BULK PREPARATION AND TESTING OF CRAIGMONT SAMPLES

NICOLA MINING INC.

KM5954

May 21, 2020

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1.0 Introduction

Nicola Mining Inc. is currently undergoing an exploration program on the New Craigmont property located in the interior of British Columbia approximately 13 kilometers from the city of Merritt, British Columbia. In May of 2019, ALS Metallurgy was commissioned by Nicola Mining Inc. to conduct bulk preparation and associated analysis of two bulk rock samples reportedly representative of low grade stockpiles at the New Craigmont Mine. The following outlines the test work that was completed for this program:

- Each bulk sample was prepared by screening and crushing oversize material as required. The two coarsest fractions from each sample were then submitted to an external lab for material sorting testing.

- The sorted product and waste streams were returned to ALS Metallurgy and each stream was prepared and sub-sampled for chemical analyses. A sorting mass balance was prepared for each sample based on the mass distribution and assay results.

- A composite was subsequently constructed from the test products and subjected to preliminary flotation and magnetic separation testing.

Thank you for choosing ALS Metallurgy for your testing requirements. If you have any questions, please do not hesitate to contact us.

Sincerely,

Kendall Culligan, GIT
Project Mineralogist

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Operations Manager
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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — P. J. MEHRFERT # 24527
May 21, 2020

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KM5954

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2.0 Initial Preparation

On May 21, 2019, ALS Metallurgy Kamloops received two bulk rock samples that were reportedly representative of low grade stockpiles at the New Craigmont Mine. The two bulk samples were identified as Tower Bulk Sample and Portal Bulk Sample and weighed about 1.4 tonnes each, detailed information regarding the samples received is located in Appendix I – Sample Origin

Upon receipt, each sample was screened in their entirety using a ½ inch screen. The material that measured coarser than 2 inches was further crushed to minus 2 inches and each bulk sample was then split into three size fractions: <2 >1", <1 >½" and minus ½". The weight distribution of each of the samples following crushing and sizing are displayed in Table 1.

TABLE 1
WEIGHT DISTRIBUTION OF SCREENED BULK SAMPLES

Sample ID	Weight (kg)	Distribution
Tower Bulk Sample	1369	100
<2" >1"	300	21.9
<1" >0.5"	316	23.0
<0.5"	754	55.1
Portal Bulk Sample	1397	100
<2" >1"	506	36.2
<1" >0.5"	352	25.2
<0.5"	540	38.6

Approximately 45 percent of the overall mass in the Tower Bulk Sample measured coarser than ½ inch. In the Portal Bulk Sample, about 41 percent measured coarser than ½ inch.

The fractions coarser than ½" from both samples were divided into 2 portions and packaged in steel drums for shipping. The set of 8 drums was shipped to Tomra in Germany for material sorting testing.

3.0 TOMRA Material Sorting Testing

The coarse fractions were tested using a sorting device equipped with X-ray transmission (XRT) sensors. The sensor detects differences in the average atomic density of the rocks and sorts on this basis. Testing was coordinated between the client and TOMRA. A report of material sorting separation details, completed by TOMRA, is located in Appendix IV – Special Data.

3.1 TOMRA Material Sorting Method Description

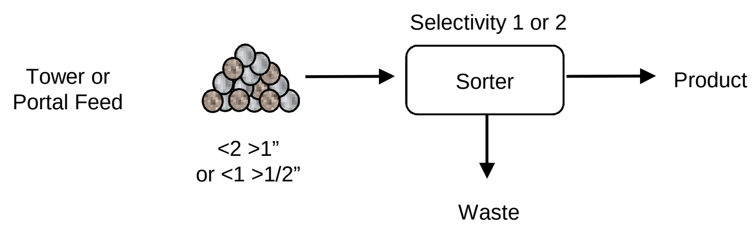
Each fraction from the Tower and Portal Bulk samples were understood to be separated using two different selectivity parameters. For purposes of this report, the less selective setting is denoted as Selectivity 1 and the more selective setting as Selectivity 2. Each test separated the feed material into two groups; a product (concentrate) stream, which contained the higher atomic density material, and a waste stream, which contained the lower atomic density material. It was anticipated that the higher atomic density material would contain elevated levels of sulphide minerals, and therefore elevated copper levels.

One portion of the <1 >½ inch fraction from the Portal Bulk Sample was tested using a two-step sorting protocol. This first run separated the material using Selectivity 1 parameters, and this product stream was further upgraded in an additional sorting run using Selectivity 2 parameters. As a result, two waste streams and one product stream were generated. Figure 1 displays a summary of the material sorting testing.

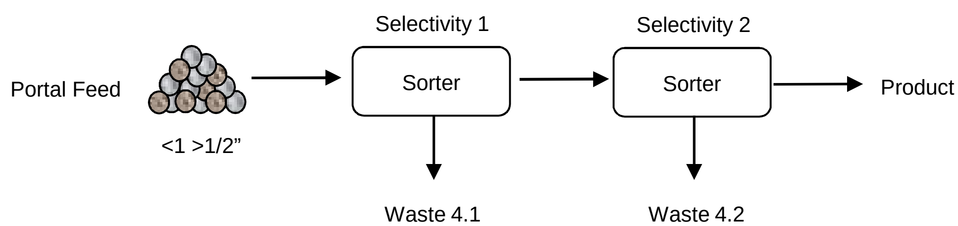
Upon completion of the sorting testing, the product and waste streams from each fraction were returned to ALS Metallurgy Kamloops for bulk preparation and analysis. The retained minus ½ inch material from each bulk sample was also homogenized and duplicate sub-samples extracted. A head cut from each sample was assayed for copper, iron and sulphur as well as an ICP scan by four acid digestion. The results of the chemical analyses and sorting mass balances can be found in Appendix IV - Special Data.

FIGURE 1
TOMRA MATERIAL SORTING

Standard Test Flowsheet



Cleaner Test Flowsheet



Summary of Material Sorting Runs

Sample	Size Fraction	kg	Sort Run	Sensitivity	Product Mass %
Tower	<2 >1"	185	T5.1	1	15.5
	<2 >1"	109	T6.1	2	10.2
	<1 >0.5"	126	T1.1	1	20.2
	<1 >0.5"	180	T2.1	2	11.8
Portal	<2 >1"	272	T7.1	1	15.0
	<2 >1"	229	T8.1	2	5.3
	<1 >0.5"	175	T3.1	1	14.6
	<1 >0.5"	159	T4.1	1	13.3
	<1 >0.5"	21*	T4.2	2	39.3

Notes: 1. Test 4.2 feed was the product of Test 4.1.
2. Details of the XRT sensor settings is not known, it is assumed that high and low sensitivities were applied due to differences in mass recovery and product quality.

3.2 Sorting Performance – Tower Bulk Sample

The sorting and screening mass balance data for the Tower Bulk Sample is summarized in Figure 2.

The copper and sulphur in the Tower bulk Sample was somewhat evenly distributed across the three feed fractions, although the <1 >½ inch portions were of slightly lower grade. Feed copper contents ranged from 0.18 to 0.30 percent and measured 0.24 percent overall. Sulphur contents ranged from 0.36 to 0.49 percent and measured 0.41 percent overall.

The sorter was able to reject Tower material with average copper and sulphur grades of 0.07 and 0.27 percent, respectively. At the less selective setting, this resulted in rejecting about 80 to 85 percent of the sorter feed mass, along with 20 to 23 percent of the feed copper. The product stream at this setting had a copper content that was about 4 to 5 times higher than the sorter feed. At the more selective setting, waste mass rejection increased to 89 percent on average, while copper losses increased to about 30 percent on average. The product stream at this more selective setting had a copper content that was about 6 to 7 times higher than the sorter feed.

It should be noted that copper concentration was considerably higher than sulphur concentration across the tests. This suggests that a portion of the sulphur is not associated with higher atomic density sulphide minerals and could be in the form of sulphates. Mineralogical or additional chemical analyses would be required to confirm. It may be of geological interest that the product streams were somewhat elevated in potassium and depleted in sodium, relative to the waste portions.

On a total sample basis, approximately 38 percent of the Tower sample feed mass could be rejected to waste by XRT material sorting methods. This is based on crushing to a top size of 2 inches and processing only the <2 >½ inch by sorting. The combined fines and sorted product would result in a potential downstream mill feed grading 0.35 percent copper, a 1.4 times upgrade from the original bulk sample feed. The combined fines plus sorted product feed would contain about 90 and 76 percent of the bulk sample copper and sulphur, respectively.

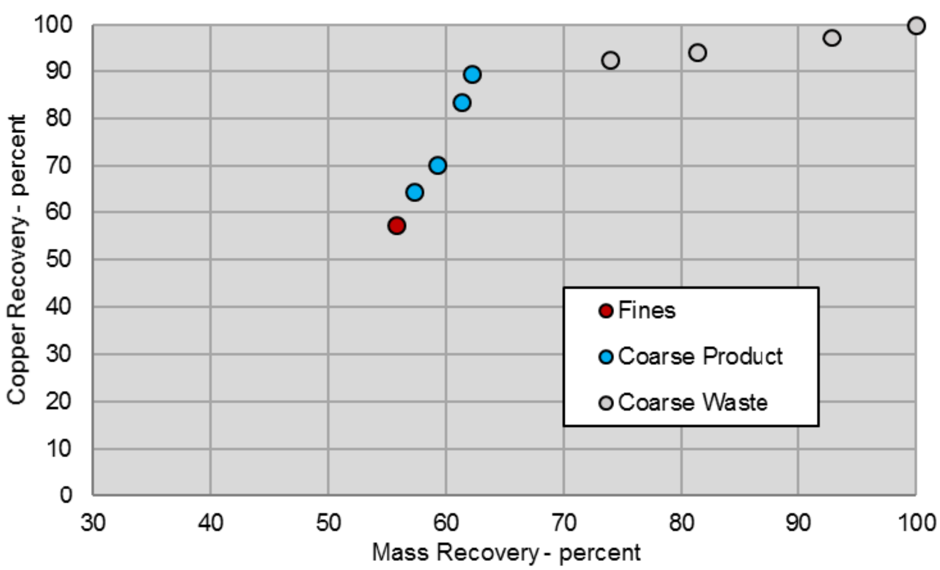
FIGURE 2
MATERIAL SORTING TESTING RESULTS - TOWER BULK SAMPLE

Material Sorting Mass Balance

Size Fraction	Sort Run	Stream	kg	mass %	Assay - percent			Distribution - percent		
					Cu	Fe	S	Cu	Fe	S
<2 >1"	T5.1	Product	29	15.5	1.54	23.3	1.72	80.4	57.1	53.9
		Waste	156	84.5	0.069	3.21	0.27	19.6	42.9	46.1
		Feed	185	100	0.30	6.32	0.49	100	100	100
<2 >1"	T6.1	Product	11	10.2	1.76	33.0	1.88	69.2	54.1	40.3
		Waste	98	89.8	0.089	3.19	0.32	30.8	45.9	59.7
		Feed	109	100	0.26	6.24	0.48	100	100	100
<1 >0.5"	T1.1	Product	25.5	20.2	0.73	10.6	0.92	76.8	47.4	51.2
		Waste	100.5	79.8	0.056	2.99	0.22	23.2	52.6	48.8
		Feed	126	100	0.19	4.53	0.36	100	100	100
<1 >0.5"	T2.1	Product	21	11.8	1.10	16.2	1.30	71.0	41.9	40.1
		Waste	159	88.2	0.060	2.99	0.26	29.0	58.1	59.9
		Feed	180	100	0.18	4.54	0.38	100	100	100
<0.5"	-	Fines	754	-	0.25	5.80	0.40	-	-	-
Total		Product	86.4	6.4	1.22	19.1	1.40	32.1	21.6	21.6
		Fines	754	55.7	0.25	5.80	0.40	57.4	57.5	54.0
		Waste	513	37.9	0.067	3.09	0.27	10.5	20.9	24.4
		Feed	1353	100	0.24	5.62	0.41	100	100	100
Potential Mill Feed			840	62.1	0.35	7.16	0.50	89.5	79.1	75.6

Note: Fines grades are the average of duplicate sub-sample assays.

Copper Recovery Vs. Mass Recovery



3.3 Sorting Performance – Portal Bulk Sample

The sorting and screening mass balance data for the Portal Bulk Sample is summarized in Figure 3.

The copper in the Portal Bulk Sample was elevated in the fines fraction, measuring about 0.21 percent copper, compared to an average of 0.13 percent copper in the coarse fractions. The overall copper content of the bulk sample was 0.16 percent. Sulphur contents were more similar between the coarse fractions and the fines, ranging from 0.22 to 0.32 percent and measured 0.28 percent overall.

The sorter was able to reject Portal material with average copper and sulphur grades of 0.07 and 0.15 percent, respectively. At the less selective setting, about 86 percent of the sorter feed mass was rejected to waste, along with 43 to 52 percent of the feed copper. The product stream at this setting had a copper content that was about 3 to 4 times higher than the sorter feed. At the more selective setting in test 8.1, waste mass rejection increased to about 95 percent, while copper losses were similar to the less selective setting at about 46 percent. The product stream at this more selective setting had a copper content that was about 10 times higher than the sorter feed. The two stage separation produced a combined result that had a similar mass rejection to the more selective sorting conducted in test 8.1, however copper losses to the combined waste streams increased to about 59 percent.

The Portal sample sulphur concentration was similar to copper concentration, suggesting that most of the sulphur is associated with sulphide minerals. The lower copper recovery following sorting for Portal compared to Tower samples may simply be a result of the lower feed grade. Of geological note, the Portal product streams were somewhat elevated in calcium and depleted in sodium, relative to the waste portions.

On a total sample basis, approximately 54 percent of the Portal sample feed mass could be rejected to waste by XRT material sorting methods. This is based on crushing to a top size of 2 inches and processing only the <2 >½ inch by sorting. The combined fines and sorted product would result in a potential downstream mill feed grading 0.27 percent copper, a 1.7 times upgrade from the original bulk sample feed. The combined fines plus sorted product feed would contain about 76 and 70 percent of the bulk sample copper and sulphur, respectively.

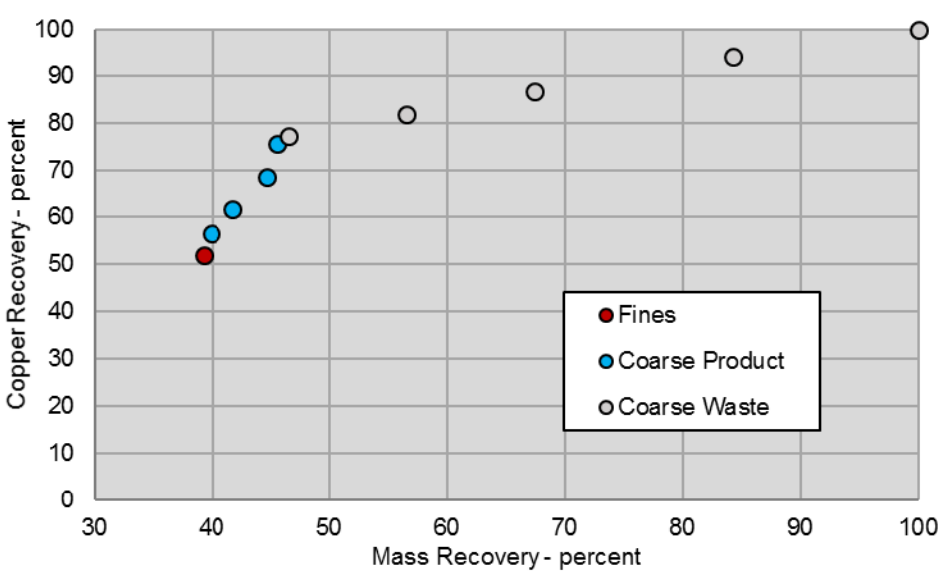
FIGURE 3
MATERIAL SORTING TESTING RESULTS - PORTAL BULK SAMPLE

Material Sorting Mass Balance

Size Fraction	Sort Run	Stream	kg	mass %	Assay - percent			Distribution - percent		
					Cu	Fe	S	Cu	Fe	S
<2 >1"	T7.1	Product	41	15.0	0.37	10.8	0.69	48.2	34.5	46.3
		Waste	232	85.0	0.070	3.61	0.14	51.8	65.5	53.7
		Feed	272	100	0.11	4.69	0.22	100	100	100
<2 >1"	T8.1	Product	12	5.3	1.30	16.5	3.09	53.6	18.9	53.9
		Waste	217	94.7	0.063	3.95	0.15	46.4	81.1	46.1
		Feed	229	100	0.13	4.61	0.30	100	100	100
<1 >0.5"	T3.1	Product	25.5	14.6	0.44	9.90	0.66	51.7	31.7	44.0
		Waste	149.5	85.4	0.070	3.64	0.14	48.3	68.3	56.0
		Feed	175	100	0.12	4.55	0.22	100	100	100
<1 >0.5"	T4.1	Product	8.3	5.2	1.21	21.7	2.82	41.2	23.3	45.5
		Waste 2	12.8	8.0	0.31	7.80	0.40	16.3	12.9	10.0
		Waste 1	138	86.7	0.075	3.57	0.17	42.5	63.8	44.5
		Feed	159	100	0.15	4.86	0.32	100	100	100
<0.5"	-	Fines	540	-	0.22	6.05	0.30	-	-	-
Total		Product	87	6.3	0.60	12.4	1.22	23.4	15.0	27.6
		Fines	540	39.3	0.22	6.05	0.30	52.1	45.6	42.6
		Waste	748	54.4	0.073	3.78	0.15	24.5	39.5	29.8
		Feed	1375	100	0.16	5.21	0.28	100	100	100
Potential Mill Feed			627	45.6	0.27	6.92	0.43	75.5	60.5	70.2

Note: Fines grades are the average of duplicate sub-sample assays.

