 16: Metallurgical Balance, LIMS, Shaking Table Tailings

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|--|-----------------------|--------|--|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|-------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | | |
| Mags 4 magnetite con. | | 1110.4 | 18.62 | 67.50 | 64.6 | 4.78 | 1.7 | 0.115 | 2.2 | 0.84 | 4.8 | 0.066 | 22.0 | 0.56 | 1.3 | 0.499 | 3.3 | 0.04 | 0.4 | 0.016 | 0.2 | 0.040 | 19.2 | 86.14 | 97.4 |
| Non-Mags 2...4 | | 742.0 | 12.45 | 14.40 | 9.2 | 58.70 | 13.7 | 1.55 | 19.8 | 6.57 | 25.1 | 0.112 | 24.9 | 5.12 | 7.9 | 5.32 | 23.7 | 0.80 | 4.8 | 0.60 | 4.2 | 0.047 | 15.1 | 0.68 | 0.5 |
| (Mags 1) | | 1852.4 | 31.07 | 46.23 | 73.8 | 26.38 | 15.3 | 0.69 | 22.0 | 3.14 | 29.9 | 0.084 | 46.9 | 2.39 | 9.2 | 2.43 | 27.1 | 0.34 | 5.2 | 0.250 | 4.3 | 0.043 | 34.3 | 51.91 | 97.9 |
| Non-Mags 1 | | 4109.7 | 68.93 | 7.41 | 26.2 | 65.60 | 84.7 | 1.10 | 78.0 | 3.32 | 70.1 | 0.043 | 53.1 | 10.60 | 90.8 | 2.95 | 72.9 | 2.84 | 94.8 | 2.48 | 95.7 | 0.037 | 65.7 | 0.49 | 2.1 |
| Calc'd Feed | | 5962.1 | 100.00 | 19.47 | 100.0 | 53.41 | 100.0 | 0.97 | 100.0 | 3.26 | 100.0 | 0.056 | 100.0 | 8.05 | 100.0 | 2.79 | 100.0 | 2.06 | 100.0 | 1.79 | 100.0 | 0.039 | 100.0 | 16.47 | 100.0 |
| Feed Assays | | | | 18.27 | | 54.66 | | 0.92 | | 3.44 | | 0.054 | | 8.39 | | 2.72 | | 2.31 | | 1.71 | | 0.012 | | 15.53 | |
| (Shaking table rejects) | | | | | | | | | | | | | | | | | | | | | | | | | |

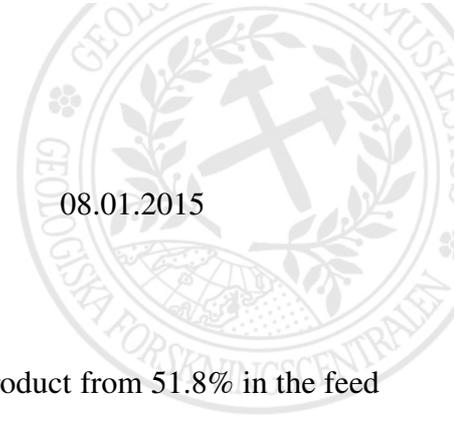
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 5.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120606
Method : 180X-O
Date : 5.9.2014
Comment : NIO Variability (II), 'Flygruvan Composite' / Scavenger WLIMS test for Fine Magnetite Concentrate production

Contents (%)

| | NM1 L14059003 | NM2..4 L14059004 | Mags 4 L14059005 |
|----------|------------------|---------------------|---------------------|
| SiO2 | 65.6000 | 58.7000 | 4.7800 |
| TiO2 | 0.2240 | 0.3600 | 0.1850 |
| Al2O3 | 10.6000 | 5.1200 | 0.5600 |
| Cr2O3 | 0.0032 | 0.0270 | 0.0780 |
| V2O3 | 0.0160 | 0.0250 | 0.0820 |
| MnO | 0.0430 | 0.1120 | 0.0660 |
| MgO | 3.3200 | 6.5700 | 0.8400 |
| CaO | 2.9500 | 5.3200 | 0.4990 |
| Rb2O | 0.0120 | 0.0053 | 0.0130 |
| SrO | 0.0046 | 0.0008 | 0.0000 |
| BaO | 0.0470 | 0.0300 | 0.0040 |
| Na2O | 2.8400 | 0.8000 | 0.0400 |
| K2O | 2.4800 | 0.6000 | 0.0160 |
| ZrO2 | 0.0190 | 0.0140 | 0.0020 |
| P2O5 | 1.1000 | 1.5500 | 0.1150 |
| Cu | 0.0010 | 0.0010 | 0.0030 |
| Ni | 0.0040 | 0.0150 | 0.0410 |
| Co | 0.0000 | 0.0130 | 0.0120 |
| Zn | 0.0030 | 0.0070 | 0.0100 |
| Pb | 0.0060 | 0.0040 | 0.0000 |
| Ag | 0.0020 | 0.0040 | 0.0030 |
| S | 0.0050 | 0.0070 | 0.0030 |
| As | 0.0000 | 0.0000 | 0.0040 |
| Sb | 0.0110 | 0.0100 | 0.0060 |
| Bi | 0.0020 | 0.0020 | 0.0020 |
| Te | 0.0010 | 0.0000 | 0.0000 |
| Y | 0.0160 | 0.0140 | 0.0012 |
| Nb | 0.0019 | 0.0007 | 0.0000 |
| Mo | 0.0000 | 0.0021 | 0.0008 |
| Sn | 0.0040 | 0.0070 | 0.0020 |
| W | 0.0040 | 0.0010 | 0.0010 |
| Cl | 0.0100 | 0.0100 | 0.0020 |
| Th | 0.0031 | 0.0038 | 0.0058 |
| U | 0.0000 | 0.0014 | 0.0099 |
| Cs | 0.0030 | 0.0030 | 0.0000 |
| La | 0.0360 | 0.0400 | 0.0070 |
| Ce | 0.0700 | 0.0720 | 0.0100 |
| Ta | 0.0010 | 0.0000 | 0.0030 |
| Ga | 0.0019 | 0.0011 | 0.0042 |
| Si | 30.7000 | 27.4000 | 2.2300 |
| Ti | 0.1340 | 0.2160 | 0.1110 |
| Cr | 0.0022 | 0.0190 | 0.0530 |
| V | 0.0110 | 0.0170 | 0.0560 |
| Fe | 7.4100 | 14.4000 | 67.5000 |
| Eltra S | 0.037 | 0.047 | 0.040 |
| Satmagan | 0.49 | 0.68 | 86.14 |



08.01.2015

5.3.5 Rougher HGMS/HGMS

The first stage of wet HGMS increased the content of iron in the hematite product from 51.8% in the feed to 60.5% in the concentrate, at a Fe recovery of 97%.

Approximately 57% of the gangue was rejected into the tailings which represented 17% of the feed mass.

Table 17: Metallurgical Balance and Test Conditions, Rougher HGMS, <0.1mm

Eastern Finland Office
Mintec
GTK Markku Kuusisto

Sata HGMS 10-15-20 SCR Wet HIMS Separator, Re-cleaning / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10 and Salmagan analyses of products

Client(s) : TSC / M. Reisinger
 : NIO / P. Marsden

Project : 1281277 / 2402

Test Feed : 'Flygruvan Composite'
 : ST Conc. - WLIMS NM product at 100% minus 100 µm

Test Conditions : One-stage HGMS re-treatment using feed solids at ca. 8 wt.-%
 : **Magnetic field strength set to 0.10 Tesla**
 : Basin bottom flow restrictor dia. 8 mm
 : Slurry velocity within the matrix ca. 49 mm/sec
 : Matrix loading parameter ca. 0.30 g/cm³ [dry solids/canister volume]
 : Matrix canister type '3.5XMO' expanded metal construction - recommended top grain size 300 microns

Date : Sept. 17th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Salmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|----------|--|--------|--------|---|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------------------|-------|------|-------|-------------------|-------|------------------|-------|-------|-------|----------|-------|
| | | g | Wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | V | | Salmagan | |
| | | | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| HGMS | HGMS Mags | 1227.6 | 82.97 | 60.50 | 97.0 | 6.78 | 36.9 | 0.69 | 34.5 | 1.34 | 74.3 | 0.028 | 76.9 | 1.91 | 50.3 | 0.80 | 95.5 | 1.50 | 44.6 | 0.18 | 33.3 | 0.070 | 22.4 | 0.069 | 96.6 | 0.88 | 94.7 |
| | HGMS NM | 251.9 | 17.03 | 9.08 | 3.0 | 56.40 | 63.1 | 6.38 | 65.5 | 2.26 | 25.7 | 0.041 | 23.1 | 9.19 | 49.7 | 0.185 | 4.5 | 9.08 | 55.4 | 1.76 | 66.7 | 1.18 | 77.6 | 0.012 | 3.4 | 0.24 | 5.3 |
| | [Calc.Feed] | 1479.5 | 100.00 | 51.75 | 100.0 | 15.23 | 100.0 | 1.66 | 100.0 | 1.50 | 100.0 | 0.030 | 100.0 | 3.15 | 100.0 | 0.70 | 100.0 | 2.79 | 100.0 | 0.45 | 100.0 | 0.259 | 100.0 | 0.059 | 100.0 | 0.77 | 100.0 |
| | Feed Assay [ST Conc. - WLIMS NM] | | | 51.80 | | 16.20 | | 1.54 | | 1.42 | | 0.022 | | 2.45 | | 0.72 | | 2.60 | | 0.55 | | 0.241 | | 0.063 | | 0.68 | |

17/9/2014

Flygruvan Composite **Rougher HGMS for the Hematitic pre-concentrate**
Targeted Matrix loading parameter : **0.30 g/cm³**

Sample dry weight : **0.70 kgs** (per batch) Feed S.G. : **4.0**
Feed solids target : **8.0 wt.-%** (est'd)
Water volume : **8.05 liters**
Slurry weight : **8.75 kgs** equal to **1063.8 g/L** volumetric weight
Solids volume : **0.175 liters**
Slurry volume : **8.23 liters**

Magnetic field setting : **0.07 Tesla** equal to : **0.10 Tesla**
Matrix canister type : **3.5 XMO** (expanded metal) (actually inside the canister)
Canister volume : **871 cm³**
Cross-sectional area : **5809 mm²**
Nominal top grain size : **300 µm**

Flow restrictor dia. : **8 mm**
Volumetric flow : **0.282 l/sec**

Flow velocity through the canister cross-section : **48.5 mm/sec**

Feeding time within the feed cycle : **11 sec**
Slurry flow volume : **3.10 liters**
Approx. slurry weight : **3.30 kg**

Dry solids in the feed slurry within the feed cycle : **264.0 g**

Calculated matrix loading value : **0.30 g/cm³**

Approx. number of running cycles : **2.7**

Rinsing time : **7 sec**



GTK

Table 18: Screen Analysis, 'Flygruvan Composite L295 436' Rougher HGMS Concentrate



Eastern Finland office
Mintec

Project name : **NIO Variability II**
Code : **1281277 / 2402**

Date : 22.9.2014
By : JP

Note : Combination of elutriation screening and
Ro-Tap dry screening for 10 min

Sample data : **NIO Variability / 'Flygruvan Composite' - HGMS Mags product**

Code : **L295436**

| Screen opening (µm) | NIO Variability | | | Flygruvan Composite | | | HGMS Mags product | | | | | | | | | | | |
|---------------------|-----------------|-----------|-----------|---------------------|-----------|-----------|-------------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 100 | 0.0 | 100.0 | 0.0 | | | | | | | | | | | | | | | |
| 75 | 29.2 | 71.8 | 28.2 | | | | | | | | | | | | | | | |
| 63 | 12.4 | 59.9 | 12.0 | | | | | | | | | | | | | | | |
| 45 | 22.5 | 38.2 | 21.7 | | | | | | | | | | | | | | | |
| 38 | 6.7 | 31.7 | 6.5 | | | | | | | | | | | | | | | |
| - 38 | 32.9 | | 31.7 | | | | | | | | | | | | | | | |
| Total | 103.7 | | 100.0 | | | | | | | | | | | | | | | |

Calc'd

P 80
(µm)

82.2

Table 19: Size-by-size Chemical Analysis, Rougher HGMS Concentrate

Grade-Distribution Balance Calculation by Sieve Size Fractions

| Sieve fraction µm | Weight | | Grades & Distributions (XRFMP-10 and Satmagan) | | | | | | | | | | | | | | | | | | | | | |
|-------------------|--------|--------|--|--------|------------------|--------|-------------------------------|--------|------|--------|-------|--------|--------------------------------|--------|------|--------|-------------------|--------|------------------|--------|-------|--------|----------|--------|
| | g | wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| | | | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% |
| + 75 | 29.2 | 28.16 | 59.20 | 27.1 | 8.81 | 38.1 | 0.69 | 30.3 | 1.57 | 38.5 | 0.025 | 27.3 | 1.49 | 35.6 | 1.68 | 32.6 | 0.25 | 42.1 | 0.093 | 40.3 | 0.068 | 27.6 | 0.60 | 19.2 |
| - 75 | 74.5 | 71.84 | 62.27 | 72.9 | 5.61 | 61.9 | 0.62 | 69.7 | 0.99 | 61.5 | 0.026 | 72.7 | 1.06 | 64.4 | 1.36 | 67.4 | 0.13 | 57.9 | 0.054 | 59.7 | 0.070 | 72.4 | 0.99 | 80.8 |
| 63/75 | 12.4 | 11.96 | 61.30 | 11.9 | 6.76 | 12.4 | 0.61 | 11.4 | 1.10 | 11.4 | 0.017 | 7.9 | 1.16 | 11.8 | 1.50 | 12.4 | 0.18 | 12.9 | 0.067 | 12.3 | 0.068 | 11.7 | 0.63 | 8.5 |
| + 63 | 41.6 | 40.12 | 59.83 | 39.1 | 8.20 | 50.5 | 0.67 | 41.6 | 1.43 | 49.9 | 0.023 | 35.2 | 1.39 | 47.3 | 1.63 | 45.0 | 0.23 | 55.0 | 0.085 | 52.6 | 0.068 | 39.3 | 0.61 | 27.7 |
| - 63 | 62.1 | 59.88 | 62.46 | 60.9 | 5.38 | 49.5 | 0.63 | 58.4 | 0.96 | 50.1 | 0.028 | 64.8 | 1.04 | 52.7 | 1.33 | 55.0 | 0.13 | 45.0 | 0.051 | 47.4 | 0.070 | 60.7 | 1.06 | 72.3 |
| 45/63 | 22.5 | 21.70 | 61.80 | 21.8 | 6.35 | 21.2 | 0.56 | 18.9 | 1.10 | 20.8 | 0.019 | 16.0 | 1.13 | 20.8 | 1.36 | 20.3 | 0.15 | 19.5 | 0.062 | 20.7 | 0.069 | 21.6 | 0.68 | 16.7 |
| + 45 | 64.1 | 61.81 | 60.52 | 60.9 | 7.55 | 71.7 | 0.63 | 60.6 | 1.31 | 70.6 | 0.021 | 51.2 | 1.30 | 68.1 | 1.53 | 65.3 | 0.20 | 74.5 | 0.077 | 73.3 | 0.068 | 60.9 | 0.63 | 44.4 |
| - 45 | 39.6 | 38.19 | 62.83 | 39.1 | 4.82 | 28.3 | 0.66 | 39.4 | 0.88 | 29.4 | 0.033 | 48.8 | 0.98 | 31.9 | 1.32 | 34.7 | 0.11 | 25.5 | 0.046 | 26.7 | 0.071 | 39.1 | 1.28 | 55.6 |
| 38/45 | 6.7 | 6.46 | 62.50 | 6.6 | 5.62 | 5.6 | 0.53 | 5.3 | 1.00 | 5.6 | 0.018 | 4.5 | 1.05 | 5.8 | 1.30 | 5.8 | 0.12 | 4.6 | 0.053 | 5.3 | 0.071 | 6.6 | 0.71 | 5.2 |
| + 38 | 70.8 | 68.27 | 60.71 | 67.5 | 7.37 | 77.3 | 0.62 | 65.9 | 1.28 | 76.3 | 0.021 | 55.7 | 1.28 | 73.9 | 1.51 | 71.1 | 0.19 | 79.1 | 0.075 | 78.5 | 0.069 | 67.5 | 0.64 | 49.6 |
| - 38 | 32.9 | 31.73 | 62.90 | 32.5 | 4.66 | 22.7 | 0.69 | 34.1 | 0.86 | 23.7 | 0.036 | 44.3 | 0.97 | 26.1 | 1.32 | 28.9 | 0.11 | 20.9 | 0.044 | 21.5 | 0.071 | 32.5 | 1.40 | 50.4 |
| Calc.Bulk | 103.7 | 100.00 | 61.40 | 100.0 | 6.51 | 100.0 | 0.64 | 100.0 | 1.15 | 100.0 | 0.026 | 100.0 | 1.18 | 100.0 | 1.45 | 100.0 | 0.17 | 100.0 | 0.065 | 100.0 | 0.069 | 100.0 | 0.88 | 100.0 |
| Bulk Assay | | | 60.50 | | 6.78 | | 0.69 | | 1.34 | | 0.028 | | 1.91 | | 1.50 | | 0.18 | | 0.070 | | 0.069 | | 0.88 | |

08.01.2015

LABTIUM

Labtium Oy
 REPORT OF XRF ANALYSIS 18.9.2014

Customer : Markku Kuusisto, GTK Mintec
 Order : 120727
 Method : 180X-O
 Date : 18.9.2014
 Comment : NIO Variability (II). 'Flygruvan Composite' / ST Conc. -WLIMS Non-Mags - HGMS products. Top size = 100 microns

Contents (%)

| | HGMS Mags L14063095 | HGMS NM L14063096 |
|----------|------------------------|----------------------|
| SiO2 | 6.7800 | 56.4000 |
| TiO2 | 0.8000 | 0.1850 |
| Al2O3 | 1.9100 | 9.1900 |
| Cr2O3 | 0.1120 | 0.0077 |
| V2O3 | 0.1010 | 0.0180 |
| MnO | 0.0280 | 0.0410 |
| MgO | 1.3400 | 2.2600 |
| CaO | 1.5000 | 9.0800 |
| Rb2O | 0.0100 | 0.0078 |
| SrO | 0.0000 | 0.0045 |
| BaO | 0.0040 | 0.0300 |
| Na2O | 0.1800 | 1.7600 |
| K2O | 0.0700 | 1.1800 |
| ZrO2 | 0.0080 | 0.0310 |
| P2O5 | 0.6900 | 6.3800 |
| Cu | 0.0000 | 0.0010 |
| Ni | 0.0540 | 0.0110 |
| Co | 0.0030 | 0.0070 |
| Zn | 0.0040 | 0.0020 |
| Pb | 0.0000 | 0.0060 |
| Ag | 0.0060 | 0.0050 |
| S | 0.0090 | 0.0290 |
| As | 0.0020 | 0.0010 |
| Sb | 0.0070 | 0.0110 |
| Bi | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0140 | 0.0340 |
| Nb | 0.0000 | 0.0014 |
| Mo | 0.0070 | 0.0032 |
| Sn | 0.0090 | 0.0040 |
| W | 0.0010 | 0.0000 |
| Cl | 0.0050 | 0.0170 |
| Th | 0.0055 | 0.0055 |
| U | 0.0087 | 0.0014 |
| Cs | 0.0030 | 0.0000 |
| La | 0.0520 | 0.1000 |
| Ce | 0.1000 | 0.1830 |
| Ta | 0.0010 | 0.0010 |
| Ga | 0.0000 | 0.0017 |
| Si | 3.1700 | 26.4000 |
| Ti | 0.4770 | 0.1110 |
| Cr | 0.0770 | 0.0053 |
| V | 0.0690 | 0.0120 |
| Fe | 60.5000 | 9.0800 |
| Satmagan | 0.88 | 0.24 |

