Sample Preparation and Analysis: Rocklands Project Samples at SGS Laboratories, Townsville

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Principally Based on TerraSearch Pty Ltd Report CUCO2007003;

Report on Sample Preparations and Geochemical Analytical Procedures Carried out at SGS Laboratories, Townsville on Samples from Rocklands Project For Cudeco Limited, June 2007

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LIMITED CUDECO
THE NEW FORCE IN COPPER

EXECUTIVE SUMMARY

This report documents how Cudeco's samples are analysed at the SGS Townsville laboratory as at October, 2009. The report shows that Cudeco's samples are being handled in an appropriate industry standard way.

The Rocklands Project presents a particular analytical challenge in relation to the treatment of high grade nuggety native copper bearing samples. It is difficult to obtain a representative sample of a rock containing coarse native copper because it is difficult to crush without smearing. This can result in a misrepresentation of large particles, even in a crushed and ground sample.

Five analytical procedures are in place to handle Cudeco's drilling samples:

Standard resource sample with no identified native copper, analysis for Cu, Co, Au – Suite 1. Dry, crush, split, pulverise, 1g sub-sample, 3-acid digest, AAS finish (AAS22D).

Sample with fine native copper noted, analysis for Cu, Co, Au – Suite 2. Dry, crush, split, pulverise, 20g sub-sample, 3-acid digest, AAS finish (AAS40G).

Exploration and bedrock drilling samples, multi-element analysis – Suite 3. Dry, crush, split, pulverise, 1g sub-sample, 4-acid digest, ICP finish (ICP40Q).

Samples containing coarse grained nuggety native copper – Suite 4B. The sample is treated as a bulk sample. Analysis is in two parts with as much native copper as possible separated and analysed in one part, and the residual material pulverised and analysed according to the Suite 2 schedule. The total amount of copper in the sample is then calculated by addition of the copper results from the two components. Sample is crushed in a Rolls crusher, followed by disc grinding with visual hand picking of coarse native copper at both stages. The native copper is cleaned and weighed. The residual material (less the coarse native copper) is analysed, and the total copper content obtained by addition. The Suite 4B procedure has the advantage of being a non-destructive method in terms of the native copper material.

Standard resource sample with no identified native copper, analysis for Cu, Co, As, Zn, S, U, V and Au – Suite 5. Dry, crush, split, pulverise, 1g sub-sample, 3-acid digest, ICP finish (ICP22D).

This report documents the steps in the analytical procedures for the above Suites in terms of flow charts, text and relevant photos.

These procedures require critical delineation by geologists before sample submission so the samples can be batched appropriately and instructions issued for the lab. In addition, the personnel in sample dispatch have to be sufficiently trained to appreciate how important it is to subdivide the samples. Skill level and geological support has to be increased to ensure that samples are analysed by the most appropriate and meaningful procedure.

Because each procedure is basically irreversible at some stage in sample preparation, particularly in regard to native copper bearing samples, the report also demonstrates how important the subdivision into the various categories is at the sample dispatch stage when they leave Cudeco's site.

Contents

1 Suite 1 : Resource Samples With No Identified Native Copper

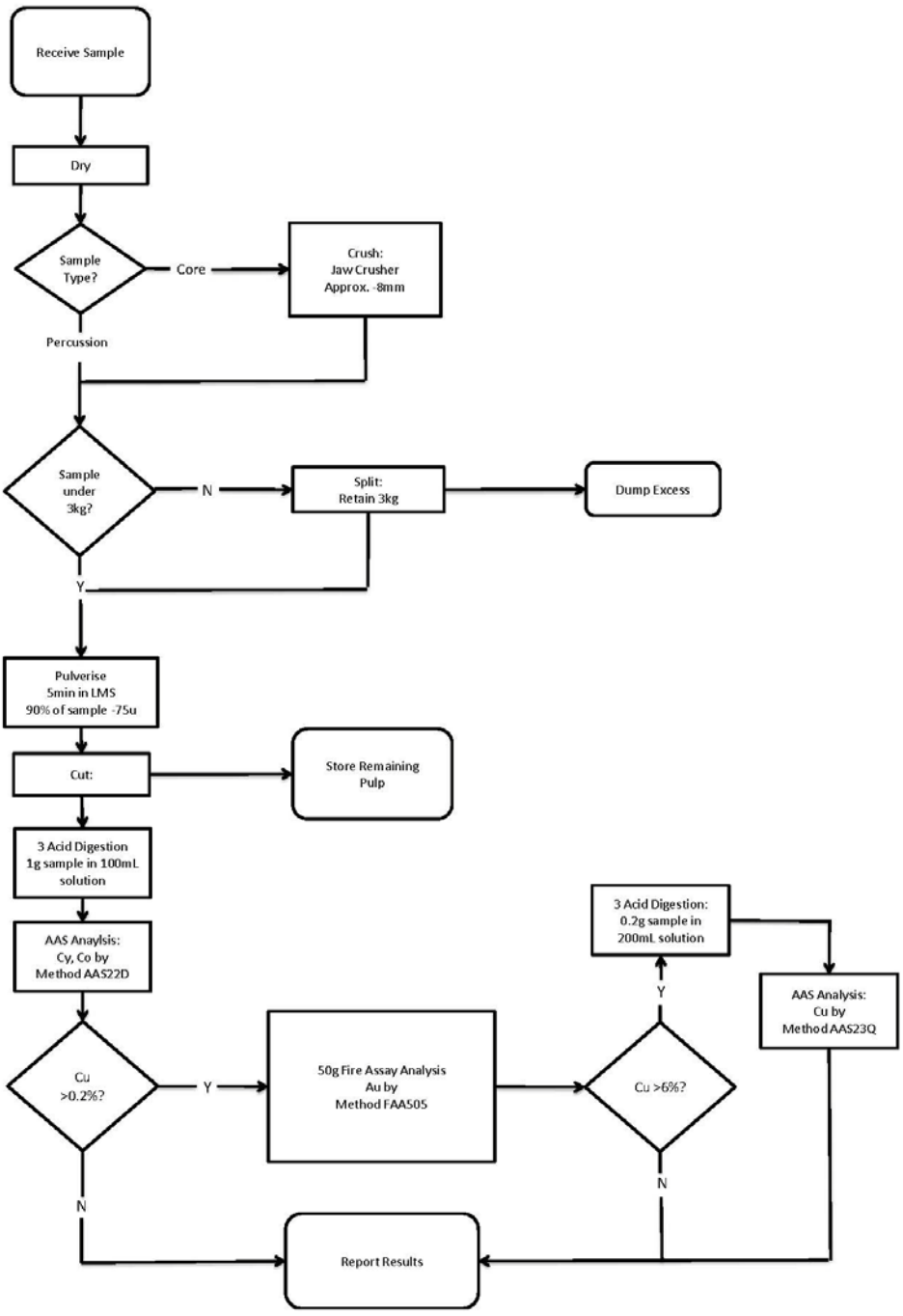

Figure 1 Flowchart for Suite 1 analyses. Resource samples with no identified native copper