Copper Recovery Vs. Mass Recovery



4.0 Metallurgical Testing and Performance

Upon completion of the material sorting testing, a Sorted Mill Feed Composite was constructed from weighted portions of both bulk sample products. This composite was used for a preliminary metallurgical test program which included flotation and magnetic separation testing. Detailed information regarding the construction of the composite is outlined in Appendix I – Sample Origin.

A representative cut from the composite was removed and assayed for copper, iron, and sulphur content. The composite measured approximately 0.3 percent copper, 6.4 percent iron, and 0.5 percent sulphur; Table 2 displays the head assay results for the composite.

TABLE 2
COMPOSITE ASSAY RESULTS

Composite	Assay - percent		
	Cu	Fe	S
Sorted Mill Feed Composite Head	0.32	6.4	0.45

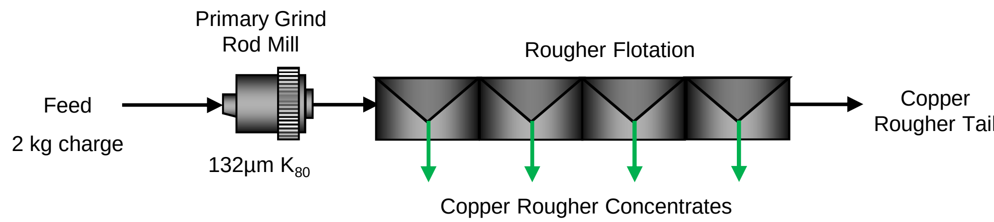
4.1 Flotation Testing

Two preliminary flotation tests were conducted on the composite, a kinetic rougher and an open circuit cleaner test. The testing was completed at a nominal primary grind sizing of 132μm K_{80} using the reagents potassium amyl xanthate (PAX) and methyl isobutyl carbonyl (MIBC) as a sulphide mineral collector and frother, respectively. Rougher flotation was completed at a natural pH that ranged from 8.5 to 8.6 while an elevated pH of 9.0 to 9.1 using lime was used in the cleaner test. Flotation data is summarized in Figure 4, detailed data can be found in Appendix II – Metallurgical Data.

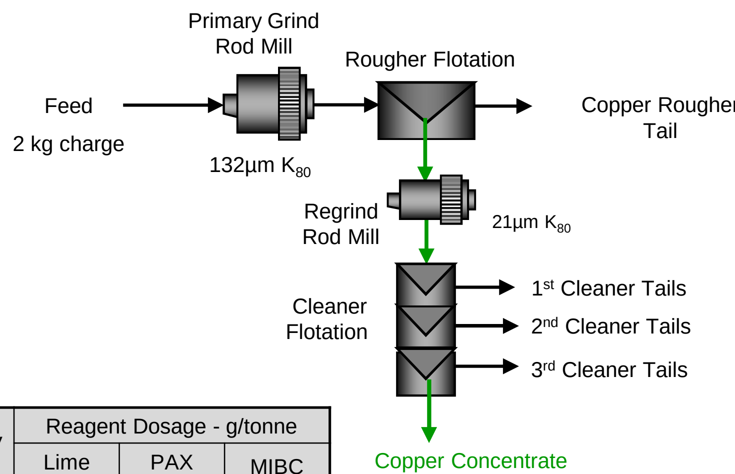
In the rougher test, about 81 percent of the copper and about 11 percent of the mass was recovered to the rougher concentrate. Rougher performance improved in the cleaner test with some lime addition. A moderate level of regrinding was applied to the rougher concentrate, resulting in a cleaner feed sizing that measured 21μm K_{80}. A copper concentrate grading 30 percent copper was produced, which contained 73 percent of the feed copper following 3 stages of dilution cleaning.

FIGURE 4
FLOTATION TEST DATA

Rougher Test Flowsheet



Cleaner Test Flowsheet

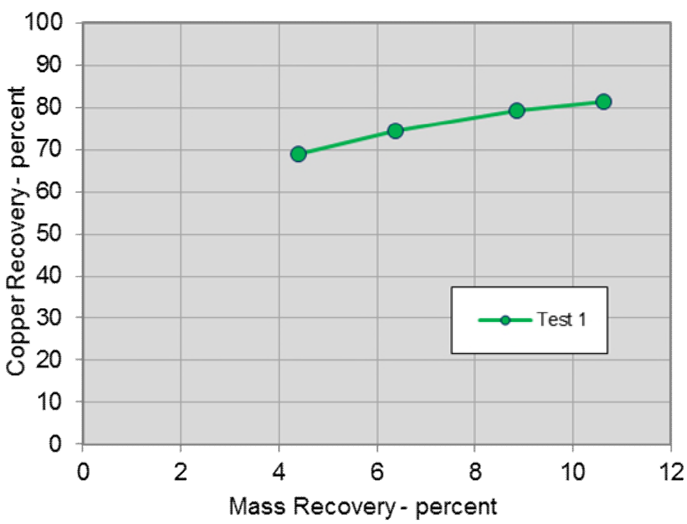


Test Conditions

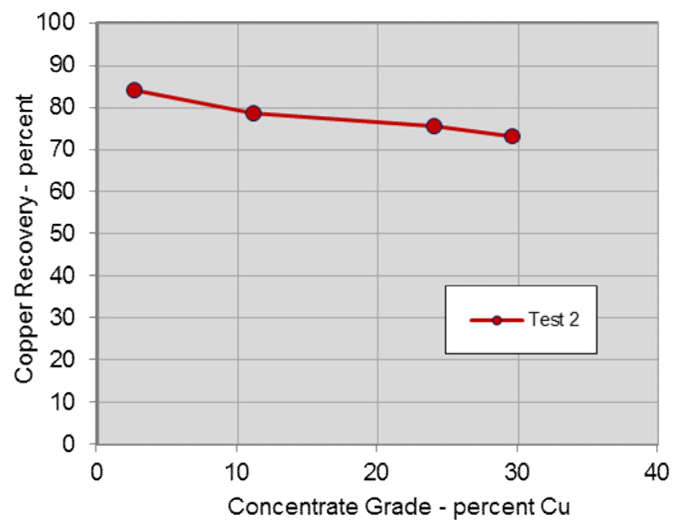
Test	Stage	pH	Redox, mV	Reagent Dosage - g/tonne		
				Lime	PAX	MIBC
Test 1 Rougher	Primary Grind	8.6	200	-	-	-
	Roughers	8.5-8.6	175-197	-	8	33
Test 2 Cleaner	Primary Grind	8.2	228	100	-	-
	Roughers	9.0	158-178	90	8	33
	Regrind	9.1	202	50	-	-
	Cleaners	9.0-9.1	149-175	-	6	66

Note: Redox was measured using a Pt tip electrode in a standard AgCl solution.

Rougher Copper Recovery Vs. Mass Recovery



Cleaner Copper Recovery Vs. Concentrate Grade



4.2 Magnetic Separation Testing

The combined sample of rougher tailings from the two flotation tests was used to evaluate the potential to produce a magnetite concentrate by magnetic separation. A summary of the test flowsheet and results is presented in Figure 5, detailed data can be found in Appendix II – Metallurgical Data.

A 3 kilogram sample of combined rougher tailings was processed through a magnetic drum separator to recover a rougher magnetic concentrate. Two stages of rougher magnetic separation were applied, which recovered approximately 32 percent of the iron remaining in the rougher tails, along with about 4.8 percent of the rougher tail mass.

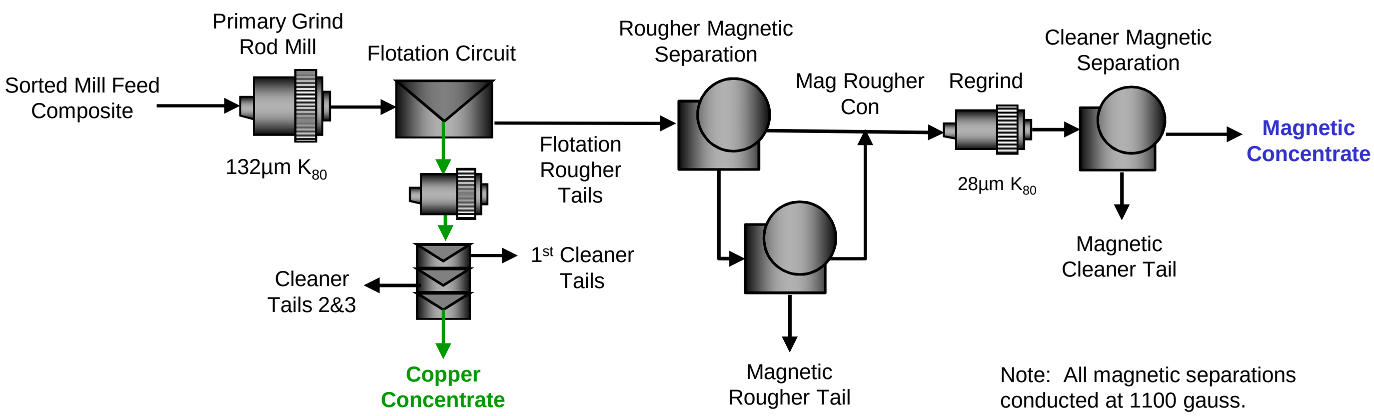
A 100 gram sub-sample of the rougher magnetic concentrate was reground to approximately 28μm K_{80}, and further upgraded in a Davis Tube magnetic separator to represent cleaner magnetic upgrading. Approximately 94 percent of the iron in the magnetic rougher concentrate was recovered to the cleaner magnetic concentrate, which graded about 65 percent iron. It is possible that testing with a larger sample and including elutriation in the final cleaner flowsheet could improve the iron grade of the magnetite concentrate, however additional regrinding could be required to produce a concentrate grading over 67 percent iron.

On a combined basis, approximately 3.3 percent of the rougher tail mass was recovered to the cleaner magnetic concentrate.

Relative to the flotation feed, approximately 28 percent of the iron in the Sorted Mill Feed Composite was recovered to the cleaner magnetic concentrate, along with approximately 3 percent of the composite mass.

FIGURE 5
MAGNETIC TEST SUMMARY

Overall Test Flowsheet



Metallurgical Balance - Rougher Magnetic Separation

Product	Mass	Assays - percent	Distribution - percent
	Percent	Fe	Fe
Magnetic Rougher Feed (calc.)	100	6.9	100
Magnetic Rougher Concentrate	**4.8**	**45.9**	**32.3**
Magnetic Rougher Tail	95.2	4.9	67.7

Metallurgical Balance - Cleaner Magnetic Separation

Product	Mass	Assays - percent	Distribution - percent
	Percent	Fe	Fe
Magnetic Cleaner Feed (calc.)	100	46.8	100
Magnetic Concentrate	**67.8**	**64.8**	**93.9**
Magnetic Cleaner Tailing	32.2	8.8	6.1

Metallurgical Balance – Overall Concentrator Process

Product	Mass	Assay - percent			Distribution - percent		
	percent	Cu	Fe	S	Cu	Fe	S
Sorted Mill Feed	100.0	0.34	6.87	0.47	100	100	100
Copper Concentrate	**0.9**	**29.6**	29.4	33.1	**73.1**	3.6	60.1
Copper Cleaner Tails 2&3	1.6	1.2	8.8	2.0	5.4	2.0	6.8
Copper 1st Clnr Tail	8.5	0.23	7.70	0.38	5.6	9.5	6.9
Copper Rougher Tails	89.1	0.06	6.54	0.14	15.8	84.9	26.2
Magnetic Concentrate	**2.9**	0.0	**64.8**	0.0	0.0	**27.6**	0.0
Mag Cleaner Tails	4.3	0.0	8.8	0.0	0.0	5.5	0.0
Magnetic Ro Tail	81.9	0.07	4.34	0.15	15.8	51.7	26.2

Notes: a) Mag Ro Tail assay values estimated to match feed grade and rougher tails distribution.
b) Cu and S values for Mag Concentrate and Mag Cleaner Tails were assumed as zero.

5.0 Conclusions and Recommendations

A preliminary metallurgical test program was conducted on two bulk samples of low grade stockpile material from the New Craigmont project site. The two bulk samples had a combined mass of approximately 3 tonnes and were reported to be representative of the Tower and Portal stockpiles. Summation of the test product masses and assay data indicated that the Tower and Portal samples contained 0.24 and 0.16 percent copper, respectively.

The bulk samples were screened to remove material that was finer than ½ inch, and any oversize material was further crushed to minus 2 inches. The material coarser than ½ inch was separated into two size fractions and shipped to TOMRA's test facility in Germany for material sorting testing. A series of sorting tests using XRT sensors were conducted and the products were returned to ALS Metallurgy for preparation and analysis.

The results indicate that the XRT sorter was successful in rejecting material that had average copper contents of 0.07 percent. Since the coarse fractions of the two bulk samples had different feed grades, rejecting material at this low average copper grade resulted in different copper and mass recoveries. For the coarse fraction of the Tower sample, which graded 0.23 percent copper, overall copper recovery to the material sorter product was about 75 percent, along with about 14 percent of the sorter feed mass. The coarse fraction of the Portal sample graded 0.13 percent copper and overall about 49 percent of the sorter feed copper was recovered to the product stream along with about 10 percent of the feed mass. These separations resulted in a copper grade upgrading factor of about 5 times on average for the coarse fractions of both samples.

High and low selectivity settings on the XRT sensor were tested. The less selective setting resulted in about a 9 percent increase in copper recovery for the Tower sample over the more selective setting, however it was accompanied by a 7 percent increase in mass recovery. The difference in copper recovery was not as clear for the Portal sample, however the mass recovery was consistently about 10 percent higher at the less selective setting.

In our experience, the results suggest that the coarse material in both samples is amenable to material sorting using XRT sensors. While the copper recovery following sorting for the Portal sample coarse fraction was somewhat low, the feed grade was also quite low. The sorter was able to contribute significant value by rejecting a high portion of low grade material and generating an upgraded product. The consistent low copper contents of the waste streams from both bulk samples is encouraging and suggests that XRT sorting can successfully remove low grade dilution from these feed streams.

The overall reduction in feed mass to a downstream milling process was dependent on the fines content of the samples, since material finer than ½ inch could not be efficiently separated by particle sorting methods. The Tower sample contained about 56 percent fines, so the overall reduction in bulk sample mass by XRT material sorting was about 38 percent. The Tower bulk sample copper grade was upgraded from 0.24 percent to 0.35 percent with this low grade mass rejection. The Portal sample contained about 39 percent fines and the overall reduction in bulk sample mass by XRT sorting was about 54 percent. The Portal bulk sample copper grade was upgraded from 0.16 percent to 0.27 percent with this low grade mass rejection.

It is recommended to continue evaluating other mineralized sources across the reserves of the project to confirm the material sorting amenability and effect on downstream mill feed grade and mass reduction. It is recommended to consider collecting additional bulk samples from the low grade stockpiles to confirm the fines contents. The cost of evaluating material sorting performance on the coarse portions of additional bulk samples could likely be reduced by extracting smaller sub-samples for testing. The potential to apply material sorting to in-situ reserves could be evaluated using half drill core samples.

A composite representing a potential mill feed was assembled from weighted portions of the fines and coarse product from both bulk samples. The head grade of the mill feed composite measured 0.32 percent copper and 0.45 percent sulphur.

A series of preliminary metallurgical tests were conducted on the mill feed composite to evaluate response to froth flotation and magnetic separation.