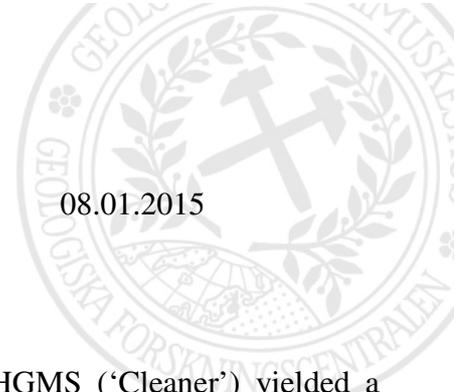


Labtium Oy
REPORT OF XRF ANALYSIS 22.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120744
Method : 180X-O
Date : 22.9.2014
Comment : **NIO Variability (II) == Flygruvan Composite; HGMS Mags - Sieve fractions**

Contents (%)

| | 75/100µm L14063296 | 63/75µm L14063297 | 45/63µm L14063298 | 38/45µm L14063299 | -38µm L14063300 |
|--------------------------------|-----------------------|----------------------|----------------------|----------------------|--------------------|
| SiO ₂ | 8.8100 | 6.7600 | 6.3500 | 5.6200 | 4.6600 |
| TiO ₂ | 0.8100 | 0.8200 | 0.8100 | 0.7900 | 0.7700 |
| Al ₂ O ₃ | 1.4900 | 1.1600 | 1.1300 | 1.0500 | 0.9700 |
| Cr ₂ O ₃ | 0.0061 | 0.0077 | 0.0130 | 0.0330 | 0.3130 |
| V ₂ O ₃ | 0.0990 | 0.1000 | 0.1010 | 0.1050 | 0.1040 |
| MnO | 0.0250 | 0.0170 | 0.0190 | 0.0180 | 0.0360 |
| MgO | 1.5700 | 1.1000 | 1.1000 | 1.0000 | 0.8600 |
| CaO | 1.6800 | 1.5000 | 1.3600 | 1.3000 | 1.3200 |
| Rb ₂ O | 0.0110 | 0.0100 | 0.0110 | 0.0100 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0030 | 0.0040 | 0.0060 | 0.0050 | 0.0030 |
| Na ₂ O | 0.2500 | 0.1800 | 0.1500 | 0.1200 | 0.1100 |
| K ₂ O | 0.0930 | 0.0670 | 0.0620 | 0.0530 | 0.0440 |
| ZrO ₂ | 0.0060 | 0.0080 | 0.0090 | 0.0090 | 0.0080 |
| P ₂ O ₅ | 0.6900 | 0.6100 | 0.5600 | 0.5300 | 0.6900 |
| Cu | 0.0000 | 0.0000 | 0.0010 | 0.0010 | 0.0050 |
| Ni | 0.0070 | 0.0060 | 0.0100 | 0.0180 | 0.1500 |
| Co | 0.0030 | 0.0110 | 0.0080 | 0.0090 | 0.0080 |
| Zn | 0.0030 | 0.0010 | 0.0030 | 0.0030 | 0.0020 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0050 | 0.0050 | 0.0060 | 0.0060 |
| S | 0.0070 | 0.0080 | 0.0070 | 0.0060 | 0.0130 |
| As | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 |
| Sb | 0.0050 | 0.0090 | 0.0070 | 0.0090 | 0.0090 |
| Bi | 0.0020 | 0.0020 | 0.0020 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0120 | 0.0150 | 0.0150 | 0.0140 | 0.0170 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0300 |
| Sn | 0.0090 | 0.0110 | 0.0100 | 0.0110 | 0.0100 |
| W | 0.0010 | 0.0010 | 0.0000 | 0.0010 | 0.0000 |
| Cl | 0.0050 | 0.0060 | 0.0020 | 0.0040 | 0.0050 |
| Th | 0.0070 | 0.0061 | 0.0071 | 0.0051 | 0.0065 |
| U | 0.0087 | 0.0083 | 0.0091 | 0.0095 | 0.0093 |
| Cs | 0.0020 | 0.0000 | 0.0000 | 0.0000 | 0.0040 |
| La | 0.0450 | 0.0590 | 0.0640 | 0.0590 | 0.0510 |
| Ce | 0.0850 | 0.1090 | 0.1180 | 0.1120 | 0.0940 |
| Ta | 0.0000 | 0.0060 | 0.0060 | 0.0000 | 0.0000 |
| Ga | 0.0023 | 0.0031 | 0.0025 | 0.0039 | 0.0018 |
| Si | 4.1200 | 3.1600 | 2.9700 | 2.6300 | 2.1800 |
| Ti | 0.4880 | 0.4940 | 0.4850 | 0.4750 | 0.4590 |
| Cr | 0.0042 | 0.0053 | 0.0088 | 0.0220 | 0.2140 |
| V | 0.0680 | 0.0680 | 0.0690 | 0.0710 | 0.0710 |
| Fe | 59.2000 | 61.3000 | 61.8000 | 62.5000 | 62.9000 |
| Satmagan | 0.60 | 0.63 | 0.68 | 0.71 | 1.40 |



08.01.2015

5.3.6 Cleaner HGMS

Re-cleaning of the Rougher HGMS concentrate via a second stage of HGMS ('Cleaner') yielded a concentrate grading 66.0% Fe, 2.6% SiO₂ and 0.09% P (0.21% P₂O₅). Rejection of gangue into the tailings was high (nearly 60%), as was the recovery of Fe into the concentrate (91%).

Table 20: Metallurgical Balance and Test Conditions, Cleaner HGMS, <0.1mm



Sala HGMS 10-15-20 SCR Wet HIMS Separator, Re-cleaning / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10 and Salmagan analyses of products

Client(s) : TSC / M. Reisinger
 NIO / P. Marsden Project : 1281277 / 2402

Test Feed : 'Flyruvan Composite'
 ST Conc. - WLIMS NM - HGMS Rgh Mags product at 100% minus 100 µm

Test Conditions : One-stage HGMS re-cleaning using feed solids at ca. 6 wt.-%
 Magnetic field strength set to 0.08 Tesla
 Basin bottom flow restrictor dia. 12 mm
 Slurry velocity within the matrix ca. 83 mm/sec
 Matrix loading parameter ca. 0.25 g/cm³ [dry solids/canister volume]
 Matrix canister type '3.5XMO' expanded metal construction - recommended top grain size 300 microns

Date : Sept. 25th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Salmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|---|--------|--------|---|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------------------|-------|------|-------|-------------------|-------|------------------|-------|-------|-------|----------|-------|
| | | g | Wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | V | | Salmagan | |
| | | | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| HGMS cleaning | Cin Mags | 920.9 | 84.96 | 66.00 | 90.8 | 2.60 | 35.9 | 0.208 | 27.0 | 0.56 | 44.2 | 0.018 | 61.4 | 0.65 | 47.8 | 0.82 | 89.2 | 0.61 | 36.2 | 0.05 | 27.1 | 0.021 | 25.2 | 0.072 | 89.6 | 0.93 | 92.8 |
| | Cin NM | 163.0 | 15.04 | 37.70 | 9.2 | 26.20 | 64.1 | 3.18 | 73.0 | 3.99 | 55.8 | 0.064 | 38.6 | 4.01 | 52.2 | 0.560 | 10.8 | 6.07 | 63.8 | 0.76 | 72.9 | 0.352 | 74.8 | 0.047 | 10.4 | 0.41 | 7.2 |
| | [Calc.Feed] | 1083.9 | 100.00 | 61.74 | 100.0 | 6.15 | 100.0 | 0.65 | 100.0 | 1.08 | 100.0 | 0.025 | 100.0 | 1.16 | 100.0 | 0.78 | 100.0 | 1.43 | 100.0 | 0.16 | 100.0 | 0.071 | 100.0 | 0.068 | 100.0 | 0.85 | 100.0 |
| | Feed Assay [ST Conc. - WLIMS NM - HGMS Rgh M] | | | 60.50 | | 6.78 | | 0.69 | | 1.34 | | 0.028 | | 1.91 | | 0.80 | | 1.50 | | 0.18 | | 0.070 | | 0.069 | | 0.88 | |

24/9/2014

Flyruvan Composite Cleaner HGMS for the Hematitic pre-concentrate

Targeted Matrix loading parameter : 0.25 g/cm³

Sample dry weight : 0.54 kgs (per batch) Feed S.G. : 4.5
 Feed solids target : 6.0 wt.-% (est'd)
 Water volume : 8.46 liters
 Slurry weight : 9.00 kgs equal to 1049.0 g/L volumetric weight
 Solids volume : 0.120 liters
 Slurry volume : 8.58 liters

Magnetic field setting : 0.05 Tesla equal to : 0.08 Tesla
 Matrix canister type : 3.5 XMO (expanded metal) (actually inside the canister)
 Canister volume : 871 cm³
 Cross-sectional area : 5809 mm²
 Nominal top grain size : 300 µm

Flow restrictor dia. : 12 mm
 Volumetric flow : 0.480 l/sec

Flow velocity through the canister cross-section : 82.6 mm/sec

Feeding time within the feed cycle : 7.5 sec
 Slurry flow volume : 3.60 liters
 Approx. slurry weight : 3.78 kg

Dry solids in the feed slurry within the feed cycle : 226.6 g

Calculated matrix loading value : 0.26 g/cm³

Approx. number of running cycles : 2.4

Rinsing time : 5 sec



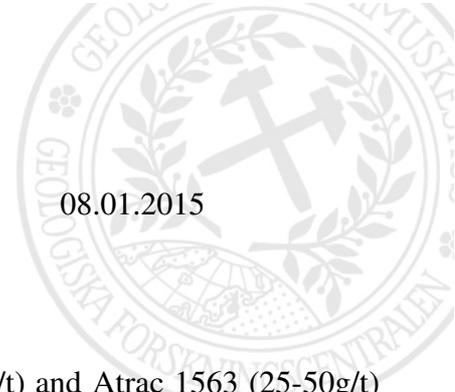
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 25.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120764
Method : 180X-O
Date : 25.9.2014
Comment : **NIO Variability (II), Flygruvan Composite, HGMS Cleaner products**
Production of hematite pre-concentrate for phosphate removal flotation

Contents (%)

| | CIn Mags L14063901 | CIn NM L14063902 |
|----------|-----------------------|---------------------|
| SiO2 | 2.6000 | 26.2000 |
| TiO2 | 0.8200 | 0.5600 |
| Al2O3 | 0.6500 | 4.0100 |
| Cr2O3 | 0.1150 | 0.0290 |
| V2O3 | 0.1060 | 0.0700 |
| MnO | 0.0180 | 0.0640 |
| MgO | 0.5600 | 3.9900 |
| CaO | 0.6100 | 6.0700 |
| Rb2O | 0.0120 | 0.0091 |
| SrO | 0.0000 | 0.0000 |
| BaO | 0.0030 | 0.0160 |
| Na2O | 0.0500 | 0.7600 |
| K2O | 0.0210 | 0.3520 |
| ZrO2 | 0.0060 | 0.0190 |
| P2O5 | 0.2080 | 3.1800 |
| Cu | 0.0020 | 0.0020 |
| Ni | 0.0570 | 0.0180 |
| Co | 0.0110 | 0.0010 |
| Zn | 0.0040 | 0.0040 |
| Pb | 0.0000 | 0.0000 |
| Ag | 0.0050 | 0.0130 |
| S | 0.0060 | 0.0180 |
| As | 0.0000 | 0.0020 |
| Sb | 0.0090 | 0.0110 |
| Bi | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0067 | 0.0490 |
| Nb | 0.0000 | 0.0005 |
| Mo | 0.0069 | 0.0022 |
| Sn | 0.0110 | 0.0080 |
| W | 0.0010 | 0.0000 |
| Cl | 0.0030 | 0.0120 |
| Th | 0.0060 | 0.0099 |
| U | 0.0089 | 0.0069 |
| Cs | 0.0020 | 0.0000 |
| La | 0.0270 | 0.2120 |
| Ce | 0.0480 | 0.3880 |
| Ta | 0.0040 | 0.0040 |
| Ga | 0.0035 | 0.0018 |
| Si | 1.2200 | 12.2000 |
| Ti | 0.4940 | 0.3330 |
| Cr | 0.0790 | 0.0200 |
| V | 0.0720 | 0.0470 |
| Fe | 66.0000 | 37.7000 |
| Satmagan | 0.93 | 0.41 |



08.01.2015

5.3.7 Reverse Flotation (by Calcium Activation)

I had already been demonstrated that the combination of water glass (500g/t) and Atrac 1563 (25-50g/t) removes phosphate minerals (apatite, monazite) very effectively from both the hematite and the magnetite concentrates. Unfortunately, the Atrac collector exhibited little affinity to silica/silicates which remained largely with the concentrate.

As a consequence, a different flotation regime was employed in an attempt to also remove a proportion of the silica alongside the phosphate minerals. The methodology is generally known as 'calcium activated fatty acid flotation'.

In essence, the silica (quartz) is floated in a basic environment by a fatty acid after activation by a calcium salt, usually calcium chloride (CaCl₂). Atrac 1563 is a fatty acid based collector but the more widely used Flotisor-FS2 from Clariant was also investigated.

The following procedure was employed:

- Addition of NaOH to increase pH to 11.5
- Addition of 50g/t CaCl₂
- Addition of 2x 50g/t Atrac 1563, Flotation for 1min after each addition
- Addition of 50g/t Flotisor-FS2
- Flotation for 2min

Table 21: Metallurgical Balance, Reverse Phosphate Flotation, Cleaner HGMS Concentrate

| FLOTATION TEST REPORT | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------------------------|---------------------------|---|-----------------------|--------|-----------|-----------|------|-----------------|---------|-------------------|-------|---|--------------------|---------------------------------|-------|-------|----------------------------------|-------|---------------------|--------------------|------|------------|--|
| Sample : HGMS Cleaner Magnetics | | Grinding : Mill : none | | Remarks : Flygruvan Composite - hematite-magnetite type ore sample | | | | | | | | | | | | | | | | | | | | | |
| Project : 1281277/2402 | | Charge : Water : | | Shaking table - WLIMS - HGMS processed hematite pre-concentrate as the feed to flotation (batch size ca. 600 g) | | | | | | | | | | | | | | | | | | | | | |
| Date : 28/09/2014 | | Fineness : P100 = 100 µm | | Removal of phosphates and silica by reverse flotation (close to 32 wt.-% feed solids at start) | | | | | | | | | | | | | | | | | | | | | |
| Done by : MFK, MEK | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test No. : 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Reagents (g/t) | | | | | | | | | | | | Grades and Recoveries (by XRF and Salmagan) | | | | | | | | | | | |
| Feed size | Condit. min | NaOH (5-%) | CaCl ₂ (solid) | Atrac 1563 (100-%) | Flotisor FS-2 (100-%) | Cell I | Air l/min | Rotor rpm | pH | Flot'n min | Product | Weight (g, wt.-%) | | Fe % | SiO ₂ % | P ₂ O ₅ % | MgO % | MnO % | Al ₂ O ₃ % | CaO % | Na ₂ O % | K ₂ O % | V % | Salmagan % | |
| < 100 µm | | | | | | | | | | | | | | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | Rec% | |
| | | 375 | | | | 1.5 | | 1100 | 8.4 | natural | | | | | | | | | | | | | | | |
| | 3 | | 50 | | | | | | 11.5 | | | | | | | | | | | | | | | | |
| | 5 | | | 50 | | | | | 11.5 | | | | | | | | | | | | | | | | |
| | | | | | | 1.5 | | | 1 | ApF1 | 154.1 | 25.90 | 67.40 | 26.5 | 1.04 | 10.1 | 0.433 | 52.8 | 0.22 | 9.5 | 0.012 | 17.8 | 0.46 | 17.9 | |
| | | | | | | | | | 11.4 | (RT1) | 440.8 | 74.10 | 65.47 | 73.5 | 3.25 | 89.9 | 0.135 | 47.2 | 0.73 | 90.5 | 0.019 | 82.2 | 0.74 | 82.1 | |
| | | | | | | | | | 11.5 | | | | | | | | | | | | | | | | |
| | 2 | | | 50 | | | | | 11.5 | | | | | | | | | | | | | | | | |
| | | | | | | 1.5 | | | 1 | ApF2 | 258.4 | 43.44 | 67.20 | 44.2 | 1.75 | 28.4 | 0.143 | 29.3 | 0.37 | 26.9 | 0.012 | 29.9 | 0.52 | 33.8 | |
| | | | | | | | | | 11.4 | (ApF1+2) | 412.5 | 69.34 | 67.27 | 70.7 | 1.48 | 38.4 | 0.251 | 82.1 | 0.31 | 38.4 | 0.012 | 47.7 | 0.50 | 51.7 | |
| | | | | | | | | | 11.5 | (RT2) | 182.4 | 30.66 | 63.03 | 29.3 | 5.38 | 61.6 | 0.124 | 17.9 | 1.24 | 63.6 | 0.030 | 52.3 | 1.05 | 48.3 | |
| | 2 | | | 50 | | | | | 11.5 | | | | | | | | | | | | | | | | |
| | | | | | | 1.5 | | | 2 | SF | 169.9 | 28.56 | 63.30 | 27.4 | 5.22 | 55.7 | 0.119 | 16.0 | 1.19 | 56.9 | 0.028 | 42.6 | 1.00 | 42.8 | |
| | | | | | | | | | 11.4 | (ApF1+2 & SF) | 582.4 | 97.90 | 66.12 | 98.1 | 2.57 | 94.1 | 0.213 | 98.1 | 0.57 | 93.3 | 0.016 | 90.2 | 0.64 | 94.5 | |
| | | | | | | | | | 11.5 | Cell Conc. | 12.5 | 2.10 | 59.30 | 1.9 | 7.50 | 5.9 | 0.192 | 1.9 | 1.91 | 6.7 | 0.081 | 9.8 | 1.75 | 5.5 | |
| | | | | | | | | | 11.4 | | | | | | | | | | | | | | | | |
| Totals | 12 | 467 | 50 | 100 | 50 | | | | 4 | Calc'd Head | 594.9 | 100.00 | 65.97 | 100.0 | 2.68 | 100.0 | 0.212 | 100.0 | 0.60 | 100.0 | 0.017 | 100.0 | 0.67 | 100.0 | |
| | | | | | | | | | | Assayed Head | | | | | | | | | | | | | | | |
| | | | | | | | | | | (HGMS Clin Mag) | | | | | | | | | | | | | | | |

Unfortunately, the results, which are presented in Table 21, indicated that the ferriferous minerals (hematite in this case) were activated by CaCl₂ as well, which is clearly undesirable. The effectiveness of depressants (e.g. starch) was not investigated at this stage but could be subject of further studies.