1.1 Suite 1: Sample Preparation

Cudeco submits two major types of drill samples to SGS: (1) Percussion and (2) Core. The main difference between the two sample types is that percussion samples are crushed during the drilling phase by the hammer bit. This happens with both reverse circulation and open hole percussion drilling, with the majority of the sample being crushed to less than 1015mm.

On the other hand, core samples are submitted to the lab as whole sections of 1020cm of solid quarter or half core. Core samples therefore require crushing to <10mm when the samples arrive at the lab. After the crush stage, both core and percussion samples undergo exactly the same preparation and analytical procedures.

1.1.1 Stage 1: Sample Labelling and Drying

Samples arrive at the lab in bulker bags usually batched as particular holes. Client Sample numbers are assigned to the storage media for the various sub-samples to be produced during the preparation and analysis: e.g. Plastic bag to store bulk sample after pulverisation, Kraft envelope to store 150g sub-sample of pulverised powder for analysis. The lab job is assigned at this stage. Samples are then dried - see Figure 2. Percussion samples are left in their calico bags and placed in ovens at approx 60ºC. Core samples are taken out of calico bags and placed in aluminium trays.

Figure 2 Samples Drying in Oven

1.1.2 Stage 2: Crush

Core samples are crushed in a continuous feed jaw crusher to less than 6-8mm - see Figure 3.

Figure 3 Jaw crusher for core samples.

1.1.3 Stage 3: Split

If total crushed sample of percussion chips or core is greater the 3kg, sample is split down to < 3kg by running through a riffle splitter

1.1.4 Stage 4: Pulverise

Crushed sample of percussion chips or crushed core are loaded into LM5 grinding mills and pulverised to a powder: i.e. where 90% of sample is <75µm. The LM5 consists of a tungsten carbide bowl and large 20cm diameter puck. It is clamped down and sample ground for approximately 5 minutes: see Figure 4 and 5. Each unit is fitted with a suction cleaner.

The capacity of the LM5 is 3kg. In most programs it is desirable for the sample to be <3kg so it can fit into an LM5 without the need for the sample to be split.

The sample is well mixed at this stage. A 150g sub sample is cut out and retained for analysis. The remaining pulverised sample is scooped out of bowl and stored. Any excess is sucked out with the suction cleaner. The bowl is cleaned with quartz wash between batches.

It is not cleaned with quartz wash within a batch unless there is a specific request.

Figure 4 Sample after pulverising in LM5 tungsten carbide mill. Bowl & puck shown.

Figure 5 Sample clamped during pulverising in LM5 tungsten carbide mill.

1.2 Suite 1: AAS Analysis and Fire Assay

1.2.1 Stage 5: Three-Acid Digest of 1g Sub-Sample

A 1g sub-sample is extracted and weighed from the 150g analytical powder. This sample is made up in a test tube to 100ml with a 3-acid solution of aqua regia (HCl, HNO3 mixture 3:1) and perchloric acid - see Figure 6 and 7.

Figure 6 Sample digesting with 3-acid mixture of aqua regia and perchloric acid.

Figure 7 Copper rich samples digesting with 3-acid mixture of aqua regia and perchloric acid. 1g sample made up to 100ml.

The three-acid digest is a vigorous analysis for sulphide and carbonate material. This acid mix does not digest silicates. Detection ranges for the AAS determination are between 0.01% and 6% Cu. High grade copper samples that assay over-range are analysed by method AAS23Q. In these samples, less powder is used and this is made up to a larger volume so that the concentration of copper in solution is able to be read. In analysis AAS23Q, 0.2g of sample is made up to 200ml of solution.

Stage 6: AAS Determination

The digested solution is read by means of Atomic Absorption Spectrometry - see Figure 8.

In the case of a standard Suite 1 sample, this method is AAS22D for Cu, Co. High grade samples (>6% Cu) are re-analysed for Cu by method AAS23Q.

Figure 8 AAS instrument. SGS Laboratory, Townsville. Used for Cu and Co determinations.

1.2.2 Stage 7: Fire Assay Determination for Au.

In Suite 1, for samples which return a copper assay over 0.5%, Au is also determined by a 50 gram fire assay – Method FAA505.

The sample is weighed with fluxes which include litharge PbO, sodium carbonate, silica, borax, and a reducing or oxidation agent. This mixture is fused in an oven, see Figure 9.

A lead button is produced from fusion stage, this is subjected to cupellation which oxidizes the lead which migrates into the porous ceramic pot and leaves a precious metal prill which has been previously

loaded with Ag to ensure all the Au is extracted (Figure 10). The Au content of the prill is determined after digestion with aqua regia and analysis by AAS. The total Au content of the sample is then calculated with reference to the original sample weight.

Figure 9 Ceramic pots loaded with 50g sample and flux ready for firing.

Figure 10 Precious metal prill in ceramic pot after fusion and cupellation of lead button, ready for acid digest and AAS determination.