Two flotation tests were conducted, the first as a kinetic rougher and the second as an open circuit cleaner test. A primary grind sizing of 132μm K_{80} was applied for both tests. In the cleaner test, which included regrinding and 3 stages of dilution cleaning, a final copper concentrate grading about 30 percent copper was produced which contained 73 percent of the feed copper. This test was very preliminary, but suggests that the material responds well to concentration by froth flotation. Additional testing should be conducted to assess rougher circuit recovery as a function of primary grind size and the potential to increase recovery with adjustments to pulp chemistry. Finally, a locked cycle test is recommended to confirm metallurgical performance in a closed circuit arrangement.

Magnetic separation was evaluated on the flotation rougher tails stream. The combined results of a magnetic rougher test and a simple cleaner upgrading test indicated that a magnetite concentrate grading about 65 percent iron could be produced. This concentrate contained about 28 percent of the iron in the mill feed composite, along with about 3 percent of the feed mass. Further testing is recommended to confirm the potential to produce a higher grade magnetite concentrate. It may be of value to produce a larger mass of concentrate for marketing purposes, and confirm the levels of potential penalty elements in the concentrate.

APPENDIX I – KM5954

SAMPLE ORIGIN

1.0 Sample Origin

Two bulk rock samples, identified as Tower Bulk Sample and Portal Bulk Sample, were received at ALS Metallurgy Kamloops on May 21, 2019, and weighed approximately 1.4 and 1.5 kilograms, respectively. Table I-1 displays the sample receiving information for this program. A sample location map provided by Nicola Mining is appended.

Upon arrival, the samples were screened at ½ inch. A small amount of material was coarser than 2 inches and was crushed to minus 2 inches. The <2 > ½ inch material split into two size fractions, <2 >1 and <1 >½ inch, and packaged in 8 plastic drums. These coarse fractions were then sent to TOMRA in Germany for material sorting testing. Arrangements for the sorting tests were coordinated by Nicola Mining personnel.

Upon completion of the material sorting testing, the product and waste streams from each fraction were returned to ALS Metallurgy Kamloops for bulk preparation and analysis. A listing of the samples received on October 7, 2019 is shown in Table I-2. Prior to preparation, personnel from Nicola Mining visited ALS Metallurgy to review the samples, take pictures, and determine a suitable preparation approach.

Once received, the larger mass waste products were crushed to minus ¾ inch, homogenized, and a 24 kilogram sub-sample was extracted from each by cone and quartering methods. Similarly, the minus ½ inch material from each bulk sample was homogenized and a 24 kilogram sub-sample extracted. All products and sub-samples were then crushed to 100 percent passing a 6 mesh screen and rotary split to extract representative sub-samples. A head cut from each sample was assayed for copper, iron and sulphur as well as an ICP scan by four acid digestion. The fines portions were sub-sampled and assayed in duplicate. Results of the chemical assays and sorting mass balances are located in Appendix IV – Special Data.

A composite, Sorted Mill Feed Composite, was then constructed for metallurgical testing using the products and fines of each stream. Table I-3 displays the details of the construction of the composite.

All samples from the project are currently in storage and will be disposed after June 30, 2020 unless other arrangements are made.

TABLE I-1
SAMPLES RECEIVED MAY 21, 2019

Sample ID	kg
Tower Bulk Sample - Bag 1	857
Tower Bulk Sample - Bag 2	581
Tower Bulk Sample Total	1438
Portal Bulk Sample - Bag 1	684
Portal Bulk Sample - Bag 2	785
Portal Bulk Sample Total	1469

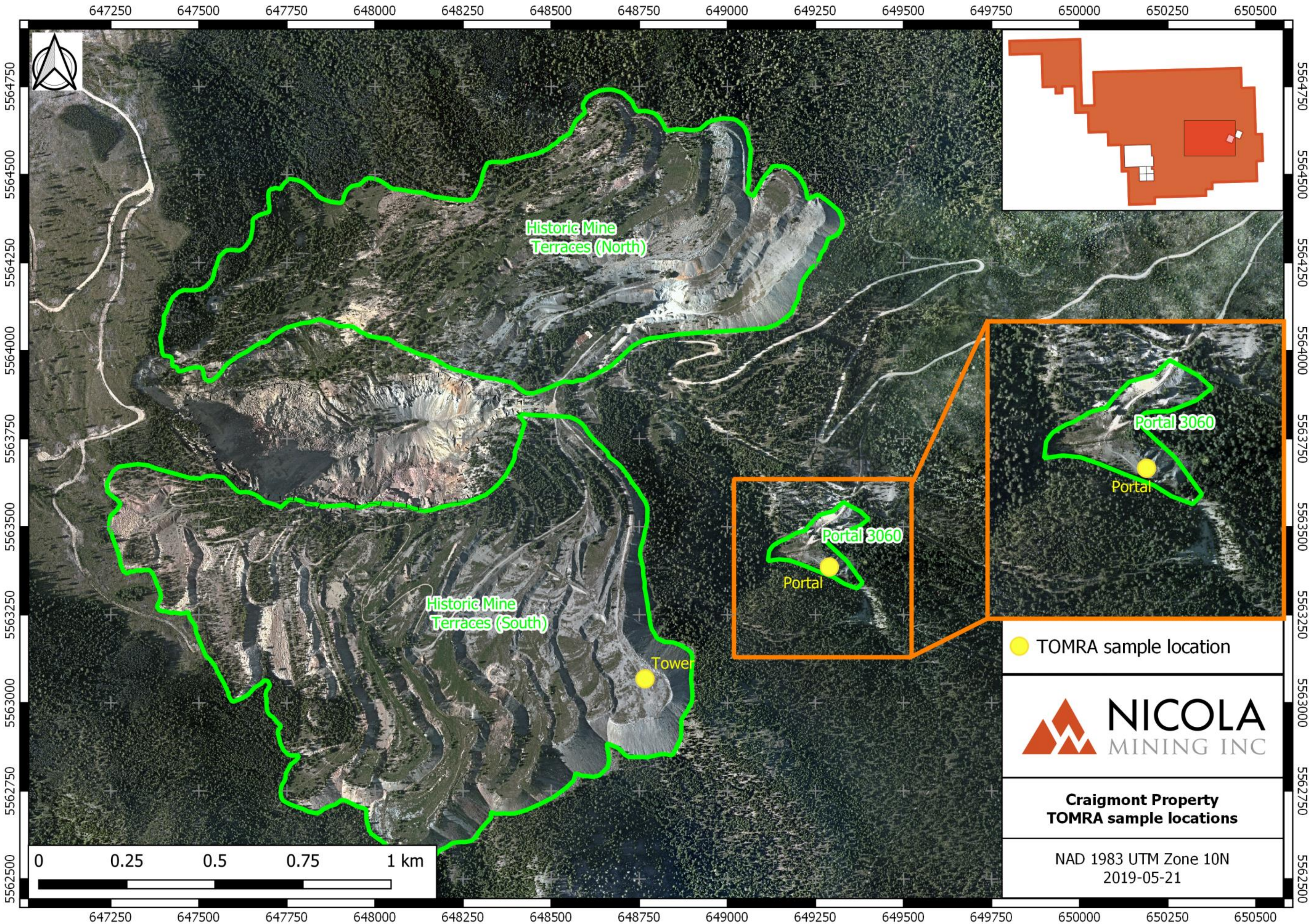
Note: Gross shipment weights, includes pallets and super sacks, estimated at 70 kg per sample.

TABLE I-2
SAMPLES RECEIVED OCTOBER 7, 2019

Sample ID	Particle Size (inches)	Product kg	Waste kg
Test 1.1 Tower	<1 >0.5	25.5	100.5
Test 2.1 Tower	<1 >0.5	21.2	159
Test 3.1 Portal	<1 >0.5	25.5	149.5
Test 4.1 Portal	<1 >0.5	0.0	138
Test 4.2 Portal	<1 >0.5	8.3	12.8
Test 5.1 Tower	<2 >1	28.6	156
Test 6.1 Tower	<2 >1	11.1	97.5
Test 7.1 Portal	<2 >1	40.8	231.5
Test 8.1 Portal	<2 >1	12.1	216.5

TABLE I-3
COMPOSITE CONSTRUCTION

Product	Size Fraction	kg
Tower T5.1	<2 >1"	0.41
Tower T6.1	<2 >1"	0.16
Tower T1.1	<1 >0.5"	0.36
Tower T2.1	<1 >0.5"	0.30
Tower Fines	<0.5"	10.77
Portal T7.1	<2 >1"	0.78
Portal T8.1	<2 >1"	0.23
Portal T3.1	<1 >0.5"	0.49
Portal T4.2	<1 >0.5"	0.16
Portal Fines	<0.5"	10.34
Total		24.0



647250
647500
647750
648000
648250
648500
648750
649000
649250
649500
649750
650000
650250
650500
5564750
5564500
5564250
5564000
5563750
5563500
5563250
5563000
5562750
5562500
Historic Mine Terraces (North)
Historic Mine Terraces (South)
Tower
Portal 3060
Portal
TOMRA sample location
NICOLA
MINING INC
Craigmont Property
TOMRA sample locations
NAD 1983 UTM Zone 10N
2019-05-21
0
0.25
0.5
0.75
1 km

APPENDIX II – KM5954

METALLURGICAL TEST DATA

INDEX

DATE: November 8, 2019

PROJECT NO: KM5954-01

PURPOSE: Preliminary Rougher Test.

PROCEDURE: Perform a one product rougher test.

FEED: 2 kg of Sorted Mill Feed Composite ore ground to a nominal 132μm K_{80}.

Stage	Reagents Added g/tonne			Time (minutes)			pH	Redox
	PAX		MIBC	Grind	Cond.	Float		
Primary Grind				23			8.6	200
COPPER CIRCUIT:								
Rougher 1	3		22		1	2	8.6	197
Rougher 2	2		-		1	2	8.6	175
Rougher 3	2		11		1	2	8.5	176
Rougher 4	1		-		1	2	8.5	175

Flotation Data	Rougher	
Flotation Machine	Denver	
Cell Size in liters	4.4	
Aspiration	Air	
Water Type	Fresh	
Impeller Speed in rpm	1100	

Grinding Data	Primary Grind
Mill:	M2-Mild
Charge/Material:	20kg-Mild
Water:	1000ml

KM5954-01 Sorted Mill Feed Composite
Overall Metallurgical Balance

Product	Weight		Assay - percent			Distribution - percent		
	%	grams	Cu	Fe	S	Cu	Fe	S
Copper Ro Con 1	4.4	87.1	4.86	11.2	5.74	68.9	7.2	56.7
Copper Ro Con 2	2.0	39.3	0.87	7.70	0.76	5.6	2.2	3.4
Copper Ro Con 3	2.5	48.7	0.60	7.50	1.01	4.8	2.7	5.6
Copper Ro Con 4	1.8	35.2	0.36	7.70	0.55	2.1	2.0	2.2
Copper Ro Tail	89.4	1767.7	0.07	6.60	0.16	18.7	85.9	32.1
Feed	100.0	1978.0	0.31	6.87	0.45	100	100	100

KM5954-01 Sorted Mill Feed Composite
Cumulative Metallurgical Balance

Cumulative	Cum. Weight		Assay - percent			Distribution - percent		
Product	%	grams	Cu	Fe	S	Cu	Fe	S
Product 1	4.4	87.1	4.86	11.2	5.74	68.9	7.2	56.7
Product 1 to 2	6.4	126.4	3.62	10.1	4.19	74.5	9.4	60.1
Product 1 to 3	8.9	175.1	2.78	9.4	3.31	79.2	12.1	65.7
Product 1 to 4	10.6	210.3	2.37	9.10	2.85	81.3	14.1	67.9
Product 5	89.4	1767.7	0.07	6.60	0.16	18.7	85.9	32.1
Feed	100.0	1978.0	0.31	6.87	0.45	100	100	100

DATE: November 19, 2019

PROJECT NO: KM5954-02

PURPOSE: Preliminary Cleaner Test.

PROCEDURE: Perform a standard one product cleaner test.

FEED: 2 kg of Sorted Mill Feed Composite ore ground to a nominal 132µm K_{80}.
Copper Regrind Discharge - 21µm K_{80}.

Stage	Reagents Added g/tonne			Time (minutes)			pH	Redox
	Lime	PAX	MIBC	Grind	Cond.	Float		
Primary Grind	100			23			8.2	228
COPPER CIRCUIT:								
Rougher 1	90	3	22		1	2	9.0	158
Rougher 2	√	2	11		1	2	9.0	166
Rougher 3	√	2	-		1	2	9.0	174
Rougher 4	√	1	-		1	2	9.0	178
Regrind	50			10			9.1	202
Cleaner 1	-	3	22		1	5	9.1	175
Cleaner 2	√	2	22		1	4	9.0	149
Cleaner 3	√	1	22		1	3	9.0	165

Flotation Data	Rougher	Cleaner
Flotation Machine	Denver	Denver
Cell Size in liters	4.4	2.2
Aspiration	Air	
Water Type	Fresh	
Impeller Speed in rpm	900	1200

Grinding Data	Primary Grind	Copper Regrind
Mill:	M2-Mild	RM3-Mild
Charge/Material:	20kg-Mild	6kg-Stainless Steel
Water:	1000ml	estimated

KM5954-02 Sorted Mill Feed Composite
Overall Metallurgical Balance

Product	Weight		Assay - percent			Distribution - percent		
	%	grams	Cu	Fe	S	Cu	Fe	S
Copper Con	0.9	17.0	**29.6**	29.4	33.1	73.1	3.7	60.1
Copper 3rd Clnr Tail	0.2	4.7	3.70	11.9	6.23	2.5	0.4	3.1
Copper 2nd Clnr Tail	1.4	26.8	0.75	8.20	1.29	2.9	1.6	3.7
Copper 1st Clnr Tail	8.6	168.9	0.23	7.70	0.38	5.6	9.7	6.9
Copper Ro Tail	88.9	1749.4	0.06	6.50	0.14	15.8	84.6	26.2
Feed	100.0	1966.8	0.35	6.84	0.48	100	100	100

KM5954-02 Sorted Mill Feed Composite
Cumulative Metallurgical Balance

Cumulative	Cum. Weight		Assay - percent			Distribution - percent		
Product	%	grams	Cu	Fe	S	Cu	Fe	S
Product 1	0.9	17.0	29.6	29.4	33.1	73.1	3.7	60.1
Product 1 to 2	1.1	21.7	24.0	25.6	27.3	75.7	4.1	63.3
Product 1 to 3	2.5	48.5	11.1	16.0	12.9	78.6	5.8	67.0
Product 1 to 4	11.1	217.4	2.67	9.55	3.18	84.2	15.4	73.8
Product 5	88.9	1749.4	0.06	6.50	0.14	15.8	84.6	26.2
Feed	100.0	1966.8	0.35	6.84	0.48	100	100	100

DATE: November 25, 2019

PROJECT NO: KM5954-03

PURPOSE: Preliminary Magnetic Separation

PROCEDURE: Perform magnetic separation on Copper Rougher Tails

FEED: 3 kg of Rougher Tails Composite

Magnetic Separation Conditions LIMS	Rougher 1	Rougher 2
Mass (kg)	3	-
Density	40	25
Gauss Surface	1100	1100
Flow Rate (L/min)	2.0	2.0
Solids SG (estimate)	3.0	3.0
Flow Rate (kg/min)	1.1	0.6

KM5954-03 Rougher Tails Composite
Overall Metallurgical Balance

Product	Weight		Assay - Percent	Distribution - Percent
	%	g	Fe	Fe
Magnetic Ro Con 1	4.54	135	47.6	31.4
Magnetic Ro Con 2	0.31	9	21.1	0.9
Magnetic Rougher Tail	95.2	2834	4.9	67.7
Feed	100.0	2979	6.9	100

KM5954-03 Rougher Tails Composite
Cumulative Metallurgical Balance

Cumulative Product	Cum. Weight		Assay - Percent	Distribution - Percent
	%	g	Fe	Fe
Product 1	4.54	135	47.6	31.4
Product 1 to 2	4.84	144	45.9	32.3
Product 3	95.2	2834	4.9	67.7
Feed	100.0	2979	6.9	100

DATE: November 28, 2019

PROJECT NO: KM5954-04

PURPOSE: To Determine the Amount of Magnetic Material in the Sample.

PROCEDURE: Standard Davis Tube Magnetic Separation.

FEED: Magnetic Rougher Concentrate ground to a nominal 28µm K_{80}.