Labtium Oy
REPORT OF XRF-ANALYSIS 29.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120798
Method : 180X-O
Date : 29.09.2014
Comment : **NIO Variability (II). Flygruvan Composite - Hematitic pre-concentrate.**
Phosphate & silica removal flotation products. Top size 100 microns

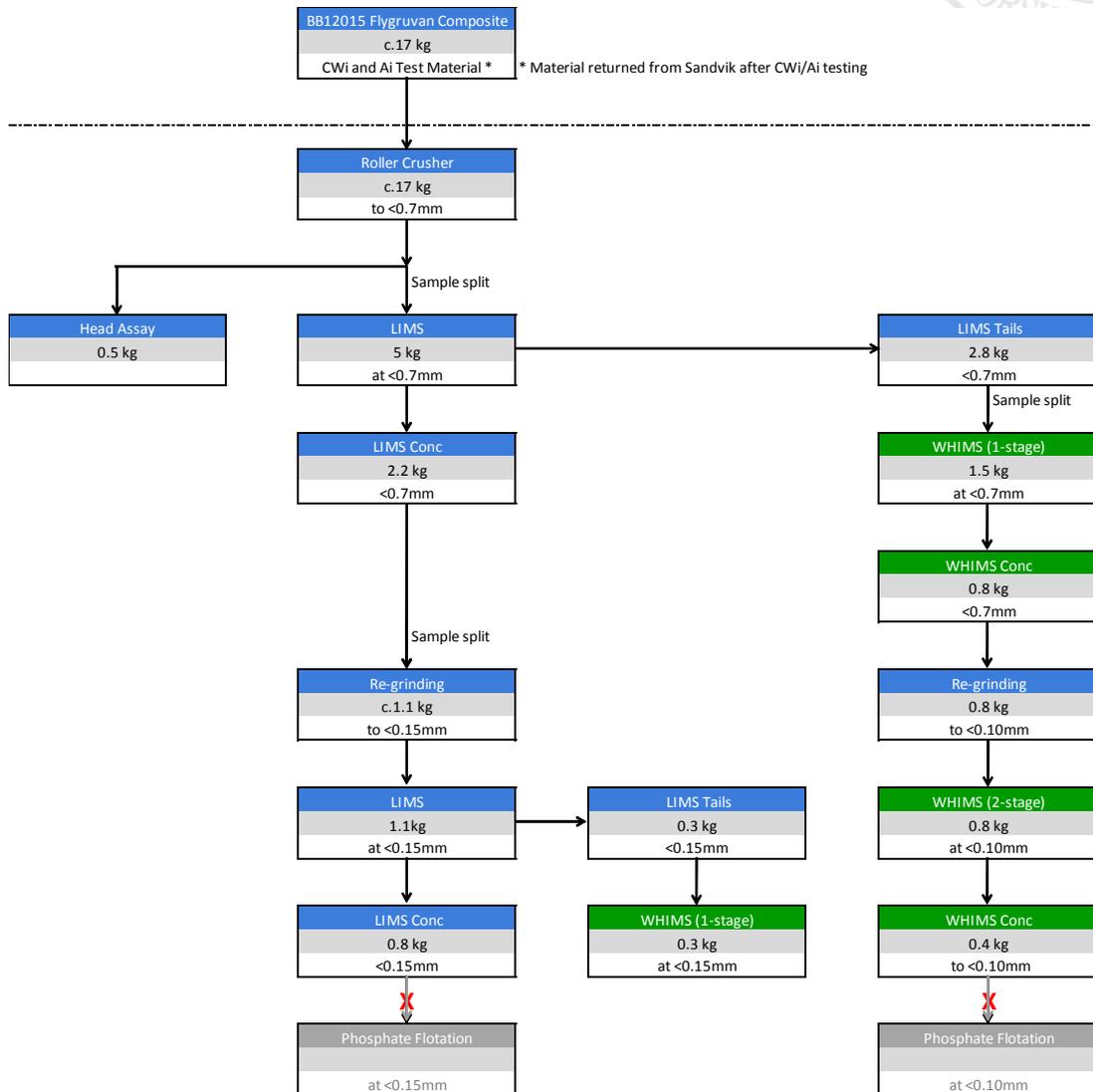
Contents (%)

| | ApF1 L14065020 | ApF2 L14065021 | SiF L14065022 | Cell Conc. L14065023 |
|----------|-------------------|-------------------|------------------|-------------------------|
| SiO2 | 1.0400 | 1.7500 | 5.2200 | 7.5000 |
| TiO2 | 0.7900 | 0.8100 | 0.8500 | 0.8500 |
| Al2O3 | 0.4600 | 0.5200 | 1.0000 | 1.7500 |
| Cr2O3 | 0.1100 | 0.0680 | 0.1230 | 0.7400 |
| V2O3 | 0.1080 | 0.1070 | 0.1010 | 0.0960 |
| MnO | 0.0120 | 0.0120 | 0.0260 | 0.0810 |
| MgO | 0.2200 | 0.3700 | 1.1900 | 1.9100 |
| CaO | 0.6300 | 0.4230 | 0.8600 | 1.3200 |
| Rb2O | 0.0110 | 0.0110 | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0060 | 0.0050 | 0.0040 | 0.0080 |
| Na2O | 0.0000 | 0.0200 | 0.1200 | 0.2400 |
| K2O | 0.0060 | 0.0090 | 0.0430 | 0.1140 |
| ZrO2 | 0.0050 | 0.0050 | 0.0060 | 0.0080 |
| P2O5 | 0.4330 | 0.1430 | 0.1190 | 0.1920 |
| Cu | 0.0030 | 0.0010 | 0.0030 | 0.0110 |
| Ni | 0.0550 | 0.0370 | 0.0620 | 0.3690 |
| Co | 0.0000 | 0.0090 | 0.0030 | 0.0140 |
| Zn | 0.0020 | 0.0020 | 0.0040 | 0.0050 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0050 | 0.0040 | 0.0050 |
| S | 0.0070 | 0.0050 | 0.0090 | 0.0510 |
| As | 0.0010 | 0.0030 | 0.0010 | 0.0050 |
| Sb | 0.0080 | 0.0100 | 0.0070 | 0.0100 |
| Bi | 0.0020 | 0.0030 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0089 | 0.0072 | 0.0091 | 0.0140 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0054 | 0.0026 | 0.0075 | 0.0820 |
| Sn | 0.0090 | 0.0110 | 0.0100 | 0.0110 |
| W | 0.0010 | 0.0010 | 0.0000 | 0.0000 |
| Cl | 0.0020 | 0.0030 | 0.0030 | 0.0080 |
| Th | 0.0053 | 0.0060 | 0.0057 | 0.0067 |
| U | 0.0100 | 0.0088 | 0.0090 | 0.0095 |
| Cs | 0.0020 | 0.0020 | 0.0010 | 0.0020 |
| La | 0.0310 | 0.0250 | 0.0240 | 0.0360 |
| Ce | 0.0550 | 0.0420 | 0.0450 | 0.0630 |
| Ta | 0.0040 | 0.0000 | 0.0000 | 0.0030 |
| Ga | 0.0039 | 0.0036 | 0.0040 | 0.0029 |
| Si | 0.4900 | 0.8200 | 2.4400 | 3.5100 |
| Ti | 0.4740 | 0.4880 | 0.5100 | 0.5100 |
| Cr | 0.0750 | 0.0460 | 0.0840 | 0.5100 |
| V | 0.0740 | 0.0730 | 0.0690 | 0.0660 |
| Fe | 67.4000 | 67.2000 | 63.3000 | 59.3000 |
| Satmagan | 0.86 | 0.81 | 1.02 | 2.30 |



08.01.2015

5.4 Flygruvan, ‘BB12015-MET003’ (‘Sandvik rejects’)



LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 5.3.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 119093
Method : 180X-O
Date : 5.3.2014
Comment : Nordic Iron Ore - Blötberget 'Upper Level' ore feed / Sandvik test material returned, analysis request 05.03.2014

Contents (%)

| | Sample 1 L14018817 | Sample 2 L14018818 | Sandvik Avg. |
|--------------------------------|-----------------------|-----------------------|-----------------|
| SiO ₂ | 40.9000 | 41.3000 | 41.10 |
| TiO ₂ | 0.1480 | 0.1470 | 0.15 |
| Al ₂ O ₃ | 5.6400 | 5.7900 | 5.72 |
| Cr ₂ O ₃ | 0.0051 | 0.0048 | 0.00 |
| V ₂ O ₃ | 0.0250 | 0.0250 | 0.03 |
| MnO | 0.0350 | 0.0330 | 0.03 |
| MgO | 1.6100 | 1.6100 | 1.61 |
| CaO | 0.9500 | 0.9500 | 0.95 |
| Rb ₂ O | 0.0088 | 0.0096 | 0.01 |
| SrO | 0.0004 | 0.0000 | 0.00 |
| BaO | 0.0460 | 0.0460 | 0.05 |
| Na ₂ O | 2.3400 | 2.4200 | 2.38 |
| K ₂ O | 0.6200 | 0.6300 | 0.63 |
| ZrO ₂ | 0.0120 | 0.0110 | 0.01 |
| P ₂ O ₅ | 0.5000 | 0.4970 | 0.50 |
| Cu | 0.0010 | 0.0010 | 0.00 |
| Ni | 0.0040 | 0.0040 | 0.00 |
| Co | 0.0020 | 0.0010 | 0.00 |
| Zn | 0.0060 | 0.0050 | 0.01 |
| Pb | 0.0000 | 0.0000 | 0.00 |
| Ag | 0.0010 | 0.0020 | 0.00 |
| S | 0.0030 | 0.0030 | 0.00 |
| As | 0.0000 | 0.0000 | 0.00 |
| Sb | 0.0120 | 0.0100 | 0.01 |
| Bi | 0.0020 | 0.0020 | 0.00 |
| Te | 0.0000 | 0.0000 | 0.00 |
| Y | 0.0025 | 0.0024 | 0.00 |
| Nb | 0.0000 | 0.0000 | 0.00 |
| Mo | 0.0000 | 0.0000 | 0.00 |
| Sn | 0.0060 | 0.0060 | 0.01 |
| W | 0.0000 | 0.0000 | 0.00 |
| Cl | 0.0060 | 0.0070 | 0.01 |
| Th | 0.0037 | 0.0028 | 0.00 |
| U | 0.0037 | 0.0037 | 0.00 |
| Cs | 0.0020 | 0.0020 | 0.00 |
| La | 0.0110 | 0.0110 | 0.01 |
| Ce | 0.0160 | 0.0150 | 0.02 |
| Ta | 0.0040 | 0.0000 | 0.00 |
| Ga | 0.0021 | 0.0026 | 0.00 |
| Si | 19.1000 | 19.3000 | 19.20 |
| Ti | 0.0890 | 0.0880 | 0.09 |
| Cr | 0.0035 | 0.0033 | 0.00 |
| V | 0.0170 | 0.0170 | 0.02 |
| Fe | 34.0000 | 33.6000 | 33.80 |
| Eltra S | 0.0176 | 0.0230 | 0.020 |
| Satmagan | 29.14 | 31.75 | 30.45 |



08.01.2015

5.4.1 Wet LIMS

Table 22: Screen Analysis, Rougher LIMS Feed, 'Flygruvan BB12015-MET003' (Sandvik rejects)



Eastern Finland office
Mintec

Project name : **NIO Variability II**
Code : **1281277 / 2402**

Date : 2.10.2014
By : JP

Note : Combination of elutriation screening and Ro-Tap dry screening for 10 min
Sample data : **NIO Variability (II) / Sandvik return material - Fine-crushed feed screen check**

| Screen opening (µm) | NIO Variability (II) | | | | | | | | | | | | | | |
|---------------------|---|-------|--------------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Sandvik return material Crushed feed (< 0.72 mm) | | | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 720 | 0.0 | 100.0 | 0.0 | | | | | | | | | | | | |
| 630 | 2.7 | 98.5 | 1.5 | | | | | | | | | | | | |
| 500 | 35.8 | 78.7 | 19.8 | | | | | | | | | | | | |
| 315 | 49.1 | 51.5 | 27.2 | | | | | | | | | | | | |
| 180 | 43.8 | 27.2 | 24.3 | | | | | | | | | | | | |
| 90 | 32.0 | 9.5 | 17.7 | | | | | | | | | | | | |
| - 90 | 17.2 | | 9.5 | | | | | | | | | | | | |
| Total | 180.6 | | 100.0 | | | | | | | | | | | | |

Calc'd
P 80
(µm)

509

Multi-stage LIMS with intermediate grinding produced a <0.15mm magnetic concentrate grading 71.2% Fe, 1.6% SiO₂, 0.40% Al₂O₃, and low contents of phosphorus (<0.01% P), vanadium, titania and alkali oxides. An overall magnetite recovery of 99% was reported.

For detailed information the reader is referred to the tables below.

Table 23: Metallurgical Balance, Rougher LIMS, 'Flygruvan BB12015-MET003' (Sandvik rejects)



Eastern Finland Office
Mintec
Markku Kuusisto

Sala Ø 200 mm 'Blue Ribbon' Wet LIMS Separator, Re-cleaning / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10, Eltra S and Salmagan analyses of products

Client(s) : TSC / M. Reisinger
NIO / P. Marsden

Project : 1281277 / 2402

Test Feed : 'Sandvik Return Material'
Screened/Roller crushed ore feed at 100% minus 0.72 mm; 2 * 2.5 kgs

Test Conditions : One-stage WLIMS pre-treatment using feed solids at 18-20 wt.-%
Nominal magnetic field strength ca. 0.07 Tesla
Basin bottom flow restrictor dia. 4 mm
Volumetric slurry feed rate ca. 1.3 liter/min

Date: Oct. 2nd 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Salmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---------------|--------|--------|---|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------------------|-------|-------|-------|-------------------|-------|------------------|-------|-------|-------|----------|-------|
| | | g | Wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | V | | Salmagan | |
| WLIMS Roughing | Rgh Mags | 2217.6 | 44.43 | 58.80 | 74.6 | 15.40 | 17.1 | 0.226 | 20.1 | 1.02 | 27.7 | 0.058 | 75.6 | 1.53 | 12.6 | 0.044 | 12.7 | 0.346 | 15.8 | 0.39 | 8.4 | 0.176 | 12.9 | 0.021 | 56.4 | 71.74 | 99.1 |
| | Rgh NM | 2773.2 | 55.57 | 16.00 | 25.4 | 59.60 | 82.9 | 0.72 | 79.9 | 2.13 | 72.3 | 0.015 | 24.4 | 8.48 | 87.4 | 0.242 | 87.3 | 1.48 | 84.2 | 3.42 | 91.6 | 0.95 | 87.1 | 0.013 | 43.6 | 0.55 | 0.9 |
| | [Calc.Feed] | 4990.8 | 100.00 | 35.02 | 100.0 | 39.96 | 100.0 | 0.500 | 100.0 | 1.64 | 100.0 | 0.034 | 100.0 | 5.39 | 100.0 | 0.154 | 100.0 | 0.98 | 100.0 | 2.07 | 100.0 | 0.61 | 100.0 | 0.017 | 100.0 | 32.18 | 100.0 |
| | Feed Assay | | | 33.80 | | 41.10 | | 0.499 | | 1.61 | | 0.034 | | 5.72 | | 0.148 | | 0.95 | | 2.38 | | 0.63 | | 0.017 | | 30.45 | |



Table 24: Metallurgical Balance, Cleaner LIMS, 'Flygruvan BB12015-MET003' (Sandvik rejects)



Sala Ø 200 mm 'Blue Ribbon' Wet LIMS Separator, Re-cleaning / GTK Mintec Outokumpu
 Material balance calculation based on XRF MP10 and Satmagan analyses of products

Client(s) : TSC / M. Reisinger
 NIO / P. Marsden

Project : 1281277 / 2402

Test Feed : 'Sandvik Return Material'
 Screened/SS Ball mill reground 'Rgh Mags' at 100% minus 0.150 mm

Test Conditions : Three-stage WLIMS recleaning using feed solids at 8-10 wt.-%
 Nominal magnetic field strength ca. 0.07 Tesla
 Basin bottom flow restrictor dia. 4 mm
 Volumetric slurry feed rate ca. 1.3 liter/min

Date : Oct. 7th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Satmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|----------------------------|--------|--------|---|----------|--------------------|------------------------|---------------------------------|-------------------------------------|-------|-----------|-------|-----------|----------------------------------|--------------------------------------|--------------------|------------------------|-------|-----------|---------------------|-------------------------|--------------------|------------------------|-------|---------|------------|----------------|
| | | g | Wt.-% | Fe % | Fe Rec-% | SiO ₂ % | SiO ₂ Rec-% | P ₂ O ₅ % | P ₂ O ₅ Rec-% | MgO % | MgO Rec-% | MnO % | MnO Rec-% | Al ₂ O ₃ % | Al ₂ O ₃ Rec-% | TiO ₂ % | TiO ₂ Rec-% | CaO % | CaO Rec-% | Na ₂ O % | Na ₂ O Rec-% | K ₂ O % | K ₂ O Rec-% | V % | V Rec-% | Satmagan % | Satmagan Rec-% |
| WLIMS Cleaning | Cin Mags 4 | 827.8 | 75.00 | 71.20 | 89.9 | 1.59 | 8.3 | 0.019 | 5.6 | 0.26 | 19.2 | 0.060 | 84.5 | 0.40 | 20.7 | 0.007 | 11.1 | 0.033 | 6.6 | 0.03 | 6.8 | 0.019 | 7.6 | 0.020 | 76.0 | 98.99 | 99.8 |
| | Cin NM2-4 | 275.9 | 25.00 | 24.10 | 10.1 | 53.00 | 91.7 | 0.97 | 94.4 | 3.28 | 80.8 | 0.033 | 15.5 | 4.59 | 79.3 | 0.168 | 88.9 | 1.39 | 93.4 | 1.24 | 93.2 | 0.69 | 92.4 | 0.019 | 24.0 | 0.73 | 0.2 |
| | [Calc.Feed] | 1103.7 | 100.00 | 59.43 | 100.0 | 14.44 | 100.0 | 0.257 | 100.0 | 1.01 | 100.0 | 0.053 | 100.0 | 1.45 | 100.0 | 0.047 | 100.0 | 0.372 | 100.0 | 0.33 | 100.0 | 0.187 | 100.0 | 0.020 | 100.0 | 74.43 | 100.0 |
| | Feed Assay [Rgh Mags] | | | 58.80 | | 15.40 | | 0.226 | | 1.02 | | 0.058 | | 1.53 | | 0.044 | | 0.346 | | 0.39 | | 0.176 | | 0.021 | | 71.74 | |

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 6.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120853
Method : 180X-O
Date : 6.10.2014
Comment **Sandvik return material**
WLIMS rougher products (< 0,72mm)

Contents (%)

| | Rgh Mags L14066361 | Rgh NM L14066362 |
|-----------------|-----------------------|---------------------|
| SiO2 | 15.4000 | 59.6000 |
| TiO2 | 0.0440 | 0.2420 |
| Al2O3 | 1.5300 | 8.4800 |
| Cr2O3 | 0.0047 | 0.0032 |
| V2O3 | 0.0310 | 0.0190 |
| MnO | 0.0580 | 0.0150 |
| MgO | 1.0200 | 2.1300 |
| CaO | 0.3460 | 1.4800 |
| Rb2O | 0.0120 | 0.0071 |
| SrO | 0.0000 | 0.0027 |
| BaO | 0.0250 | 0.0650 |
| Na2O | 0.3900 | 3.4200 |
| K2O | 0.1760 | 0.9500 |
| ZrO2 | 0.0040 | 0.0180 |
| P2O5 | 0.2260 | 0.7200 |
| Cu | 0.0000 | 0.0000 |
| Ni | 0.0050 | 0.0030 |
| Co | 0.0230 | 0.0070 |
| Zn | 0.0090 | 0.0020 |
| Pb | 0.0000 | 0.0030 |
| Ag | 0.0040 | 0.0010 |
| S | 0.0040 | 0.0060 |
| As | 0.0000 | 0.0000 |
| Sb | 0.0060 | 0.0110 |
| Bi | 0.0030 | 0.0010 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0006 | 0.0043 |
| Nb | 0.0000 | 0.0013 |
| Mo | 0.0000 | 0.0000 |
| Sn | 0.0030 | 0.0070 |
| W | 0.0010 | 0.0010 |
| Cl | 0.0040 | 0.0090 |
| Th | 0.0047 | 0.0030 |
| U | 0.0082 | 0.0009 |
| Cs | 0.0030 | 0.0020 |
| La | 0.0100 | 0.0150 |
| Ce | 0.0140 | 0.0210 |
| Ta | 0.0020 | 0.0000 |
| Ga | 0.0027 | 0.0014 |
| Si | 7.2000 | 27.9000 |
| Ti | 0.0260 | 0.1450 |
| Cr | 0.0032 | 0.0022 |
| V | 0.0210 | 0.0130 |
| Fe | 58.8000 | 16.0000 |
| Mn | 0.0450 | 0.0110 |
| Mg | 0.6100 | 1.2900 |
| Ca | 0.2470 | 1.0600 |
| Ba | 0.0220 | 0.0580 |
| Satmagan | 71.74 | 0.55 |

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 8.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120887
Method : 180X-O
Date : 8.10.2014
Comment **Sandvik return material**
WLIMS cleaner products

Contents (%)

| | Cln Mags 4 L14067084 | Cln NM 2-4 L14067085 |
|-----------------|-------------------------|-------------------------|
| SiO2 | 1.5900 | 53.0000 |
| TiO2 | 0.0070 | 0.1680 |
| Al2O3 | 0.4000 | 4.5900 |
| Cr2O3 | 0.0300 | 0.0250 |
| V2O3 | 0.0290 | 0.0280 |
| MnO | 0.0600 | 0.0330 |
| MgO | 0.2600 | 3.2800 |
| CaO | 0.0330 | 1.3900 |
| Rb2O | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 |
| BaO | 0.0060 | 0.0890 |
| Na2O | 0.0300 | 1.2400 |
| K2O | 0.0190 | 0.6900 |
| ZrO2 | 0.0020 | 0.0110 |
| P2O5 | 0.0190 | 0.9700 |
| Cu | 0.0020 | 0.0010 |
| Ni | 0.0190 | 0.0160 |
| Co | 0.0090 | 0.0170 |
| Zn | 0.0100 | 0.0020 |
| Pb | 0.0000 | 0.0020 |
| Ag | 0.0040 | 0.0010 |
| S | 0.0050 | 0.0230 |
| As | 0.0000 | 0.0010 |
| Sb | 0.0040 | 0.0110 |
| Bi | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0007 | 0.0038 |
| Nb | 0.0000 | 0.0008 |
| Mo | 0.0000 | 0.0000 |
| Sn | 0.0000 | 0.0110 |
| W | 0.0010 | 0.0000 |
| Cl | 0.0030 | 0.0080 |
| Th | 0.0046 | 0.0031 |
| U | 0.0083 | 0.0038 |
| Cs | 0.0010 | 0.0000 |
| La | 0.0040 | 0.0250 |
| Ce | 0.0050 | 0.0390 |
| Ta | 0.0020 | 0.0000 |
| Ga | 0.0006 | 0.0021 |
| Si | 0.7400 | 24.8000 |
| Ti | 0.0040 | 0.1010 |
| Cr | 0.0210 | 0.0170 |
| V | 0.0200 | 0.0190 |
| Fe | 71.2000 | 24.1000 |
| Mn | 0.0470 | 0.0250 |
| Mg | 0.1600 | 1.9800 |
| Ca | 0.0240 | 0.9900 |
| Ba | 0.0050 | 0.0800 |
| Satmagan | 98.99 | 0.73 |

5.4.2 HIMS/HGMS, Rougher LIMS Tailings

The Rougher LIMS tailings were subjected to three stages (rougher-cleaner) of wet HGMS (HIMS) with intermediate grinding to investigate the possibility of producing a hematite concentrate. The final concentrate assayed 64.1% Fe, 4.9% SiO₂ and 0.05% phosphorus (0.12% P₂O₅). 81% of the Fe contained in the Rougher LIMS tailings was recovered into the final HGMS concentrate.

