REPORT

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04 May 2011

GLENCORE INTERNATIONAL PLC

Mineral Expert's Report: Mutanda

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MINERAL EXPERT'S REPORT: MUTANDA MINING SPRL

Dear Sirs

PURPOSE OF REPORT

Golder Associates Africa (Pty) Ltd ("GAA") has been commissioned by Glencore International AG ("Glencore") on behalf of Glencore International plc (the "Company") which is expected to be the ultimate parent company of the group, to prepare a Mineral Expert's Report ("MER") in respect of the mining assets owned by and operated by Mutanda sprl (the "Material Assets") a company in which Glencore has an interest.

Glencore owns a 40% equity interest in Mutanda Mining Sprl which owns the Material Assets which are the subject of this MER.

The Material Assets comprise of the following:

- 3 Open Pit mines, East, Central and Central N/W;
- Hydrometallurgical plant;
- Acid plant and liquid SO_2 plant, and
- Dense media separation plant.

This MER has been prepared by a team of Competent Persons with each team member possessing the appropriate technical and professional qualifications.

This report, which summarises the findings of GAA's review, accords with the requirements set out in the United Kingdom Financial Services Authority's Prospectus Rules ("Prospectus Rules") and has been prepared having regard to the recommendations for the consistent implementation of the European Commission's Regulation on Prospectuses No. 890/2004 (the European Securities and Markets Authority ("ESMA") recommendations) published by the Committee of European Securities Regulators (now the

ESMA, as updated on 23 March 2011 following the publication of a consultation paper in April 2010 in relation to content of prospectuses regarding mineral companies) and Chapter 18 of the Hong Kong Listing Rules.

GAA understands that this MER will be included as part of the prospectus (the "Prospectus") to be published in connection with a global offering of shares and the admission of the ordinary shares of the Company to the Official List of the United Kingdom Financial Services Authority and the admission of such shares to trading on the London Stock Exchange plc's market for listed securities and the main board of the Hong Kong Stock Exchange Limited (together, "Admission").

This MER provides an audit of the mineral resource estimates, classification of resources and reserves (to the extent applicable) and evaluation of the Material Assets.

The practices and estimation methods undertaken by GAA are in accordance with the criteria for internationally recognised reserve and resource categories of the "Australasian Code for Reporting Mineral Resources and Ore Reserves" (2004) published by the Joint Ore Reserves Committee ("JORC") of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and the Minerals Council of Australia (the "JORC Code").

In addition, GAA is of the opinion that such practices and estimations accord with the requirements set out in the Prospectus Rules in conjunction with the ESMA recommendations (including proposed amendments thereto). In this report, all reserves and resources estimates, initially prepared by Mutanda in accordance with the JORC Code, have been substantiated by evidence obtained from GAA's site visits, interviews, own data collection, analysis and modelling. Where appropriate, reliance has been placed on the work of other experts. Only proven and probable reserves have been valued, which accords with the requirements set out in the Prospectus Rules in conjunction with the ESMA recommendations. Other assets of Glencore, which include extensive resources, have not been included in the valuation.

CAPABILITY AND INDEPENDENCE

GAA has 50 years of mining and engineering expertise built up on 6 continents. GAA operates as an independent technical consultant providing resource evaluation, mining engineering and mine valuation services to clients. GAA has received, and will receive, professional fees for its preparation of this report. However, neither GAA nor any of its directors, staff or sub-consultants who contributed to this report has any interest in:

- the Company, Glencore, Mutanda or any of their subsidiaries; or
- the Material Assets reviewed.

Drafts of this report were provided to Glencore and Mutanda, but only for the purpose of confirming both the accuracy of factual material and the reasonableness of assumptions relied upon in the report.

For the purposes of Prospectus Rule 5.5.3R(2)(f), GAA is responsible for this report as part of the Prospectus and declares that it has taken all reasonable care to ensure that the information contained in this report is, to the best of its knowledge, in accordance with the facts and contains no omission likely to affect its import. This declaration is included in the Prospectus in compliance with item 1.2 of Annex I and item 1.2 of Annex III of the Prospectus Directive Regulation.

This MER has been prepared based on a technical and economic review by a team of consultants and associates sourced from the GAA's Johannesburg offices. Details of the qualifications and experience of the consultants who carried out the work are included in the MER.

METHODOLOGY

The methodology used to compile this report consists of the following:

- site visits conducted by GAA representatives between October and December 2010 to inspect the mine site (open pits), plant and processing facilities, waste dumps and tailings facilities in order to audit technical content of previous Technical Reports and studies conducted for and on behalf of Glencore and where necessary for GAA staff to evaluate current requirements and future developments;

- interviews with various senior Mutanda managers;
- GAA own data analysis, engineering, financial, resource, mining and resource modelling; and
- reliance on previous technical studies and experts reports.

The information contained in this report is current and effective from 1 January 2011, unless otherwise indicated. The results of GAA evaluation are as set out in this MER.

All opinions, findings and conclusions expressed in this report are those of GAA and its sub-consultants.

DECLARATIONS

GAA will receive a fee for the preparation of this MER in accordance with normal professional consulting practice. This fee is not contingent on the outcome of Admission and GAA will receive no other benefit for the preparation of this report. GAA does not have any pecuniary or other interests that could reasonably be regarded as capable of affecting its ability to provide an unbiased opinion in relation to the mineral resources, ore reserves and the valuation of Material Assets.

GAA does not have, at the date of this report, and has not previously had any shareholding in or other relationship with the Company, Glencore, or Mutanda and consequently considers itself to be independent of the Company, Glencore, and Mutanda.

The results of the technical and economic reviews are summarised herein.

GLOSSARY OF TERMS

Defined and technical terms used in this report are set out in APPENDIX A of this MER.

QUALIFICATIONS OF CONSULTANTS

The individuals listed in the table below, have provided input to this MER are Qualified/ Competent Persons as defined in the JORC Code, the Prospectus Rules, the ESMA recommendations and Chapter 18 of the Hong Kong Listing Rules and have extensive experience in the mining industry and are members in good standing of appropriate professional institutions.

Name	Company	Qualification
Peter Onley	GAA	MBA MSc BSc(Hons) FAusIMM CP Peter Onley has more than 40 years experience in the mining industry holding qualifications in geology, geotechnical engineering and business. He has worked in a variety of roles, starting as an exploration geologist, a mining geologist, exploration manager, mineral industry consultant, business manager and director of two Australian listed companies. He has worked as a mining industry consultant for over 25 years. He was formerly a director of GAA employing more than 800 staff in Australia. He has consulted to the industry on a wide range of commodities including diamonds, gold, uranium, iron-ore, bauxite, base metals and both sulphide and lateritic nickel together with some minor commodities such as

Name	Company	Qualification
		molybdenum and tungsten. He has for some years been a member of the Geological Survey Liaison Committee which reviews and advises on future work programs for the Geological Survey of Western Australia. He is also a member of the AusIMM Geoscience Committee.
Willem van der Schyff	GAA	BSc (Geology), GDE (Mine Engineering) Willem is an Associate with GAA, the Business Unit Leader for the Mining Services Business Unit and a geologist specialising in resource modelling and evaluation. He has 20 years experience on diverse commodities, ranging from Iron Ore, Coal, Heavy Mineral Sands, Base Metals, Gold, Bauxite and Industrial Minerals, on five continents. This experience includes exploration geology, mining geology and resource modelling and estimation. He is a registered Professional Geologist with the South African Council for Natural Scientific Professions and is a member of the Geological Society of South Africa.
Jaco Lotheringen	Ukwazi	B Eng Mining Engineering (UP), Mine Manager's Certificate of Competency Jaco is currently a director of Ukwazi Mining and it its senior mine engineer. He has 12 years mining experience and has been involved in resource estimates, mine feasibility and mine design studies for the past 6 years for major mining companies such as Kumba, BHP Billiton and Anglo Platinum. His professional memberships include: Registered as a Professional Engineer at Engineering Council of South Africa (20030022); Registered as a Member at South African Institute of Mining and Metallurgy (SAIMM) (701237). Member of the Institute of Directors in South Africa. Jaco has specific commodity experience in precious metals (gold, platinum), base metals (iron and copper) and minerals such as coal.
Anthony James Nieuwenhuys	SNC Lavlin	BSC (Eng) MDP Anthony James Nieuwenhuys is Managing Director – SNC-Lavalin South Africa with over 30 years of extensive experience in managing international multi-disciplinary projects in the mining, metallurgical and beverage sectors. This experience includes both technical and financial

Name	Company	Qualification
		aspects of major projects. Mr Nieuwenhuys' management capabilities include sourcing and arranging financing for projects, strong organizational and interpersonal skills, leadership, initiative, marketing, managing a multi-disciplinary engineering company and the ability to work in different business environments. On the technical side, James has extensive experience in the design, construction and operational aspects of most metallurgical facilities and has specific mining and commodity experience in respect of gold, nickel, diamonds and cobalt.

This report was prepared by GAA in order to support the mineral reserve and resource information contained in the Prospectus. The project manager of the MER was Spencer Eckstein and project director was Frank Wimberley.

Yours Faithfully,

GOLDER ASSOCIATES AFRICA (PTY) LTD.

Frank Wimberley
Project Director

Willem van der Schyff
Competent Person

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Golder Associates Africa (Pty) Ltd ("GAA") was commissioned by Glencore International AG ("Glencore") on behalf of Glencore Internation Plc (the "Company"), which is expected to the the ultimate parent company of the group, in November 2010 to prepare a Mineral Experts Report ("MER") in respect of the Material Assets (as described below) owned and operated by Mutanda Mining Sprl.