2 Suite 2: Samples Containing Finely Disseminated Native Copper

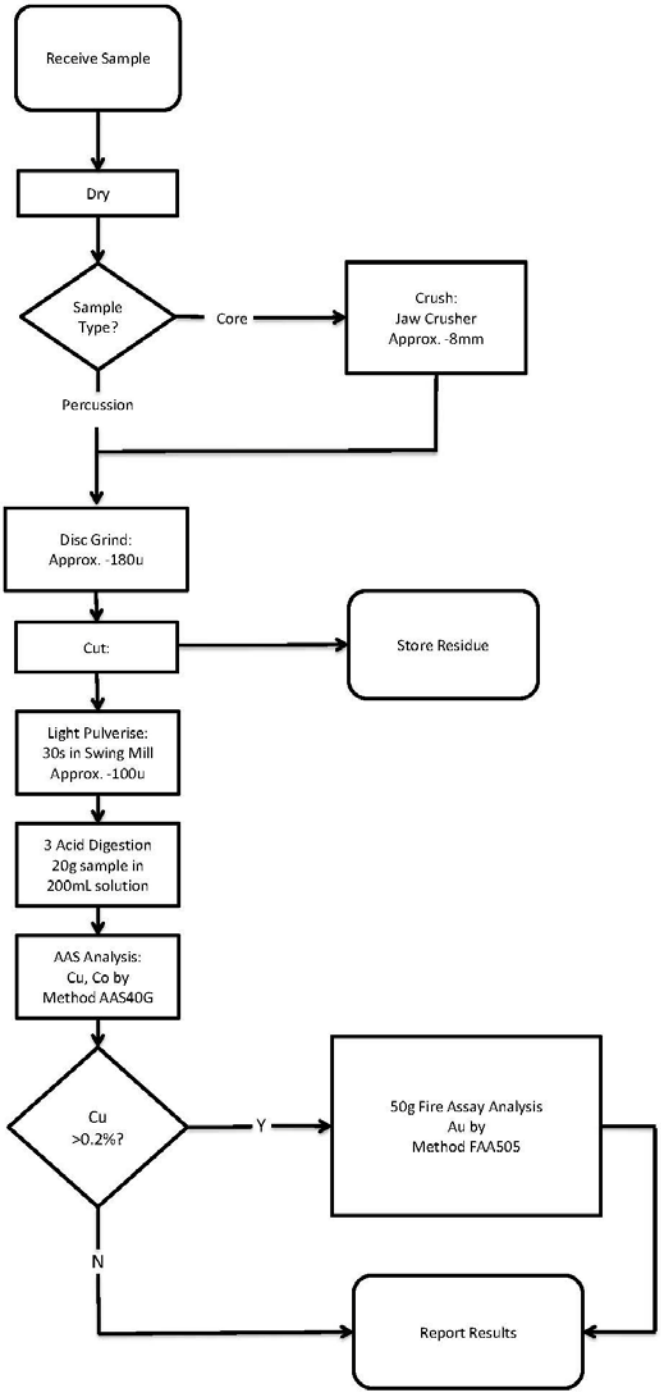

Figure 11 Flowchart for Suite 2 analyses. Samples containing finely disseminated native copper.

2.1 Suite 2: Sample Preparation.

2.1.1 Stage 1: Sample Labelling and Drying

This stage is similar to Suite 1. The lab job is assigned at this stage. Samples are then dried - see Figure 2. Percussion samples are left in their calico bags and placed in ovens at approximately 60ºC. Core samples are taken out of calico bags and placed in aluminium trays.

2.1.2 Stage 2: Crush

This stage is similar to Suite 1. Core samples are crushed in a continuous feed jaw crusher to less than 6-8mm - see Figure 3.

2.1.3 Stage 3: Disc Grind

Crushed sample of percussion chips or crushed core are fed through continuous feed disc grinder and the sample is crushed to approximately 180µm - see Figure 12.

Figure 12 Continuous feed disc grinder. The vertical plates are brought together to crush the sample.

2.1.4 Stage 4: Split

The total crushed sample is split down to a sub-sample of 500g with the bulk residue retained for storage.

2.1.5 Stage 5: Pulverise in Grinding Mill

500g of crushed sample is placed in a tungsten carbide swing mill and lightly pulverised for

30 seconds – see Figure 13. The resulting powder is in the order of 75 to 100µm.

Figure 13 Tungsten carbide swing mill - capacity 500g.

2.2 Suite 2: AAS Analysis and Fire Assay

2.2.1 Stage 6: Three-Acid Digest of 20g Sub-Sample

A 20g sub sample is extracted and weighed from the 500g analytical powder. This sample is made up in a beaker to 200ml with a 3-acid solution of aqua regia (HCl, HNO3 mixture 3:1) and perchloric acid, and then heated on a stove in a fume cupboard - see Figure 14.

Figure 14 Digestion of Suite 2 samples (fine disseminated native copper). 20 gram of sample digested with 3-acid digest (aqua regia and perchloric), made up to 200ml in beaker, heated on stove.

The three-acid digest is a vigorous analysis for sulphide and carbonate material. This acid mix does not digest silicates.

2.2.2 Stage 7: AAS Determination

The digested solution is read by means of Atomic Absorption Spectrometry - see Figure 8.

In the case of standard Suite 2 sample, this method is AAS40G for Cu, Co.

2.2.3 Stage 8: Fire Assay Determination for Au

In Suite 2, for samples which return a copper assay over 0.5%, Au is also determined by 50 gram fire assay – Method FAA505.

Analysis is similar to Suite 1 above.

3 3. SUITE 3: EXPLORATION AND BEDROCK SAMPLES SUBMITTED FOR MULTI-ELEMENT ANALYSIS.