Table 25: Metallurgical Balance and Test Conditions, HGMS, Rougher LIMS Tailings

| Test product(s) | | Weight grams wt.-% | | XRF MP-10 and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------------|--------|---------------------------------|--------|------------------|--------|-------------------------------|--------|------|--------|-------|--------|--------------------------------|--------|-------|--------|-------------------|--------|------------------|--------|-------|--------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| | | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | | |
| HGMS Cln M2 | | 341.0 | 22.62 | 64.10 | 81.2 | 4.89 | 1.9 | 0.116 | 3.7 | 0.68 | 8.2 | 0.031 | 35.8 | 1.08 | 3.1 | 0.205 | 3.0 | 0.23 | 1.8 | 0.138 | 3.2 | 0.042 | 76.6 | 1.74 | 68.0 |
| HGMS Cln NM2 | | 38.7 | 2.57 | 27.00 | 3.9 | 44.10 | 1.9 | 1.00 | 3.6 | 4.01 | 5.5 | 0.030 | 3.9 | 7.11 | 2.3 | 1.43 | 2.4 | 2.34 | 2.1 | 1.09 | 2.9 | 0.023 | 4.8 | 0.39 | 1.7 |
| (HGMS Cln M1) | | 379.7 | 25.18 | 60.32 | 85.1 | 8.89 | 3.9 | 0.206 | 7.3 | 1.02 | 13.7 | 0.031 | 39.7 | 1.69 | 5.5 | 0.330 | 5.4 | 0.45 | 3.9 | 0.235 | 6.1 | 0.040 | 81.3 | 1.60 | 69.7 |
| HGMS Cln NM1 | | 449.9 | 29.84 | 6.95 | 11.6 | 69.40 | 35.6 | 1.15 | 48.3 | 2.91 | 46.3 | 0.023 | 35.0 | 9.35 | 35.7 | 2.15 | 41.8 | 3.34 | 34.5 | 1.24 | 38.0 | 0.006 | 14.0 | 0.27 | 13.9 |
| (HGMS Rgh Mags) | | 829.6 | 55.02 | 31.38 | 96.7 | 41.70 | 39.5 | 0.72 | 55.6 | 2.04 | 60.0 | 0.027 | 74.7 | 5.85 | 41.2 | 1.32 | 47.2 | 2.02 | 38.4 | 0.78 | 44.1 | 0.021 | 95.3 | 0.88 | 83.7 |
| HGMS Rgh Non-Mags | | 678.2 | 44.98 | 1.31 | 3.3 | 78.20 | 60.5 | 0.70 | 44.4 | 1.67 | 40.0 | 0.011 | 25.3 | 10.20 | 58.8 | 1.80 | 52.8 | 3.96 | 61.6 | 1.21 | 55.9 | 0.001 | 4.7 | 0.21 | 16.3 |
| Calc'd Feed | | 1507.8 | 100.00 | 17.85 | 100.0 | 58.12 | 100.0 | 0.71 | 100.0 | 1.88 | 100.0 | 0.020 | 100.0 | 7.80 | 100.0 | 1.53 | 100.0 | 2.89 | 100.0 | 0.97 | 100.0 | 0.012 | 100.0 | 0.58 | 100.0 |
| Feed Assays [WLIMS Rgh NM] | | | | 16.00 | | 59.60 | | 0.72 | | 2.13 | | 0.015 | | 8.48 | | 1.48 | | 3.42 | | 0.95 | | 0.013 | | 0.55 | |

7/10/2014

9/10/2014

Sandvik return material Rougher HGMS for the Hematitic pre-concentrate
Targeted Matrix loading parameter : **0.30 g/cm3**

Sample dry weight : **0.750 kgs** (per batch) Feed S.G. : **2.8**
 Feed solids target : **8.0 wt.-%** (est'd)
 Water volume : **8.63 liters**
 Slurry weight : **9.38 kgs** equal to **1054.2 g/L** volumetric weight
 Solids volume : **0.268 liters**
 Slurry volume : **8.89 liters**

Magnetic field setting : **0.07 Tesla** equal to : **0.10 Tesla**
 Matrix canister type : **3.5 XRO** (expanded metal) (actually inside the canister)
 Canister volume : **871 cm3**
 Cross-sectional area : **5809 mm2**
 Nominal top grain size : **850 µm**

Flow restrictor dia. : **8 mm**
 Volumetric flow : **0.287 l/sec**

Flow velocity through the canister cross-section : **49.4 mm/sec**

Feeding time within the feed cycle : **11 sec**
 Slurry flow volume : **3.16 liters**
 Approx. slurry weight : **3.33 kg**

Dry solids in the feed slurry within the feed cycle : **266.3 g**

Calculated matrix loading value : **0.31 g/cm3**

Approx. number of running cycles : **2.8**

Rinsing time : **6 sec**

Sandvik return material Cleaner HGMS for the Hematitic pre-concentrate
Targeted Matrix loading parameter : **0.25 g/cm3**

Sample dry weight : **0.820 kgs** (per batch) Feed S.G. : **4.0**
 Feed solids target : **7.0 wt.-%** (est'd)
 Water volume : **10.89 liters**
 Slurry weight : **11.71 kgs** equal to **1055.4 g/L** volumetric weight
 Solids volume : **0.205 liters**
 Slurry volume : **11.10 liters**

Magnetic field setting : **0.04 Tesla** equal to : **0.06 Tesla**
 Matrix canister type : **3.5 XMO** (expanded metal) (actually inside the canister)
 Canister volume : **871 cm3**
 Cross-sectional area : **5809 mm2**
 Nominal top grain size : **300 µm**

Flow restrictor dia. : **12 mm**
 Volumetric flow : **0.480 l/sec**

Flow velocity through the canister cross-section : **82.6 mm/sec**

Feeding time within the feed cycle : **6 sec**
 Slurry flow volume : **2.88 liters**
 Approx. slurry weight : **3.04 kg**

Dry solids in the feed slurry within the feed cycle : **212.8 g**

Calculated matrix loading value : **0.24 g/cm3**

Approx. number of running cycles : **3.9**

Rinsing time : **5 sec**



LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 10.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120909
Method : 180X-O
Date : 10.10.2014
Comment **Sandvik return material.**
HGMS rougher & cleaner products

Contents (%)

| | HGMS Cln Mags L14068368 | HGMS Cln NM L14068369 | HGMS Rgh NM L14068370 |
|----------|----------------------------|--------------------------|--------------------------|
| SiO2 | 8.7100 | 69.4000 | 78.2000 |
| TiO2 | 0.6500 | 0.1080 | 0.0830 |
| Al2O3 | 1.7000 | 9.3500 | 10.2000 |
| Cr2O3 | 0.2530 | 0.0094 | 0.0004 |
| V2O3 | 0.0590 | 0.0085 | 0.0019 |
| MnO | 0.0270 | 0.0230 | 0.0110 |
| MgO | 1.0200 | 2.9100 | 1.6700 |
| CaO | 0.2970 | 2.1500 | 1.8000 |
| Rb2O | 0.0110 | 0.0079 | 0.0053 |
| SrO | 0.0000 | 0.0052 | 0.0075 |
| BaO | 0.0260 | 0.1060 | 0.0690 |
| Na2O | 0.4800 | 3.3400 | 3.9600 |
| K2O | 0.2190 | 1.2400 | 1.2100 |
| ZrO2 | 0.0080 | 0.0220 | 0.0210 |
| P2O5 | 0.1780 | 1.1500 | 0.7000 |
| Cu | 0.0060 | 0.0010 | 0.0000 |
| Ni | 0.1230 | 0.0070 | 0.0030 |
| Co | 0.0090 | 0.0310 | 0.0230 |
| Zn | 0.0030 | 0.0030 | 0.0020 |
| Pb | 0.0000 | 0.0060 | 0.0070 |
| Ag | 0.0040 | 0.0010 | 0.0010 |
| S | 0.0040 | 0.0060 | 0.0070 |
| As | 0.0010 | 0.0000 | 0.0000 |
| Sb | 0.0090 | 0.0100 | 0.0060 |
| Bi | 0.0010 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0010 | 0.0020 |
| Y | 0.0016 | 0.0068 | 0.0029 |
| Nb | 0.0018 | 0.0019 | 0.0020 |
| Mo | 0.0220 | 0.0005 | 0.0011 |
| Sn | 0.0150 | 0.0040 | 0.0010 |
| W | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0060 | 0.0100 | 0.0120 |
| Th | 0.0053 | 0.0032 | 0.0012 |
| U | 0.0087 | 0.0000 | 0.0000 |
| Cs | 0.0030 | 0.0010 | 0.0020 |
| La | 0.0100 | 0.0240 | 0.0080 |
| Ce | 0.0160 | 0.0390 | 0.0170 |
| Ta | 0.0060 | 0.0000 | 0.0010 |
| Ga | 0.0019 | 0.0012 | 0.0013 |
| Si | 4.0700 | 32.5000 | 36.6000 |
| Ti | 0.3920 | 0.0650 | 0.0500 |
| Cr | 0.1730 | 0.0064 | 0.0003 |
| V | 0.0400 | 0.0058 | 0.0013 |
| Fe | 60.5000 | 6.9500 | 1.3100 |
| Mn | 0.0210 | 0.0180 | 0.0080 |
| Mg | 0.6200 | 1.7600 | 1.0100 |
| Ca | 0.2120 | 1.5400 | 1.2800 |
| Ba | 0.0230 | 0.0950 | 0.0620 |
| Satmagan | 1.54 | 0.27 | 0.21 |

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 13.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120921
Method : 180X-O
Date : 13.10.2014
Comment **Sandvik return material**
HGMS recleaner products

Contents (%)

| | HGMS Cln M2 L14068781 | HGMS Cln NM2 L14068782 |
|----------|--------------------------|---------------------------|
| SiO2 | 4.8900 | 44.1000 |
| TiO2 | 0.6900 | 0.3180 |
| Al2O3 | 1.0800 | 7.1100 |
| Cr2O3 | 0.3040 | 0.0240 |
| V2O3 | 0.0610 | 0.0330 |
| MnO | 0.0310 | 0.0300 |
| MgO | 0.6800 | 4.0100 |
| CaO | 0.2050 | 1.4300 |
| Rb2O | 0.0130 | 0.0130 |
| SrO | 0.0000 | 0.0006 |
| BaO | 0.0200 | 0.1110 |
| Na2O | 0.2300 | 2.3400 |
| K2O | 0.1380 | 1.0900 |
| ZrO2 | 0.0080 | 0.0170 |
| P2O5 | 0.1160 | 0.8200 |
| Cu | 0.0040 | 0.0040 |
| Ni | 0.1430 | 0.0140 |
| Co | 0.0020 | 0.0160 |
| Zn | 0.0030 | 0.0040 |
| Pb | 0.0000 | 0.0020 |
| Ag | 0.0030 | 0.0000 |
| S | 0.0070 | 0.0120 |
| As | 0.0000 | 0.0000 |
| Sb | 0.0100 | 0.0120 |
| Bi | 0.0030 | 0.0020 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0007 | 0.0076 |
| Nb | 0.0001 | 0.0014 |
| Mo | 0.0290 | 0.0000 |
| Sn | 0.0160 | 0.0090 |
| W | 0.0000 | 0.0000 |
| Cl | 0.0040 | 0.0100 |
| Th | 0.0053 | 0.0048 |
| U | 0.0094 | 0.0032 |
| Cs | 0.0020 | 0.0020 |
| La | 0.0090 | 0.0290 |
| Ce | 0.0110 | 0.0460 |
| Ta | 0.0020 | 0.0030 |
| Ga | 0.0030 | 0.0013 |
| Si | 2.2800 | 20.6000 |
| Ti | 0.4170 | 0.1910 |
| Cr | 0.2080 | 0.0160 |
| V | 0.0420 | 0.0230 |
| Fe | 64.1000 | 27.0000 |
| Mn | 0.0240 | 0.0230 |
| Mg | 0.4100 | 2.4200 |
| Ca | 0.1470 | 1.0200 |
| Ba | 0.0180 | 0.0990 |
| Satmagan | 1.74 | 0.39 |

A size-by-size chemical analysis of the re-cleaner HGMS concentrate is presented in the Table below. Liberation appears to improve slightly at sizes <0.063mm resulting in an enhanced grade of c.66% Fe. No further improvement in Fe grade was observed at smaller fractions.

Table 26: Size-by-size Chemical Analysis, Re-cleaner HGMS Concentrate

| Sieve fraction µm | | Weight g wt.-% | | Grades & Distributions (XRFMP-10 and Satmagan) | | | | | | | | | | | | | | | | | | | | | |
|----------------------|-------|---|--------|--|--------|------------------|--------|-------------------------------|--------|-------|--------|-------|--------|--------------------------------|--------|-------|--------|-------------------|--------|------------------|--------|-------|--------|----------|--------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| | | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% |
| | | Sample: NIO Var (II), Sandvik RM, HGMS Cln M2 (< 100 µm) Notes: Project: 1281277 / 2402 Date: 15.10.2014 Test: Sala HGMS Rgh-Cln runs 7.-13.10.2014 By: M. Kuusisto Product fineness P(80) = 69 microns <i>Sieve fractions of the hematitic product concentrate to chemical assaying</i> | | | | | | | | | | | | | | | | | | | | | | | |
| | | GTK Mintec | | | | | | | | | | | | | | | | | | | | | | | |
| + 75 | 15.4 | 14.89 | 56.00 | 13.0 | 11.80 | 37.8 | 0.271 | 32.5 | 2.98 | 68.2 | 0.016 | 9.1 | 2.82 | 39.6 | 0.382 | 28.8 | 0.53 | 34.4 | 0.55 | 66.6 | 0.038 | 13.6 | 0.65 | 6.3 | |
| - 75 | 88.0 | 85.11 | 65.85 | 87.0 | 3.41 | 62.2 | 0.098 | 67.5 | 0.24 | 31.8 | 0.028 | 90.9 | 0.75 | 60.4 | 0.166 | 71.2 | 0.18 | 65.6 | 0.048 | 33.4 | 0.042 | 86.4 | 1.69 | 93.7 | |
| | | 63/75 | | | | | | | | | | | | | | | | | | | | | | | |
| + 63 | 26.4 | 25.53 | 59.25 | 23.5 | 9.31 | 51.1 | 0.227 | 46.7 | 1.96 | 76.9 | 0.013 | 12.8 | 2.12 | 51.0 | 0.332 | 42.8 | 0.44 | 49.2 | 0.362 | 75.0 | 0.039 | 24.2 | 0.69 | 11.5 | |
| - 63 | 77.0 | 74.47 | 66.15 | 76.5 | 3.06 | 48.9 | 0.089 | 53.3 | 0.20 | 23.1 | 0.031 | 87.2 | 0.70 | 49.0 | 0.152 | 57.2 | 0.16 | 50.8 | 0.041 | 25.0 | 0.042 | 75.8 | 1.82 | 88.5 | |
| | | 45/63 | | | | | | | | | | | | | | | | | | | | | | | |
| + 45 | 53.6 | 51.84 | 62.68 | 50.5 | 6.39 | 71.1 | 0.165 | 68.7 | 1.08 | 86.2 | 0.011 | 20.9 | 1.44 | 70.3 | 0.249 | 65.3 | 0.31 | 69.9 | 0.205 | 86.2 | 0.041 | 50.8 | 0.78 | 26.2 | |
| - 45 | 49.8 | 48.16 | 66.22 | 49.5 | 2.79 | 28.9 | 0.080 | 31.3 | 0.19 | 13.8 | 0.043 | 79.1 | 0.65 | 29.7 | 0.143 | 34.7 | 0.14 | 30.1 | 0.035 | 13.8 | 0.042 | 49.2 | 2.34 | 73.8 | |
| | | 20/45 | | | | | | | | | | | | | | | | | | | | | | | |
| + 20 | 85.7 | 82.88 | 64.26 | 82.7 | 5.01 | 89.1 | 0.132 | 88.3 | 0.74 | 94.7 | 0.011 | 36.3 | 1.14 | 89.4 | 0.204 | 85.4 | 0.25 | 88.8 | 0.141 | 95.0 | 0.041 | 82.3 | 0.93 | 50.6 | |
| | | - 20 | | | | | | | | | | | | | | | | | | | | | | | |
| Calc.Bulk | 103.4 | 100.00 | 64.38 | 100.0 | 4.66 | 100.0 | 0.124 | 100.0 | 0.65 | 100.0 | 0.026 | 100.0 | 1.06 | 100.0 | 0.198 | 100.0 | 0.23 | 100.0 | 0.123 | 100.0 | 0.041 | 100.0 | 1.53 | 100.0 | |
| Bulk Assay | | | 64.10 | | 4.89 | | 0.116 | | 0.68 | | 0.031 | | 1.08 | | 0.205 | | 0.23 | | 0.138 | | 0.042 | | 1.74 | | |



Labtium Oy
REPORT OF XRF ANALYSIS 15.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120954
Method : 180X-O
Date : 15.10.2014
Comment : NIO Variability (II). 'Sandvik Return Material'. HGMS Cln Mags 2. Sieve fractions