Glencore owns 40% of the equity interest in Mutanda which owns the Material Assets, which are the subject of this report

The Material Assets comprise of the following

- 3 Open Pit mines, East, Central and Central N/W;
- hydrometallurgical plant;
- acid plant and liquid SO_2 plant, and
- dense media separation plant.

Further details of the Material Assets are set out in the paragraphs below.

The purpose of the MER is to provide a technical report which evaluates the nature and value of the Material Assets held by Mutanda in order to assist the Company in listing on the London and Hong Kong stock exchange.

The MER also includes observations and comments from GAA following site audits conducted in December 2010 to determine environmental compliance with Equator Principles and to assess closure costs.

This MER has been prepared in accordance with the Australasian Code for Reporting of Exploration Results Mineral Resources and Ore Reserves (2004) published by the Joint Ore Reserves Committee ("JORC") of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and the Minerals Council of Australia. In respect of the valuations, they have been prepared under the guidelines of the Code for the Technical Assessment and Valuation of Mineral and Petroleum Assets and Securities for Independent Expert Reports (2005 edition), as prepared by the VALMIN Committee, a joint committee of the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists and the Mineral Industry Consultants Association.

The methodology used to compile this report consists of the following:

- Site visits conducted by GAA representatives between October and December 2010 to inspect the mine site, plant and processing facilities, waste dumps and tailings facilities in order to audit technical content of previous technical reports and studies conducted for and on behalf of Mutanda and where necessary for GAA staff to evaluate current requirements and future developments;
- Interviews with various senior Mutanda managers;
- GAA own data analysis, engineering, financial, resource, mining and resource modelling
- Reliance on previous technical studies and experts reports.

The information contained in this report is current and effective from 1 January 2011, unless otherwise indicated. The results of GAA evaluation are set out below.

1.2 Project Description

Mutanda is a newly developed high grade copper and cobalt producer, with its operations located in the province of Katanga in the DRC. Mutanda is being developed to produce up to 110ktpa of copper and 23ktpa of cobalt contained in hydroxide as of 2012. Based on current oxide reserves and resources the LOM is expected to be at least 20 years.

The long term prospects of the Mutanda concession lies to the south of the East orebody where drill holes finished within the orebody at depth. Significant underground sulphide potential exists and in fact forms a large percentage of the Mutanda concession ore resource. Further oxide exploitation potential exists from underground to increase oxide processing life.

The Mutanda concession is situated approximately 40km from Kolwezi in the Western Katanga Province. It has easy access to the National Road and railway line between Kolwezi and Zambia, as well as abundant water supply for plant processes due to the location of the Kando River approximately 2.5km from the southern boundary. A new 120kV capacity power line capable of supplying power up to 120MW connects into the SNEL reticulation network 20km from the mine and from the on-site sub-station power is transferred to the plant along a 22kV reticulation network. Stand-by power generation of 13.5MW installed capacity automatically starts up in the event of network power failures.

As of 31 December 2010 Mutanda had 929 employees.

1.3 Ownership

Glencore holds a 50% interest in Samref Congo Sprl which in turn holds an 80% interest in Mutanda. The remaining 20% interest in Mutanda was recently acquired by Rowny Assets Limited (entities associated with Dan Gertler) from La Generale des Carrieres et des Mines ("Gecamines"), a State-owned mining company in the DRC.

1.4 Legal Tenure

Exploitation permits under the Mining Code of the DRC are renewable in accordance with the terms of the Mining Code for periods of 15 years.

An exploitation permit grants to its holder the exclusive right to carry out exploration and exploitation works for the minerals for which it has been granted. This right covers the construction of necessary facilities for mining exploration, the use of water and wood resources, and the free commercialisation of products for sale, in compliance with corresponding legislation.

Property	Exploitation Permit Number	Rights Granted	Valid Until
Mutanda	PE 662	Cu, Co, Au, Ni and associated minerals	26/05/2022 Renewable
Ki-kolwezi	PE 4959	Cu, Co and associated minerals	03/04/2024 Renewable

1.5 Resources

Geology

The Mutanda copper-cobalt deposit lies with the lower part of the Neoproterozoic Katangan sedimentary succession which extends over more than 700km from Zambia through the Katanga province of the DRC and is up to 150km wide. It is part of a thrust-and-fold belt known as the Lufilian Arc. It shares the same characteristics of most of the deposits within the Copperbelt in that it is stratiform and associated with carbonate or carbon-rich lithologies (Cailteux, et. al. 2005).

The Katangan copper-cobalt metallogenic province is bounded to the north by a major dislocation zone, but in the south rests unconformably on a pre-Katangan basement. Due to the increased disruption to the north of the Lufilian Arc, the unconformity between the basement and sediments has not been seen in the DRC and all contacts with the basement are tectonic.

Mineralisation

The main copper oxide minerals present are malachite and pseudomalachite, with heterogenite, the main Cobalt mineral. Quartz and chlorite dominate the gangue component in all the samples.

The sulphide minerals have yet to be subjected to a laboratory mineralogical analysis.

Mineral Resources

The consolidated Mineral Resources of the various areas of Mutanda as at 31 December 2010 are summarised in the table below:

Consolidated Resource Statement of Mutanda Mine as at 31 December 2010				
	Category	**Mt**	**%TCu**	**%TCo**
	Measured	7.8	1.62	0.81
Central Orebody	Indicated	5.3	1.16	0.67
	Inferred	7.6	0.95	0.91
	Total	**20.7**	**1.28**	**0.81**
	Category	**Mt**	**%TCu**	**%TCo**
	Measured	29.0	2.67	1.13
East Orebody	Indicated	18.4	1.65	0.87
	Inferred	164.6	1.03	0.45
	Total	**212.0**	**1.34**	**0.60**
	Category	**Mt**	**%TCu**	**%TCo**
	Measured	66.8	2.10	0.55
Central Northwest Orebody	Indicated	0.02	0.17	0.05
	Inferred			
	Total	**66.8**	**2.10**	**0.55**
	Category	**Mt**	**%TCu**	**%TCo**
	Measured	103.7	2.22	0.73
Mutanda Total	Indicated	23.8	1.54	0.82
	Inferred	172.1	1.03	0.47
	Total	**299.5**	**1.48**	**0.59**

1.6 Reserves

Mutanda Mine consists of two operational pits, a small dormant pit and a potential pit to be developed. The mine plan is based on the recovered copper target up to 110 000 tonnes per year, ramping up to steady state in 2013. An average Run of Mine ("ROM") plant feed grade of 4.13 %Cu is achieved up to 2015 from the pits with an average Life of Mine ("LOM") plant feed grade of 3.4 %Cu.

Various ROM stockpiles have been constructed since 2009 of which the "R5" high grade has been included in the mine plan. Two high copper and two low grade heap leach stockpiles have not been included in the LOM Plan though volumes have been verified by GAA. If included in the mine plan, it is expected that these current stockpiles will be depleted early in 2013 and will lower the risk of the mining ramp up. Surveyed and re-modelled grades were used to estimate stockpile levels. However volumes of high copper and low grade stockpiles mentioned above could not be included in the mining schedule and reserves statements,at this stage since the information required to verify the densities is not yet available. Accordingly these stockpiles have not been included in the financial valuation.

Some of the potential risks associated with Mutanda are:

- Mutanda has been a small operation, mining low volumes on a selective basis. With this LOM Plan the operation has to adjust to a higher volume operation with reasonable losses and dilutions.
- The dormant pit to the south of Central pit includes some limited underground workings that cannot be fully mapped. This could have a negative impact on mining rates in the area, though this does not impact any mining in the East and CNW pits.
- An additional waste dumping space of 4 km^2 is required for waste dumping on the Kansuki project area. This can be a potential high risk issue to the project, since the waste backfill opportunity is limited. However this may be mitigated by the processing of existing stock piles.
- A total of 5.6 million tonnes of sulphide ore is planned in the current LOM Plan. Dedicated stockpile areas are required. Due to the limited space available, this could increase mining cost should continuous re-handling be required.
- A total of 11.9 million tonnes of low grade ore is scheduled in the current LOM Plan. Dedicated stockpile and heap leach areas are required. Due to the limited space available, this could increase mining costs should continuous re-handling be required, though all ROM low grade material will be placed onto the heap when mined. Rehandling of “spent” ore and possible use of existing stockpiles will attract a rehandling cost.
- Waste stripping is allowed for and required on the Kansuki project area. This LOM Plan assumes that a suitable agreement could be reached which is likely as Glencore is a common shareholder. No ore from the Kansuki area has been included in this estimate.

Various opportunities exist at Mutanda that includes but is not limited to a situation where:

- Sulphide material contained in the transitional zone is mined and stockpiled over the life of the operation. This amounts to 5.6 million tonnes of sulphide material with a grade above the operational cut-off grade.
- As the depletion of the current oxide operation occurs, the sulphide orebody will become exposed. Material upside could exist at the end of life of the current operation, should copper sulphide processing capacity be established since most of the pre-stripping has been completed by the current copper oxide pits.
- Various high and low grade stockpiles exist, additional to the incorporated R5 high grade stockpile, that has not been included in the LOM Plan. Additional work is required on the re-modelling of loose density before it can be included in the LOM Plan and Reserve estimate in future.
- Potential for underground exploitation of the remaining oxide resource in CNW area.

A total of 1.5 million ROM tonnes was produced from the two pits in 2009 and 1.7 million tonnes planned for 2010. The pits and the current stockpiles deliver a plant feed head grade of 3.4 %Cu for a total of 60.5 million tonnes of ore up to the year 2030. Ore production from the Mutanda pits is primarily oxide material. An estimate of 30% copper sulphides is mined selectively from the mixed ore and stockpiled on a dedicated sulphide stockpile. The mineral Reserve is estimated at 55.9 million tonnes Proved and Probable Mineral Reserves at 3.4 %Cu and 1.0 %Co.