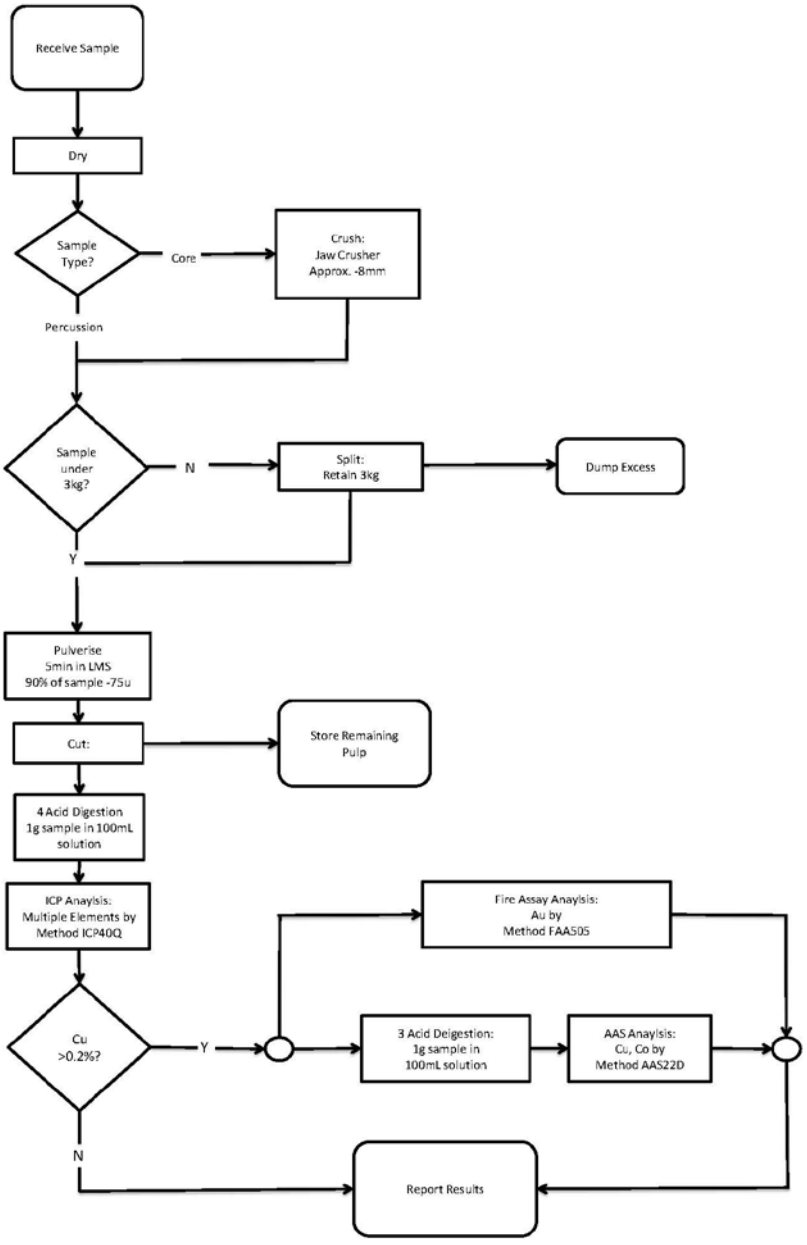

Figure 15 Flowchart for Suite 3 analysis. Diamond core, exploration and bedrock samples submitted for multi-element analysis.

3.1 Suite 3: Sample Preparation

3.1.1 Stage 1: Sample Labelling and Drying

This stage is similar to Suite 1. The lab job is assigned at this stage. Samples are then dried - see Figure 2. Percussion samples are left in their calico bags and placed in ovens at approximately 60ºC. Core samples are taken out of calico bags and placed in aluminium trays.

3.1.2 Stage 2: Crush

This stage is similar to Suite 1. Core samples are crushed in a continuous feed jaw crusher to less than 6-8mm - see Figure 5.

3.1.3 Stage 3: Split

This stage is similar to Suite 1. If total crushed sample of percussion chips or core is greater the 3kg, sample is split down to <3kg by running through a riffle splitter.

3.1.4 Stage 4: Pulverise

This stage is similar to Suite 1. Crushed sample of percussion chips or crushed core are loaded into LM5 grinding mills and pulverised to a powder: i.e. where 90% of sample is <75µm. The LM5 consists of a tungsten carbide bowl and large 20cm diameter puck. It is clamped down and sample ground for approximately 5 minutes: see Figure 4 and Figure 5. Each unit is fitted with a suction cleaner. The capacity of the LM5 is 3kg. In most programs it is desirable for the sample to be <3kg so it can fit into an LM5 without the need for the sample to be split.

The sample is well mixed at this stage. A 150g sub-sample is cut out and retained for analysis. The remaining pulverised sample is scooped out of bowl and stored. Any excess is sucked out with the suction cleaner. The bowl is cleaned with quartz wash between batches.

It is not cleaned with quartz wash within a batch unless there is a specific request.

3.2 Suite 3: ICP Analysis and Fire Assay

3.2.1 Stage 5: Four-Acid Digest of 1g Sub-Sample

A 1g sub-sample is extracted and weighed from the 150g analytical powder. This sample is made up in a test tube to 100ml with a 4-acid solution of aqua regia (HCl, HNO3 mixture 3:1), perchloric and hydrofluoric acid - see Figure 6 andFigure 7.

The four acid digest is a vigorous analysis for almost all rock materials. The addition of hydrofluoric acid means that silicates are digested. Detection ranges for the ICP determination are up to 10000 ppm (1%) for Cu. Cudeco samples that return Cu >0.5%, are re-analysed for Cu, Co by AAS method AAS22D.

3.2.2 Stage 6: ICP Determination

The digested solution is read by means of Inductively Coupled Plasma Atomic Emission Spectroscopy - see Figure 16. In the case of multi-element analysis for Suite 3 samples, this method is ICP40Q for the following elements:

List of Elements Analysed by Method ICP40Q Lower Detection Limit (ppm) Upper Detection Limit (ppm)							
Ag 1 100	Al 100 400000	As 5 10000	Bi 10 10000	Ca 50 400000	Co 5 10000	Cu 5 10000	Fe 100 1000000
K 100 200000	La 5 10000	Mg 20 400000	Mn 10 40000	Mo 10 10000	Na 50 200000	Ni 5 20000	Pb 5 5000
S 50 50000	Sb 5 5000	Th 10 10000	Ti 10 10000	V 2 10000	Zn 5 10000	Zr 5 10000	U 100 10000

As in Suite 1, all samples with greater than 0.5% Cu are analysed for Cu, Co by AAS22D, and Au by FAA505.

Figure 16 ICP system set up and reading solutions in test tubes.

Figure 17 SGS Chief Chemist/Laboratory Manager Russell Larsen in ICP control room at console with standards on shelves.

The multi-element suite is read as a spectrum from the ICP, continuously calibrated against internal standards and monitored by the Chief Chemist – see Figure 17. The ICP unit in Townsville is SGS' primary instrument for ICP analysis in Eastern Australia.