Contents (%)

| | + 75 µm L14069125 | 63/75 µm L14069126 | 45/63 µm L14069127 | 20/45 µm L14069128 | -20 µm L14069129 |
|--------------------------------|----------------------|-----------------------|-----------------------|-----------------------|---------------------|
| SiO ₂ | 11.8000 | 5.8200 | 3.5500 | 2.7000 | 2.9600 |
| TiO ₂ | 0.6700 | 0.7000 | 0.7200 | 0.7000 | 0.6500 |
| Al ₂ O ₃ | 2.8200 | 1.1400 | 0.7800 | 0.6500 | 0.6600 |
| Cr ₂ O ₃ | 0.0140 | 0.0180 | 0.0260 | 0.1050 | 1.3500 |
| V ₂ O ₃ | 0.0560 | 0.0600 | 0.0620 | 0.0610 | 0.0630 |
| MnO | 0.0160 | 0.0090 | 0.0080 | 0.0130 | 0.0970 |
| MgO | 2.9800 | 0.5300 | 0.2300 | 0.1800 | 0.2000 |
| CaO | 0.3820 | 0.2620 | 0.1690 | 0.1280 | 0.1690 |
| Rb ₂ O | 0.0150 | 0.0110 | 0.0140 | 0.0110 | 0.0110 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0660 | 0.0150 | 0.0100 | 0.0050 | 0.0080 |
| Na ₂ O | 0.5300 | 0.3200 | 0.1800 | 0.1400 | 0.1500 |
| K ₂ O | 0.5500 | 0.0980 | 0.0520 | 0.0350 | 0.0360 |
| ZrO ₂ | 0.0070 | 0.0070 | 0.0080 | 0.0080 | 0.0070 |
| P ₂ O ₅ | 0.2710 | 0.1650 | 0.1040 | 0.0780 | 0.0850 |
| Cu | 0.0060 | 0.0010 | 0.0040 | 0.0030 | 0.0110 |
| Ni | 0.0080 | 0.0110 | 0.0150 | 0.0430 | 0.6400 |
| Co | 0.0100 | 0.0110 | 0.0150 | 0.0070 | 0.0210 |
| Zn | 0.0030 | 0.0020 | 0.0040 | 0.0030 | 0.0030 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0020 | 0.0030 | 0.0030 | 0.0030 | 0.0030 |
| S | 0.0040 | 0.0030 | 0.0030 | 0.0020 | 0.0080 |
| As | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 |
| Sb | 0.0080 | 0.0110 | 0.0090 | 0.0090 | 0.0100 |
| Bi | 0.0020 | 0.0010 | 0.0020 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0014 | 0.0016 | 0.0000 | 0.0013 | 0.0014 |
| Nb | 0.0010 | 0.0020 | 0.0020 | 0.0016 | 0.0012 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0065 | 0.1450 |
| Sn | 0.0140 | 0.0160 | 0.0170 | 0.0160 | 0.0180 |
| W | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Cl | 0.0090 | 0.0040 | 0.0010 | 0.0030 | 0.0030 |
| Th | 0.0055 | 0.0070 | 0.0048 | 0.0042 | 0.0047 |
| U | 0.0070 | 0.0093 | 0.0089 | 0.0089 | 0.0097 |
| Cs | 0.0010 | 0.0010 | 0.0020 | 0.0010 | 0.0010 |
| La | 0.0140 | 0.0090 | 0.0070 | 0.0050 | 0.0050 |
| Ce | 0.0240 | 0.0160 | 0.0090 | 0.0080 | 0.0080 |
| Ta | 0.0130 | 0.0100 | 0.0040 | 0.0000 | 0.0060 |
| Ga | 0.0014 | 0.0020 | 0.0032 | 0.0044 | 0.0011 |
| Si | 5.5000 | 2.7200 | 1.6600 | 1.2600 | 1.3900 |
| Ti | 0.4050 | 0.4170 | 0.4290 | 0.4180 | 0.3870 |
| Cr | 0.0096 | 0.0120 | 0.0180 | 0.0720 | 0.9200 |
| V | 0.0380 | 0.0410 | 0.0420 | 0.0420 | 0.0430 |
| Fe | 56.0000 | 63.8000 | 66.0000 | 66.9000 | 65.0000 |
| Satmagan | 0.65 | 0.74 | 0.86 | 1.20 | 4.42 |

The elevated levels of Cr, Ni, and Mo in the <0.020mm fraction indicate the presence of grinding media wear (stainless steel).

5.4.3 HIMS/HGMS, Cleaner LIMS Tailings

A single stage of HGMS was carried out to study the possibility of recovering hematite from the cleaner LIMS tailings; the concentrate obtained thereby contained 44.9% Fe and 27% SiO₂.

The results demonstrate that a minimum of 2 stages of HGMS will be required to produce a satisfactory hematite concentrate from the cleaner LIMS tailings.

Table 27: Metallurgical Balance and Test Conditions, HGMS, Cleaner LIMS Tailings



Sala HGMS 10-15-20 SCR Wet HIMS Separator, Scavenging / GTK Mintec Outokumpu
Material balance calculation based on XRF MP10 and Satmagan analyses of products

Client(s) : TSC / M. Reisinger
NIO / P. Marsden

Project : 1281277 / 2402

Test Feed : 'Sandvik Return Material'
'WLIMS Cln NM2-4' product at 100% minus 150 µm

Test Conditions : One-stage HGMS scavenging using feed solids at ca. 4-5 wt.-%

Magnetic field strength set to 0.06 Tesla

Basin bottom flow restrictor dia. 12 mm

Slurry velocity within the matrix ca. 83 mm/sec

Matrix loading parameter ca. 0.20 g/cm³ [dry solids/canister volume]

Matrix canister type '3.5XMO' expanded metal construction - recommended top grain size 300 microns

Date : Oct. 10th 2014

| Test No. | Product | Weight | | Grades & Recoveries (based on XRF MP10 and Satmagan analyses) | | | | | | | | | | | | | | | | | | | | | | | |
|------------|--------------------------------|--------|--------|---|-------|------------------|-------|-------------------------------|-------|------|-------|-------|-------|--------------------------------|-------|------------------|-------|------|-------|-------------------|-------|------------------|-------|-------|-------|----------|-------|
| | | g | Wt.-% | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | TiO ₂ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| | | | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| HGMS Scav. | Scav Mags | 140.1 | 52.63 | 44.90 | 94.1 | 27.00 | 27.4 | 0.490 | 25.7 | 2.76 | 47.3 | 0.028 | 43.7 | 3.24 | 38.6 | 0.293 | 93.4 | 0.71 | 25.5 | 0.76 | 35.7 | 0.483 | 36.6 | 0.032 | 93.9 | 1.08 | 81.6 |
| | Scav NM | 126.1 | 47.37 | 3.13 | 5.9 | 79.60 | 72.6 | 1.57 | 74.3 | 3.42 | 52.7 | 0.040 | 56.3 | 5.73 | 61.4 | 0.023 | 6.6 | 2.30 | 74.5 | 1.52 | 64.3 | 0.93 | 63.4 | 0.002 | 6.1 | 0.27 | 18.4 |
| | [Calc.Feed] | 266.2 | 100.00 | 25.11 | 100.0 | 51.92 | 100.0 | 1.00 | 100.0 | 3.07 | 100.0 | 0.034 | 100.0 | 4.42 | 100.0 | 0.165 | 100.0 | 1.46 | 100.0 | 1.12 | 100.0 | 0.69 | 100.0 | 0.018 | 100.0 | 0.70 | 100.0 |
| | Feed Assay [WLIMS Cln NM2-4] | | | 24.10 | | 53.00 | | 0.97 | | 3.28 | | 0.033 | | 4.59 | | 0.168 | | 1.39 | | 1.24 | | 0.69 | | 0.019 | | 0.73 | |

9/10/2014

Sandvik return material Re-cleaner HGMS for the Hematitic pre-concentrate

Targeted Matrix loading parameter : 0.20 g/cm³

Sample dry weight : 0.270 kgs (per batch) Feed S.G. : 4.5
 Feed solids target : 4.5 wt.-% (est'd)
 Water volume : 5.73 liters
 Slurry weight : 6.00 kgs equal to 1036.3 g/L volumetric weight
 Solids volume : 0.060 liters
 Slurry volume : 5.79 liters

Magnetic field setting : 0.04 Tesla equal to : 0.06 Tesla
 Matrix canister type : 3.5 XMO (expanded metal) (actually inside the canister)
 Canister volume : 871 cm³
 Cross-sectional area : 5809 mm²
 Nominal top grain size : 300 µm

Flow restrictor dia. : 12 mm
 Volumetric flow : 0.480 l/sec

Flow velocity through the canister cross-section : 82.6 mm/sec

Feeding time within the feed cycle : 6 sec
 Slurry flow volume : 2.88 liters
 Approx. slurry weight : 2.98 kg

Dry solids in the feed slurry within the feed cycle : 134.3 g

Calculated matrix loading value : 0.15 g/cm³

Approx. number of running cycles : 2.01

Rinsing time : 5 sec



LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 13.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120921
Method : 180X-O
Date : 13.10.2014
Comment : **Sandvik return material**
Scavenger HGMS Non-Mags product

Contents (%)

HGMS Scav NM
L14068783

| | |
|--------------------------------|---------|
| SiO ₂ | 79.6000 |
| TiO ₂ | 0.0230 |
| Al ₂ O ₃ | 5.7300 |
| Cr ₂ O ₃ | 0.0045 |
| V ₂ O ₃ | 0.0034 |
| MnO | 0.0400 |
| MgO | 3.4200 |
| CaO | 2.3000 |
| Rb ₂ O | 0.0065 |
| SrO | 0.0045 |
| BaO | 0.1140 |
| Na ₂ O | 1.5200 |
| K ₂ O | 0.9300 |
| ZrO ₂ | 0.0090 |
| P ₂ O ₅ | 1.5700 |
| Cu | 0.0010 |
| Ni | 0.0080 |
| Co | 0.0280 |
| Zn | 0.0040 |
| Pb | 0.0070 |
| Ag | 0.0010 |
| S | 0.0300 |
| As | 0.0000 |
| Sb | 0.0090 |
| Bi | 0.0020 |
| Te | 0.0020 |
| Y | 0.0062 |
| Nb | 0.0015 |
| Mo | 0.0006 |
| Sn | 0.0020 |
| W | 0.0000 |
| Cl | 0.0090 |
| Th | 0.0012 |
| U | 0.0000 |
| Cs | 0.0020 |
| La | 0.0330 |
| Ce | 0.0520 |
| Ta | 0.0010 |
| Ga | 0.0008 |
| Si | 37.2000 |
| Ti | 0.0140 |
| Cr | 0.0031 |
| V | 0.0023 |
| Fe | 3.1300 |
| Mn | 0.0310 |
| Ca | 1.6500 |
| Ba | 0.1020 |
| Satmagan | 0.27 |

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 10.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120909
Method : 180X-O
Date : 10.10.2014
Comment : **Sandvik return material**
Scavenger HGMS Mags product

Contents (%)

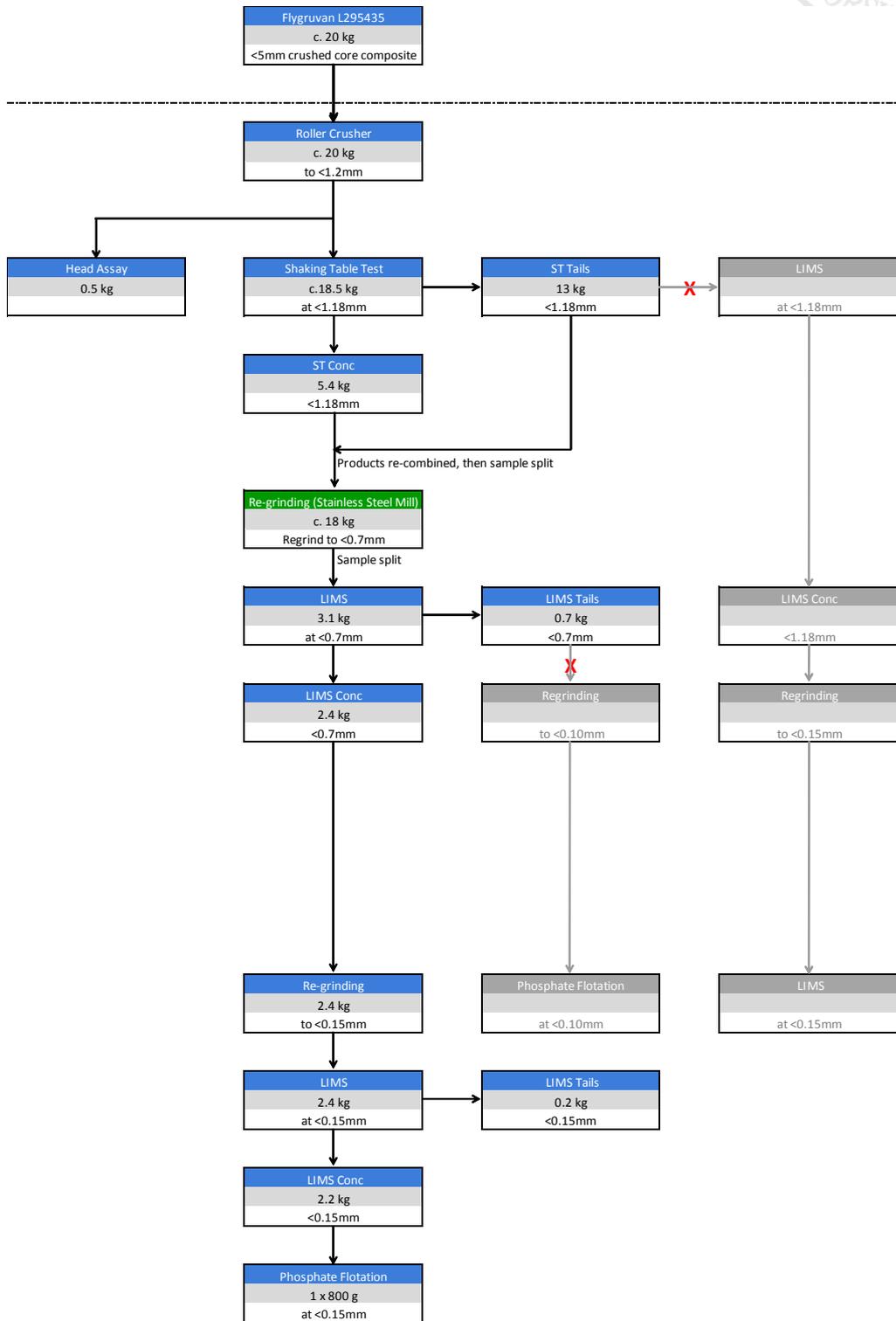
HGMS Scav Mags
L14068371

| | |
|--------------------------------|---------|
| SiO ₂ | 27.0000 |
| TiO ₂ | 0.2930 |
| Al ₂ O ₃ | 3.2400 |
| Cr ₂ O ₃ | 0.0350 |
| V ₂ O ₃ | 0.0470 |
| MnO | 0.0280 |
| MgO | 2.7600 |
| CaO | 0.7100 |
| Rb ₂ O | 0.0120 |
| SrO | 0.0000 |
| BaO | 0.0630 |
| Na ₂ O | 0.7600 |
| K ₂ O | 0.4830 |
| ZrO ₂ | 0.0120 |
| P ₂ O ₅ | 0.4900 |
| Cu | 0.0010 |
| Ni | 0.0230 |
| Co | 0.0180 |
| Zn | 0.0040 |
| Pb | 0.0000 |
| Ag | 0.0010 |
| S | 0.0180 |
| As | 0.0020 |
| Sb | 0.0100 |
| Bi | 0.0020 |
| Te | 0.0000 |
| Y | 0.0027 |
| Nb | 0.0016 |
| Mo | 0.0000 |
| Sn | 0.0160 |
| W | 0.0000 |
| Cl | 0.0050 |
| Th | 0.0030 |
| U | 0.0068 |
| Cs | 0.0020 |
| La | 0.0210 |
| Ce | 0.0330 |
| Ta | 0.0000 |
| Ga | 0.0021 |
| Si | 12.6000 |
| Ti | 0.1760 |
| Cr | 0.0240 |
| V | 0.0320 |
| Fe | 44.9000 |
| Mn | 0.0220 |
| Ca | 0.5100 |
| Ba | 0.0570 |
| Satmagan | 1.08 |



08.01.2015

5.5 Kalvgruvan, 'Drill core composite L295 435'




LABTIUM

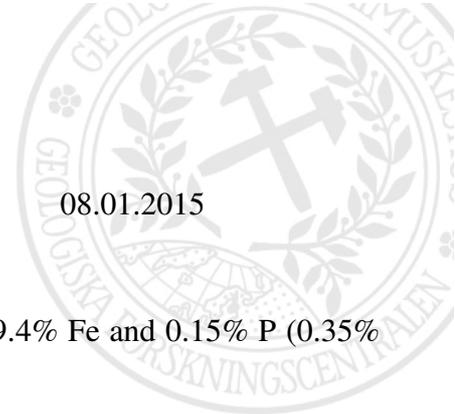
Labtium Oy
REPORT OF XRF ANALYSIS 26.8.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120462
Method : 180X-O
Date : 26.8.2014
Comments : NIO Variability Tests --- analysis request 21.8.2014
: **Kalvgruvan Composite (KC) - Feed**
Codes : L295435

Contents (%)

| | KC Feed A L14054235 | KC Feed B L14054236 | KC Feed Average L295435 |
|-----------------|------------------------|------------------------|-------------------------------|
| SiO2 | 23.6000 | 22.7000 | 23.1500 |
| TiO2 | 0.2540 | 0.2530 | 0.2535 |
| Al2O3 | 4.2400 | 3.9900 | 4.1150 |
| Cr2O3 | 0.0047 | 0.0039 | 0.0043 |
| V2O3 | 0.1290 | 0.1290 | 0.1290 |
| MnO | 0.0610 | 0.0630 | 0.0620 |
| MgO | 5.2400 | 4.7800 | 5.0100 |
| CaO | 2.0100 | 1.9500 | 1.9800 |
| Rb2O | 0.0110 | 0.0120 | 0.0115 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0090 | 0.0080 | 0.0085 |
| Na2O | 0.8200 | 0.7900 | 0.8050 |
| K2O | 0.4310 | 0.4280 | 0.4295 |
| ZrO2 | 0.0080 | 0.0080 | 0.0080 |
| P2O5 | 1.2200 | 1.1000 | 1.1600 |
| Cu | 0.0010 | 0.0010 | 0.0010 |
| Ni | 0.0080 | 0.0090 | 0.0085 |
| Co | 0.0030 | 0.0030 | 0.0030 |
| Zn | 0.0060 | 0.0050 | 0.0055 |
| Pb | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0030 | 0.0030 | 0.0030 |
| S | 0.0050 | 0.0040 | 0.0045 |
| As | 0.0010 | 0.0000 | 0.0005 |
| Sb | 0.0100 | 0.0110 | 0.0105 |
| Bi | 0.0010 | 0.0020 | 0.0015 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0046 | 0.0055 | 0.0051 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0030 | 0.0040 | 0.0035 |
| W | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0100 | 0.0110 | 0.0105 |
| Th | 0.0048 | 0.0056 | 0.0052 |
| U | 0.0060 | 0.0062 | 0.0061 |
| Cs | 0.0020 | 0.0040 | 0.0030 |
| La | 0.0090 | 0.0110 | 0.0100 |
| Ce | 0.0180 | 0.0170 | 0.0175 |
| Ta | 0.0040 | 0.0030 | 0.0035 |
| Ga | 0.0022 | 0.0031 | 0.0027 |
| Si | 11.0000 | 10.6000 | 10.8000 |
| Ti | 0.1520 | 0.1520 | 0.1520 |
| Cr | 0.0032 | 0.0027 | 0.0030 |
| V | 0.0880 | 0.0880 | 0.0880 |
| Fe | 45.4000 | 46.7000 | 46.0500 |
| Mn | 0.0470 | 0.0490 | 0.0480 |
| Mg | 3.1600 | 2.8800 | 3.0200 |
| Ca | 1.4300 | 1.3900 | 1.4100 |
| Ba | 0.0080 | 0.0070 | 0.0075 |
| Eltra S | 0.006 | 0.031 | 0.019 |
| Satmagan | 64.91 | 64.59 | 64.75 |





08.01.2015

5.5.1 Shaking Table, <1.18mm

Gravity concentration (via shaking table) produced a concentrate grading 69.4% Fe and 0.15% P (0.35% P₂O₅) at a Fe recovery of c.43%.