Table 1: Summary of Reserve Estimate

Mining operation	Proved			Probable			Total		
	Tonnes (*000)	% T Cu	% T Co	Tonnes (*000)	% T Cu	% T Co	Tonnes (*000)	% T Cu	% T Co
Mutanda pits	47,176	3.4	0.9	6,570	3.1	1.2	53,746	3.4	0.9
ROM High Grade Stockpile	2,227	3.4	2.3				2,227	3.4	2.3
TOTAL	49,403	3.4	1.0	6,570	3.1	1.2	55,973	3.4	1.0

1.7 Plant and Equipment

Mutanda is in the process of commissioning phase 1 of a 3-phased expansion project. This will ultimately deliver a processing plant able to produce up to 110,000t Cu and 23,000t of contained cobalt in the form of a hydroxide salt.

Phase 2 construction is well underway with mechanical completion targeted for 31st August 2011. A fast track project is underway to bring on line SX-EW #2 (20,000t capacity) in early April 2010 utilising the phase 1 copper circuit at a higher feed grade and SX-EW#3 (20,000t capacity) from a newly constructed heap leach. This heap leach is included as part of the phase 3 expansion which is being fast tracked to produce additional copper in 2011. By the time the phase 2 plant is commissioned it is targeted to have SXEW processes for phase 2 running at or close to nameplate capacity.

Phase 3 has been designed as a fast track 40,000t Cu expansion module which consists of upgrading transformer capacity in the tank-houses and increase copper production from 20,000t to 25,000t. In addition a 4th tankhouse rated at 35,000t will be installed for an overall tankhouse capacity of 110,000t Cu per annum. Additional investment in phase 2 SX plants in phase 3 will enable phase 2 to produce 80,000t per annum through its copper circuit, with phase 1 contributing 20,000t. The additional make up tonnage (up to 10,000t) is expected to come from the NW heap leach. Phase 3 completion is scheduled as Q1-2012.

The SX-EW plants include the following processes: crushing, screening, milling, pre-leaching, leaching, clarification and SX-EW.

As at 31st December, Mutanda has exceeded all budgeted copper targets for 2010.

Once phase 3 is fully commissioned, the heap leach will treat low grade Mutanda ore (0.5-0.85%Cu) and increase output of the Mutanda processing plant to up to 110,000tpa of copper cathode.

1.8 Closure

Closure costs are estimated at USD8,1 million. It should be noted that whilst this report deals with the oxide resource only, there is a significant sulphide resource to be exploited, which could delay the closure liability for a number of years.

1.9 Environmental, Health and Safety

This report presents the findings of an environmental and social audit conducted by GAA at Mutanda Mine concession on 9th December 2010.

Key Results of the Audit

In regard to authorisations required, it was demonstrated during the audit that:

- Mutanda holds an approved operating license for its concessions (PE662) in accordance with Article 64 of the DRC Mining Code (Law No 007/2002 of 11th July, 2002).

- Mutanda holds an approved operating license for its concessions (PE4959) in accordance with Article 64 of the DRC Mining Code (Law No 007/2002 of 11th July, 2002).
- An Environmental Impact Study (“EIS”) and Environmental Management Plan (“EMP”) were submitted and approved for the Feasibility Study. The EIS is updated annually and accordingly the EMP is updated annually as prescribed by the DRC legislation.
- Table 17 in the main body of the report summarises the extent to which Mutanda’s environmental and social management complies with Equator Principles and the International Finance Corporation (“IFC”) performance standards.
- Current and future site environmental impacts of potential risk include:
  - Low level risk of spillage from the Dense Media Separation (“DMS”) Plant spirals product onto the neighbouring concession, settling ponds are monitored daily and any spillage is cleaned up as and when it occurs.
  - In so far as hazardous waste is disposed of, these are done in facilities which are lawfully operated and which are constructed in terms of industry norms and standards.
  - Uncertainty regarding the geochemical behaviour of mine geological and waste materials disturbed and/or deposited by Mutanda activities, these materials are sampled and tested to confirm their geochemical behaviour and acid drainage potential.
  - There may be a risk related to the migration of responsibility from the construction project to an operational plant in the SHEQ department, a full time Environmental Manager will be employed to monitor this.
- Social impacts from mining are limited.
- The social impacts of the Corporate Social Responsibilty (“CSR”) projects associated with the Mutanda mine are substantive given the socio-economic circumstances of the local community.

Mutanda currently has a structured approach to CSR with a small department focusing on projects related to government initiatives.

1.10 Economic Evaluation

An economic evaluation of Glencore’s interest in Mutanda was done using the discounted cash flow method. Revenue, capital expenditure and operating costs were projected over the life of mine and discounted to give the expected value of Mutanda.

Revenue, capital and operating cost estimates

Production levels of copper and cobalt for Mutanda were based on the mine plans for the operations and the expected recoveries from the processing plants. The price obtained for the production was derived from futures prices on the LME. Operating cost estimates were based on contractual, current and budgeted costs.

Capital expenditure is required for the completion of the existing phase 1 and 2, and the new phase 3 plans to enable annualised copper production of up to 110 ktpa, and associated support infrastructure. USD 35 million per annum is required as sustaining capital. The future capital requirements for Mutanda over the life of the mine are shown in the following table:

Capital Expenditure for Mutanda

USD Thousands	2011	2012	2013	2014	2015	2016 2030	LOM Total
Capital expenditure	382,596	51,000	59,000	43,000	85,000	492,000	1,112,596

Valuation

The valuation was done at a discount rate of 10%, base date 1 January 2011. The net present value ("NPV") of Mutanda is USD 3 089 million. The net present value ("NPV") of Glencore's investment in Mutanda is USD 1 318 million.

1.11 Mutanda MER Extraction Table

* Capacities refer to annualized capacity at year end - 31 December

		2011E	2012E	2013E	2014E	2015E
Finished metal production capacity	**Units**					
Copper	t	60,000	110,000	110,000	110,000	110,000
Cobalt	t	23,000	23,000	23,000	23,000	23,000
Actual / forecast production						
Copper Conc.	t	17,133				
Copper Cathode	t	24,068	81,251	103,531	103,214	103,477
Cobalt	t	12,548	23,000	23,000	23,000	23,000
Cash cost (excl. royalties, realisation charges, before by-product revenues)	US$m	163	346	386	396	398
By-products revenues	US$m	384	590	557	517	511
Royalties (as a % of net revenue)	%	4.50	4.50	4.50	4.50	4.50
Depreciation & amortisation	US$m	284	117	63	53	47
StatutoryTax rate	%	30%	30%	30%	30%	30%
Capex						
Sustaining	US$m	31	25	35	35	35
Expansionary	US$m	352	26	24	8	50

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APPENDIX A
List of Abbreviations and Glossary of Technical Terms

2.0 DESCRIPTION OF RESOURCES

A full feasibility study was undertaken by Paradigm Project Management ("PPM") in November 2008. It describes in detail the resource estimation for portion of the Mutanda deposit, incorporating the report by SRK entitled "Report on the Geology and Exploration of Mutanda Property" produced in March 2008. Riaan Herman Consulting cc ("RHC") was requested to look in detail at the modeling, statistics and geostatistics of the Eastern and Central Lobes and estimate resources for use on the mine. This report "Resource Report on the Central and Eastern Lobes found on the Mutanda Deposit – November 2008" was compiled by RHC. GAA reviewed these parameters and agrees with the results.