4 Suite 4B: High Grade Samples Containing Coarse Nuggets Of Native Copper

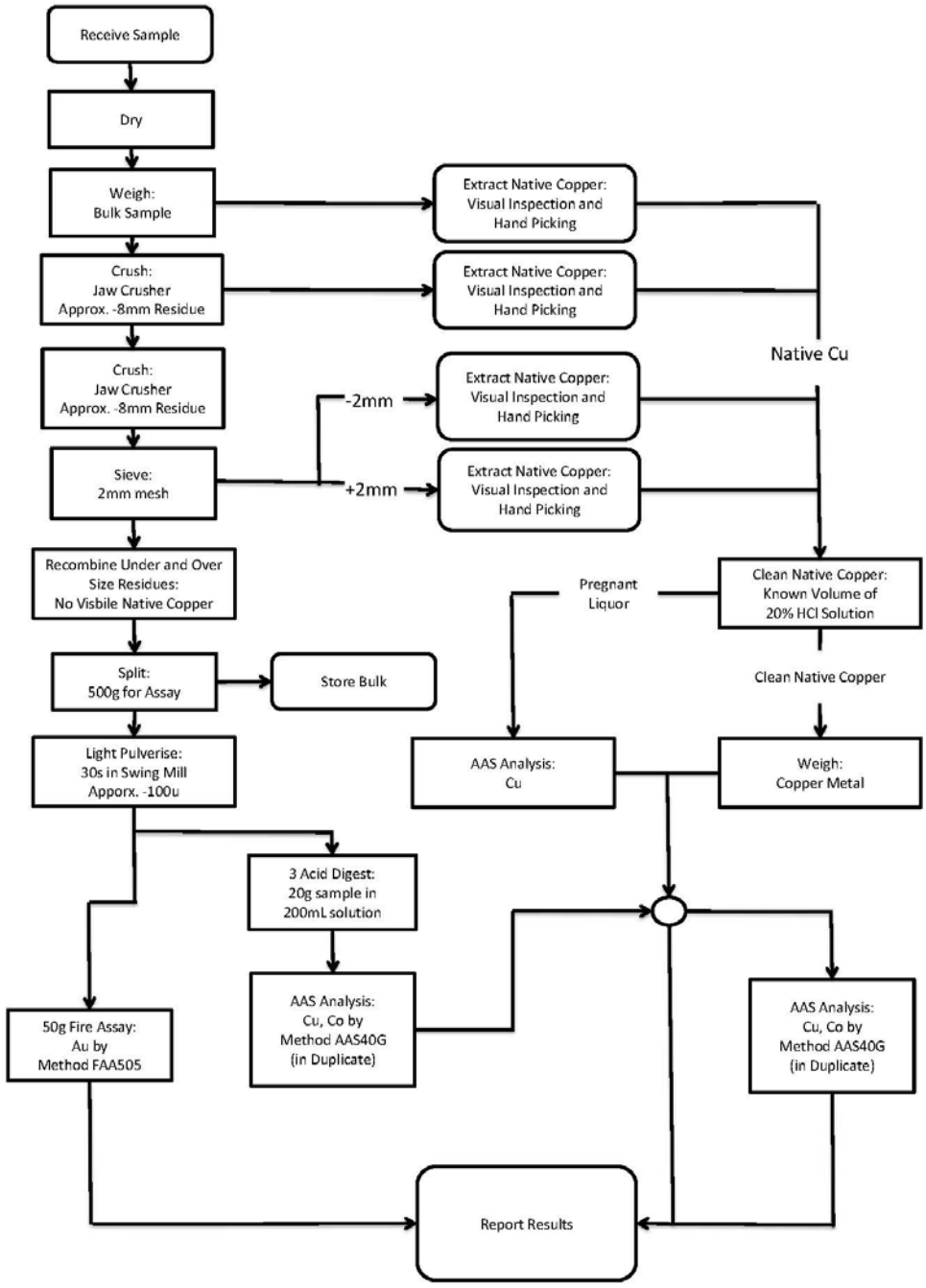

Figure 18 Flowchart for Suite 4B analyses. High grade samples containing coarse nuggets of native copper.

Some of the Rocklands project samples contain significant amounts of coarse native copper; see for example Figure 19 and Figure **20**. These are the samples that require special treatment as it is very difficult to obtain an accurate copper analysis by conventional methods, as applied in Suites 1 to 3.

Figure 19 Coarse nuggety native copper from LMDH007, 49-50m.

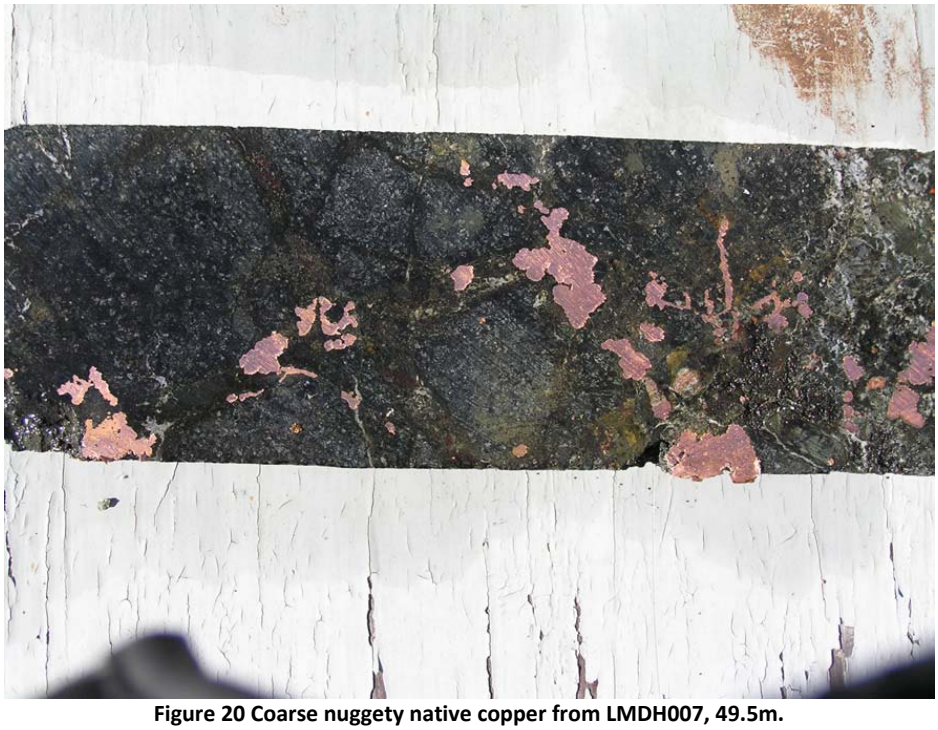

Figure 20 Coarse nuggety native copper from LMDH007, 49.5m.