Table 28: Metallurgical Balance, Shaking Table, <1.18mm 'Kalvgruvan Composite L295 435'

| Test product(s) | | Weight grams wt.-% | | XRF MP-10, Eltra S and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|--|-----------------------|--------|--|-------|------------------|-------|-------------------------------|-------|-------|-------|-------|-------|--------------------------------|-------|-------|-------|-------------------|-------|------------------|-------|---------|-------|----------|-------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | Eltra S | | Satmagan | |
| | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | | |
| Concentrate | | 5372.7 | 29.17 | 69.40 | 42.7 | 2.40 | 3.2 | 0.352 | 9.0 | 0.74 | 4.6 | 0.050 | 23.5 | 0.63 | 4.8 | 0.454 | 6.6 | 0.02 | 0.8 | 0.032 | 2.2 | 0.044 | 28.0 | 98.20 | 43.3 |
| Middling | | 11636.1 | 63.17 | 40.10 | 53.4 | 28.90 | 82.9 | 1.32 | 73.3 | 5.84 | 79.3 | 0.063 | 64.0 | 4.88 | 80.3 | 2.41 | 75.9 | 0.98 | 87.4 | 0.53 | 77.7 | 0.050 | 68.9 | 56.11 | 53.6 |
| (Conc + Middling) | | 17008.8 | 92.33 | 49.36 | 96.1 | 20.53 | 86.1 | 1.01 | 82.3 | 4.23 | 84.0 | 0.059 | 87.5 | 3.54 | 85.1 | 1.79 | 82.5 | 0.68 | 88.2 | 0.373 | 79.9 | 0.048 | 96.8 | 69.41 | 96.8 |
| Tailing 1 | | 1274.5 | 6.92 | 23.70 | 3.5 | 40.30 | 12.7 | 2.59 | 15.8 | 9.68 | 14.4 | 0.100 | 11.1 | 7.46 | 13.4 | 4.53 | 15.6 | 1.10 | 10.7 | 1.15 | 18.5 | 0.015 | 2.3 | 27.24 | 2.8 |
| (Conc + Middl. + Tails 1) | | 18283.3 | 99.25 | 47.57 | 99.6 | 21.91 | 98.7 | 1.12 | 98.1 | 4.61 | 98.4 | 0.062 | 98.6 | 3.81 | 98.6 | 1.98 | 98.1 | 0.71 | 98.9 | 0.427 | 98.4 | 0.046 | 99.1 | 66.47 | 99.7 |
| Tailing 2 | | 137.9 | 0.75 | 24.80 | 0.4 | 37.80 | 1.3 | 2.93 | 1.9 | 10.00 | 1.6 | 0.114 | 1.4 | 7.37 | 1.4 | 5.16 | 1.9 | 1.01 | 1.1 | 0.93 | 1.6 | 0.055 | 0.9 | 28.27 | 0.3 |
| Calc'd Feed | | 18421.2 | 100.00 | 47.40 | 100.0 | 22.03 | 100.0 | 1.14 | 100.0 | 4.65 | 100.0 | 0.062 | 100.0 | 3.84 | 100.0 | 2.01 | 100.0 | 0.71 | 100.0 | 0.43 | 100.0 | 0.046 | 100.0 | 66.18 | 100.0 |
| Feed Assays | | | | 46.05 | | 23.15 | | 1.16 | | 5.01 | | 0.062 | | 4.12 | | 1.98 | | 0.81 | | 0.43 | | 0.019 | | 64.75 | |

Table 29: Screen Analysis, 'Kalvgruvan Composite L295 435' Shaking Table Feed and Concentrate



Project name : **NIO Variability**
Code : **1281272 / 2402**

Date : 21.8.2014
By : ANS

Note : Combination of elutriation screening and Ro-Tap dry screening for 10 min

Sample data : NIO Variability / 'Kalvgruvan Composite' - Feed screen check

Code : **L295435**

| Screen opening (µm) | NIO Variability | | | Kalvgruvan Composite Feed | | | | | | | | | | | | | | |
|---------------------|-----------------|-----------|--------------|---------------------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|
| | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) | Weight (g) | Pass. (%) | Frac. (%) |
| 1180 | 0.00 | 100.0 | 0.0 | | | | | | | | | | | | | | | |
| 1000 | 8.16 | 93.0 | 7.0 | | | | | | | | | | | | | | | |
| 710 | 18.22 | 77.2 | 15.7 | | | | | | | | | | | | | | | |
| 500 | 14.74 | 64.5 | 12.7 | | | | | | | | | | | | | | | |
| 250 | 21.92 | 45.6 | 18.9 | | | | | | | | | | | | | | | |
| 125 | 21.26 | 27.3 | 18.3 | | | | | | | | | | | | | | | |
| 75 | 11.52 | 17.3 | 9.9 | | | | | | | | | | | | | | | |
| - 75 | 20.09 | | 17.3 | | | | | | | | | | | | | | | |
| Total | 115.91 | | 100.0 | | | | | | | | | | | | | | | |

Calc'd
P 80
(µm)

761.0



A concentrate sub-sample was screened into the following size fractions, sampled and submitted for the chemistry:

- +0.63mm;
- -0.63+0.5mm;
- -0.5mm+0.315mm;
- -0.315mm+0.18mm;
- -0.18mm.

The results are presented in the Table below.

Table 30: Size-by-size Chemical Analysis, <1.18mm Shaking Table Concentrate

| Sieve fraction µm | | Weight g wt.-% | | Grades & Distributions (XRFMP-10 and Satmagan) | | | | | | | | | | | | | | | | | | | | |
|----------------------|--------------|---|--------------|--|-------------|------------------|--------------|-------------------------------|-------------|-------------|--------------|-------------|-------------|--------------------------------|--------------|-------------|-------------|-------------------|--------------|------------------|--------------|-------------|--------------|-------------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan |
| | | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | % | dist-% | |
| | | Sample: NiO, Kalvgruvan Composite, Table Conc (< 1.18 mm) Notes: Project: 1281277 / 2402 Date: 24.9.2014 Test: Shaking table test 2.9.2014 By: M. Kuusisto Product fineness P(80) = 302 microns Sieve fractions of the product to chemical assaying | | | | | | | | | | | | | | | | | | | | | | |
| | | GTK Mintec | | | | | | | | | | | | | | | | | | | | | | |
| + 630 | 6.2 | 2.16 | 63.50 | 2.0 | 7.21 | 6.2 | 0.82 | 5.1 | 1.75 | 5.0 | 0.058 | 2.5 | 1.20 | 4.0 | 1.18 | 5.7 | 0.09 | 12.2 | 0.073 | 5.1 | 0.113 | 2.1 | 82.57 | 1.8 |
| - 630 | 280.9 | 97.84 | 69.42 | 98.0 | 2.41 | 93.8 | 0.336 | 94.9 | 0.74 | 95.0 | 0.050 | 97.5 | 0.63 | 96.0 | 0.433 | 94.3 | 0.01 | 87.8 | 0.030 | 94.9 | 0.116 | 97.9 | 97.03 | 98.2 |
| 500/630 | 6.7 | 2.33 | 66.90 | 2.3 | 4.39 | 4.1 | 0.57 | 3.8 | 1.08 | 3.3 | 0.053 | 2.4 | 0.89 | 3.2 | 0.79 | 4.1 | 0.04 | 5.9 | 0.048 | 3.6 | 0.116 | 2.3 | 89.40 | 2.2 |
| + 500 | 12.9 | 4.49 | 65.27 | 4.2 | 5.75 | 10.3 | 0.69 | 8.9 | 1.40 | 8.3 | 0.055 | 4.9 | 1.04 | 7.3 | 0.98 | 9.8 | 0.06 | 18.1 | 0.060 | 8.8 | 0.115 | 4.4 | 86.12 | 4.0 |
| - 500 | 274.2 | 95.51 | 69.48 | 95.8 | 2.36 | 89.7 | 0.330 | 91.1 | 0.73 | 91.7 | 0.050 | 95.1 | 0.62 | 92.7 | 0.424 | 90.2 | 0.01 | 81.9 | 0.029 | 91.2 | 0.116 | 95.6 | 97.21 | 96.0 |
| 315/500 | 35.0 | 12.19 | 68.40 | 12.0 | 3.26 | 15.8 | 0.407 | 14.3 | 0.89 | 14.3 | 0.057 | 13.7 | 0.73 | 13.8 | 0.53 | 14.4 | 0.02 | 15.3 | 0.038 | 15.1 | 0.117 | 12.3 | 93.36 | 11.8 |
| + 315 | 47.9 | 16.68 | 67.56 | 16.3 | 3.93 | 26.1 | 0.483 | 23.3 | 1.03 | 22.6 | 0.057 | 18.6 | 0.81 | 21.1 | 0.65 | 24.2 | 0.03 | 33.4 | 0.044 | 23.9 | 0.116 | 16.7 | 91.41 | 15.8 |
| - 315 | 239.2 | 83.32 | 69.64 | 83.7 | 2.23 | 73.9 | 0.319 | 76.7 | 0.71 | 77.4 | 0.049 | 81.4 | 0.61 | 78.9 | 0.409 | 75.8 | 0.01 | 66.6 | 0.028 | 76.1 | 0.116 | 83.3 | 97.77 | 84.2 |
| 180/315 | 96.5 | 33.61 | 68.80 | 33.4 | 2.97 | 39.7 | 0.367 | 35.6 | 0.85 | 37.6 | 0.053 | 35.2 | 0.71 | 37.1 | 0.474 | 35.5 | 0.03 | 63.4 | 0.037 | 40.5 | 0.118 | 34.1 | 97.25 | 33.8 |
| + 180 | 144.4 | 50.30 | 68.39 | 49.6 | 3.29 | 65.8 | 0.406 | 58.8 | 0.91 | 60.1 | 0.054 | 53.8 | 0.74 | 58.2 | 0.53 | 59.6 | 0.03 | 96.9 | 0.039 | 64.4 | 0.117 | 50.8 | 95.31 | 49.6 |
| - 180 | 142.7 | 49.70 | 70.20 | 50.4 | 1.73 | 34.2 | 0.287 | 41.2 | 0.61 | 39.9 | 0.047 | 46.2 | 0.54 | 41.8 | 0.365 | 40.4 | 0.00 | 3.1 | 0.022 | 35.6 | 0.115 | 49.2 | 98.13 | 50.4 |
| Calc.Bulk | 287.1 | 100.00 | 69.29 | 100.0 | 2.51 | 100.0 | 0.347 | 100.0 | 0.76 | 100.0 | 0.051 | 100.0 | 0.64 | 100.0 | 0.449 | 100.0 | 0.02 | 100.0 | 0.031 | 100.0 | 0.116 | 100.0 | 96.71 | 100.0 |
| Bulk Assay | | | 69.40 | | 2.40 | | 0.352 | | 0.74 | | 0.050 | | 0.63 | | 0.454 | | 0.02 | | 0.032 | | 0.116 | | 98.20 | |

L A S T I U M

Labtium Oy
REPORT OF XRF ANALYSIS 3.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120586
Method : 180X-O
Date : 3.9.2014
Comment : NIO Variability (II), Kalvgruvan Composite / Shaking table test - analysis request 3.9.2014

Contents (%)

| | Conc L14058019 | Midds L14058020 | Tails 1 L14058021 | Tails 2 L14058022 |
|----------|-------------------|--------------------|----------------------|----------------------|
| SiO2 | 2.4000 | 28.9000 | 40.3000 | 37.8000 |
| TiO2 | 0.1850 | 0.2710 | 0.3000 | 0.3480 |
| Al2O3 | 0.6300 | 4.8800 | 7.4600 | 7.3700 |
| Cr2O3 | 0.0042 | 0.0067 | 0.0034 | 0.0070 |
| V2O3 | 0.1700 | 0.1130 | 0.0680 | 0.0700 |
| MnO | 0.0500 | 0.0630 | 0.1000 | 0.1140 |
| MgO | 0.7400 | 5.8400 | 9.6800 | 10.0000 |
| CaO | 0.4540 | 2.4100 | 4.5300 | 5.1600 |
| Rb2O | 0.0110 | 0.0120 | 0.0140 | 0.0130 |
| SrO | 0.0000 | 0.0000 | 0.0006 | 0.0007 |
| BaO | 0.0020 | 0.0110 | 0.0160 | 0.0140 |
| Na2O | 0.0200 | 0.9800 | 1.1000 | 1.0100 |
| K2O | 0.0320 | 0.5300 | 1.1500 | 0.9300 |
| ZrO2 | 0.0020 | 0.0090 | 0.0170 | 0.0160 |
| P2O5 | 0.3520 | 1.3200 | 2.5900 | 2.9300 |
| Cu | 0.0000 | 0.0010 | 0.0020 | 0.0060 |
| Ni | 0.0090 | 0.0080 | 0.0070 | 0.0080 |
| Co | 0.0110 | 0.0050 | 0.0060 | 0.0080 |
| Zn | 0.0070 | 0.0060 | 0.0080 | 0.0120 |
| Pb | 0.0000 | 0.0000 | 0.0020 | 0.0030 |
| Ag | 0.0030 | 0.0030 | 0.0020 | 0.0040 |
| S | 0.0040 | 0.0050 | 0.0090 | 0.0170 |
| As | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| Sb | 0.0070 | 0.0100 | 0.0100 | 0.0100 |
| Bi | 0.0020 | 0.0030 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0020 | 0.0065 | 0.0140 | 0.0160 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0012 |
| Sn | 0.0020 | 0.0030 | 0.0040 | 0.0040 |
| W | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| Cl | 0.0030 | 0.0130 | 0.0220 | 0.0220 |
| Th | 0.0058 | 0.0036 | 0.0036 | 0.0039 |
| U | 0.0095 | 0.0050 | 0.0028 | 0.0032 |
| Cs | 0.0020 | 0.0020 | 0.0010 | 0.0030 |
| La | 0.0060 | 0.0110 | 0.0180 | 0.0230 |
| Ce | 0.0110 | 0.0180 | 0.0370 | 0.0440 |
| Ta | 0.0070 | 0.0000 | 0.0010 | 0.0010 |
| Ga | 0.0030 | 0.0026 | 0.0020 | 0.0015 |
| Si | 1.1200 | 13.5000 | 18.9000 | 17.7000 |
| Ti | 0.1110 | 0.1620 | 0.1800 | 0.2090 |
| Cr | 0.0029 | 0.0046 | 0.0023 | 0.0048 |
| V | 0.1160 | 0.0770 | 0.0460 | 0.0480 |
| Fe | 69.4000 | 40.1000 | 23.7000 | 24.8000 |
| Eltra S | 0.044 | 0.050 | 0.015 | 0.055 |
| Satmagan | 98.20 | 56.11 | 27.24 | 28.27 |

LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 24.9.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120750
Method : 180X-O
Date : 24.09.2014
Comment : NIO Variability (II) - 'Kalgruvan Composite' / ST Concentrate sieve fractions

Contents (%)

| | +630µm L14063427 | 500/630µm L14063428 | 315/500µm L14063429 | 180/315µm L14063430 | -180µm L14063431 |
|--------------------------------|---------------------|------------------------|------------------------|------------------------|---------------------|
| SiO ₂ | 7.2100 | 4.3900 | 3.2600 | 2.9700 | 1.7300 |
| TiO ₂ | 0.2930 | 0.2290 | 0.1880 | 0.1870 | 0.1770 |
| Al ₂ O ₃ | 1.2000 | 0.8900 | 0.7300 | 0.7100 | 0.5400 |
| Cr ₂ O ₃ | 0.0170 | 0.0160 | 0.0077 | 0.0054 | 0.0053 |
| V ₂ O ₃ | 0.1660 | 0.1710 | 0.1720 | 0.1730 | 0.1680 |
| MnO | 0.0580 | 0.0530 | 0.0570 | 0.0530 | 0.0470 |
| MgO | 1.7500 | 1.0800 | 0.8900 | 0.8500 | 0.6100 |
| CaO | 1.1800 | 0.7900 | 0.5300 | 0.4740 | 0.3650 |
| Rb ₂ O | 0.0120 | 0.0110 | 0.0120 | 0.0120 | 0.0120 |
| SrO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0040 | 0.0070 | 0.0040 | 0.0030 | 0.0030 |
| Na ₂ O | 0.0900 | 0.0400 | 0.0200 | 0.0300 | 0.0000 |
| K ₂ O | 0.0730 | 0.0480 | 0.0380 | 0.0370 | 0.0220 |
| ZrO ₂ | 0.0030 | 0.0030 | 0.0020 | 0.0020 | 0.0030 |
| P ₂ O ₅ | 0.8200 | 0.5700 | 0.4070 | 0.3670 | 0.2870 |
| Cu | 0.0080 | 0.0030 | 0.0000 | 0.0000 | 0.0020 |
| Ni | 0.0110 | 0.0110 | 0.0080 | 0.0090 | 0.0070 |
| Co | 0.0070 | 0.0050 | 0.0030 | 0.0030 | 0.0020 |
| Zn | 0.0100 | 0.0070 | 0.0080 | 0.0070 | 0.0080 |
| Pb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0050 | 0.0040 | 0.0040 | 0.0020 | 0.0020 |
| S | 0.0050 | 0.0050 | 0.0020 | 0.0040 | 0.0050 |
| As | 0.0040 | 0.0000 | 0.0000 | 0.0010 | 0.0000 |
| Sb | 0.0080 | 0.0090 | 0.0070 | 0.0070 | 0.0050 |
| Bi | 0.0030 | 0.0020 | 0.0020 | 0.0020 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0042 | 0.0026 | 0.0020 | 0.0010 | 0.0011 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Sn | 0.0020 | 0.0020 | 0.0030 | 0.0010 | 0.0010 |
| W | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 |
| Cl | 0.0080 | 0.0040 | 0.0040 | 0.0030 | 0.0030 |
| Th | 0.0052 | 0.0036 | 0.0051 | 0.0039 | 0.0048 |
| U | 0.0091 | 0.0089 | 0.0082 | 0.0096 | 0.0087 |
| Cs | 0.0040 | 0.0020 | 0.0030 | 0.0030 | 0.0010 |
| La | 0.0080 | 0.0090 | 0.0040 | 0.0050 | 0.0060 |
| Ce | 0.0140 | 0.0120 | 0.0120 | 0.0090 | 0.0120 |
| Ta | 0.0050 | 0.0010 | 0.0020 | 0.0030 | 0.0080 |
| Ga | 0.0040 | 0.0054 | 0.0035 | 0.0045 | 0.0044 |
| Si | 3.3700 | 2.0500 | 1.5200 | 1.3900 | 0.8100 |
| Ti | 0.1750 | 0.1370 | 0.1130 | 0.1120 | 0.1060 |
| Cr | 0.0120 | 0.0110 | 0.0053 | 0.0037 | 0.0036 |
| V | 0.1130 | 0.1160 | 0.1170 | 0.1180 | 0.1150 |
| Fe | 63.5000 | 66.9000 | 68.4000 | 68.8000 | 70.2000 |
| Satmagan | 82.57 | 89.40 | 93.36 | 97.25 | 98.13 |



5.5.2 Wet LIMS

The products of the shaking table tests were re-combined and the re-combined feed subjected to two stages of wet LIMS with intermediate re-grinding of the concentrate.

Table 31: Metallurgical Balance, Wet LIMS, 'Kalvgruvan Composite L295 435'

| Test product(s) | | Weight grams wt.-% | | XRF MP-10 and Satmagan analyses | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|--|-------------------------|---------------|---------------------------------|-------------|------------------|--------------|-------------------------------|--------------|---------------|--------------|----------------|--------------|--------------------------------|--------------|--------------|--------------|-------------------|--------------|------------------|--------------|----------------|-------------|---------------|-------------|
| | | | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| | | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | % | Rec.-% | | |
| Cln Mags 4 Conc. | | 2156.5 | 70.48 | 68.30 | 96.4 | 3.64 | 13.0 | 0.272 | 16.8 | 0.81 | 16.3 | 0.049 | 53.2 | 0.79 | 17.4 | 0.423 | 13.9 | 0.06 | 8.9 | 0.034 | 5.2 | 0.118 | 97.0 | 95.31 | 99.7 |
| Cln Non-Mags 2-4 (Rgh Mags) | | 218.7 2375.2 | 7.15 77.63 | 7.66 62.72 | 1.1 97.5 | 55.90 8.45 | 20.3 33.4 | 4.40 0.65 | 27.6 44.4 | 11.00 1.75 | 22.4 38.7 | 0.134 0.057 | 14.8 67.9 | 7.41 1.40 | 16.5 33.9 | 7.45 1.07 | 24.8 38.7 | 0.98 0.14 | 14.7 23.5 | 0.86 0.110 | 13.3 18.4 | 0.012 0.108 | 1.0 98.0 | 1.23 86.65 | 0.1 99.8 |
| Rgh Non-Mags | | 684.6 | 22.37 | 5.65 | 2.5 | 58.60 | 66.6 | 2.83 | 55.6 | 9.62 | 61.3 | 0.093 | 32.1 | 9.47 | 66.1 | 5.88 | 61.3 | 1.63 | 76.5 | 1.69 | 81.6 | 0.008 | 2.0 | 0.61 | 0.2 |
| Calc'd Feed | | 3059.8 | 100.00 | 49.95 | 100.0 | 19.67 | 100.0 | 1.14 | 100.0 | 3.51 | 100.0 | 0.065 | 100.0 | 3.21 | 100.0 | 2.15 | 100.0 | 0.48 | 100.0 | 0.464 | 100.0 | 0.086 | 100.0 | 67.40 | 100.0 |
| Feed Assays | | | | 46.05 | | 23.15 | | 1.16 | | 5.01 | | 0.062 | | 4.12 | | 1.98 | | 0.81 | | 0.430 | | 0.088 | | 64.75 | |

At <0.15mm, the final concentrate assayed 68.3% Fe, 3.6% SiO₂ and 0.12% P (0.27% P₂O₅). In excess of 99% of the magnetite was recovered by LIMS.