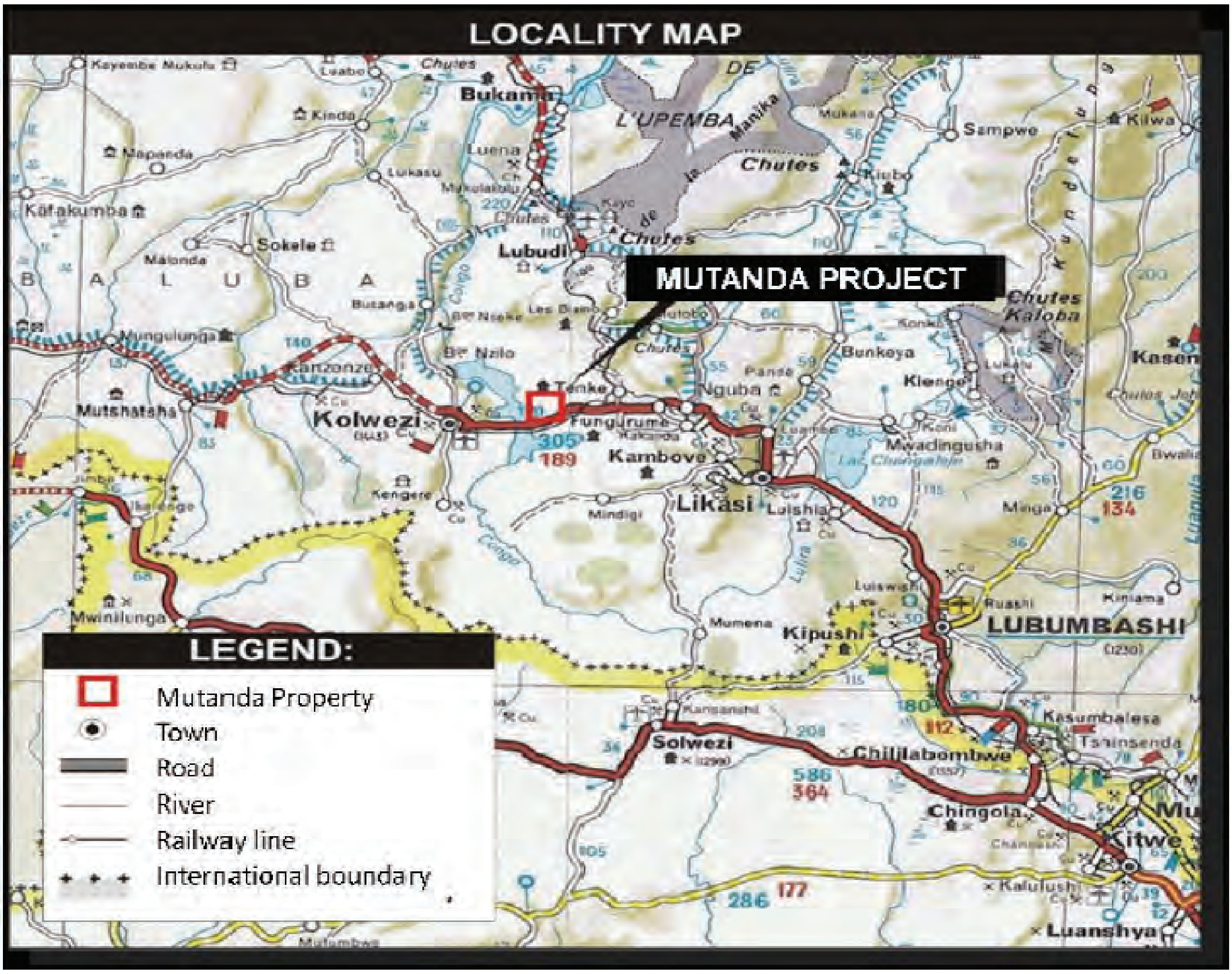

Figure 1: Mutanda Location Map

2.1 General Geology

The Mutanda copper-cobalt deposit lies with the lower part of the Neoproterozoic Katangan sedimentary succession which extends over more than 700km from Zambia through the Katanga province of the DRC and is up to 150km wide. It is part of a thrust-and-fold belt known as the Lufilian Arc (Figure 2). It shares the same characteristics of most of the deposits within the Copperbelt in that it is stratiform and associated with carbonate or carbon-rich lithologies (Cailteux, et. al. 2005).

The Katangan copper-cobalt metallogenic province is bounded to the north by a major dislocation zone, but in the south rests unconformably on a pre-Katangan basement (Figure 3). Due the increased disruption to the north of the Lufilian Arc, the unconformity between the basement and sediments has not been seen in the DRC and all contacts with the basement are tectonic.

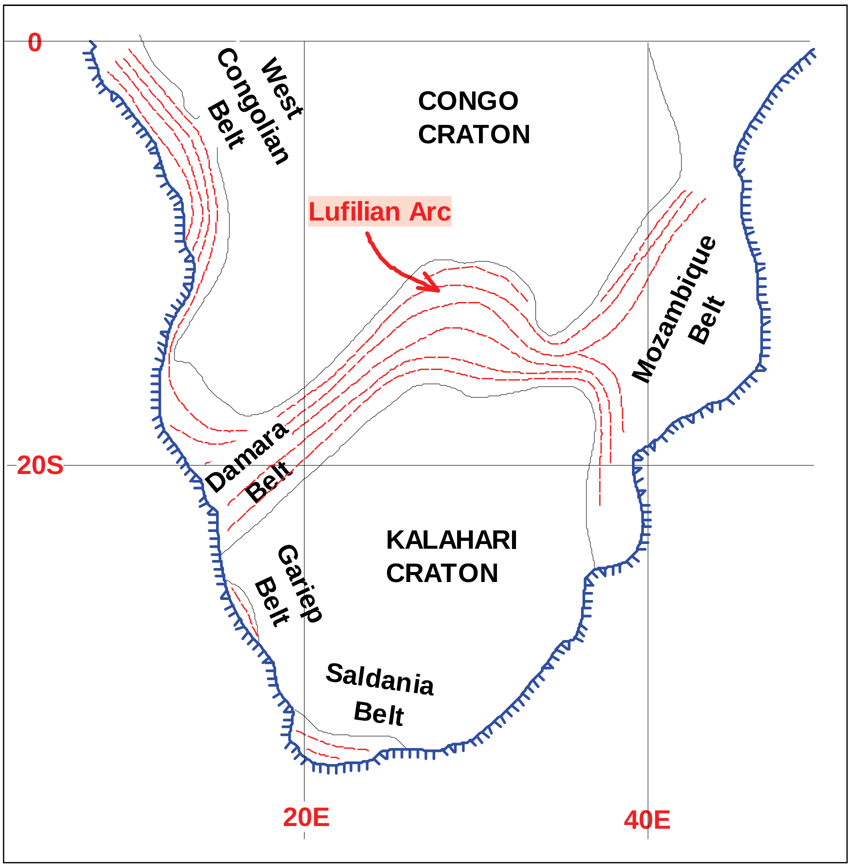

Figure 2: Tectonic Setting of the Katanga Copperbelt

2.1.1 Regional Structure

The Lufilian Arc has resulted from significant crustal shortening during closure of the basin now occupied by the Katangan sediments. The dominant sense of movement is from the south and the early ductile deformation forming north-verging recumbent folds. These have been disrupted by later brittle deformation in the form of thrust faults which have produced a number of displaced blocks. These are often associated with unusual breccias and it has been suggested that these formed from the dissolution of evaporite layers which formed a lubricant underneath these klippen. One of the largest of these is the Kolwezi Klippe which is surrounded by breccias of this type. Although sometimes stratiform, many of these breccias also form dykes cutting across the sedimentary layering.

2.1.2 Regional Stratigraphy

The Katangan supracrustal succession is 5 to 10km thick and has been subdivided into three main stratigraphic units, the Roan, Nguba and Kundelungu Groups (Table 2) each of which contain a number of subunits, designated by a letter prefix (denoting the Group) and numbers for the sub-groups and formations.

The Roan Group comprises siliciclastic and carbonate sedimentary rocks of fluviatile/lacustrine/marine origin with minor, mafic, igneous rocks, emplaced in a continental rift. The Nguba assemblage also consists of siliciclastic and carbonate sedimentary rocks with igneous rocks emplaced in a proto-oceanic rift similar to the Red Sea. The uppermost Kundelungu succession represents syn- to post-orogenic deposits. There are two phases of the Kundelungu: The tabular Kundelungu is a continental molasse sequence with a folded part affected by the waning stages of basin closure during the Lufilian Orogeny leading to the development of predominantly north-verging folds, thrusts and nappes. All of the Roan exposed in Katanga (except for the basal conglomerate), the Nguba and the folded Kundelungu (excluding the tabular part) are allochtonous tectonic sheets. The Mwashya Subgroup (R4) at the top of the Roan conformably overlies the Dipeta (R3) and is conformably overlain by the Grand Conglomérat (Table 2), although stratigraphic contacts can be occupied by syntectonic breccias which have also been interpreted as sedimentary conglomerates.

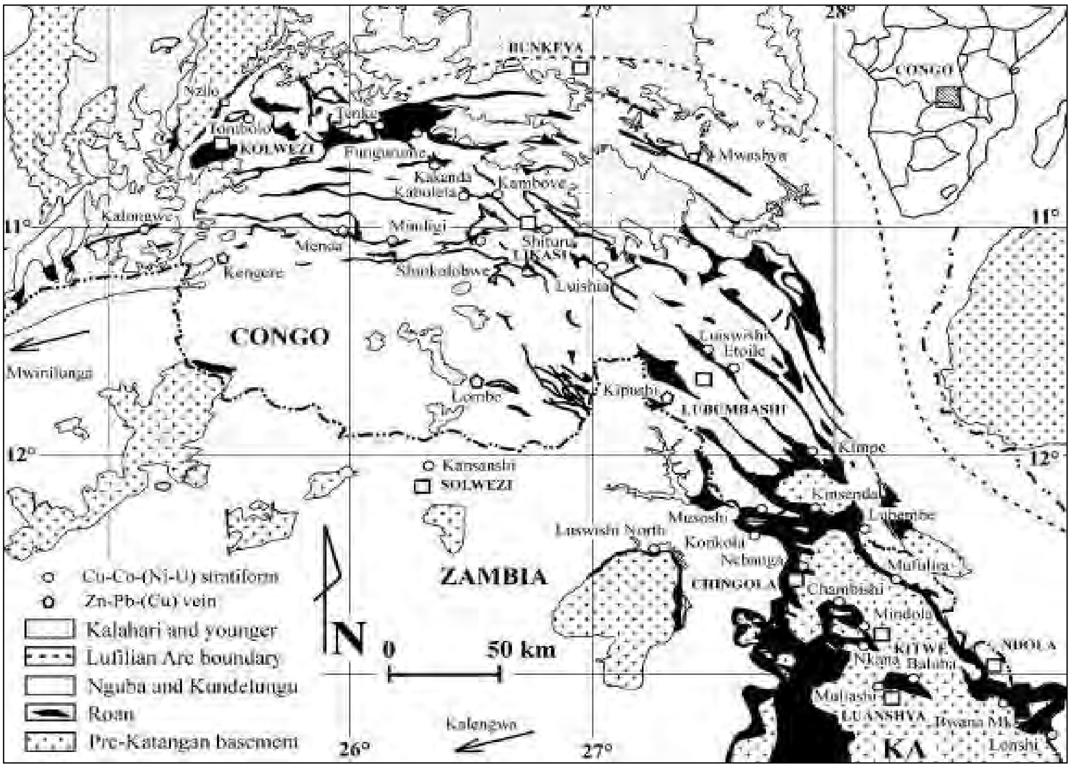

Figure 3: Geological Map of the Zambia Katanga Copperbelt

The DRC stratiform copper–cobalt orebodies all occur in the (Mines (R2) and Mwashya (R4) Subgroups of the Roan Group (Table 3) which displays a regional facies variation between Zambia-type and Congo-type successions. In Zambia and southeast Congo, the deposits are mainly hosted by para-autochthonous rocks close to the basement which define two parallel trends on either side of the Kafue anticline (Figure 3). The deposits off these trends (e.g. Western Province in Zambia) are assumed to be of minor economic importance but this could be a function of less exploration in these areas.