Conditions	Cycle I	Cycle II	Cycle III
Mass (g)	33	33	33
DCV	21	21	21
DCA	0.3	0.3	0.3
Gauss	1100	1100	1100
Flow Rate (1 min)	0.4	0.4	0.4
Agitation Speed (rpm)	82	82	82
Time (min)	4.5	4.5	4.5
Comments:			

Note: Ground total feed for 3 minutes in a stirred mill, processed in Davis Tube in 3 portions.

KM5954-04 Mag Rougher Concentrate
Overall Metallurgical Balance

Product	Weight		Assay - Percent	Distribution - Percent
	%	g	Fe	Fe
Magnetic Concentrate	67.8	67	64.8	93.9
Magnetic Tail	32.2	32	8.8	6.1
Feed	100.0	98	46.8	100

DATE: November 29, 2019

PROJECT NO: KM5954 Tests 2 - 4 Compilation

PURPOSE: Preliminary Cleaner plus Magnetic Separation Test.

PROCEDURE: One product cleaner test followed by magnetic separation on Rougher tails

FEED: 2.0 kg of Sorted Mill Feed Composite ore ground to a nominal 132µm K_{80}.
Copper Regrind Discharge - 21µm K_{80}.
Magnetic Cleaner Regrind Discharge - 28µm K_{80}.

Stage	Reagents Added g/tonne			Time (minutes)			pH	Redox
	Lime	PAX	MIBC	Grind	Cond.	Float		
Primary Grind	100			23			8.2	228
<u>COPPER CIRCUIT:</u>								
Rougher 1	90	3	22		1	2	9.0	158
Rougher 2	√	2	11		1	2	9.0	166
Rougher 3	√	2	-		1	2	9.0	174
Rougher 4	√	1	-		1	2	9.0	178
Regrind	50			10			9.1	202
Cleaner 1	-	3	22		1	5	9.1	175
Cleaner 2	√	2	22		1	4	9.0	149
Cleaner 3	√	1	22		1	3	9.0	165
LIMS Mag Separation		*Rougher*						
Davis Tube Separation		*Cleaner*		3				

Flotation Data	Rougher	Cleaner
Flotation Machine	Denver	Denver
Cell Size in liters	4.4	2.2
Aspiration	Air	
Water Type	Fresh	
Impeller Speed in rpm	900	1200

Grinding Data	Primary Grind	Copper Regrind
Mill:	M2-Mild	RM3-Mild
Charge/Material:	20kg-Mild	6kg-Stainless Steel
Water:	1000ml	estimated

KM5954 Sorted Mill Feed Composite
Overall Metallurgical Balance - Copper Flotation Plus Magnetite Circuit

Product	Weight		Assay - percent			Distribution - percent		
	%	grams	Cu	Fe	S	Cu	Fe	S
Copper Con	0.9	17.0	**29.6**	29.4	33.1	73.1	3.6	60.1
Copper 3rd Clnr Tail	0.2	4.7	3.70	11.9	6.23	2.5	0.4	3.1
Copper 2nd Clnr Tail	1.3	26.8	0.75	8.20	1.29	2.9	1.6	3.7
Copper 1st Clnr Tail	8.5	168.9	0.23	7.70	0.38	5.6	9.5	6.9
Mag Cleaner Con	2.9	58.4	0.0	64.8	0.0	0.0	27.6	0.0
Mag Cleaner Tails	4.3	86.2	0.0	8.8	0.0	0.0	5.5	0.0
Mag Ro Tail	81.9	1635.4	0.07	4.34	0.15	15.8	51.7	26.2
Feed	100.0	1997.4	0.34	6.87	0.47	100	100	100

Notes: a) Mag Ro Tail assay values estimated to match feed grade and rougher tails distribution.

b) Cu and S values for Mag Cleaner Con and Mag Cleaner Tails were assumed as zero.

KM5954 Sorted Mill Feed Composite
Cumulative Metallurgical Balance

Cumulative Product	Cum. Weight		Assay - percent			Distribution - percent		
	%	grams	Cu	Fe	S	Cu	Fe	S
Product 1	0.9	17.0	29.6	29.4	33.1	73.1	3.6	60.1
Product 1 to 2	1.1	21.7	24.0	25.6	27.3	75.7	4.1	63.2
Product 1 to 3	2.4	48.5	11.1	16.0	12.9	78.6	5.7	66.9
Product 1 to 4	10.9	217.4	2.67	9.55	3.18	84.2	15.1	73.8
Product 5	2.9	58.4	-	64.80	-	0.0	27.6	0.0
Product 5 to 6	7.2	144.6	-	31.42	-	0.0	33.1	0.0
Product 7	81.9	1635.4	0.07	4.34	0.15	15.8	51.7	26.2
Feed	100.0	1997.4	0.34	6.87	0.47	100	100	100

APPENDIX III – KM5954

PARTICLE SIZING DATA

INDEX

TABLE III-1
SCREEN ANALYSIS
KM5954 Sorted Mill Feed Composite
19 Minute Grind Calibration

Product	Particle Size µm	Weight % Retained	Cumulative % Passing
48 Mesh	300	0.00	100.0
65 Mesh	212	5.60	94.4
100 Mesh	150	15.70	78.7
150 Mesh	106	13.70	65.0
200 Mesh	75	9.90	55.1
270 Mesh	53	8.40	46.7
400 Mesh	38	6.40	40.3
TOTAL		100.00	**

K80= 155µm

Note: 19 min. grind calibration using 2 kg. Ore, 1000 ml water and
20 kg. of Mild Steel rods in Mill: M2

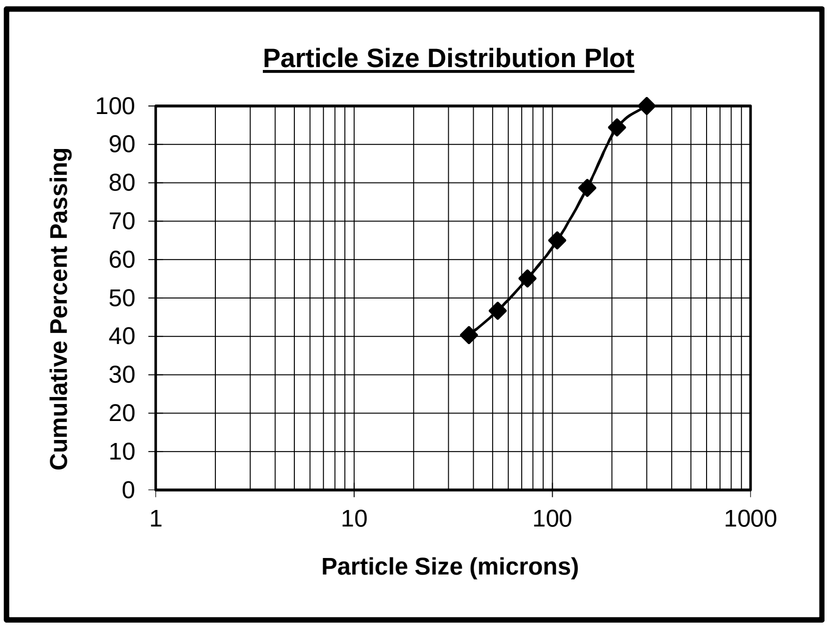


TABLE III-2
SCREEN ANALYSIS
KM5954 Sorted Mill Feed Composite
23 Minute Grind Calibration

Product	Particle Size µm	Weight % Retained	Cumulative % Passing
48 Mesh	300	0.00	100.0
65 Mesh	212	0.20	99.8
100 Mesh	150	10.20	89.6
150 Mesh	106	24.30	65.3
200 Mesh	75	12.30	53.0
270 Mesh	53	6.60	46.4
400 Mesh	38	4.20	42.2
TOTAL		100.00	**

K80= 132µm

Note: 23 min. grind calibration using 2 kg. Ore, 1000 ml water and
20 kg. of Mild Steel rods in Mill: M2

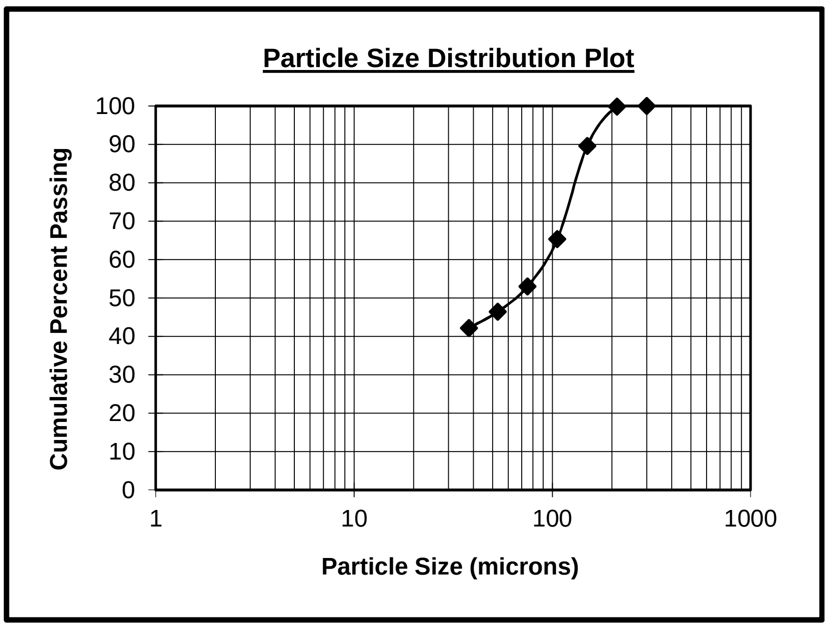


TABLE III-3

ALS Metallurgy

ISO9001:2008
Certificate No. FS63170

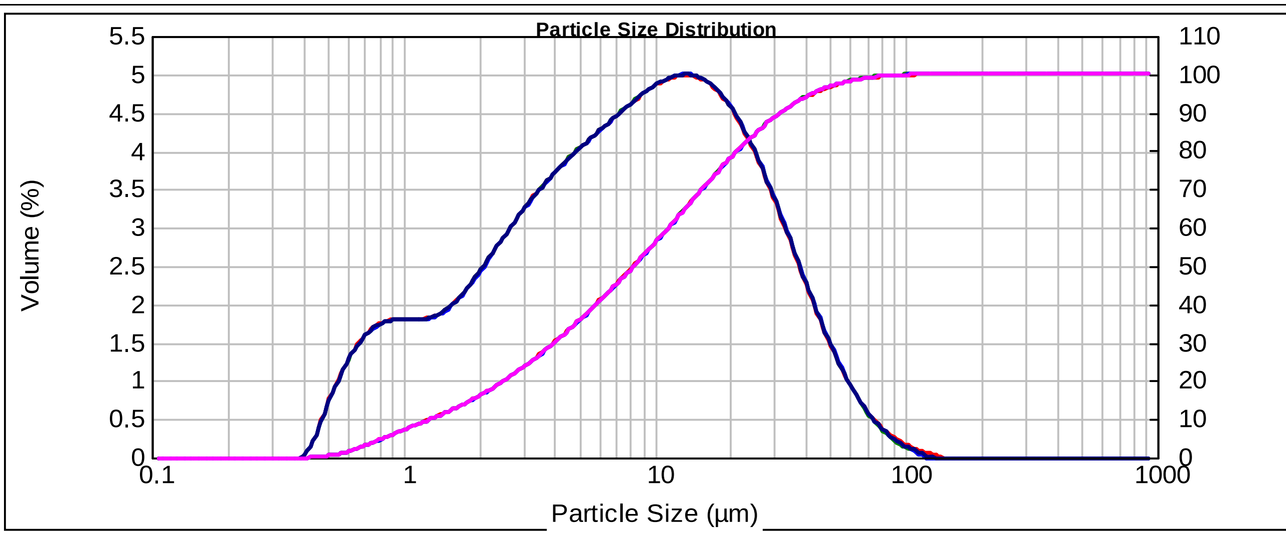
Result Analysis Report

Project and Test number:	Measured by:	Measured:
KM5954-02	Kent	Tuesday, November 19, 2019 9:45:05 AM
Sample Name:	**Edited by:**	**Analysed:**
Copper Regrind Discharge - Average	Kent	Tuesday, November 19, 2019 9:45:07 AM

Particle Name:	Accessory Name:	Analysis model:	Sensitivity:
Silica 0.1	Hydro 2000MU (A)	General purpose	Normal
Particle RI:	**Absorption:**	**Size range:**	**Obscuration:**
1.544	0.1	0.100 to 1000.000 um	18.89 %
Dispersant Name:	**Dispersant RI:**	**Weighted Residual:**	**Result Emulation:**
Water	1.330	0.830 %	Off

Concentration:	Span :	Uniformity:	Result units:
0.0109 %Vol	3.676	1.17	Volume
Specific Surface Area:	**Surface Weighted Mean D[3,2]:**	**Vol. Weighted Mean D[4,3]:**	
1.67 m²/g	3.585 um	13.222 um	

d(0.1): 1.276 um   d(0.5): 8.265 um   **d(0.8): 21.296 um**   d(0.9): 31.655 um   d(0.98): 57.04 um



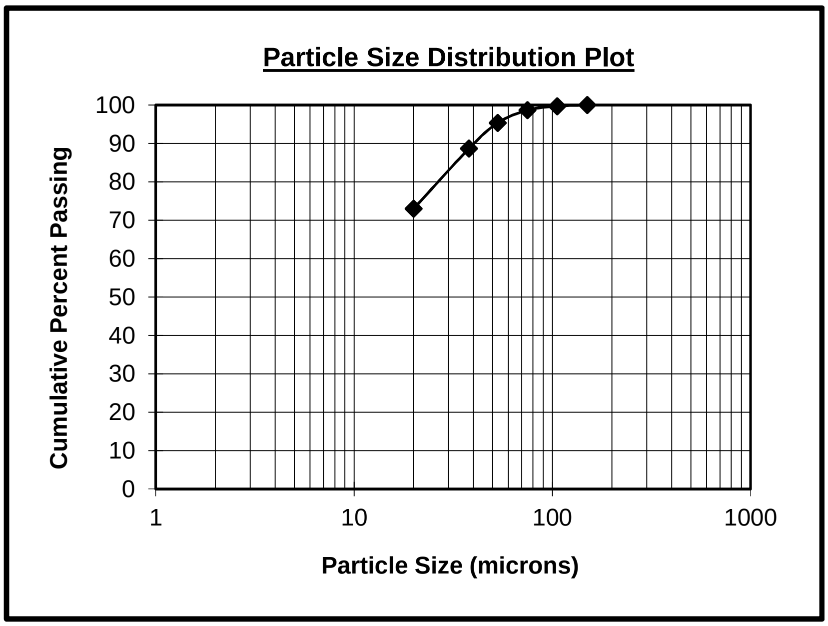
Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %	Size (μm)	Volume In %
0.100	0.00	0.479	0.42	2.291	1.68	10.965	2.99	52.481	0.72	251.189	0.00
0.110	0.00	0.525	0.61	2.512	1.79	12.023	3.01	57.544	0.57	275.423	0.00
0.120	0.00	0.575	0.77	2.754	1.90	13.183	3.01	63.096	0.43	301.995	0.00
0.132	0.00	0.631	0.89	3.020	2.01	14.454	2.99	69.183	0.32	331.131	0.00
0.145	0.00	0.692	0.98	3.311	2.10	15.849	2.94	75.858	0.24	363.078	0.00
0.158	0.00	0.759	1.04	3.631	2.19	17.378	2.87	83.176	0.17	398.107	0.00
0.174	0.00	0.832	1.08	3.981	2.28	19.055	2.77	91.201	0.10	436.516	0.00
0.191	0.00	0.912	1.09	4.365	2.35	20.893	2.64	100.000	0.07	478.630	0.00
0.209	0.00	1.000	1.09	4.786	2.43	22.909	2.48	109.648	0.04	524.807	0.00
0.229	0.00	1.096	1.09	5.248	2.50	25.119	2.31	120.226	0.00	575.440	0.00
0.251	0.00	1.202	1.09	5.754	2.57	27.542	2.12	131.826	0.00	630.957	0.00
0.275	0.00	1.318	1.12	6.310	2.64	30.200	1.91	144.544	0.00	691.831	0.00
0.302	0.00	1.445	1.17	6.918	2.70	33.113	1.70	158.489	0.00	758.578	0.00
0.331	0.00	1.585	1.25	7.586	2.77	36.308	1.49	173.780	0.00	831.764	0.00
0.363	0.00	1.738	1.34	8.318	2.84	39.811	1.28	190.546	0.00	912.011	0.00
0.398	0.03	1.905	1.45	9.120	2.90	43.652	1.08	208.930	0.00	1000.000	
0.437	0.22	2.089	1.56	10.000	2.95	47.863	0.89	229.087	0.00		
0.479		2.291		10.965		52.481		251.189			