The final LIMS concentrate was further subjected to reverse flotation to investigate the removal of phosphates (the reader is referred to Section 5.5.3 for details).

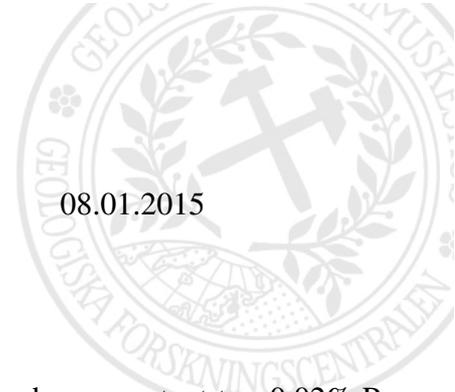
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 1.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120815
Method : 180X-O
Date : 1.10.2014
Comment : NIO Variability (II). 'Kalgruvan Composite'. WLIMS rougher & cleaner products

Contents (%)

| | CIn M4 L14065699 | CIn NM2-4 L14065700 | Rgh NM L14065701 |
|----------|---------------------|------------------------|---------------------|
| SiO2 | 3.6400 | 55.9000 | 58.6000 |
| TiO2 | 0.2350 | 0.3580 | 0.2730 |
| Al2O3 | 0.7900 | 7.4100 | 9.4700 |
| Cr2O3 | 0.0230 | 0.0340 | 0.0082 |
| V2O3 | 0.1740 | 0.0180 | 0.0110 |
| MnO | 0.0490 | 0.1340 | 0.0930 |
| MgO | 0.8100 | 11.0000 | 9.6200 |
| CaO | 0.4230 | 7.4500 | 5.8800 |
| Rb2O | 0.0120 | 0.0071 | 0.0120 |
| SrO | 0.0000 | 0.0038 | 0.0049 |
| BaO | 0.0040 | 0.0130 | 0.0200 |
| Na2O | 0.0600 | 0.9800 | 1.6300 |
| K2O | 0.0340 | 0.8600 | 1.6900 |
| ZrO2 | 0.0030 | 0.0240 | 0.0220 |
| P2O5 | 0.2720 | 4.4000 | 2.8300 |
| Cu | 0.0030 | 0.0020 | 0.0020 |
| Ni | 0.0220 | 0.0320 | 0.0080 |
| Co | 0.0230 | 0.0250 | 0.0180 |
| Zn | 0.0060 | 0.0070 | 0.0050 |
| Pb | 0.0000 | 0.0080 | 0.0070 |
| Ag | 0.0040 | 0.0020 | 0.0030 |
| S | 0.0040 | 0.0590 | 0.0210 |
| As | 0.0000 | 0.0030 | 0.0000 |
| Sb | 0.0100 | 0.0090 | 0.0100 |
| Bi | 0.0030 | 0.0020 | 0.0020 |
| Te | 0.0000 | 0.0030 | 0.0020 |
| Y | 0.0013 | 0.0220 | 0.0150 |
| Nb | 0.0000 | 0.0025 | 0.0016 |
| Mo | 0.0000 | 0.0042 | 0.0007 |
| Sn | 0.0020 | 0.0020 | 0.0030 |
| W | 0.0010 | 0.0000 | 0.0010 |
| Cl | 0.0030 | 0.0320 | 0.0280 |
| Th | 0.0045 | 0.0036 | 0.0031 |
| U | 0.0087 | 0.0000 | 0.0000 |
| Cs | 0.0020 | 0.0010 | 0.0040 |
| La | 0.0070 | 0.0300 | 0.0190 |
| Ce | 0.0070 | 0.0610 | 0.0340 |
| Ta | 0.0060 | 0.0000 | 0.0010 |
| Ga | 0.0042 | 0.0020 | 0.0018 |
| Si | 1.7000 | 26.1000 | 27.4000 |
| Ti | 0.1410 | 0.2140 | 0.1640 |
| Cr | 0.0160 | 0.0230 | 0.0056 |
| V | 0.1180 | 0.0120 | 0.0075 |
| Fe | 68.3000 | 7.6600 | 5.6500 |
| Satmagan | 95.31 | 1.23 | 0.61 |



08.01.2015

5.5.3 Reverse Flotation

Reverse flotation using the established methodology (5.1.4) reduced the phosphorus content to <0.02% P (0.04% P₂O₅) at a flotation yield of >97wt-%.

Table 32: Metallurgical Balance, Reverse Flotation, <0.15mm LIMS Conc, 'Kalvgruvan Composite L295 435'

| FLOTATION TEST REPORT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|-------------|--------------------------|--------------------|--|--------|-----------|-----------|-----|------------|--------------------|----------|---|-------|-------|--------------------|---------------------------------|-------|-------|----------------------------------|-------|---------------------|--------------------|------|------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| Sample : WLIMS Oh Magnetite Conc. | | Grinding : Mill : | | Remarks : Kalvgruvan Composite - magnetite-type ore sample | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project : 1281277/2402 | | Charge : | | WLIMS reclaimed magnetite product concentrate ["Mags 4"] as the feed to flotation (batch size 800 g) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date : 02/10/2014 | | Water : | | Apatite removal by reverse flotation (at pH around 10, plus close to 40 wt-% feed solids at start) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Done by : MFK, MEK | | Fineness : P100 = 150 µm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test No. : 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mintec | | Reagents (g/t) | | | | | | | | | | Grades and Recoveries (by XRF and Satmagan) | | | | | | | | | | | | | | | | | | | | | | |
| Feed size | Condit. min | Water glass (5-%) | Atrac 1503 (100-%) | Flotanol C-7 (100-%) | Cell l | Air l/min | Rotor rpm | pH | Flot'n min | Product | Weight g | wt-% | | Fe % | SiO ₂ % | P ₂ O ₅ % | MgO % | MnO % | Al ₂ O ₃ % | CaO % | Na ₂ O % | K ₂ O % | V % | Satmagan % | | | | | | | | | | |
| <150 µm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | 500 | | | 1.5 | 1100 | | 8.5 | | natural | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | | 25 | | | | | 9.9 | | due to water glass | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | | | | 1.5 | | | 9.9 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | | 25 | | 1.5 | | | 9.8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | 1.5 | | | 9.7 | 1.5 | ApF1+2 (RT2) | 7.5 | 0.94 | 33.40 | 0.5 | 4.34 | 1.1 | 21.20 | 64.9 | 1.50 | 1.7 | 0.052 | 1.0 | 1.01 | 1.2 | 25.50 | 53.0 | 0.07 | 1.3 | 0.075 | 2.2 | 0.059 | 0.6 | 44.85 | 0.4 |
| | 2 | | | | 1.5 | | | 9.7 | | | 788.9 | 89.06 | 68.66 | 99.5 | 3.59 | 98.9 | 0.109 | 35.1 | 0.84 | 98.3 | 0.048 | 99.0 | 0.76 | 98.8 | 0.215 | 47.0 | 0.05 | 88.7 | 0.032 | 97.8 | 0.114 | 98.4 | 96.44 | 99.6 |
| | 1 | | | | 1.5 | | | 9.7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | | 25 | | 1.5 | | | 9.6 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.5 | | | 9.6 | 1.5 | ApF3+4 (ApF1...4) | 15.6 | 1.96 | 57.00 | 1.6 | 8.62 | 4.7 | 3.53 | 22.5 | 2.79 | 6.5 | 0.068 | 2.8 | 1.85 | 4.7 | 4.20 | 18.1 | 0.11 | 4.2 | 0.116 | 7.1 | 0.106 | 1.8 | 76.39 | 1.6 |
| | | | | | 1.5 | | | 9.6 | | | 23.1 | 2.90 | 49.34 | 2.1 | 7.23 | 5.8 | 9.27 | 87.4 | 2.37 | 8.1 | 0.063 | 3.8 | 1.58 | 6.0 | 11.12 | 71.1 | 0.10 | 5.5 | 0.103 | 9.3 | 0.094 | 2.4 | 67.50 | 2.0 |
| | | | | | 1.5 | | | 9.6 | | Cell Conc. | 773.3 | 97.10 | 68.90 | 97.9 | 3.49 | 94.2 | 0.040 | 12.6 | 0.80 | 91.9 | 0.048 | 96.2 | 0.74 | 94.0 | 0.135 | 28.9 | 0.05 | 94.5 | 0.030 | 90.7 | 0.114 | 97.6 | 96.80 | 96.0 |
| Totals | 22 | 500 | 100 | 10 | | | | 6.0 | 6.0 | Calc'd Head | 796.4 | 100.00 | 68.33 | 100.0 | 3.60 | 100.0 | 0.308 | 100.0 | 0.85 | 100.0 | 0.048 | 100.0 | 0.76 | 100.0 | 0.453 | 100.0 | 0.05 | 100.0 | 0.032 | 100.0 | 0.113 | 100.0 | 95.95 | 100.0 |
| | | | | | | | | | | Assayed Head | | | 68.30 | | 3.64 | | 0.272 | | 0.81 | | 0.049 | | 0.79 | | 0.423 | | 0.06 | | 0.034 | | 0.118 | | 95.31 | |

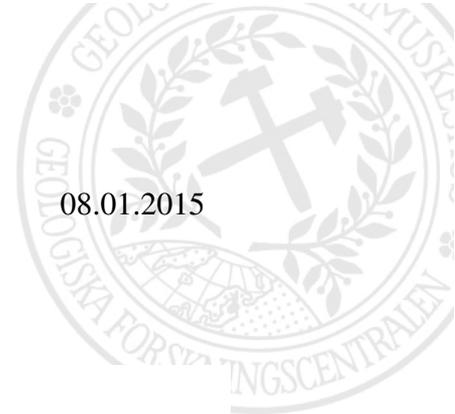
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 3.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 120852
Method : 180X-O
Date : 3.10.2014
Comment : NIO Variability (II). 'Kalgruvan Composite'. WUMS CIn Mags 4, Flotation products. Fineness < 150 µm

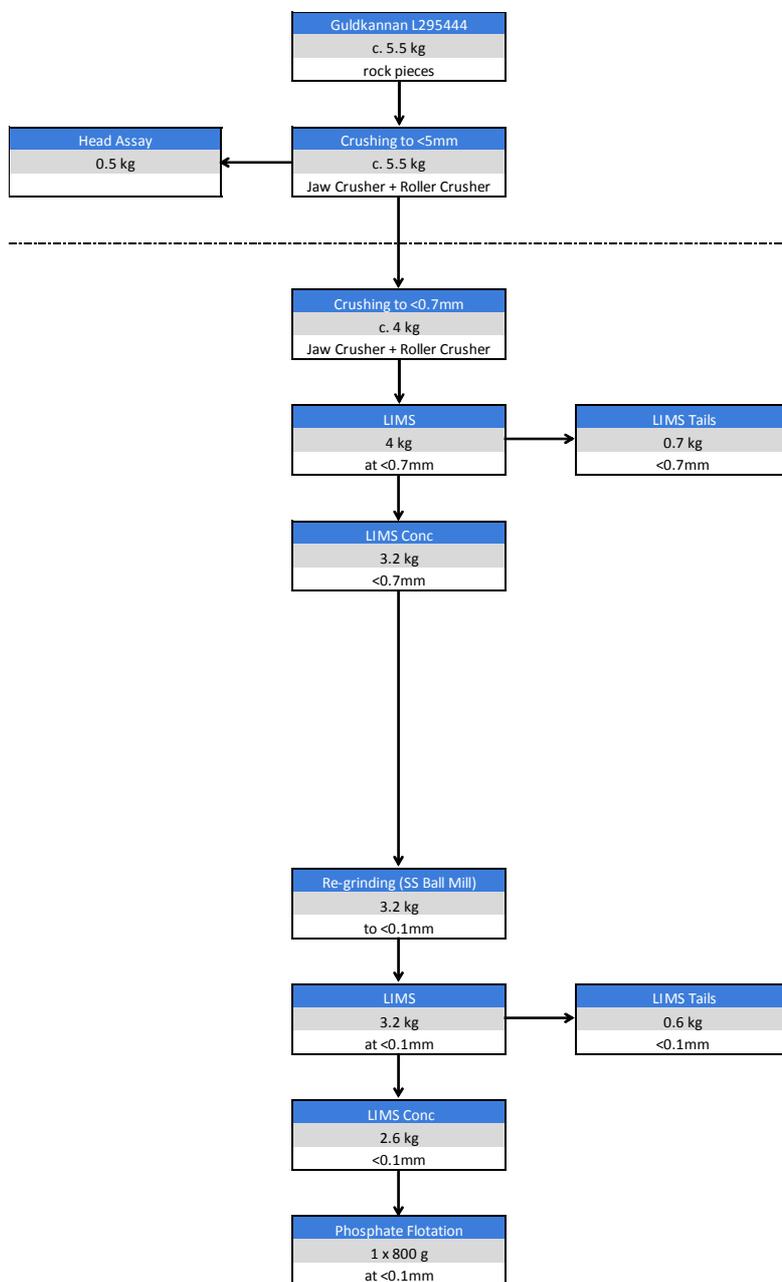
Contents (%)

| | ApF1+2 L14066358 | ApF3+4 L14066359 | Cell Conc. L14066360 |
|----------|---------------------|---------------------|-------------------------|
| SiO2 | 4.3400 | 8.6200 | 3.4900 |
| TiO2 | 0.1620 | 0.3010 | 0.2270 |
| Al2O3 | 1.0100 | 1.8500 | 0.7400 |
| Cr2O3 | 0.0560 | 0.0780 | 0.0240 |
| V2O3 | 0.1020 | 0.1560 | 0.1680 |
| MnO | 0.0520 | 0.0680 | 0.0480 |
| MgO | 1.5000 | 2.7900 | 0.8000 |
| CaO | 25.5000 | 4.2000 | 0.1350 |
| Rb2O | 0.0084 | 0.0130 | 0.0120 |
| SrO | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0010 | 0.0070 | 0.0040 |
| Na2O | 0.0700 | 0.1100 | 0.0500 |
| K2O | 0.0750 | 0.1160 | 0.0300 |
| ZrO2 | 0.0050 | 0.0050 | 0.0030 |
| P2O5 | 21.2000 | 3.5300 | 0.0400 |
| Cu | 0.0030 | 0.0020 | 0.0010 |
| Ni | 0.0370 | 0.0530 | 0.0160 |
| Co | 0.0220 | 0.0090 | 0.0040 |
| Zn | 0.0060 | 0.0050 | 0.0080 |
| Pb | 0.0010 | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0040 | 0.0030 |
| S | 0.0440 | 0.0370 | 0.0040 |
| As | 0.0010 | 0.0030 | 0.0010 |
| Sb | 0.0090 | 0.0060 | 0.0050 |
| Bi | 0.0010 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0630 | 0.0130 | 0.0008 |
| Nb | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0003 | 0.0011 | 0.0000 |
| Sn | 0.0030 | 0.0010 | 0.0000 |
| W | 0.0000 | 0.0000 | 0.0010 |
| Cl | 0.0510 | 0.0120 | 0.0030 |
| Th | 0.0048 | 0.0078 | 0.0045 |
| U | 0.0042 | 0.0086 | 0.0097 |
| Cs | 0.0000 | 0.0020 | 0.0010 |
| La | 0.0240 | 0.0300 | 0.0050 |
| Ce | 0.0510 | 0.0590 | 0.0070 |
| Ta | 0.0000 | 0.0020 | 0.0060 |
| Ga | 0.0011 | 0.0000 | 0.0033 |
| Si | 2.0300 | 4.0300 | 1.6300 |
| Ti | 0.0970 | 0.1800 | 0.1360 |
| Cr | 0.0390 | 0.0530 | 0.0160 |
| V | 0.0690 | 0.1060 | 0.1140 |
| Fe | 33.4000 | 57.0000 | 68.9000 |
| Satmagan | 44.85 | 78.39 | 96.80 |



08.01.2015

5.6 Guldkannan, 'Sample L295444'



LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS

Customer : Markku Kuusisto. GTK Mintec
Orders : 120752; 121038
Method : 180X-O
Comment : NIO Variability (II) === L295444 Guldkannan / Iviken - Feed Sample Assays - Comparison

Contents (%)

Labtium Code : **L14063444** **L14070974**
Date of analysis : 24.09.2014 24.10.2014

| Note : | Without LOI | With LOI |
|----------|-------------|----------|
| SiO2 | 20.0000 | 18.8000 |
| TiO2 | 0.5100 | 0.5200 |
| Al2O3 | 2.8100 | 2.5700 |
| Cr2O3 | 0.0041 | 0.0038 |
| V2O3 | 0.1530 | 0.1510 |
| MnO | 0.0580 | 0.0620 |
| MgO | 6.2900 | 5.5700 |
| CaO | 4.8900 | 4.9100 |
| Rb2O | 0.0096 | 0.0096 |
| SrO | 0.0000 | 0.0000 |
| BaO | 0.0100 | 0.0120 |
| Na2O | 0.2600 | 0.2400 |
| K2O | 0.3290 | 0.3300 |
| ZrO2 | 0.0060 | 0.0050 |
| P2O5 | 3.1000 | 2.9400 |
| Cu | 0.0000 | 0.0000 |
| Ni | 0.0070 | 0.0090 |
| Co | 0.0020 | 0.0250 |
| Zn | 0.0050 | 0.0070 |
| Pb | 0.0000 | 0.0000 |
| Ag | 0.0040 | 0.0040 |
| S | 0.0140 | 0.0070 |
| As | 0.0010 | 0.0000 |
| Sb | 0.0090 | 0.0070 |
| Bi | 0.0030 | 0.0010 |
| Te | 0.0000 | 0.0000 |
| Y | 0.0170 | 0.0170 |
| Nb | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0000 |
| Sn | 0.0030 | 0.0020 |
| W | 0.0010 | 0.0010 |
| Cl | 0.0120 | 0.0090 |
| Th | 0.0054 | 0.0052 |
| U | 0.0060 | 0.0061 |
| Cs | 0.0000 | 0.0000 |
| La | 0.0280 | 0.0270 |
| Ce | 0.0480 | 0.0490 |
| Ta | 0.0040 | 0.0010 |
| LOI | | 1.0800 |
| Ga | 0.0031 | 0.0029 |
| Si | 9.3600 | 8.7800 |
| Ti | 0.3050 | 0.3110 |
| Cr | 0.0028 | 0.0026 |
| V | 0.1040 | 0.1030 |
| Fe | 44.9000 | 45.4000 |
| Satmagan | 60.63 | 60.63 |

5.6.1 Wet LIMS

A 4kg subsample of <5mm material was split out and ground (roller crushing in closed circuit with dry screen) to <0.7mm for the purpose of wet LIMS.

LIMS was carried out stage-wise with intermediate re-grinding of the rougher concentrate to <0.10mm.