The lowermost Roan rocks rest unconformably on the pre-Katangan basement in Zambia but in the DRC, the Cu-Co deposits are associated with thrust sheets, nappes and klippen formed during the Lufilian Orogeny.

The dominant lithologies of the lowermost RAT (Roches Argilo-Talqueuses – DRC) and Mindola (Zambia) Sub-groups (R1) are dolomites and dolomitic shales. These were deposited in an oxic environment and in Zambia, a basal, boulder conglomerate is overlain by aeolian quartzites and immature braided stream/alluvial fanglomerates, arkoses and upward-fining sandstones. In DRC, the base of the RAT Subgroup is unknown, but a probable boulder conglomerate correlative occurs in places above the Kibaran basement. RAT correlatives in the DRC include red, chlorite-rich dolomitic rocks with variable fine-grained sand and silt components.

The Musoshi (Zambia) and Mines (Congo) Sub-groups (R2) represent a transgressive succession deposited in a reducing evaporitic environment. They include a succession of arenites, silty to sandy argillites and shales exposed north of the Kafue Anticline in Zambia, and dolomitic shales and dolomites south of the Kafue Anticline, and in the DRC. A carbonate unit forms a marker at the top of the mineralised successions in both DRC and Zambia. The bulk of the copper-cobalt mineralisation occurs in the lower parts of these Sub-groups and was deposited before the Lufilian deformation in both DRC and Zambia.

The correlative Kirilabombwe (Zambia) and Dipeta (Congo) Sub-groups (R3) have strong similarities and both lithological successions include arkoses, conglomerates, siltstones, dolomitic shales and dolomites.

The Mwashya Subgroup (R4) is characterized by platform carbonates (Lower Mwashya) grading to more open marine dolomitic shales, black shales or sandstones in the Upper Mwashya.

Gabbros intruding the Dipeta Sub-group (but not the Mwashya) and mafic lavas and pyroclastic rocks in the Lower Mwashya belong to a single syn-Lower Mwashya igneous event (760 ± 5Ma).

The Upper Mwashya is overlain by a glacial diamictite known as the Grand Conglomérat, which forms the base of the Nguba Group (previously the Lower Kundulungu) which is succeeded by the Kundulungu Group, the two being separated by a second diamictite, the Petit Conglomérat. Both of these stratigraphic units are dominated by siliclastic carbonate rocks and dolomites, and are devoid of mineralisation.

2.1.3 Local Geology

2.1.3.1 Mines Sub-group Deposits

The majority of the primary copper-cobalt deposits are stratigraphically controlled and occur in the Kamoto Dolomite (R2.1) and Dolomitic Shale Formations (R2.2) of the Mines Subgroup (R2) (DRC) and in the Zambian correlative known as the Ore Shale Formation at the base of the Musoshi Subgroup. Within these lithostratigraphic units, the orebodies extend for hundreds of metres to several kilometres along strike, but are often interrupted by faults related to the Lufilian orogeny. Typically there is lateral variation of the sulphides within the mineralised layers which grade from copper-rich into copper-poor and finally barren pyritic zones. Primary Cu-Co sulphide mineralisation also occurs in dolomites of the lower Mwashya Subgroup (R4) in the DRC and the Mutanda deposit is one of these hosted by small tectonic slices abutting against the Kansuki Fault, a major east-west trending dislocation (Figure 4).

The Mines Subgroup stratiform deposits stretch from Kolwezi in the west, around the Lufilian Arc to Kimpe in the southeast (Figure 4). They are characterised by two orebodies, with a 15 to 55m cumulative thickness (average of between 20 to 25m). The mineralisation is hosted in a transgressive supratidal to subtidal sedimentary sequence deposited under quiet, shallow-water conditions. The host rocks contain blebs, nodules and lenticular beds of dolomite–quartz pseudomorphs after anhydrite and gypsum, and high contents of Mg, Ba, Sr, Li, B and Br can be linked to the deposition of sediments under saline evaporitic conditions.

The lower orebody host-rocks include massive chloritic-dolomitic siltstones known as the Grey RAT, a fine-grained stratified dolostone (DStrat. – Dolomie Stratifié) and laminated, silicified, stromatolitic dolomites (RSF – Roches Siliceuses Feuilletés). The Upper Orebody host-rocks include the basal Dolomitic Shales (SDB – Shales Dolomitiques de Base), an intermittent overlying coarse-grained impure dolostone (BOMZ Black Ore Mineralised Zone) with a generally barren stromatolitic dolomite (RSC – Roches Siliceuses Cellulaires) between the two. The RSC is mineralised in some areas near the contact with the lower and upper orebodies.

In some deposits the primary mineralisation extends into the overlying carbonaceous dolomitic shales. The organic matter content of these rocks is variable and generally low but locally sufficient to form black shales and dolomites. The DRC mineralised succession is remarkably regular along strike, showing the same lithological succession for more than 350km from Kolwezi to Lubembe (Figure 3).

2.1.3.2 Mwashya Sub-group Deposits

The Mwashya Sub group (R4) is exposed for several hundred kilometres along major Lufilian thrust zones between Kolwezi and Kimpe (Figure 2). Along this trend there are several copper deposits in the Lower Mwashya but the Shituru deposit near Likasi is the only one that has been mined. It occurs on the southern flank of an anticline faulted along the fold axial plane. Mineralisation occurs in two stratiform bodies with high grades in the supergene zone and lower grades at the deeper levels. Most of the ore lies within laminated dolomite and dolomitic shales (lithologically similar to RSF/DStrat rocks of the Mines Sub-group) and interbedded with low-grade, massive stromatolitic dolomite. There appears to be no direct link between the pyroclastic rocks interbedded with the Lower Mwashya and this mineralisation. The Mutanda deposit appears to be very similar to Shituru.

2.1.3.3 Property Geology

The Mutanda deposit lies with a small thrust slice abutting against the Kansuki Fault, a major dislocation zone which stretches from Kolwezi to beyond Kalumbwe Myunga deposits over a distance of 75km. A number of Roan klippe lie along this fault, with the Kolwezi block by far the largest of these. To the west of Mutanda lie the Tilwezembi and Deziwa deposits and to the east Kalumbwe Myungwa (Figure 4).

The stratigraphic units at Mutanda include the Dipeta R3 and Mwashya R4 of the Roan Group, and the Ng 1.1 and Ng 1.3 of the Nguba Group. As with the Shituru deposit the stratigraphy is overturned and contacts between the three main units underlying the property are tectonic and in places occupied by breccias. Exposure over the property is generally poor particularly of the Roan Group rocks with the topographic highs underlain by clastic sediments of the Nguba Ng 1.1. The bulk of the mineralisation lies under a cover of red soil (terre rouge) and laterite (sol laterite) and locally these contain nodules of heterogenite.

The concession has been subdivided on the geographical location of three ore zones known as the West, Central and East Zones which all lie within the northern third of the property, with the South Zone devoid of mineralisation – at least near surface.

In describing the geology of the property the terms “above” and “below” refer to stratigraphic position and not the current spatial position, which is the reverse of this. Thus, while the Nguba Ng 1.3 is deepest stratigraphic unit, it is the youngest.

2.1.3.4 Stratigraphy and Lithology

The Dipeta R3 consists of argillite, which is highly weathered and has a distinctive talcose feel on broken and jointed surfaces. Many of the exposures are massive and can be red to purple, ochreous yellow or grey and more rarely white. In places this rock has a brecciated appearance with a black manganese oxide or red/yellow (iron) staining on the multitude of random joints within the body of the rock. These are probably not tectonic and may be due to the presence of expanding clays.

The second common lithology is banded rock, possible tuff which is green in fresher exposures and pink when highly weathered. A common feature of this lithology is the presence of multihued alteration spots, generally spherical and of variable size up to 30mm across. The meso-scale banding is diffuse and ranges from darker green to a cream/green in colour. This rock has the appearance of a fine-grained pyroclastic but according to Cailteux et. al. (2005) there are no volcanic rocks in the R3. The origin of this lithology will be confirmed by the petrographic study currently in progress. The R3 is typically weathered to greater depths than the other units and no fresh rock has been intersected in any of the coreholes, partly because all of these pass through this unit on the way to the R4 mineralisation.

The R3 is in contact with the Nguba 1.1, Nguba 1.3 (in depth) and the R4 and typically these contacts are the locus for a breccia which has been infiltrated and cemented by silica and iron/magnesium oxides. Where in contact with the R4, the breccias locally contain heterogenite.

Near surface the Lower Mwashya R4 is highly weathered and contains significant copper and cobalt oxide mineralisation. Normally the malachite and heterogenite occur together but in very different proportions, with lenticular zones much richer in one or other of these minerals. The intense alteration near surface includes silicified, friable iron-rich oxide material (with some magnesium oxides) and other zones of malachite and heterogenite. In one part of the western pit of the Central Zone there appears to be a recent collapse breccia filled with iron altered rock.

In the fresh core the R4 presents a very different aspect and largely consists of a recrystallised stromatolitic dolomite with veinlets and disseminations of chalcocite and carrollite and more rarely bornite. In the lower parts of this dolomite are interlayered dolomitic argillites which are finely bedded and contain fine disseminations and veinlets of copper and cobalt sulphides along bedding planes and coarser disseminations of these minerals (particularly euhedral carrollite) are dispersed throughout. In the upper part of this unit there are two distinctive and consistent marker beds: a persistent specular haematite layer often in close proximity to a thin jaspilite layer and a more diffuse band of oolitic dolomite.

Above the dolomite is a black shale layer which has only been intersected in five holes to date. This unit is locally highly mineralised.