Operator notes:

TABLE III-4
SCREEN ANALYSIS
KM5954-04 Mag Feed

Product	Particle Size µm	Weight % Retained	Cumulative % Passing
100 Mesh	150	0.00	100.0
150 Mesh	106	0.33	99.7
200 Mesh	75	1.00	98.7
270 Mesh	53	3.33	95.3
400 Mesh	38	6.67	88.7
635 Mesh	20	15.67	73.0
TOTAL		100.00	**

K80= 28µm



APPENDIX IV – KM5954

SPECIAL DATA

TABLE IV-1
Material Sorting Mass Balance - Tower Sample

Size Fraction	Sort Run	Stream	kg	mass %	Assay - percent			Distribution - percent			Overall Distribution - percent			
					Cu	Fe	S	Cu	Fe	S	mass	Cu	Fe	S
<2 >1"	T5.1	Product	28.6	15.5	1.54	23.3	1.72	80.4	57.1	53.9	2.1	13.4	8.8	8.8
		Waste	156	84.5	0.069	3.21	0.27	19.6	42.9	46.1	11.5	3.3	6.6	7.5
		Feed	184.6	100	0.30	6.32	0.49	100	100	100	13.6	16.7	15.3	16.3
<2 >1"	T6.1	Product	11.1	10.2	1.76	33.0	1.88	69.2	54.1	40.3	0.8	5.9	4.8	3.7
		Waste	97.5	89.8	0.089	3.19	0.32	30.8	45.9	59.7	7.2	2.6	4.1	5.5
		Feed	108.6	100	0.26	6.24	0.48	100	100	100	8.0	8.6	8.9	9.2
<1 >0.5"	T1.1	Product	25.5	20.2	0.73	10.6	0.92	76.8	47.4	51.2	1.9	5.7	3.6	4.2
		Waste	100.5	79.8	0.056	2.99	0.22	23.2	52.6	48.8	7.4	1.7	4.0	4.0
		Feed	126	100	0.19	4.53	0.36	100	100	100	9.3	7.4	7.5	8.2
<1 >0.5"	T2.1	Product	21.2	11.8	1.10	16.2	1.30	71.0	41.9	40.1	1.6	7.1	4.5	4.9
		Waste	159	88.2	0.060	2.99	0.26	29.0	58.1	59.9	11.7	2.9	6.2	7.3
		Feed	180.2	100	0.18	4.54	0.38	100	100	100	13.3	10.0	10.8	12.3
<0.5"	-	Fines 1	754	-	0.25	5.90	0.41	-	-	-	55.7	57.4	57.5	54.0
		Fines 2			0.25	5.70	0.40							
Total		Product	86.4	6.4	1.22	19.1	1.40	32.1	21.6	21.6				
		Fines	754	55.7	0.25	5.80	0.40	57.4	57.5	54.0				
		Waste	513	37.9	0.067	3.09	0.27	10.5	20.9	24.4				
		Feed	1353.4	100	0.24	5.62	0.41	100	100	100				
Potential Mill Feed			840.4	62.1	0.35	7.16	0.50	89.5	79.1	75.6				

TABLE IV-2
Material Sorting Mass Balance - Portal Sample

Size Fraction	Sort Run	Stream	kg	mass %	Assay - percent			Distribution - percent			Overall Distribution - percent			
					Cu	Fe	S	Cu	Fe	S	mass	Cu	Fe	S
<2 >1"	T7.1	Product	40.8	15.0	0.37	10.8	0.69	48.2	34.5	46.3	3.0	6.8	6.1	7.3
		Waste	231.5	85.0	0.070	3.61	0.14	51.8	65.5	53.7	16.8	7.3	11.7	8.5
		Feed	272.3	100	0.11	4.69	0.22	100	100	100	19.8	14.0	17.8	15.8
<2 >1"	T8.1	Product	12.1	5.3	1.30	16.5	3.09	53.6	18.9	53.9	0.9	7.1	2.8	9.8
		Waste	216.5	94.7	0.063	3.95	0.15	46.4	81.1	46.1	15.7	6.1	11.9	8.4
		Feed	228.6	100	0.13	4.61	0.30	100	100	100	16.6	13.2	14.7	18.1
<1 >0.5"	T3.1	Product	25.5	14.6	0.44	9.90	0.66	51.7	31.7	44.0	1.9	5.0	3.5	4.4
		Waste	149.5	85.4	0.070	3.64	0.14	48.3	68.3	56.0	10.9	4.7	7.6	5.6
		Feed	175	100	0.12	4.55	0.22	100	100	100	12.7	9.7	11.1	10.0
<1 >0.5"	T4.1	Product	8.3	5.2	1.21	21.7	2.82	41.2	23.3	45.5	0.6	4.5	2.5	6.1
		Waste 2	12.8	8.0	0.31	7.80	0.40	16.3	12.9	10.0	0.9	1.8	1.4	1.3
		Waste 1	138	86.7	0.075	3.57	0.17	42.5	63.8	44.5	10.0	4.6	6.9	6.0
		Feed	159.1	100	0.15	4.86	0.32	100	100	100	11.6	10.9	10.8	13.4
<0.5"	-	Fines 1	540	-	0.23	6.10	0.31	-	-	-	39.3	52.1	45.6	42.6
		Fines 2			0.20	6.00	0.29							
Total		Product	86.7	6.3	0.60	12.4	1.22	23.4	15.0	27.6				
		Fines	540	39.3	0.22	6.05	0.30	52.1	45.6	42.6				
		Waste	748.3	54.4	0.073	3.78	0.15	24.5	39.5	29.8				
		Feed	1375	100	0.16	5.21	0.28	100	100	100				
Potential Mill Feed			626.7	45.6	0.27	6.92	0.43	75.5	60.5	70.2				

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To: ALS METALLURGY, DIV OF ALS CANADA LTD
2957 BOWERS PL
KAMLOOPS BC V1S 1W5

Finalized Date: 1-NOV-2019
Account: KRL

CERTIFICATE VA19260634

Project: KM5954
P.O. No.: A2538
This report is for 21 Pulp samples submitted to our lab in Vancouver, BC, Canada on 15-OCT-2019.

The following have access to data associated with this certificate:

ALS METALLURGY BRENDA TREMBLAY	SIMONE BAWTREE	BRAEDEN HAMMERL

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-24	Pulp Login - Rcd w/o Barcode
DISP-01	Disposal of all sample fractions

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
ME-MS61	48 element four acid ICP-MS	
ME-OG62	Ore Grade Elements - Four Acid	ICP-AES
Cu-OG62	Ore Grade Cu - Four Acid	

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Saa Traxler, General Manager, North Vancouver

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2957 BOWERS PL
KAMLOOPS BC V1S 1W5

Finalized Date: 1-NOV-2019
Account: KRL

Project: KM5954

CERTIFICATE OF ANALYSIS VA19260634

Method / Analyte / Units / LOD — Sample Description	WEI-21 Recvd Wt. kg 0.02	ME-MS61 Ag ppm 0.01	ME-MS61 Al % 0.01	ME-MS61 As ppm 0.2	ME-MS61 Ba ppm 10	ME-MS61 Be ppm 0.05	ME-MS61 Bi ppm 0.01	ME-MS61 Ca % 0.01	ME-MS61 Cd ppm 0.02	ME-MS61 Ce ppm 0.01	ME-MS61 Co ppm 0.1	ME-MS61 Cr ppm 1	ME-MS61 Cs ppm 0.05	ME-MS61 Cu ppm 0.2	ME-MS61 Fe % 0.01
KM5954 TOWER T1.1 WASTE	0.06	0.07	7.40	16.5	310	0.58	0.06	2.83	0.10	17.15	15.9	79	1.98	599	3.79
KM5954 TOWER T2.1 WASTE	0.06	0.07	7.66	15.6	320	0.60	0.07	3.03	0.11	17.20	17.4	86	2.05	661	3.90
KM5954 TOWER T5.1 WASTE	0.06	0.05	7.68	14.9	310	0.57	0.06	3.56	0.11	18.60	16.7	47	1.90	806	4.17
KM5954 TOWER T6.1 WASTE	0.06	0.07	7.61	15.8	310	0.56	0.07	3.50	0.11	17.80	16.3	57	1.78	1035	4.31
KM5954 TOWER T1.1 CON	0.06	0.30	6.73	21.0	530	0.54	0.09	3.87	0.19	45.6	22.5	79	1.67	7870	8.65
KM5954 TOWER T2.1 CON	0.06	0.40	6.02	10.0	650	0.56	0.08	3.53	0.31	69.3	22.6	78	1.33	>10000	12.35
KM5954 TOWER T5.1 CON	0.06	0.33	4.92	6.7	630	0.59	0.07	2.89	0.36	72.7	22.9	64	1.01	>10000	17.95
KM5954 TOWER T6.1 CON	0.06	0.43	3.43	3.7	600	0.66	0.06	2.06	0.41	110.5	24.9	51	0.44	>10000	25.9
KM5954 PORTAL T3.1 WASTE	0.06	0.05	8.38	4.0	360	0.67	0.04	4.60	0.06	15.25	19.6	64	1.11	814	5.08
KM5954 PORTAL T4.1 WASTE	0.06	0.05	8.28	4.2	360	0.68	0.04	4.68	0.08	17.70	22.8	57	1.18	904	5.24
KM5954 PORTAL T4.2 WASTE	0.06	0.14	7.53	6.7	260	0.79	0.08	7.29	0.07	39.5	30.6	49	1.03	3510	10.55
KM5954 PORTAL T7.1 WASTE	0.06	0.05	7.97	4.0	360	0.58	0.04	4.93	0.08	14.85	24.2	56	1.07	787	5.33
KM5954 PORTAL T8.1 WASTE	0.06	0.04	8.25	4.5	370	0.62	0.04	5.37	0.09	16.55	25.1	50	1.16	747	5.88
KM5954 PORTAL T3.1 CON	0.06	0.21	7.37	8.6	250	0.80	0.10	7.75	0.09	34.2	35.9	55	0.99	5320	12.75
KM5954 PORTAL T4.2 CON	0.06	0.54	5.09	27.0	130	0.64	0.19	8.71	0.17	35.9	112.5	63	0.53	>10000	22.5
KM5954 PORTAL T7.1 CON	0.06	0.21	6.91	10.3	210	0.71	0.08	8.88	0.06	36.8	43.1	56	1.00	3940	12.45
KM5954 PORTAL T8.1 CON	0.06	0.64	4.38	28.3	90	0.49	0.14	12.25	0.21	29.7	108.0	64	0.37	>10000	19.45
KM5954 PORTAL FINES 1	0.08	0.16	8.14	7.8	440	0.71	0.06	5.16	0.13	25.5	27.2	54	1.82	2500	6.76
KM5954 PORTAL FINES 2	0.08	0.15	8.10	7.8	420	0.74	0.06	5.13	0.14	29.6	25.4	55	1.69	2180	6.64
KM5954 TOWER FINES 1	0.06	0.20	6.98	14.3	400	0.65	0.11	3.31	0.15	24.9	17.8	77	3.06	2630	5.17
KM5954 TOWER FINES 2	0.08	0.28	7.18	13.8	410	0.59	0.07	3.26	0.24	27.2	15.9	71	2.91	2640	5.31

***** See Appendix Page for comments regarding this certificate *****

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To: ALS METALLURGY, DIV OF ALS CANADA LTD
2957 BOWERS PL
KAMLOOPS BC V1S 1W5

Finalized Date: 1-NOV-2019
Account: KRL

Project: KM5954

CERTIFICATE OF ANALYSIS VA19260634

Sample Description	Method / Analyte / Units / LOD	ME-MS61 Ga ppm 0.05	ME-MS61 Ge ppm 0.05	ME-MS61 Hf ppm 0.1	ME-MS61 In ppm 0.005	ME-MS61 K % 0.01	ME-MS61 La ppm 0.5	ME-MS61 Li ppm 0.2	ME-MS61 Mg % 0.01	ME-MS61 Mn ppm 5	ME-MS61 Mo ppm 0.05	ME-MS61 Na % 0.01	ME-MS61 Nb ppm 0.1	ME-MS61 Ni ppm 0.2	ME-MS61 P ppm 10	ME-MS61 Pb ppm 0.5
KM5954 TOWER T1.1 WASTE		15.50	0.05	1.4	0.053	1.15	6.9	12.6	1.16	526	3.66	3.00	1.8	7.8	680	4.1
KM5954 TOWER T2.1 WASTE		16.00	0.06	1.4	0.051	1.23	6.9	12.8	1.19	558	3.21	3.07	1.8	8.7	700	4.3
KM5954 TOWER T5.1 WASTE		16.40	0.07	1.2	0.066	1.10	7.7	12.0	1.16	615	3.00	3.06	1.8	7.5	680	4.9
KM5954 TOWER T6.1 WASTE		15.80	0.05	1.2	0.069	1.14	7.1	11.6	1.20	616	4.62	3.02	1.7	8.4	740	4.5
KM5954 TOWER T1.1 CON		16.40	0.09	1.4	0.147	1.79	23.8	14.2	1.56	551	18.80	1.93	1.4	13.7	880	6.1
KM5954 TOWER T2.1 CON		15.90	0.12	1.2	0.197	2.17	36.9	13.3	1.69	471	23.2	1.39	1.1	15.5	780	7.0
KM5954 TOWER T5.1 CON		13.45	0.11	1.0	0.234	2.21	39.5	10.4	1.51	377	22.7	0.99	0.8	16.4	900	4.0
KM5954 TOWER T6.1 CON		11.40	0.18	0.7	0.221	2.17	61.6	8.9	1.51	260	23.8	0.26	0.4	18.6	680	3.0
KM5954 PORTAL T3.1 WASTE		16.55	0.05	0.8	0.057	1.03	6.4	10.1	1.89	636	2.39	3.28	1.4	10.3	710	2.8
KM5954 PORTAL T4.1 WASTE		18.15	0.05	1.0	0.071	1.05	7.1	11.1	1.87	636	1.90	3.27	1.5	10.8	730	2.8
KM5954 PORTAL T4.2 WASTE		19.60	0.08	1.1	0.401	0.91	24.2	9.0	2.24	679	9.85	1.94	1.4	13.2	860	2.5
KM5954 PORTAL T7.1 WASTE		18.50	<0.05	0.9	0.069	0.91	5.7	10.5	1.98	719	2.12	2.91	1.4	12.5	650	3.2
KM5954 PORTAL T8.1 WASTE		18.55	0.06	0.9	0.091	0.93	7.1	10.3	2.18	782	1.71	2.82	1.4	13.2	690	3.0
KM5954 PORTAL T3.1 CON		19.00	0.08	1.0	0.361	0.86	19.3	9.5	1.93	741	7.59	1.84	1.6	14.6	830	3.0
KM5954 PORTAL T4.2 CON		17.85	0.09	0.9	0.451	0.50	21.3	7.8	1.45	939	27.6	0.76	1.2	34.4	650	3.5
KM5954 PORTAL T7.1 CON		19.05	0.08	1.0	0.440	0.76	22.9	8.0	2.10	938	9.10	1.43	1.3	16.7	760	3.6
KM5954 PORTAL T8.1 CON		16.45	0.09	1.0	0.575	0.34	19.0	5.5	1.40	1390	12.75	0.58	1.1	34.4	840	4.9
KM5954 PORTAL FINES 1		17.50	0.06	1.0	0.129	1.12	12.6	11.2	1.75	555	5.46	2.81	1.5	11.7	670	9.4
KM5954 PORTAL FINES 2		17.95	0.06	1.0	0.135	1.08	15.0	11.7	1.75	554	6.81	2.83	1.6	11.9	670	8.0
KM5954 TOWER FINES 1		15.95	0.06	1.3	0.082	1.31	10.1	13.2	1.27	537	9.03	2.44	1.6	9.6	680	6.2
KM5954 TOWER FINES 2		15.35	0.06	1.3	0.077	1.35	11.2	12.6	1.31	544	8.52	2.47	1.5	9.0	710	23.3

***** See Appendix Page for comments regarding this certificate *****

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To: ALS METALLURGY, DIV OF ALS CANADA LTD
2957 BOWERS PL
KAMLOOPS BC V1S 1W5