4.1 Suite 4A: Previous Treatment of Nuggety Native Copper Samples; Total Acid Digest of Native Copper, AAS Analysis of Pregnant Liquor and Residue

SGS felt initially that digesting as much as possible of the coarse native copper with acid would produce the most accurate analysis. This prolonged acid dissolution was successfully utilized on three quarter core samples from LMDH007. Figure 21 is a flow chart for this method, the original Suite 4A. Samples were reported as: (1) weight of original sample, (2) weight % of copper metal in pregnant liquor by AAS analysis, (3) copper content weight % from AAS40G analysis of residue, and (4) calculated copper

content obtained by addition of (2) and (3). Although the total digestion approach of Suite 4A produced satisfactory results, they are not likely to be any more accurate than the now preferred Suite 4B method (rolls crush/hand picking native copper). It would also take up to a month longer for the sample to digest. Another possible alternative procedure is smelting, however given the requirement of a very high temperature furnace, it does not appear feasible in any sort of practical sense in North Queensland.

Both the above alternatives will cost a lot more, if not being prohibitively more expensive, than the preferred Suite 4B method (rolls crush/hand picking native copper). An additional advantage of the Suite 4B method is that it is non-destructive in terms of the native copper extracted from the crushed samples.

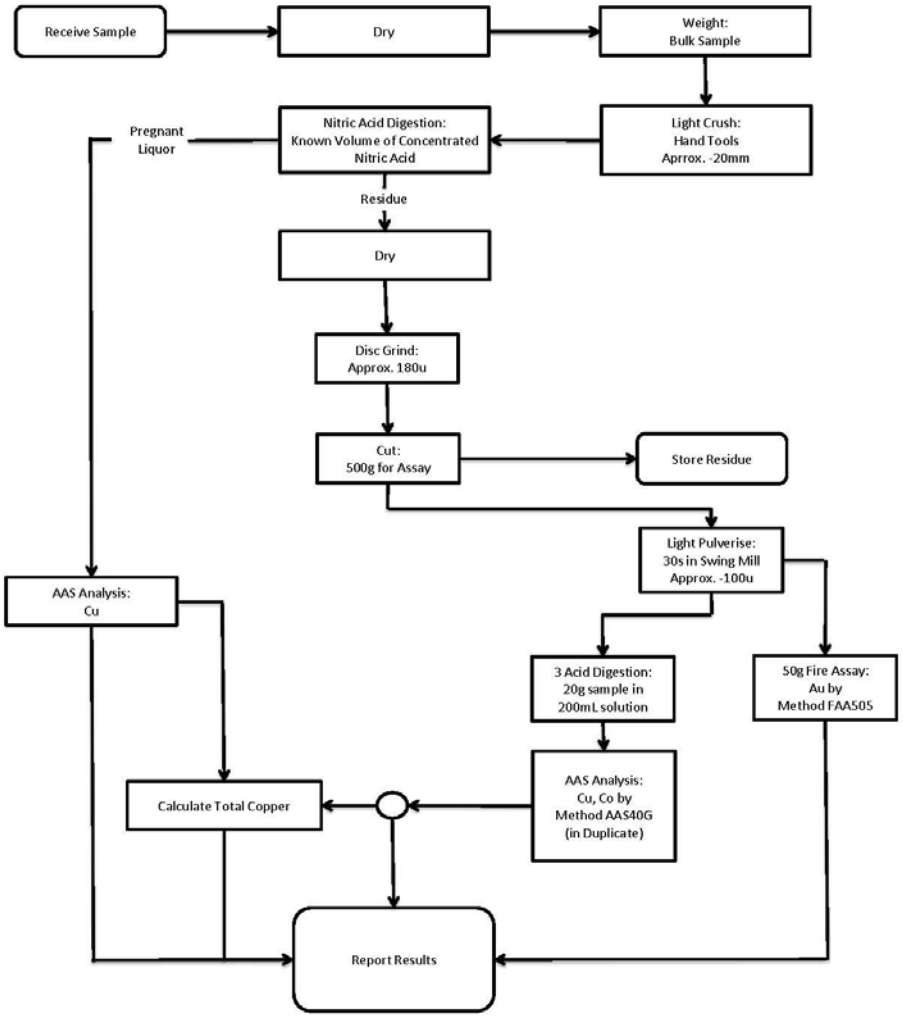

Figure 21 Flowchart for Suite 4A Analyses. Previous procedure utilized for samples containing coarse nuggety native copper.

4.2 Suite 4B: Sample Preparation, Separation of Nuggety Native Copper and Residue Material, Analysis of Native Copper Component

4.2.1 Stage 1: Sample Labelling and Drying

This stage is similar to Suite 1. The lab job is assigned at this stage. Samples are then dried - see Figure 2. Percussion samples are left in their calico bags and placed in ovens at approximately 60ºC. Core samples are taken out of calico bags and placed in aluminium trays.

4.2.2 Stage 2: Weighing Of Bulk Sample

The total sample as submitted is weighed after drying. This is an important step as it will ultimately determine the accuracy of the copper analysis.

4.2.3 Stage 3: Visual Inspection and Hand Picking of Coarse Native Copper

The submitted sample is inspected and any loose coarse native copper is hand picked and stored in Kraft envelope.

4.2.4 Stage 4: Crush

This stage is similar to Suite 1. Core samples are crushed in a continuous feed jaw crusher. Particle size is less than 6-8mm - see Figure 3.

4.2.5 Stage 5: Visual Inspection and Hand Picking of Coarse Native Copper

The jaw crushed sample is inspected and any loose coarse native copper is hand picked and stored in Kraft envelope.

4.2.6 Stage 6: Rolls Crusher

Crushed sample of percussion chips or crushed core are fed through a continuous feed rolls crusher and the sample is crushed to approx 2-3mm – see Figure 22. The rolls crusher will flatten coarse native copper nuggets without smearing them on the crushing machinery.

Figure 22 Feeding hopper for rolls crusher. Rollers crush sample to less than 2-3mm.

4.2.7 Stage 7: Sieving (2mm)

The crushed sample from the Rolls Crusher is passed through a 2mm sieve.

4.2.8 Stage 8: Visual Inspection of -2mm Fines, Hand Picking Of Coarse Native Copper

The fines that have passed through a 2mm sieve are visually inspected for native copper.

Any native copper is added to the Kraft envelope. The remaining fine residue is retained for Suite 2 analysis.

Stage 9: Visual Inspection of +2mm Fraction, Hand Picking Of Coarse Native Copper

The +2mm sample is inspected and any loose coarse native copper is hand picked and added to the Kraft envelope. The remainder of the +2mm sample is added to the -2mm residue sample. The native copper still requires cleaning and contains minor amounts of adhered material. Figure 23 and 20 are examples of the amount of native copper obtained from a 1m quarter core sample in highly mineralized zones.