Above the R4 is a chaotic breccia which is interpreted to be a collapsed remnant of an original evaporite removed by hydrothermal fluids.

The Nguba Ng 1.1 (the Grand Conglomérat) at Mutanda is a greenish diamictite when fresh, altering to pink, pale yellow or grey-white near surface. The clasts within this unit tend to be widely dispersed and in some areas there are none. The clasts are of variable composition and size, but many are of crystalline rock – presumably from the basement to the Katangan. This unit is restricted to the Central, Southern and West Zones in the northern part of the property. It forms the footwall to the R4 mineralisation in the western part of the Central Zones but terminates against a fault to the east. Where the Ng 1.1 is in contact with the R4 it is typically mineralised and near surface appears as veinlets of malachite along joint planes, but there is very little cobalt in these. This mineralisation has also been encountered in RC drill holes to 60m from surface.

Other rocks encountered in the South Zone include a succession of repeated fining-upward sedimentary beds with a thin, intermittent, matrix-supported conglomerate below more continuous beds of grit, sandstone, siltstone and shale. In addition recent excavations have exposed a very finely banded argillite which, though highly weathered, appears to be of glacial origin. These lithologies have tentatively been assigned to the Ng 1.1.

The Ng 1.2 is missing at Mutanda and the Nguba Ng 1.3 is normally in contact with the Ng 1.1 and the Roan lithologies. The ubiquitous lithology of this unit is a very distinctive purple argillaceous siltstone, which forms the “basement” to the mineralisation at Mutanda.

2.1.3.5 Structure

The dominant dislocations appear to be thrust controlled and abut against the Kansuki Fault. The Mutanda block is allochthonous and the strata are overturned and therefore it is assumed that these thrusts have exploited the axial plane of an early tight recumbent fold with the lower limb dislocated to some unknown part of the Lufilian Arc and certainly outside the property boundary. The faults appear to branch off a sole thrust, steepen to the north and form the bounding surfaces of the stratigraphic units. Each of these normally has a tectonic breccia along the contact. On the eastern boundary, the R4 has been terminated to the north by a strike slip fault.

There is also a collapse breccia at the top of the Roan Group which is interpreted to be the remnant of an evaporite layer. These may have formed in the early stages of deformation and have acted as a lubricating layer during deformation.

2.1.4 Mineralisation

2.1.4.1 Oxides

The main copper oxide minerals present are malachite (Cu2CO3(OH)2) and pseudomalachite (a hydrated phosphate of copper - Cu5(PO4)2(OH)4), with heterogenite (CoO.OH) the main Cobalt mineral. Quartz and chlorite dominate the gangue component in all the samples, with some samples containing illite and one (S03) containing minor talc. Other gangue minerals identified are Fe-oxyhydroxides (haematite and goethite), Al-oxyhydroxides (gibbsite) and kaolinite. There but no significant uranium in the oxides (the sulphides have yet to be tested).

Although individual samples differ in the mineralogical make-up, most contained variable amounts of malachite, pseudomalachite and heterogenite associated with fragments of quartz, quartz and chlorite, quartz and illite or intergrowths of some, or all, of these minerals. Malachite generally occurs as:

- fragments attached to quartz;

- liberated fragments;
- fragments attached to or included in finely intergrown quartz and chlorite; and
- intimately intergrown with Fe-oxyhydroxides and may also form a botryoidal crust with Fe-oxyhydroxides;

The heterogenite occurs as:

- fragments in finely intergrown quartz and chlorite;
- large liberated fragments with a characteristic sponge-like texture;
- less-porous fragments attached to quartz; and
- intimately intergrown with Fe-oxyhydroxides

Malachite and pseudomalachite are the principal copper minerals present, with the relative amounts of these varying from sample to sample. Both are bright green and difficult to differentiate in hand specimen. In general malachite is more abundant, and although the two phases may vary slightly with respect to their solubility, both are expected to be amenable to acid leaching. Very small amounts of chalcocite (Cu2S) are present usually as remnant inclusions in malachite. Traces of chalcopyrite are only found as occluded grains in quartz, and can be disregarded since they represent isolated, non-reactive particles.

Heterogenite (or more accurately lithiophorite [(Co,Mn)O(OH)] based on the Mn-content of the mineral) is the principal cobalt mineral.

Quartz is the major gangue component, with minor amounts of chlorite, mica (illite) and Fe-oxyhydroxides (mainly goethite). The clay minerals kaolinite, gibbsite and talc are present in varying, but generally trace amounts. Malachite and pseudomalachite are generally intergrown with quartz, chlorite and goethite.

Table 1: Stratigraphy of the Katangan Copperbelt

	Group	Sub-group	Formation		Lithologies
+ 500 Ma	Kundelungu formerly Upper Kundelungu	Plateaux Ku 3			Arkose, conglomerate, sandstone, shale
		Kiubo Ku 2			Sandstone, carbonated siltstone or shale, limestone
		Kalule Ku 1			Ku 1.3 Carbonated siltstone and shale, grey to pink oolitic limestone at base ("Calcaire Rose Oolitique")
					Ku 1.2 Carbonated siltstone and shale; pink to grey dolomite at base ("Calcaire Rose")
					Ku 1.1"Petit Conglomerat": glacial diamictite
+ 620 Ma	Nguba formerly Lower Kundelungu	Mongwezi Ng 2			Dolomitic Sandstone siltstone or shale
		Likasi Ng 1			Ng 1.3 Carbonated siltstone and shale
					Ng 1.2 Dolomite limestone dolomitic shale and siltstone
					Ng 1.1 "Grand Conglomerat": glacial diamictite
+ 750 Ma	Roan	Mwashya R-4	Upper	R-4.2	Shales, carbonaceous shales or sandstones
			Lower	R-4.1	Dolomites, jasper beds, pyroclastics and haematite, local stratiform Cu-Co mineralisation
		Dipeta R-3		R-3.4	Dolomites interbedded with argillaceous to dolomitic siltstone and feldspathic sandstone; intrusive bodies
				R-3.3	
				R-3.2	
			RGS	R-3.1	Dolomitic Siltstones
		Mines R-2	Kambove	R-2.3	Laminated, stromatolitic, talcose dolomites and dolomitic siltstone local stratiform Cu-Co mineralisation
			Dolomitic shale	R-2.2	Dolomitic shales, carbonaceous shales, dolomite and occasional sandstone or arkose
					Dolomitic shales, sandy dolomite at top; stratiform Cu-Co mineralisation (Upper Ore Body)
		Kamoto		R-2.1	R-2.1.3 "Roches Silicueuses Cellulaire": stromatolitic dolomite with interbedded siltstone; Cu-Co mineralisation at top and base
					R-2.1.2 bedded dolomites with siltstones; silty dolomite in the lower part; Cu-Co mineralisation (Lower Orebody)
					R-2.1.1 "R.A.T. grises": dolomitic siltstone; Cu-Co at top
		RAT R-1		R-1.3	Pink lilac haematitic chloritic dolomite, massive siltstone
				R-1.2	Pink to purple grey haematitic chloritic siltstone; sandstone in the lower part; stromatolitic dolomite at top
				R-1.1	Purple-red haematitic slightly dolomitic bedded siltstone
	Base of R.A.T. sequence unknown				
<900Ma	Basal Conglomerate				