Finalized Date: 1-NOV-2019
Account: KRL

Project: KM5954

CERTIFICATE OF ANALYSIS VA19260634

Sample Description / Method / Analyte / Units / LOD	ME-MS61 Rb ppm 0.1	ME-MS61 Re ppm 0.002	ME-MS61 S % 0.01	ME-MS61 Sb ppm 0.05	ME-MS61 Sc ppm 0.1	ME-MS61 Se ppm 1	ME-MS61 Sn ppm 0.2	ME-MS61 Sr ppm 0.2	ME-MS61 Ta ppm 0.05	ME-MS61 Te ppm 0.05	ME-MS61 Th ppm 0.01	ME-MS61 Ti % 0.005	ME-MS61 Tl ppm 0.02	ME-MS61 U ppm 0.1	ME-MS61 V ppm 1
KM5954 TOWER T1.1 WASTE	32.1	0.004	0.22	1.97	18.4	<1	0.8	220	0.16	0.06	1.53	0.381	0.24	1.2	114
KM5954 TOWER T2.1 WASTE	32.8	0.005	0.26	2.08	18.6	1	0.9	229	0.14	0.05	1.48	0.393	0.22	1.2	120
KM5954 TOWER T5.1 WASTE	29.9	0.006	0.28	2.25	19.6	1	0.8	244	0.14	0.07	1.53	0.382	0.19	1.2	124
KM5954 TOWER T6.1 WASTE	27.6	0.003	0.32	2.37	19.1	<1	0.8	258	0.13	0.06	1.34	0.383	0.19	1.1	119
KM5954 TOWER T1.1 CON	52.3	0.014	0.92	2.48	18.0	2	0.8	216	0.11	0.08	1.39	0.326	0.22	1.8	120
KM5954 TOWER T2.1 CON	57.0	0.011	1.31	2.14	15.0	1	0.8	178.0	0.09	0.08	1.34	0.263	0.21	2.3	111
KM5954 TOWER T5.1 CON	54.9	0.009	1.62	1.40	12.0	1	0.8	130.5	0.07	0.09	1.33	0.208	0.19	2.2	97
KM5954 TOWER T6.1 CON	47.7	0.009	1.68	0.97	6.8	1	0.6	71.0	<0.05	0.08	1.42	0.108	0.14	1.9	92
KM5954 PORTAL T3.1 WASTE	19.4	0.002	0.13	0.95	19.9	<1	0.6	476	0.11	<0.05	1.02	0.428	0.12	0.8	196
KM5954 PORTAL T4.1 WASTE	17.1	<0.002	0.13	1.13	22.1	<1	0.6	474	0.13	<0.05	1.04	0.426	0.14	0.9	199
KM5954 PORTAL T4.2 WASTE	27.5	0.008	0.40	2.92	21.2	1	0.7	461	0.13	<0.05	0.98	0.387	0.10	5.6	187
KM5954 PORTAL T7.1 WASTE	11.6	0.003	0.14	0.83	22.1	1	0.6	519	0.12	<0.05	0.93	0.416	0.13	0.8	203
KM5954 PORTAL T8.1 WASTE	12.7	0.003	0.14	0.98	23.2	<1	0.6	541	0.11	<0.05	0.90	0.428	0.13	1.1	211
KM5954 PORTAL T3.1 CON	27.2	0.005	0.68	2.71	20.1	1	0.8	413	0.13	0.06	0.98	0.377	0.10	4.5	179
KM5954 PORTAL T4.2 CON	15.7	0.012	2.77	2.53	13.4	3	0.8	293	0.09	0.17	1.36	0.264	0.06	4.5	150
KM5954 PORTAL T7.1 CON	24.3	0.006	0.69	2.61	18.2	1	0.8	410	0.10	0.07	0.82	0.337	0.09	5.3	163
KM5954 PORTAL T8.1 CON	9.7	0.010	3.04	2.39	10.7	3	0.9	140.5	0.08	0.16	0.74	0.209	0.04	4.9	120
KM5954 PORTAL FINES 1	33.3	0.003	0.29	1.75	19.9	1	0.7	433	0.13	<0.05	1.47	0.378	0.14	1.9	170
KM5954 PORTAL FINES 2	31.3	0.005	0.28	1.67	20.4	1	0.7	424	0.12	0.06	1.36	0.378	0.13	2.0	171
KM5954 TOWER FINES 1	35.4	0.004	0.37	2.02	18.9	1	0.8	208	0.12	0.08	1.50	0.348	0.20	1.5	113
KM5954 TOWER FINES 2	37.1	0.003	0.39	2.04	18.6	1	0.8	208	0.12	0.10	1.51	0.356	0.22	1.5	114

***** See Appendix Page for comments regarding this certificate *****

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To: ALS METALLURGY, DIV OF ALS CANADA LTD
2957 BOWERS PL
KAMLOOPS BC V1S 1W5

Finalized Date: 1-NOV-2019
Account: KRL

Project: KM5954

CERTIFICATE OF ANALYSIS VA19260634

Sample Description	Method Analyte Units LOD	ME-MS61 W ppm 0.1	ME-MS61 Y ppm 0.1	ME-MS61 Zn ppm 2	ME-MS61 Zr ppm 0.5	Cu-OG62 Cu % 0.001
KM5954 TOWER T1.1 WASTE		1.5	17.8	46	43.2	
KM5954 TOWER T2.1 WASTE		1.4	18.3	47	42.9	
KM5954 TOWER T5.1 WASTE		1.4	18.9	51	36.9	
KM5954 TOWER T6.1 WASTE		2.2	17.9	49	37.5	
KM5954 TOWER T1.1 CON		7.7	18.0	43	40.8	
KM5954 TOWER T2.1 CON		17.2	15.6	42	37.5	1.225
KM5954 TOWER T5.1 CON		29.4	12.5	33	35.2	1.635
KM5954 TOWER T6.1 CON		34.3	6.0	27	22.1	1.910
KM5954 PORTAL T3.1 WASTE		0.7	14.6	50	20.2	
KM5954 PORTAL T4.1 WASTE		0.8	15.6	49	23.6	
KM5954 PORTAL T4.2 WASTE		2.5	25.1	36	23.8	
KM5954 PORTAL T7.1 WASTE		0.8	14.5	57	22.8	
KM5954 PORTAL T8.1 WASTE		0.7	15.5	58	22.0	
KM5954 PORTAL T3.1 CON		3.9	24.0	35	26.1	
KM5954 PORTAL T4.2 CON		7.8	21.2	26	25.5	1.260
KM5954 PORTAL T7.1 CON		4.5	24.6	38	28.0	
KM5954 PORTAL T8.1 CON		5.6	23.3	27	30.2	1.375
KM5954 PORTAL FINES 1		2.7	17.6	46	26.3	
KM5954 PORTAL FINES 2		2.5	17.8	47	25.5	
KM5954 TOWER FINES 1		5.1	20.5	46	44.1	
KM5954 TOWER FINES 2		5.3	19.8	46	42.8	

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CERTIFICATE OF ANALYSIS VA19260634

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

REE's may not be totally soluble in this method.

Applies to Method: ME-MS61

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:

Cu-OG62	DISP-01	LOG-24	ME-MS61
ME-OG62	WEI-21		

MASS BALANCE AND PICTURES

Sorting of
Copper ore

Client:	Nicola Mining
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Deposit / Project:	Craigmont Mine
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Document History	**Name**	**Date**	**Sign**
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TOMRA SORTING SOLUTIONS | MINING

CONTENT

1 TEST RESULTS (SUMMARY)

Test	Sample	particle size	sensor	Input [kg]	Product [kg]	Waste [kg]	Yield [%]	Capacity [tph]
Test 1.1	Tower	-1"+1/2"	XRT	126,0	25,5	100,5	20,24	33
Test 2.1	Tower	-1"+1/2"	XRT	180,2	21,2	159,0	11,76	33
Test 3.1	Portal	-1"+1/2"	XRT	175,0	25,5	149,5	14,57	33
Test 4.1	Portal	-1"+1/2"	XRT	159,1	21,1	138,0	13,26	33
Test 4.2*	Portal	-1"+1/2"	XRT	21,1	8,3	12,8	39,34	n.a.
Test 5.1	Tower	-2"+1"	XRT	184,6	28,6	156,0	15,49	74
Test 6.1	Tower	-2"+1"	XRT	108,6	11,1	97,5	10,22	74
Test 7.1	Portal	-2"+1"	XRT	272,3	40,8	231,5	14,98	74
Test 8.1	Portal	-2"+1"	XRT	228,6	12,1	216,5	5,29	74

*Test 4.2: Feed Product of Test 4.1 (cleaning step)

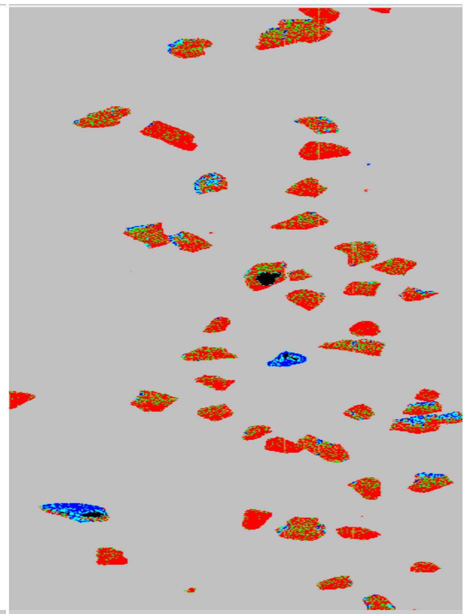
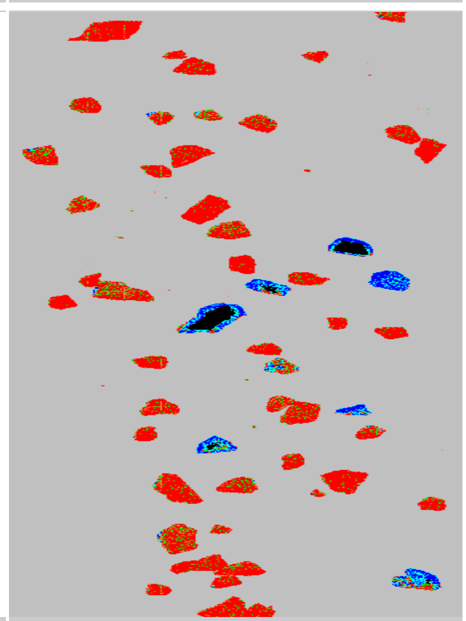
2 TEST PROCEDURE AND RESULTS

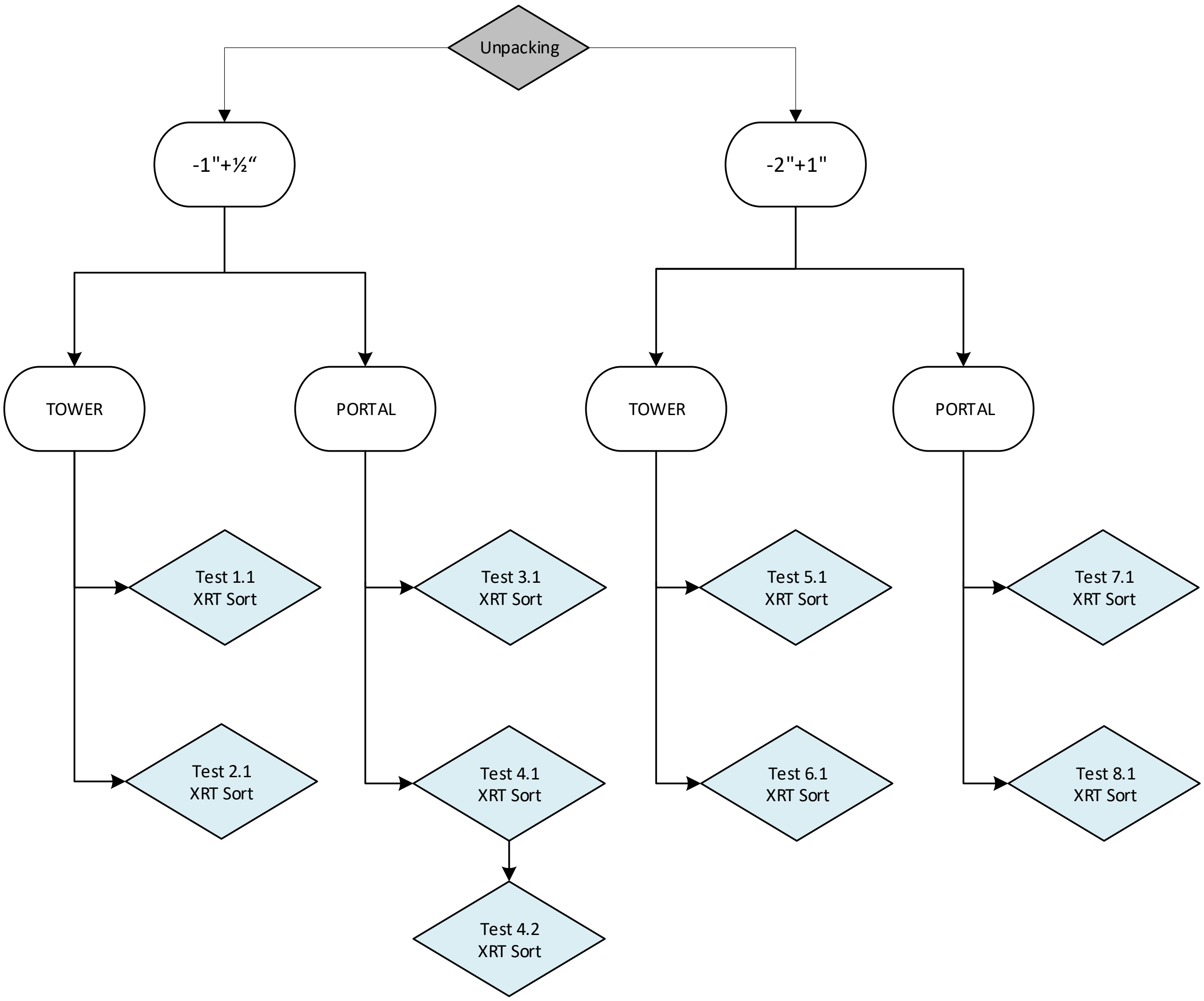
The selected sensing technique for this material is the X-ray transmission (XRT) sensor because of the expected differences in atomic density of the copper-bearing particles and host rock material. The sorter used for the test work documented in this report was TOMRA's COM Tertiary XRT. The sorter is described in detail in chapter 4.

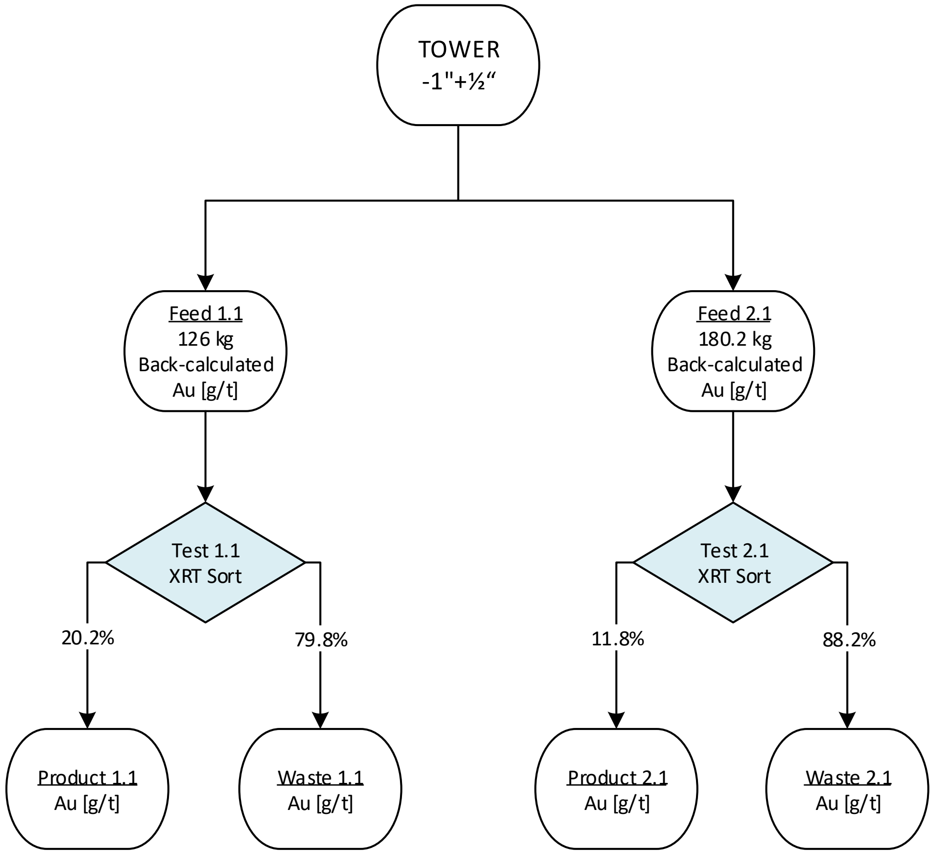
In order to investigate the separability, the sorter is trained, the software parameterized, and images were taken of the sample set.