Table 33: Metallurgical Balance, Wet LIMS, 'Guld Kannan Sample L295 444'

| Test product(s) | | Weight grams wt.-% | | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | MnO | | Al ₂ O ₃ | | CaO | | Na ₂ O | | K ₂ O | | V | | Sattmagan | |
|--|--|-------------------------|----------------|---------------|-------------|------------------|--------------|-------------------------------|--------------|---------------|--------------|----------------|--------------|--------------------------------|--------------|---------------|--------------|-------------------|--------------|------------------|--------------|----------------|-------------|---------------|-------------|
| | | | | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% | % | Rec-% |
| Cln Mags 4 Conc. | | 2604.9 | 65.80 | 69.60 | 95.0 | 1.86 | 7.4 | 0.340 | 7.1 | 0.49 | 7.7 | 0.034 | 34.8 | 0.24 | 7.4 | 0.56 | 7.0 | 0.00 | 0.4 | 0.022 | 4.3 | 0.133 | 92.8 | 94.98 | 99.7 |
| Cln Non-Mags 2-4 (Rgh Mags) | | 619.6 3224.5 | 15.65 81.45 | 7.11 57.59 | 2.3 97.4 | 47.40 10.61 | 44.8 52.2 | 7.53 1.72 | 37.3 44.4 | 11.90 2.68 | 44.3 51.9 | 0.131 0.053 | 31.9 66.8 | 4.91 1.14 | 36.1 43.5 | 13.20 2.99 | 39.1 46.0 | 0.29 0.06 | 28.5 28.9 | 0.83 0.177 | 38.7 43.0 | 0.020 0.111 | 3.3 96.1 | 0.58 76.84 | 0.1 99.8 |
| Rgh Non-Mags | | 734.2 | 18.55 | 6.88 | 2.6 | 42.70 | 47.8 | 9.48 | 55.6 | 10.90 | 48.1 | 0.115 | 33.2 | 6.49 | 56.5 | 15.40 | 54.0 | 0.61 | 71.1 | 1.03 | 57.0 | 0.020 | 3.9 | 0.68 | 0.2 |
| Calc'd Feed | | 3958.7 | 100.00 | 48.19 | 100.0 | 16.56 | 100.0 | 3.16 | 100.0 | 4.21 | 100.0 | 0.064 | 100.0 | 2.13 | 100.0 | 5.29 | 100.0 | 0.16 | 100.0 | 0.335 | 100.0 | 0.094 | 100.0 | 62.72 | 100.0 |
| Feed Assays | | | | 45.40 | | 18.80 | | 2.94 | | 5.57 | | 0.062 | | 2.57 | | 4.91 | | 0.24 | | 0.330 | | 0.103 | | 60.63 | |

The final concentrate assayed 69.6% Fe, 1.9% SiO₂ and 0.15% P (0.34% P₂O₅). Magnetite recovery was in excess of 99%.

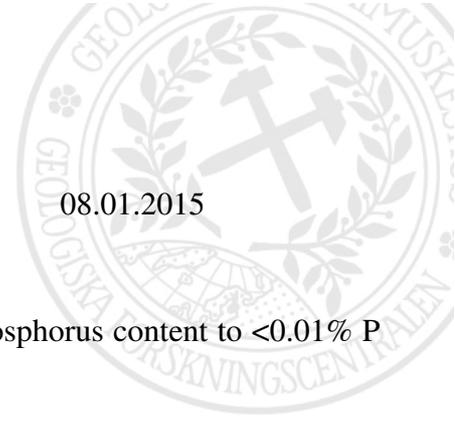
LABTIUM

Labtium Oy
REPORT OF XRF ANALYSIS 24.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 121038
Method : 180X-O; Loss-on-ignition (LOI) included
Date : 24.10.2014
Comment : NIO Variability (II). 'L295444 Guldkannen/Iviken'. WLIMS rougher & cleaner products

Contents (%)

| | Cln Mags4 L14070942 | Cln NM2-4 L14070943 | Rgh NM L14070944 |
|----------|------------------------|------------------------|---------------------|
| SiO2 | 1.8600 | 47.4000 | 42.7000 |
| TiO2 | 0.2340 | 1.1200 | 0.9900 |
| Al2O3 | 0.2400 | 4.9100 | 6.4900 |
| Cr2O3 | 0.0460 | 0.0200 | 0.0027 |
| V2O3 | 0.1950 | 0.0300 | 0.0300 |
| MnO | 0.0340 | 0.1310 | 0.1150 |
| MgO | 0.4900 | 11.9000 | 10.9000 |
| CaO | 0.5600 | 13.2000 | 15.4000 |
| Rb2O | 0.0120 | 0.0065 | 0.0089 |
| SrO | 0.0000 | 0.0049 | 0.0085 |
| BaO | 0.0030 | 0.0180 | 0.0270 |
| Na2O | 0.0000 | 0.2900 | 0.6100 |
| K2O | 0.0220 | 0.8300 | 1.0300 |
| ZrO2 | 0.0030 | 0.0110 | 0.0110 |
| P2O5 | 0.3400 | 7.5300 | 9.4800 |
| Cu | 0.0030 | 0.0040 | 0.0060 |
| Ni | 0.0330 | 0.0190 | 0.0080 |
| Co | 0.0150 | 0.0210 | 0.0230 |
| Zn | 0.0030 | 0.0090 | 0.0090 |
| Pb | 0.0000 | 0.0050 | 0.0060 |
| Ag | 0.0020 | 0.0050 | 0.0040 |
| S | 0.0010 | 0.0180 | 0.0230 |
| As | 0.0010 | 0.0010 | 0.0010 |
| Sb | 0.0050 | 0.0090 | 0.0090 |
| Bi | 0.0030 | 0.0030 | 0.0020 |
| Te | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.0034 | 0.0440 | 0.0480 |
| Nb | 0.0000 | 0.0008 | 0.0005 |
| Mo | 0.0000 | 0.0010 | 0.0000 |
| Sn | 0.0010 | 0.0040 | 0.0040 |
| W | 0.0000 | 0.0000 | 0.0000 |
| Cl | 0.0010 | 0.0240 | 0.0260 |
| Th | 0.0045 | 0.0049 | 0.0031 |
| U | 0.0091 | 0.0000 | 0.0000 |
| Cs | 0.0020 | 0.0030 | 0.0010 |
| La | 0.0080 | 0.0650 | 0.0500 |
| Ce | 0.0140 | 0.1260 | 0.1030 |
| Ta | 0.0020 | 0.0000 | 0.0010 |
| LOI | 3.1500 | -1.9520 | -1.9650 |
| Ga | 0.0036 | 0.0022 | 0.0030 |
| Si | 0.8700 | 22.2000 | 20.0000 |
| Ti | 0.1400 | 0.6700 | 0.5900 |
| Cr | 0.0320 | 0.0140 | 0.0019 |
| V | 0.1330 | 0.0200 | 0.0200 |
| Fe | 69.6000 | 7.1100 | 6.8800 |
| Satmagan | 94.98 | 0.58 | 0.68 |



08.01.2015

5.6.2 Reverse Flotation

Reverse flotation using the established methodology (5.1.4) reduced the phosphorus content to <0.01% P at a flotation yield of >92wt-%.

Table 34: Metallurgical Balance, Reverse Flotation, <0.1mm LIMS Conc, 'Guld Kannan Sample L295 444'

| FLOTATION TEST REPORT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-------------|---|---------------------|----------------------|--|-----------|-----------|--|------------|--------------------|-----------------|--|------------|------------------|------------|-------------------------------|-------------|------------|-------------|-------------|-------------|-------------------|-------------|------------------|-------------|----------|-------------|----------|------|
| | | Sample : WLMS Magnetite Ch Conc. Project : 1281277/2402 Date : 23/10/2014 Done by : MFK, MEK Test No. : 1 | | | Grinding : Mill : Charge : Water : Fineness : P100 = 100 µm | | | Remarks : Guld Kannan / Aiken (L295444) - magnetite-type ore sample, very high in apatite ("worst case scenario") WLMS reclaimed magnetite product concentrate as the feed to flotation (batch size 800 g) Apatite removal by reverse flotation (at pH 9.0 to 9.5, plus close to 40 wt-% feed solids at start) | | | | | | | | | | | | | | | | | | | | | |
| | | Reagents (g/l) | | | | | | | | | | Grades and Recoveries (by XRF - with LOI - and Satmagan) | | | | | | | | | | | | | | | | | |
| Feed size | Condit. min | Water glass (5-%) | Altrac 1563 (100-%) | Flotanol C-7 (100-%) | Cell I | Air l/min | Rotor rpm | pH | Flot'n min | Product | Weight g | Fe | | SiO ₂ | | P ₂ O ₅ | | MgO | | CaO | | Na ₂ O | | K ₂ O | | V | | Satmagan | |
| <100 µm | | | | | | | | | | | | % | Rec% | % | Rec% | % | Rec% | % | Rec% | % | Rec% | % | Rec% | % | Rec% | % | Rec% | % | Rec% |
| | 10 | 500 | 25 | | 1.5 | | 1100 | 8.1 | | natural | | | | | | | | | | | | | | | | | | | |
| | 5 | | | | | | | 9.6 | | due to water glass | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 9.6 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 9.5 | 1.5 | ApF1 (RT1) | 6.4 0.80 13.20 | 0.2 1.48 | 0.6 1.86 | 33.80 67.7 | 0.57 1.86 | 0.9 99.4 | 44.10 0.131 | 54.3 32.3 | 0.04 0.51 | 14.0 99.1 | 0.035 0.301 | 1.2 45.7 | 0.036 0.00 | 0.2 86.0 | 0.80 0.023 | 0.0 98.8 | 0.0 0.130 | 0.0 99.8 | |
| | 2 | | 25 | | | | | 9.5 | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | 10 | | | | 9.5 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 1.5 | 1.5 | ApF2 (ApF1+2) | 17.8 2.24 51.30 | 1.7 1.8 | 9.70 7.53 | 11.7 12.3 | 4.76 12.44 | 26.5 94.2 | 4.35 3.35 | 19.1 20.0 | 5.88 15.99 | 20.1 74.4 | 0.02 0.03 | 19.4 33.4 | 0.233 0.181 | 22.7 23.9 | 0.117 0.096 | 2.0 2.3 | 58.81 43.47 | 1.4 1.4 | |
| | | | | | | | | 9.6 | | (RT2) | 771.9 96.96 | 70.40 98.2 | 1.68 87.7 | 0.024 5.8 | 0.42 80.0 | 0.172 25.6 | 0.00 66.6 | 0.018 76.1 | 0.130 97.7 | 95.70 98.6 | | | | | | | | | |
| | 2 | | 25 | | | | | 9.4 | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | 10 | | | | 9.4 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 1.5 | 1.5 | ApF3 (ApF1...3) | 11.7 1.47 60.00 | 1.3 3.1 | 8.15 7.73 | 6.5 18.8 | 0.57 8.57 | 2.1 96.2 | 3.42 3.37 | 9.9 29.9 | 1.41 11.24 | 3.2 77.6 | 0.02 0.02 | 12.8 46.2 | 0.185 0.182 | 11.8 35.7 | 0.126 0.105 | 1.4 3.7 | 68.08 51.49 | 1.1 2.5 | |
| | | | | | | | | 9.4 | | (RT3) | 760.2 95.49 | 70.56 96.9 | 1.58 81.2 | 0.016 3.8 | 0.37 70.1 | 0.153 22.4 | 0.00 53.8 | 0.015 64.3 | 0.130 96.3 | 96.12 97.5 | | | | | | | | | |
| | 2 | | 25 | | | | | 9.4 | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | 10 | | | | 9.3 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 5.0 | | ApF4 (ApF1...4) | 25.0 3.14 63.40 | 2.9 5.9 | 6.50 7.22 | 11.0 29.8 | 0.098 5.09 | 0.8 97.0 | 2.55 3.04 | 15.7 45.6 | 0.78 6.94 | 3.8 81.3 | 0.01 0.02 | 13.7 59.9 | 0.118 0.156 | 16.1 51.8 | 0.130 0.116 | 3.2 6.9 | 73.22 60.41 | 2.4 4.9 | |
| | | | | | | | | 9.3 | | Cell Conc. | 735.2 92.35 | 70.80 94.1 | 1.41 70.2 | 0.013 3.0 | 0.30 54.4 | 0.132 18.7 | 0.00 40.1 | 0.012 48.2 | 0.130 93.1 | 96.90 95.1 | | | | | | | | | |
| Totals | 24 | 500 | 100 | 30 | | | | Total | 9.5 | Calc'd Head | 796.1 100.00 | 69.51 100.0 | 1.85 100.0 | 0.402 100.0 | 0.51 100.0 | 0.65 100.0 | 0.00 100.0 | 0.00 100.0 | 0.023 100.0 | 0.129 100.0 | 94.11 100.0 | | | | | | | | |
| | | | | | | | | | | Assayed Head | | 69.60 | 1.86 | 0.340 | 0.49 | 0.56 | 0.00 | 0.022 | 0.133 | 94.98 | | | | | | | | | |



Labtium Oy
REPORT OF XRF ANALYSIS 27.10.2014

Customer : Markku Kuusisto, GTK Mintec
Order : 121043
Method : 180X-O; Loss-on-ignition (LOI) included
Date : 27.10.2014
Comment : NIO Variability II, L295444 - WLIMS Cln Mags 4 - Flotation Test 1 products

Contents (%)

| | ApF1 L14071026 | ApF2 L14071027 | ApF3 L14071028 | ApF4 L14071029 | Cell conc. L14071030 |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------------|
| SiO2 | 1.4800 | 9.7000 | 8.1500 | 6.5000 | 1.4100 |
| TiO2 | 0.2900 | 0.9400 | 0.7500 | 0.5700 | 0.1970 |
| Al2O3 | 0.3400 | 1.8600 | 1.4000 | 0.9400 | 0.1600 |
| Cr2O3 | 0.0120 | 0.0810 | 0.0950 | 0.1330 | 0.0400 |
| V2O3 | 0.0520 | 0.1720 | 0.1850 | 0.1920 | 0.1920 |
| MnO | 0.0220 | 0.0660 | 0.0650 | 0.0580 | 0.0320 |
| MgO | 0.5700 | 4.3500 | 3.4200 | 2.5500 | 0.3000 |
| CaO | 44.1000 | 5.8800 | 1.4100 | 0.7800 | 0.1320 |
| Rb2O | 0.0030 | 0.0110 | 0.0130 | 0.0120 | 0.0100 |
| SrO | 0.0120 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| BaO | 0.0030 | 0.0040 | 0.0050 | 0.0060 | 0.0040 |
| Na2O | 0.0400 | 0.0200 | 0.0200 | 0.0100 | 0.0000 |
| K2O | 0.0350 | 0.2330 | 0.1850 | 0.1180 | 0.0120 |
| ZrO2 | 0.0030 | 0.0060 | 0.0040 | 0.0050 | 0.0020 |
| P2O5 | 33.8000 | 4.7600 | 0.5700 | 0.0980 | 0.0130 |
| Cu | 0.0010 | 0.0090 | 0.0060 | 0.0080 | 0.0000 |
| Ni | 0.0120 | 0.0600 | 0.0680 | 0.0870 | 0.0280 |
| Co | 0.0180 | 0.0120 | 0.0170 | 0.0120 | 0.0100 |
| Zn | 0.0020 | 0.0050 | 0.0050 | 0.0050 | 0.0050 |
| Pb | 0.0030 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Ag | 0.0050 | 0.0070 | 0.0060 | 0.0040 | 0.0040 |
| S | 0.0260 | 0.0190 | 0.0120 | 0.0120 | 0.0010 |
| As | 0.0080 | 0.0030 | 0.0000 | 0.0010 | 0.0000 |
| Sb | 0.0160 | 0.0100 | 0.0070 | 0.0080 | 0.0050 |
| Bi | 0.0020 | 0.0030 | 0.0020 | 0.0030 | 0.0030 |
| Te | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Y | 0.1190 | 0.0300 | 0.0120 | 0.0081 | 0.0002 |
| Nb | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Mo | 0.0000 | 0.0013 | 0.0037 | 0.0070 | 0.0000 |
| Sn | 0.0040 | 0.0030 | 0.0020 | 0.0020 | 0.0010 |
| W | 0.0010 | 0.0010 | 0.0000 | 0.0000 | 0.0010 |
| Cl | 0.0600 | 0.0110 | 0.0060 | 0.0020 | 0.0030 |
| Th | 0.0054 | 0.0082 | 0.0068 | 0.0052 | 0.0046 |
| U | 0.0005 | 0.0070 | 0.0089 | 0.0092 | 0.0093 |
| Cs | 0.0000 | 0.0030 | 0.0030 | 0.0020 | 0.0020 |
| La | 0.0410 | 0.0700 | 0.0330 | 0.0210 | 0.0040 |
| Ce | 0.0800 | 0.1360 | 0.0670 | 0.0410 | 0.0090 |
| Ta | 0.0000 | 0.0030 | 0.0060 | 0.0060 | 0.0010 |
| LOI | 0.3360 | 1.6600 | 2.1000 | 2.5000 | -3.2200 |
| Ga | 0.0002 | 0.0035 | 0.0026 | 0.0019 | 0.0047 |
| Si | 0.6900 | 4.5400 | 3.8100 | 3.0400 | 0.6600 |
| Ti | 0.1740 | 0.5600 | 0.4500 | 0.3430 | 0.1180 |
| Cr | 0.0083 | 0.0550 | 0.0650 | 0.0910 | 0.0270 |
| V | 0.0360 | 0.1170 | 0.1260 | 0.1300 | 0.1300 |
| Fe | 13.2000 | 51.3000 | 60.0000 | 63.4000 | 70.8000 |
| Satmagan | 0.80 | 58.81 | 68.08 | 73.22 | 96.90 |

6 SUMMARY AND CONCLUSIONS

A condensed set of concentrate data is presented in Table 35.

It is worth noting that concentrates which are predominantly composed of hematite (underlined figures in the table) tend to contain higher levels of TiO₂.

Table 35: Summary of Concentrate Qualities and Yields

| Sample Origin | Feed | Product | | | | | | | |
|-------------------------------------|-------------------|-----------|--------------------|---------|------|-------------------|-------|-------------------|-------|
| | %Fe | Yield wt% | Type | Size | %Fe | %SiO ₂ | %P | %TiO ₂ | %V |
| Kalvgruvan 'BB12015-MET003' | 54.0* (52.2**) | 73.1 | Flot. Conc. | <0.1mm | 71.3 | 1.19 | <0.01 | 0.11 | 0.110 |
| Hugget '2' | 37.2* (35.9**) | 17.0 | ST/LIMS Conc. | <1.18mm | 70.0 | 2.07 | 0.03 | 0.13 | 0.048 |
| | | 5.6 | ST/LIMS Conc. | <0.15mm | 68.7 | 3.78 | 0.013 | 0.09 | 0.041 |
| | | 25.5 | ST/Flot Conc. | <0.1mm | 65.5 | 4.36 | 0.065 | <u>0.37</u> | 0.089 |
| | | 48.1 | Combined | | 67.5 | 3.48 | 0.05 | 0.25 | 0.07 |
| Flygruvan 'Composite L295 436' | 30.4* (27.9**) | 18.8 | ST/LIMS Conc. | <1.18mm | 66.0 | 5.74 | 0.15 | 0.21 | 0.055 |
| | | 13.3 | ST/LIMS Conc. | <0.15mm | 67.5 | 4.78 | 0.05 | 0.19 | 0.056 |
| | | 6.8 | ST/HGMS Conc. | <0.1mm | 66.0 | 2.60 | 0.09 | <u>0.82</u> | 0.072 |
| | | 38.9 | Combined | | 66.5 | 4.86 | 0.11 | 0.31 | 0.06 |
| Flygruvan 'BB12015-MET003' | 35.0* (33.8**) | 33.3 | LIMS Conc. | <0.15mm | 71.2 | 1.59 | <0.01 | <0.01 | 0.020 |
| | | 12.6 | HGMS Conc. | <0.1mm | 64.1 | 4.89 | 0.05 | <u>0.69</u> | 0.042 |
| | | 45.9 | Combined | | 69.3 | 2.50 | <0.02 | <0.2 | 0.03 |
| Kalvgruvan, 'Composite L295 435' | 49.9* (46.1**) | 68.4 | LIMS/Flot Conc. | <0.15mm | 68.9 | 3.49 | 0.017 | 0.23 | 0.114 |
| Guld Kannan, 'Sample L295 444' | 48.2* (45.4**) | 60.8 | LIMS/Flot Conc. | <0.1mm | 70.8 | 1.41 | <0.01 | 0.20 | 0.13 |

* back-calculated, **assayed

7 REFERENCES

'Bench scale testing of Flygruvan composite sample originating from BB12015-MET003', Phase 1 Report, Geological Survey of Finland (GTK), Eastern Finland Office, Mineral Processing (Mintec), 03/11/2014.