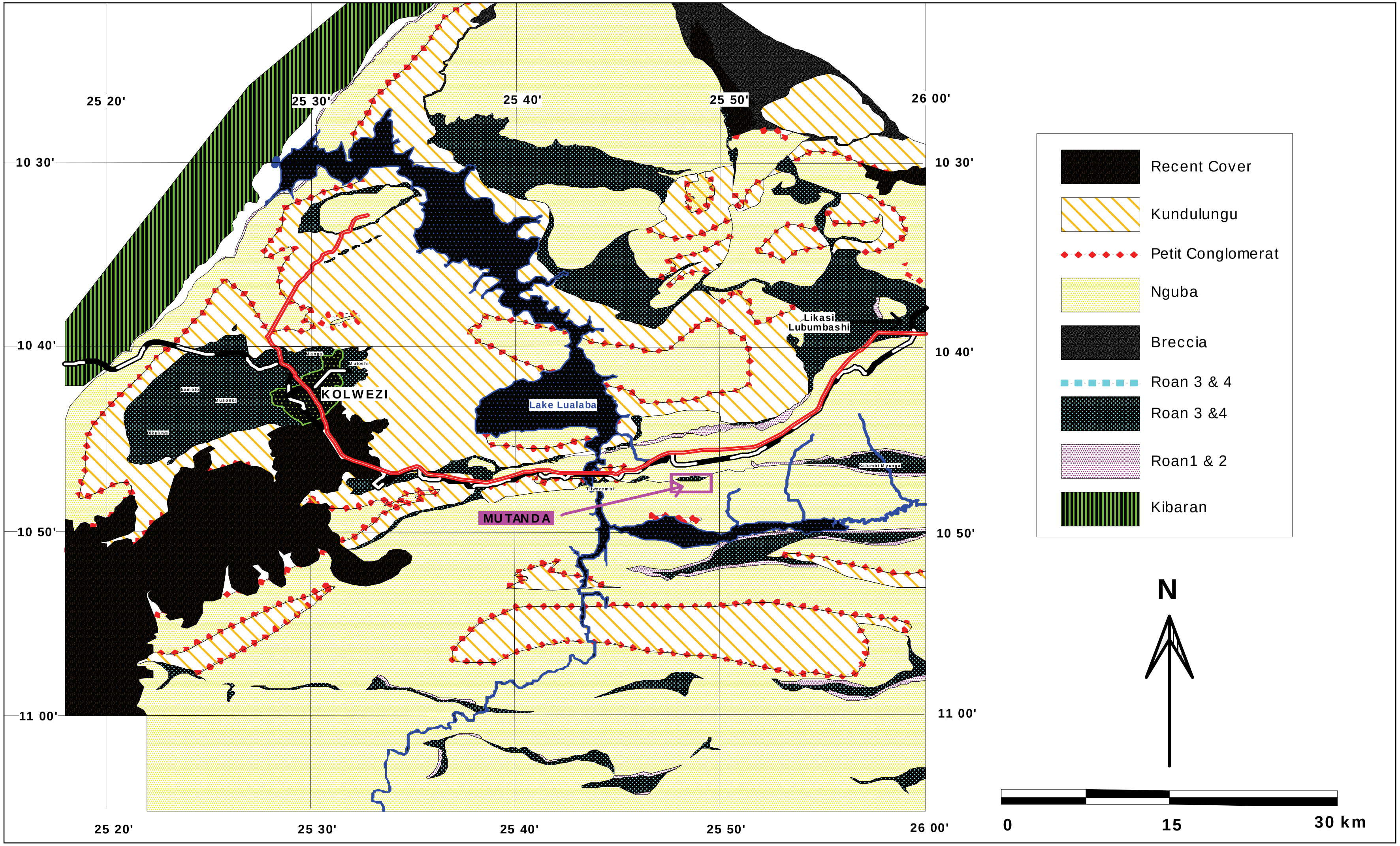

Figure 4: Regional Geological Plan Kolwezi Area

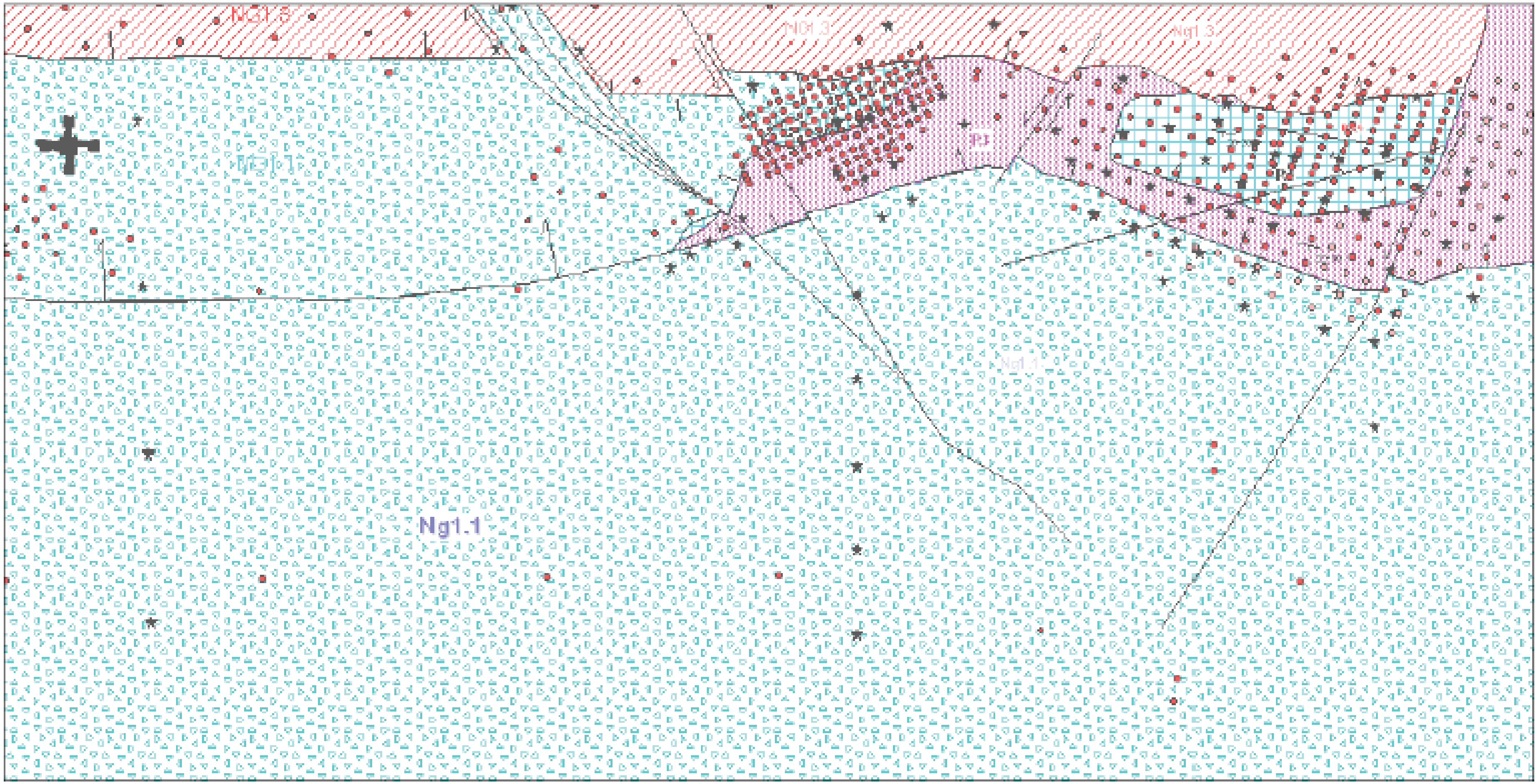

Figure 5: Geological Map of the Mutanda License Area

Generally, both the Cu-rich and Co-rich samples can be classified as oxide-type ore, with minor secondary sulphides.

2.1.4.2 Sulphides

The sulphide minerals have yet to be subjected to a laboratory mineralogical analysis but the major copper minerals are, in order of decreasing abundance, chalcocite, bornite with minor chalcopyrite. No pyrite has been encountered and the only other sulphide is carrollite. The copper sulphides tend to finely disseminated along bedding planes in the dolomitic argillites and more coarsely so in the dolomite. They also occur in narrow (1mm) veinlets which cross-cut the bedding. Carrollite has a similar habit and can be difficult to distinguish from the copper minerals where fine-grained. However sub- to euhedral carrollite does occur as larger, disseminated crystals (up to 3mm) in both the dolomite and more argillic rocks. In some of the oolitic dolomites the sulphides preferentially replace the oolites.

A less common style of sulphide occurrence is in coarse quartz breccias where there are clasts of very coarse chalcopyrite associated with coarser quartz fragments.

In addition to the sulphides there are very sporadic nuggets of native copper.

2.1.4.3 Orebodies

Four mineralised bodies have been delineated at Mutanda. The largest of these lies in the East Zone which extends along an east-west strike for 900m and down dip for 500m. It lies within the R4 dolomites and dolomitic shales and is up to 50m thick near surface. This body dips at 35° to the south and plunges towards to southeast. Although sulphides have been intersected at depth these are more sparsely drilled and have yet to be investigated in detail. The down-plunge extensions of this mineralisation have yet to be drilled.

This mineralised zone has been drilled on a 25m x 25m grid and sampled at 1m intervals throughout. The Central Zone has been drilled on a 25m grid but only a part of the Eastern Zone has been drilled on a 25m grid, with the majority of it drilled on a 50m grid. The bulk of the mineralisation is oxidised although portions contain sulphides.

A second carbonaceous shale-hosted mineralised zone lies stratigraphically above the main mineralisation (some 60m vertically below) and has been intersected in only seven drillholes. It appears to be variable in thickness and intensity of the mineralisation but visually the grades for both copper and cobalt appear to be higher than those in the carbonate hosted sulphide zone.

The Central Northwest orebody has been drilled on a 50m x 50m grid. The bulk of the mineralization is oxidised.