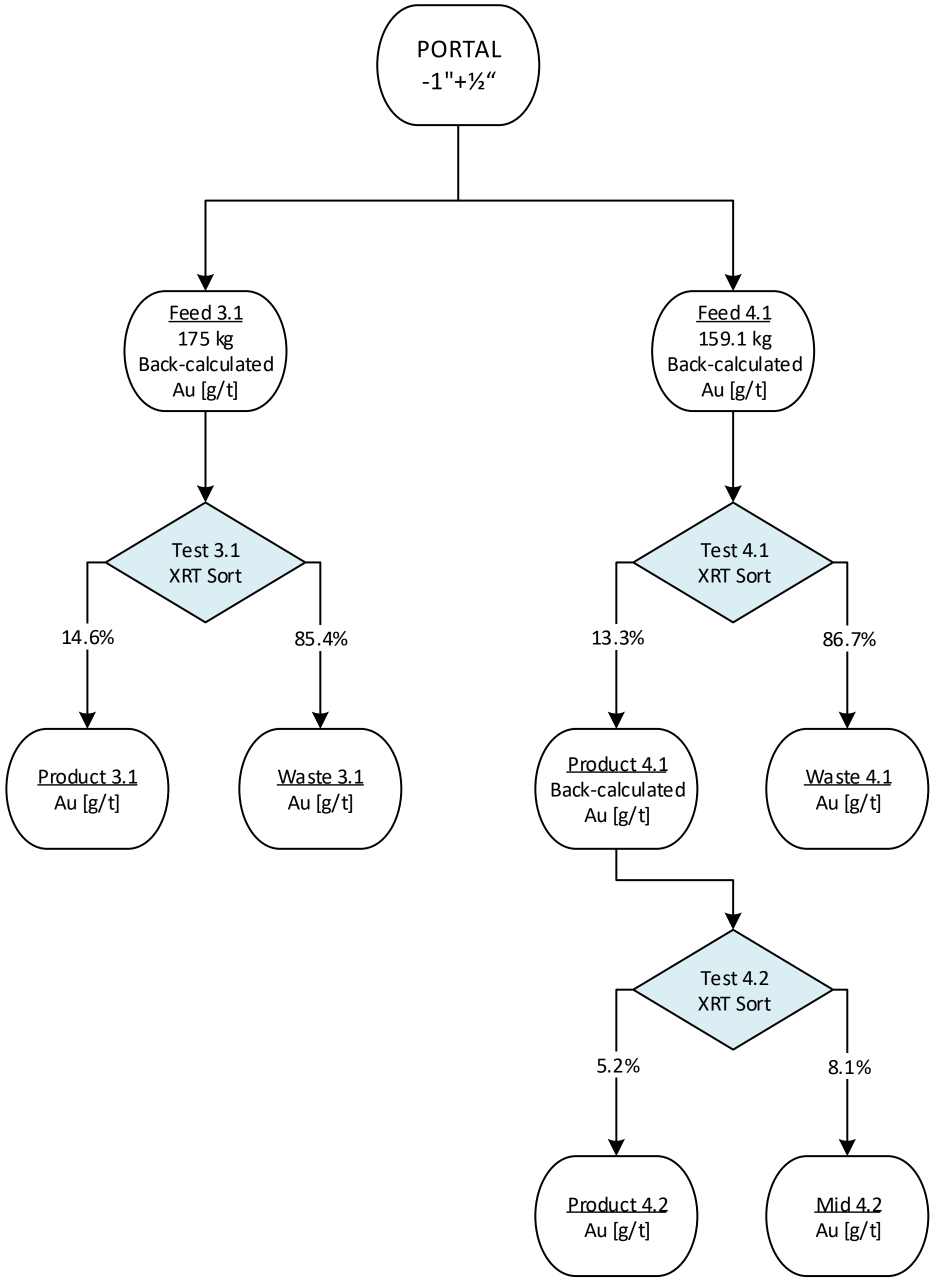
For the training of the COM Tertiary XRT, samples were exposed to high energy X-rays, and the resultant image was captured by the sensor. The X-ray sensor signal depends on atomic density and thickness of the material and relays information about the internal composition of the particles. Examples of raw and processed sensor images collected are shown in the figures below. For images recorded with the COM Tertiary XRT, TOMRA´s image-processing software is used to classify changes in the intensity of the X-ray passing through the samples as either high atomic density or low atomic density. Note that, because the sorter is tailored to the material being tested, the terms high atomic density and low atomic density are used in a relative context. The different selected color classes (colored pixels) are then assessed as a percentage of the single rock area. This percentage is used as the parameter to determine and set the sorting cut.

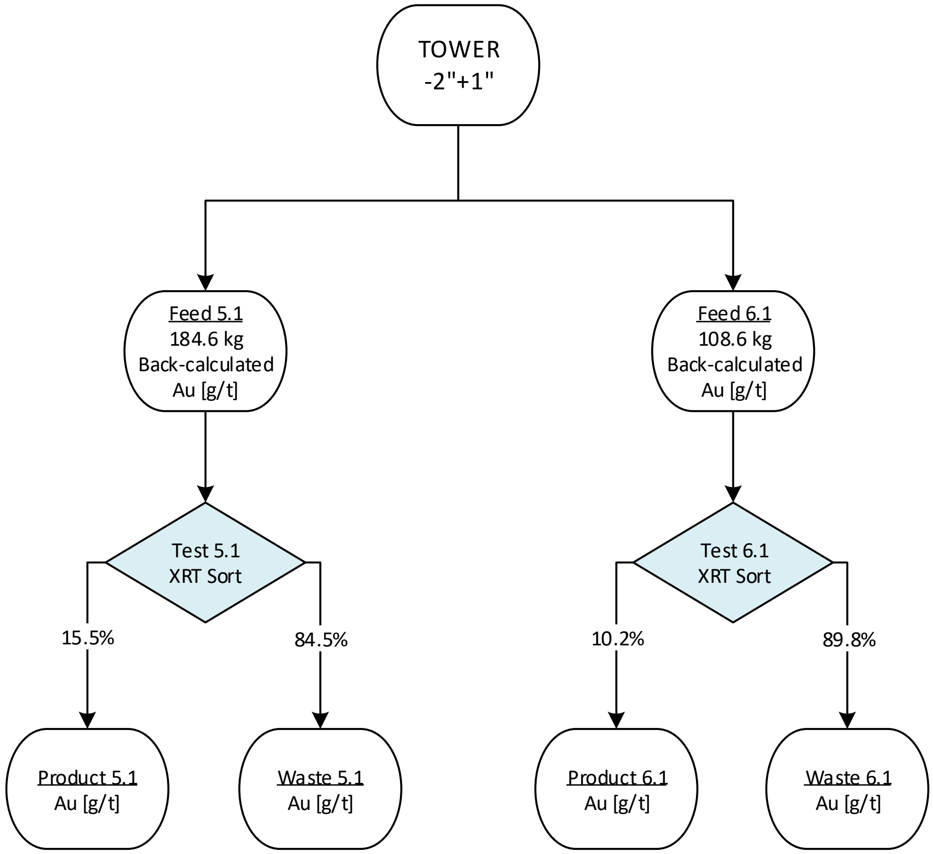
Classification scheme XRT Dual:	Given colors
Low atomic density (Waste)	Red & green
High atomic density (Product)	Blue & black
Background	Grey

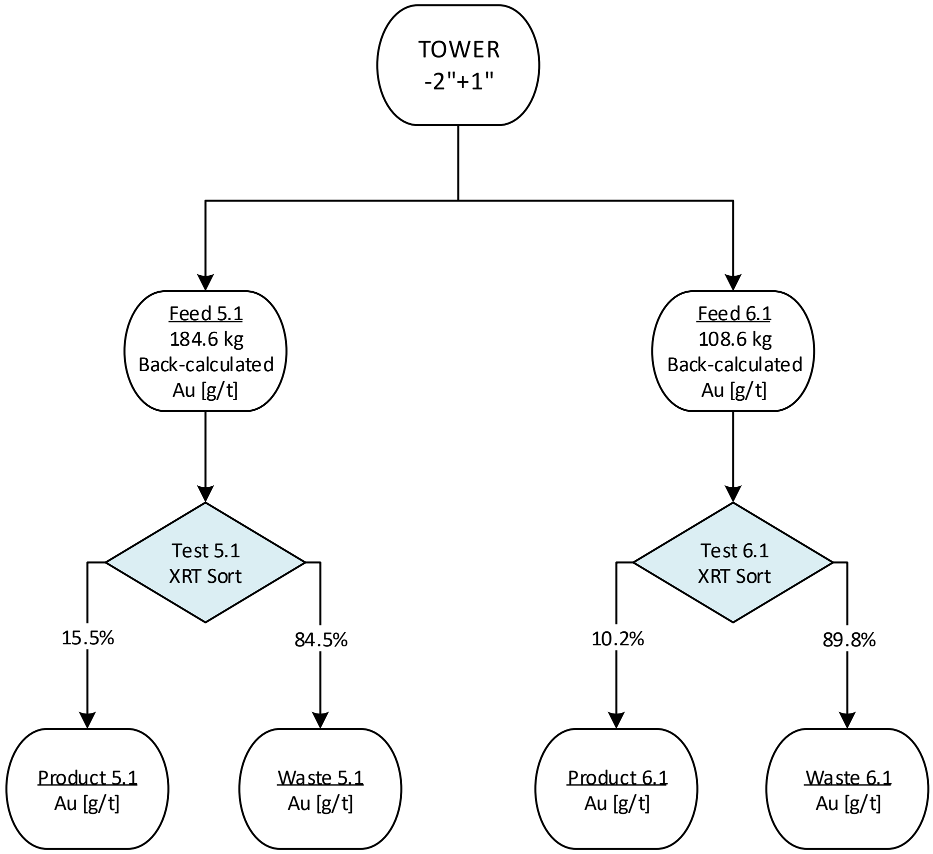
Sample 1	Raw XRT Dual image	Processed XRT Dual image
Sample PORTAL -2”+1”		
Sample TOWER -2”+1”		


Unpacking
-1"+½"
-2"+1"
TOWER
PORTAL
TOWER
PORTAL
Test 1.1
XRT Sort
Test 2.1
XRT Sort
Test 3.1
XRT Sort
Test 4.1
XRT Sort
Test 4.2
XRT Sort
Test 5.1
XRT Sort
Test 6.1
XRT Sort
Test 7.1
XRT Sort
Test 8.1
XRT Sort

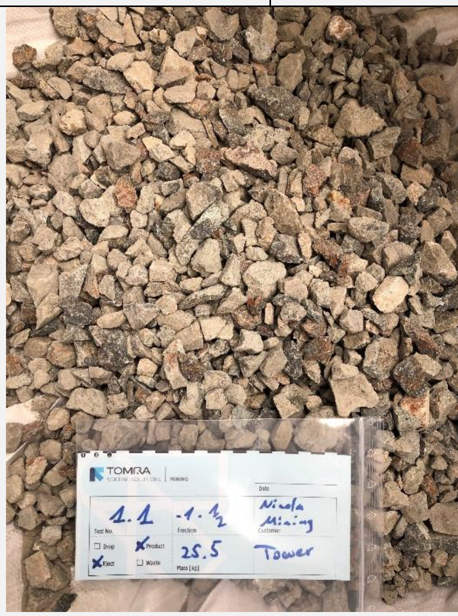
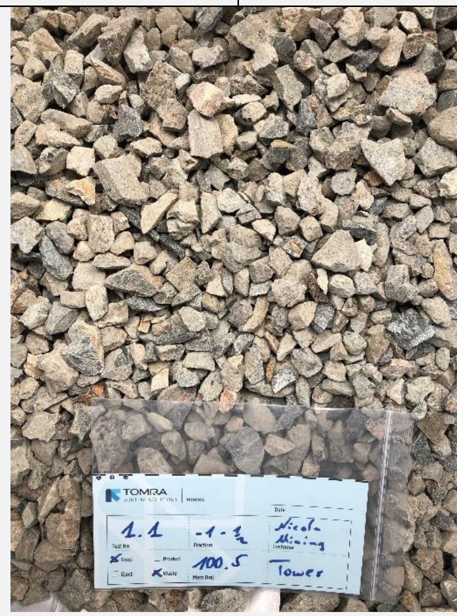

TOWER
-1"+½"
Feed 1.1
126 kg
Back-calculated
Au [g/t]
Feed 2.1
180.2 kg
Back-calculated
Au [g/t]
Test 1.1
XRT Sort
Test 2.1
XRT Sort
20.2%
79.8%
11.8%
88.2%
Product 1.1
Au [g/t]
Waste 1.1
Au [g/t]
Product 2.1
Au [g/t]
Waste 2.1
Au [g/t]

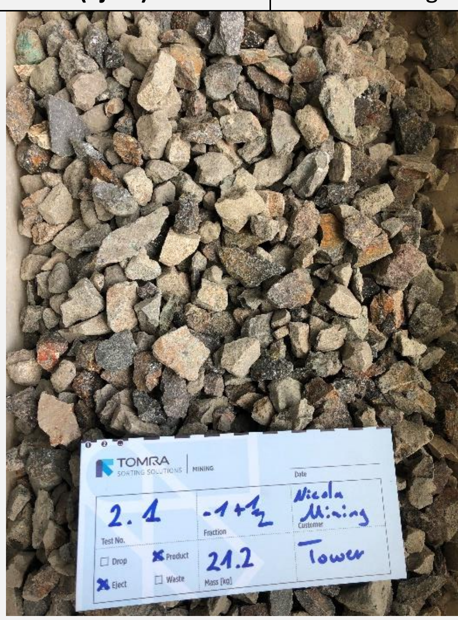
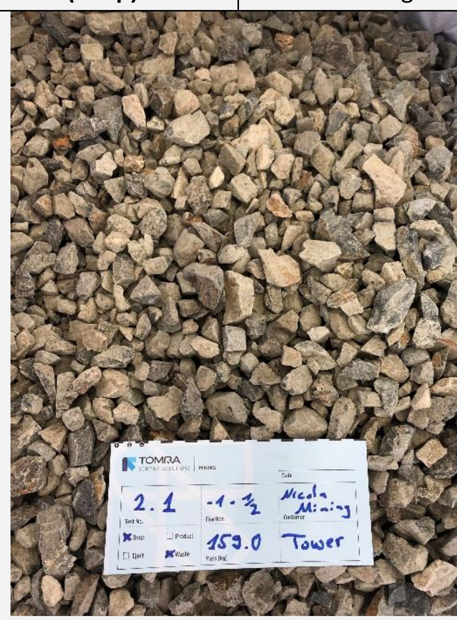

PORTAL
-1"+½"
Feed 3.1
175 kg
Back-calculated
Au [g/t]
Feed 4.1
159.1 kg
Back-calculated
Au [g/t]
Test 3.1
XRT Sort
Test 4.1
XRT Sort
14.6%
85.4%
13.3%
86.7%
Product 3.1
Au [g/t]
Waste 3.1
Au [g/t]
Product 4.1
Back-calculated
Au [g/t]
Waste 4.1
Au [g/t]
Test 4.2
XRT Sort
5.2%
8.1%
Product 4.2
Au [g/t]
Mid 4.2
Au [g/t]


TOWER
-2"+1"
Feed 5.1
184.6 kg
Back-calculated
Au [g/t]
Feed 6.1
108.6 kg
Back-calculated
Au [g/t]
Test 5.1
XRT Sort
Test 6.1
XRT Sort
15.5%
84.5%
10.2%
89.8%
Product 5.1
Au [g/t]
Waste 5.1
Au [g/t]
Product 6.1
Au [g/t]
Waste 6.1
Au [g/t]

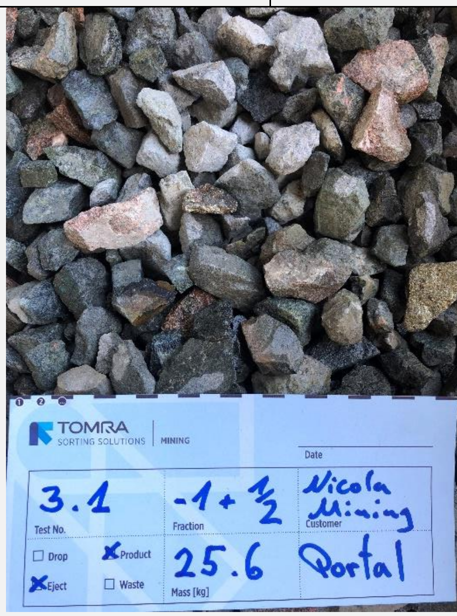

TOWER
-2"+1"
Feed 5.1
184.6 kg
Back-calculated
Au [g/t]
Feed 6.1
108.6 kg
Back-calculated
Au [g/t]
Test 5.1
XRT Sort
Test 6.1
XRT Sort
15.5%
84.5%
10.2%
89.8%
Product 5.1
Au [g/t]
Waste 5.1
Au [g/t]
Product 6.1
Au [g/t]
Waste 6.1
Au [g/t]