Figure 23 Coarse nuggety native copper hand picked from 1m quarter core; LMDH007, 72-73m

Figure 24 Coarse nuggety native copper hand picked from 1m quarter core; LMDH007, 54-55m.

4.2.9 Stage 10: Cleaning of Hand Picked Coarse Native Copper with Dilute (20%) Hydrochloric Acid

The hand picked coarse native copper is cleaned in a beaker with dilute (20%) hydrochloric acid. Figure 25 shows the cleaning process underway. Figure 26 shows the cleaned sample.

4.2.10 Stage 11: Analysis of Pregnant Liquor after Cleaning of Native Copper.

A copper determination is obtained from the pregnant liquor after cleaning the native copper in a beaker – see Figure 25. The wash can contain copper from other copper minerals present. Nitric Acid is added to the wash and slime material to digest any fine copper that has broken away from the bulk, and the copper content quantified by AAS.

Figure 25 Cleaning of native copper in a beaker with dilute (20%) hydrochloric acid.

Figure 26 Cleaned native copper.

4.2.11 Stage 12: Weighing of Cleaned Native Copper

The cleaned native copper is weighed to obtain the weight of coarse nuggety native copper in the sample. This weight is added to the copper content obtained from the weight percent in residue and the weight percent in the pregnant liquor.

4.2.12 Stage 13: Split Residue

The total crushed residue sample (now containing no visible native copper) is split down to a sub-sample of 500g, with the bulk residue retained for storage.

4.2.13 Stage 14: Pulverise Residue in Grinding Mill

The 500g of residue sample is placed in a tungsten carbide swing mill and lightly pulverised for 30 seconds – see Figure 13. The resulting powder is in the order of 75-100µm.

4.3 Suite 4B: AAS Analysis and Fire Assay of Residue

4.3.1 Stage 15: Three-Acid Digest of 20g Sub-Sample of Residue

A 20g sub sample is extracted and weighed from the 500g analytical powder. This sample is made up in a beaker to 200ml with a 3-acid solution of aqua regia (HCl, HNO3 mixture 3:1) and perchloric acid, then heated on a stove in a fume cupboard - see Figure 7.

4.3.2 Stage 16: AAS Determination of Residue

The digested solution is read by means of Atomic Absorption Spectrometry - see Figure 8. In the case of Suite 4B sample, this method is AAS40G for Cu, Co. This is carried out in duplicate in order to test the homogeneity of the residue fraction. This will indicate how effective removing the coarse native copper was on homogenising the residue fraction.

4.3.3 Stage 17: Fire Assay Determination of Residue for Au

In Suite 4B, Au is determined by 50 gram fire assay – Method FAA505.

Analysis is similar to Suite 1 above.

4.3.4 Stage 18: Calculation of Total Copper

The weight percent copper determined from the AAS analysis of the residue represents the amount of copper in the original sample less the amount of native copper that had been extracted from the sample during handpicking. The total copper content can be calculated from the weight of copper metal, weight of copper in residue which has been analysed by AAS40G and the copper taken up in solution during the acid washing of the copper metal.

5 Suite 5: Resource Samples With No Identified Native Copper

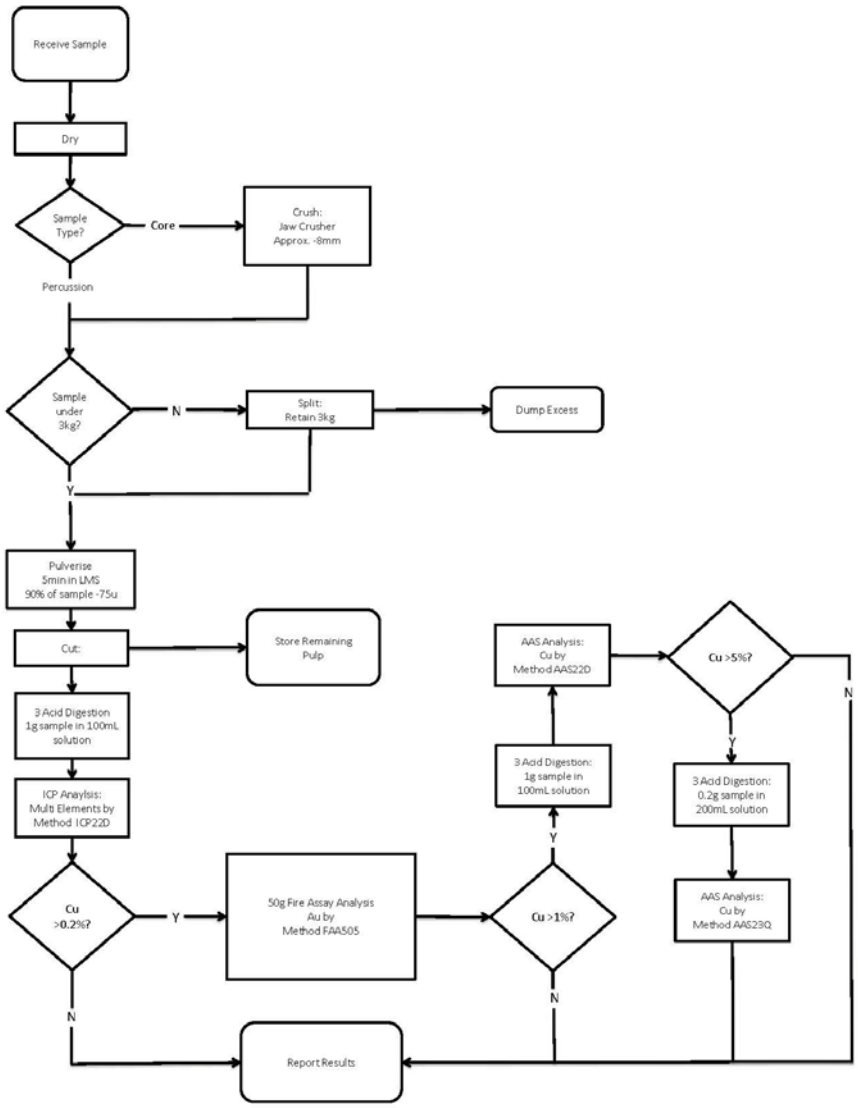

Figure 27 Flowchart for Suite 5 analyses. Samples that do not contain native copper.

5.1 Suite 5: Sample Preparation

Cudeco submits two major types of drill samples to SGS: (1) Percussion and (2) Core. The main difference between the two sample types is that percussion samples are crushed during the drilling

phase by the hammer bit. This happens with both reverse circulation and open hole percussion drilling, with the majority of the sample being crushed to less than 1015mm.