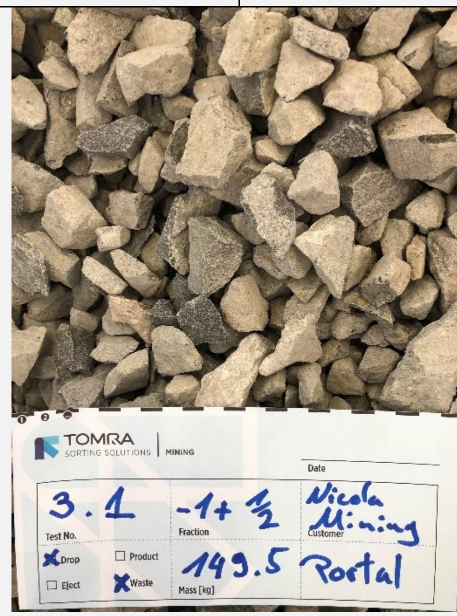
3 Sorted Images

Test 1.1	Sample TOWER		
Size: -1"+1/2"	Setting: Set 1	Capacity [tph]: 33	Air pressure [bar]: 6
Product 1.1 (Eject)	Mass: 25.5 kg	**Waste 1.1 (Drop)**	Mass: 100.5 kg
			

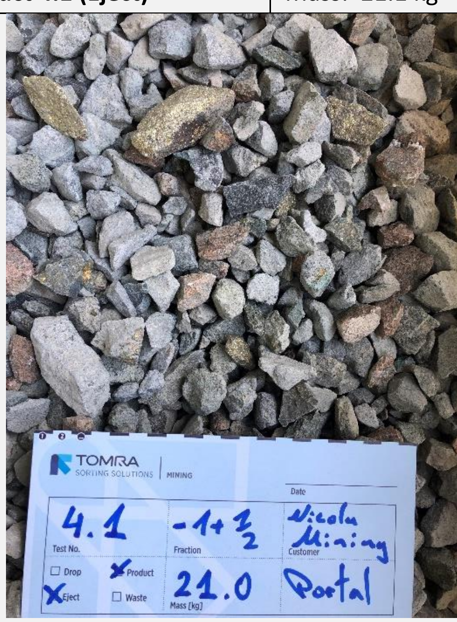
Test 2.1	Sample TOWER		
Size: -1"+1/2"	Setting: Set 2	Capacity [tph]: 33	Air pressure [bar]: 6
Product 2.1 (Eject)	Mass: 21.2 kg	**Waste 2.1 (Drop)**	Mass: 159.0 kg
			

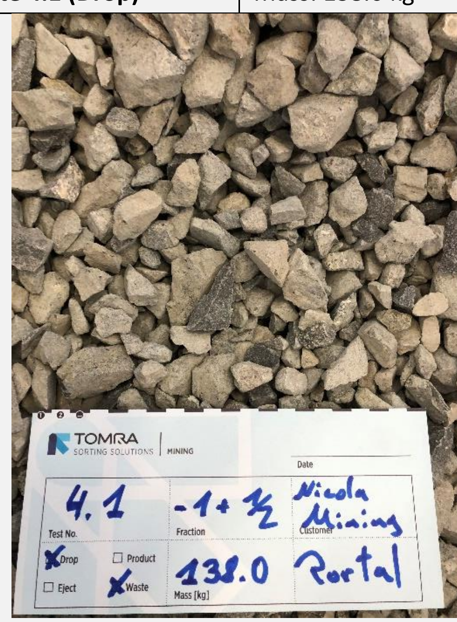
Test 3.1	Sample PORTAL		
Size: -1”+1/2”	Setting: Set 1	Capacity [tph]: 33	Air pressure [bar]: 6
Product 3.1 (Eject)	Mass: 25.5 kg	**Waste 3.1 (Drop)**	Mass: 149.5 kg



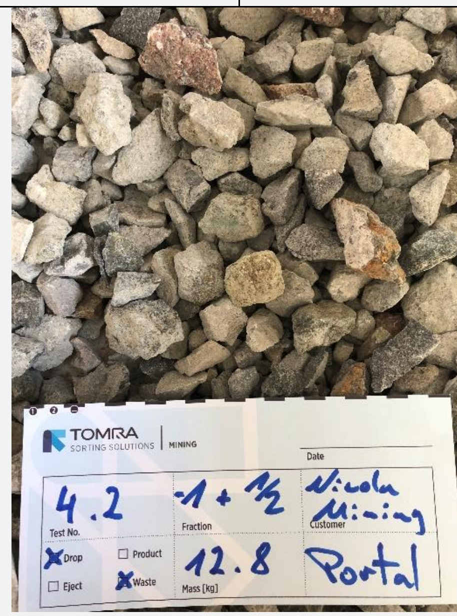


Test 4.1	Sample PORTAL		
Size: -1”+1/2”	Setting: Set 2	Capacity [tph]: 33	Air pressure [bar]: 6
Product 4.1 (Eject)	Mass: 21.1 kg	**Waste 4.1 (Drop)**	Mass: 138.0 kg

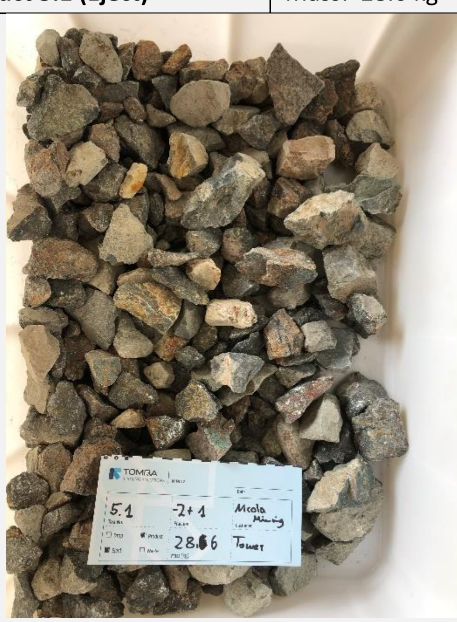




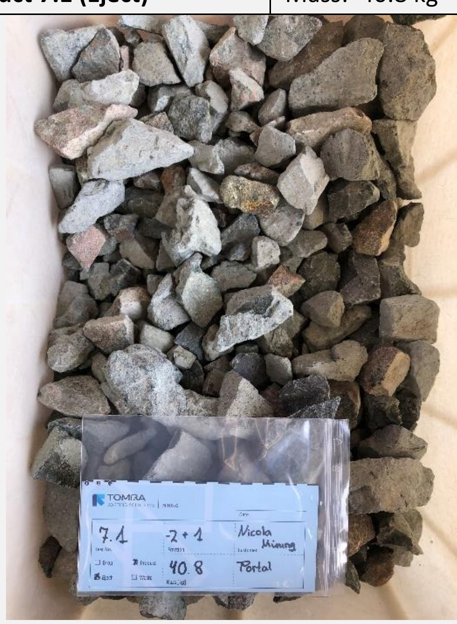
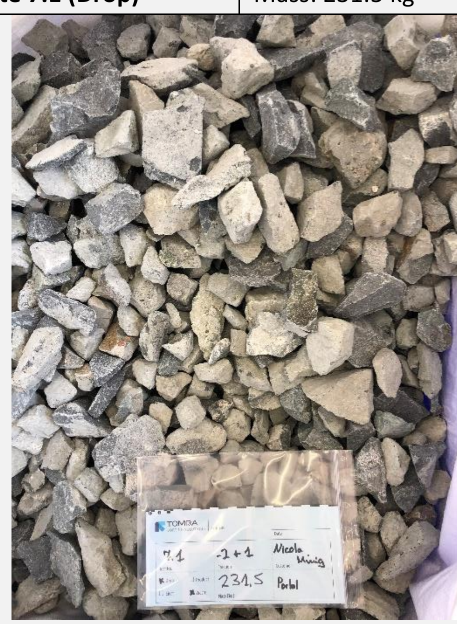
Test 4.2 – Feed Product 4.1	Sample PORTAL		
Size: -1”+1/2”	Setting: set 3-cleaner	Capacity [tph]: n.a.	Air pressure [bar]: 6
Product 4.2 (Eject)	Mass: 8.3 kg	**Waste 4.2 (Drop)**	Mass: 12.8 kg

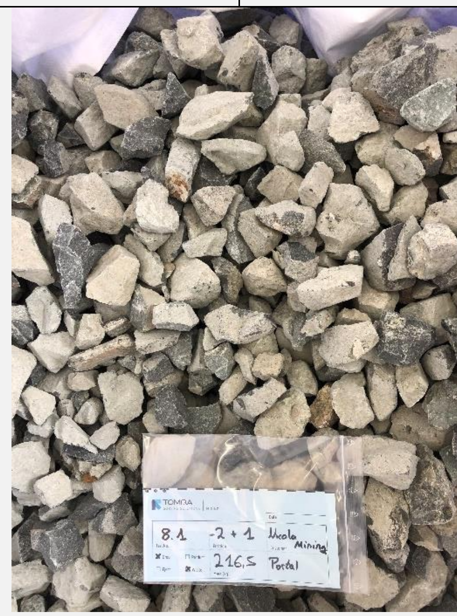


Test 5.1	Sample TOWER		
Size: -2”+1”	Setting: Set 1	Capacity [tph]: 74	Air pressure [bar]: 7
Product 5.1 (Eject)	Mass: 28.6 kg	**Waste 5.1 (Drop)**	Mass: 156.0 kg



Test 6.1	Sample TOWER		
Size: -2"+1"	Setting: Set 2	Capacity [tph]: 74	Air pressure [bar]: 7
Product 6.1 (Eject)	Mass: 11.1 kg	**Waste 6.1 (Drop)**	Mass: 97.5 kg
			

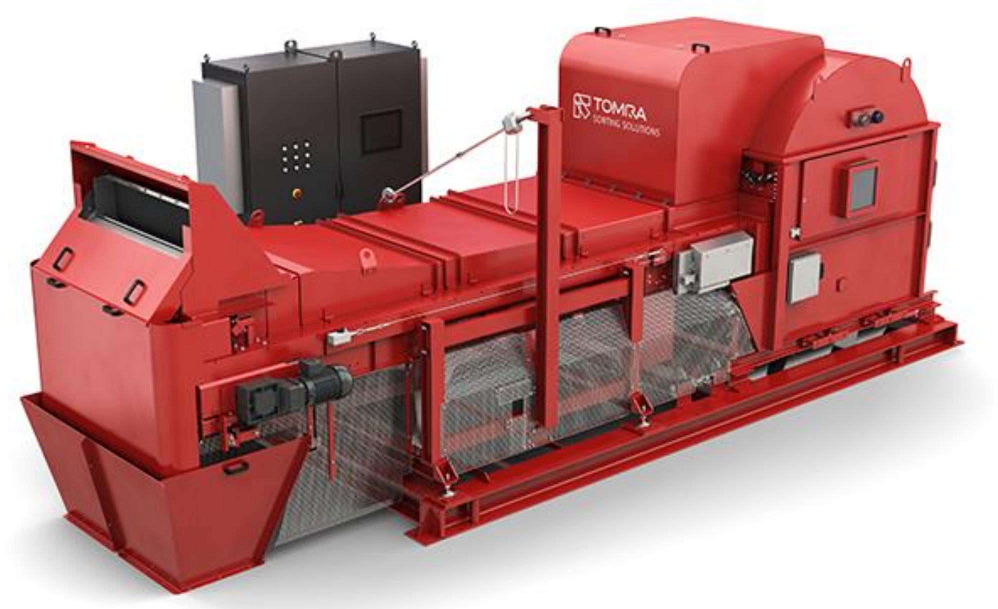
Test 7.1	Sample PORTAL		
Size: -2"+1"	Setting: Set 1	Capacity [tph]: 74	Air pressure [bar]: 7
Product 7.1 (Eject)	Mass: 40.8 kg	**Waste 7.1 (Drop)**	Mass: 231.5 kg
			

Test 8.1	Sample PORTAL		
Size: -2”+1”	Setting: Set 2	Capacity [tph]: 74	Air pressure [bar]: 7
Product 8.1 (Eject)	Mass: 12.1 kg	**Waste 8.1 (Drop)**	Mass: 216.5 kg
			

4 TEST EQUIPMENT

COM Tertiary XRT

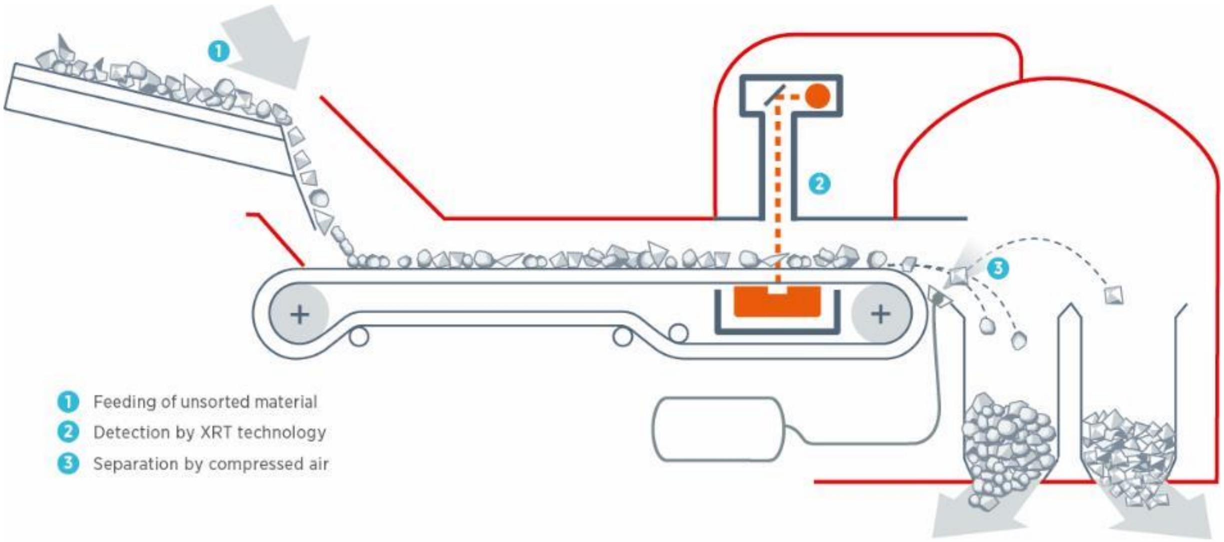
The COM (common belt) series sorting equipment covers the range of applications which require a belt feeding system. The belt principle allows the presentation of a non-uniform feed. The particles can stabilize on the belt before they are scanned by the sensor(s). This principle also allows for a higher surface moisture in the tertiary size range.



The X-ray transmission technology enables materials to be recognized and separated based on their specific atomic density. This technology makes it possible to obtain a high purity level in sorting materials irrespective of moisture or surface pollution level.

The COM Tertiary XRT uses an electric X-ray tube and a highly sensitive, cutting-edge X-ray camera with DUOLINE® sensor technology - using two independent sensor lines with different spectral sensitivities. Data supplied by this camera is processed using TOMRA Sorting's proprietary high-speed X-ray processing unit. The system is able to identify the atomic density of the material – regardless of its thickness.

The machine can be quickly optimized for the required sorting tasks by the selection of sorting programs and sensitivity adjustments. The next figure shows the functional principle of the COM Tertiary XRT.



Input material (1) is evenly fed via a screen feeder or vibration feeder over a transition chute (both not shown) onto a conveyor belt. An electric X-ray tube (2) creates a broad-band radiation. This radiation penetrates the material and provides spectral absorption information that is measured with an X-ray camera using DUOLINE® sensor technology. The resulting sensor information is then processed to provide a detailed "density image" of the material allowing it to be separated into high and low-density fractions. If the sensor detects material to be sorted out, it commands the control unit to open the appropriate valves of the ejection module at the end of the conveyor belt (3). The detected materials are separated from the material flow by jets of compressed air. The sorted material is divided into two fractions in the separation chamber.

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