On the other hand, core samples are submitted to the lab as whole sections of 1020cm of solid quarter or half core. Core samples therefore require crushing to <10mm when the samples arrive at the lab. After the crush stage, both core and percussion samples undergo exactly the same preparation and analytical procedures.

5.1.1 Stage 1: Sample Labelling and Drying

Samples arrive at the lab in bulker bags usually batched as particular holes. Client Sample numbers are assigned to the storage media for the various sub-samples to be produced during the preparation and analysis: e.g. Plastic bag to store bulk sample after pulverisation, Kraft envelope to store 150g sub-sample of pulverised powder for analysis. The lab job is assigned at this stage. Samples are then dried - see Figure 2. Percussion samples are left in their calico bags and placed in ovens at approx 60ºC. Core samples are taken out of calico bags and placed in aluminium trays.

5.1.2 Stage 2: Crush

Core samples are crushed in a continuous feed jaw crusher to less than 6-8mm - see Figure 3.

5.1.3 Stage 3: Split

If total crushed sample of percussion chips or core is greater the 3kg, sample is split down to < 3kg by running through a riffle splitter

5.1.4 Stage 4: Pulverise

Crushed sample of percussion chips or crushed core are loaded into LM5 grinding mills and pulverised to a powder: i.e. where 90% of sample is <75µm. The LM5 consists of a tungsten carbide bowl and large 20cm diameter puck. It is clamped down and sample ground for approximately 5 minutes: see Figure 4 and Figure 5. Each unit is fitted with a suction cleaner.

The capacity of the LM5 is 3kg. In most programs it is desirable for the sample to be <3kg so it can fit into an LM5 without the need for the sample to be split.

The sample is well mixed at this stage. A 150g sub sample is cut out and retained for analysis. The remaining pulverised sample is scooped out of bowl and stored. Any excess is sucked out with the suction cleaner. The bowl is cleaned with quartz wash between batches.

It is not cleaned with quartz wash within a batch unless there is a specific request.

5.2 Suite 5: ICP Analysis and Fire Assay

5.2.1 Stage 5: Four-Acid Digest of 1g Sub-Sample

A 1g sub-sample is extracted and weighed from the 150g analytical powder. This sample is made up in a test tube to 100ml with a 4-acid solution of aqua regia (HCl, HNO3 mixture 3:1), perchloric and hydrofluoric acid - see Figure 6 and Figure 7.

The four acid digest is a vigorous analysis for almost all rock materials. The addition of hydrofluoric acid means that silicates are digested. Detection ranges for the ICP determination are up to 10000 ppm (1%) for Cu. Cudeco samples that return Cu >1%, are re-analysed for Cu, Co by AAS method AAS22D. Samples that return Cu >5% are re-analysed for Cu by AAS method AAS23Q.

5.2.2 Stage 6: ICP Determination

The digested solution is read by means of Inductively Coupled Plasma Atomic Emission Spectroscopy - see Figure 16. In the case of multi-element analysis for Suite 5 samples, this method is ICP22D for the following elements:

List of Elements Analysed by Method ICP22D Lower Detection Limit (ppm) Upper Detection Limit (ppm)						
As 3 10000	Co 1 10000	Cu 1 50000	S 20 50000	U 10 10000	V 1 10000	Zn 5 10000

5.2.3 Stage 7: Fire Assay Determination for Au.

In Suite 5, Au is determined by 50 gram fire assay – Method FAA505. Analysis is similar to Suite 1 above.

APPENDIX 1:

NOTES ON ANALYSIS OF CUDECO'S ROCKLANDS SAMPLES CONTAINING NATIVE COPPER

SGS Chief Chemist/Laboratory Manager Russell Larsen June, 2007, Townsville

Samples containing native copper present several difficulties in quantifying the copper content.

In sample preparation, unlike most minerals, copper will not pulverise and being malleable will flatten and smear in the pulverising unit. The pulverised material produced then will not be homogeneous with respect to the copper giving highly variable results. Finely disseminated native copper can be ground in a disc grinder by the shearing action which significantly reduces the variability of the analytical results once larger analysis portions are taken to reduce the impact of the "copper spotting" through the prepared sample.

Samples containing large native copper particles will not grind and direct preparation is not possible. Current procedure adopted for these samples involves physical separation of these larger particles (generally greater than 2mm in size), prior to the preparation the remaining material by more conventional means as described in the finely disseminated procedure. The coarse copper particles are simply cleaned and weighed.

Suite 2 analysis should be restricted to samples containing fine native copper particles (less than 2mm).

The total sample is dried, crushed if necessary, disc ground, a 500 gram laboratory split is taken and lightly pulverised prior to analysis. The residue is stored in the disc ground state to allow further splitting or metallurgical testing.

Analysis of copper and cobalt content is by method AAS40G where a 20 gram sample is taken, digested and the copper and cobalt content determined by AAS.

Suite 4B analysis must be restricted to samples containing native copper particles greater than 2mm in size.

The total sample is dried, and crushed through a jaw crusher (to approximately 8 mm) if necessary and then hand picked to remove any obvious copper particles.

The total remaining sample is then crushed using a rolls crusher set between 1-2mm. The object is to crush matrix particles and to flatten or expose copper metal. The total sample is sieved through a 2mm sieve and hand picked for the copper particles now exposed. The total remaining sample is then ground by the disc grinder, (as in Suite 2), to again expose any coarser copper particles and grind any fine particles. The sample is again hand picked to remove any obvious copper metal.

All copper metal recovered is now combined for the cleaning operation.

As with Suite 2, a 500g samples is split off from the bulk, lightly pulverised and presented to the laboratory for AAS40G analysis. The residue is retained for any further requests.

The samples analysed in duplicate by AAS40G to determine the success in the removal of the coarse copper metal and the reproducibility of the analysis.

The copper metal cleaned in dilute hydrochloric acid which digests any gangue material leaving clean copper. The wash can contain copper from other copper minerals present. Nitric Acid is added to the wash and slime material to digest any fine copper that has broken away from the bulk, and the copper content quantified by AAS.

The total copper content can be calculated from the weight of copper metal, weight of residue which has been analysed by AAS40G and the copper lost in the washing operation of the copper metal.

This procedure is considered to be the most appropriate method to quantify the copper present in these samples.

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