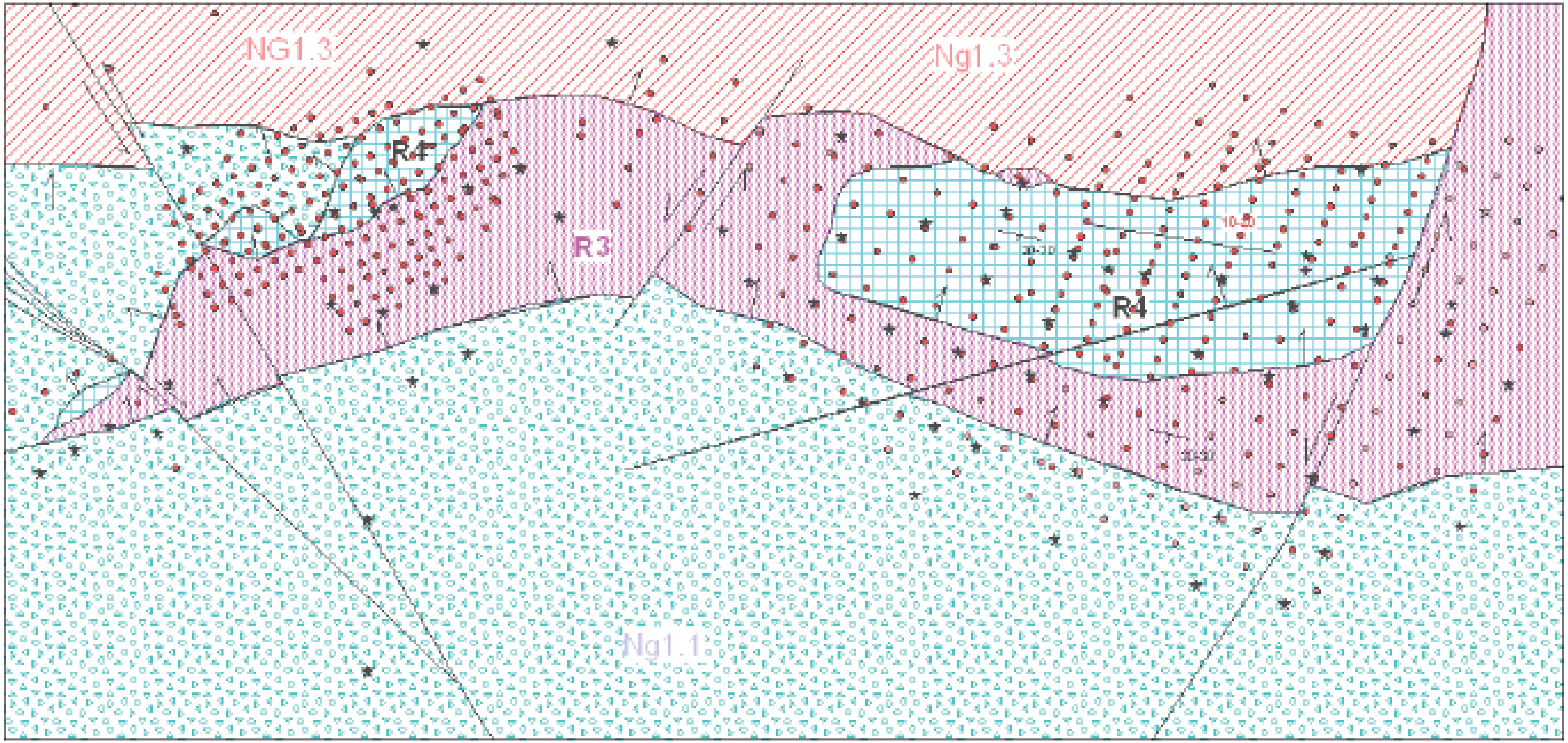

Figure 6: Geological Map of the Mutanda Orebodies

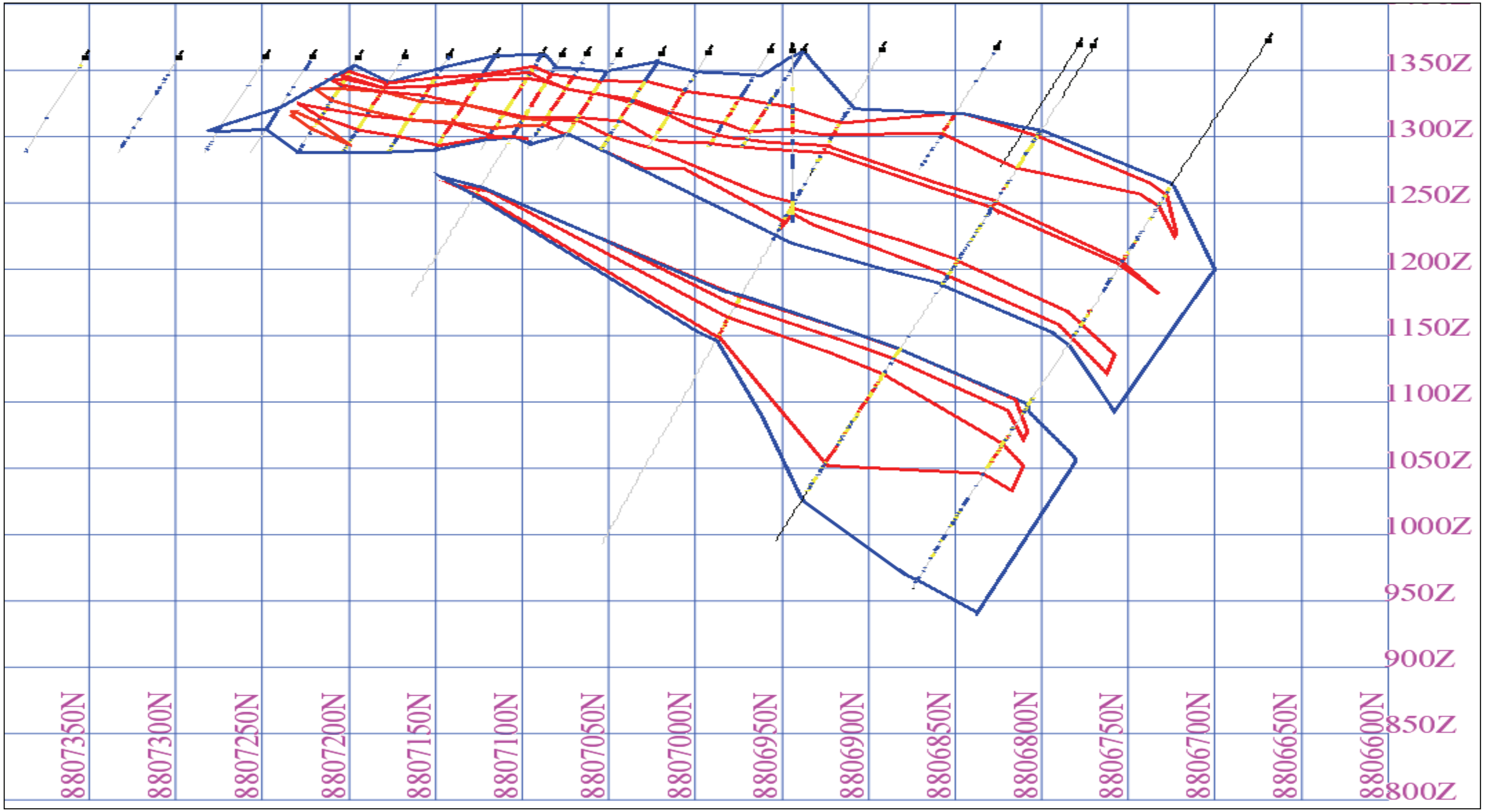

Figure 7: Cross Section through the Mutanda East Orebody

Note: the lower blue contact is the 0.4% Cu interpretation and the red the 1% Cu interpretation and grid lines are 50 meters apart

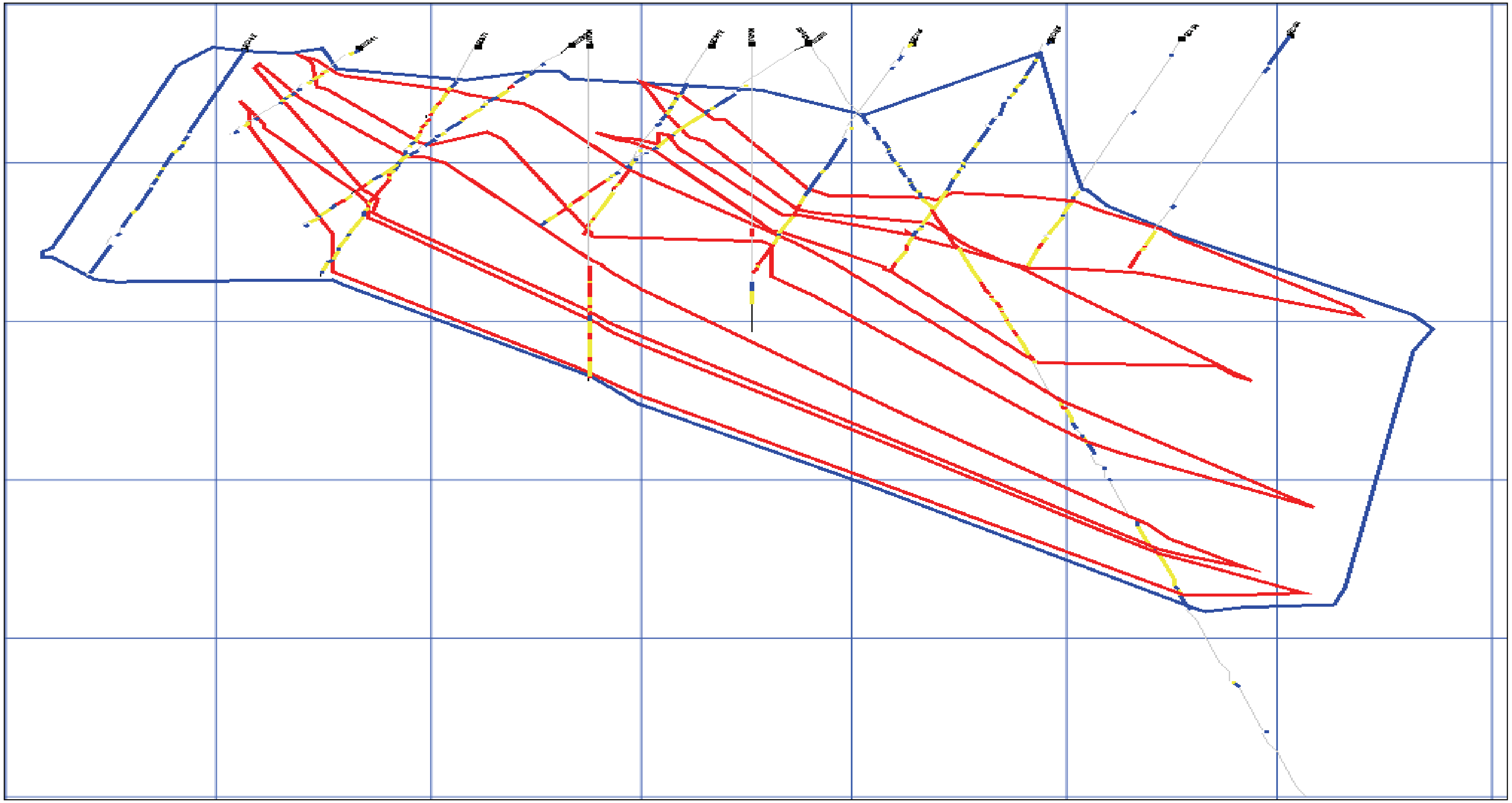

Figure 8: Cross Section through the Mutanda Central Orebody

Note: the lower blue contact is the 0.4% Cu interpretation and the red the 1% Cu interpretation and grid lines are 50 meters apart

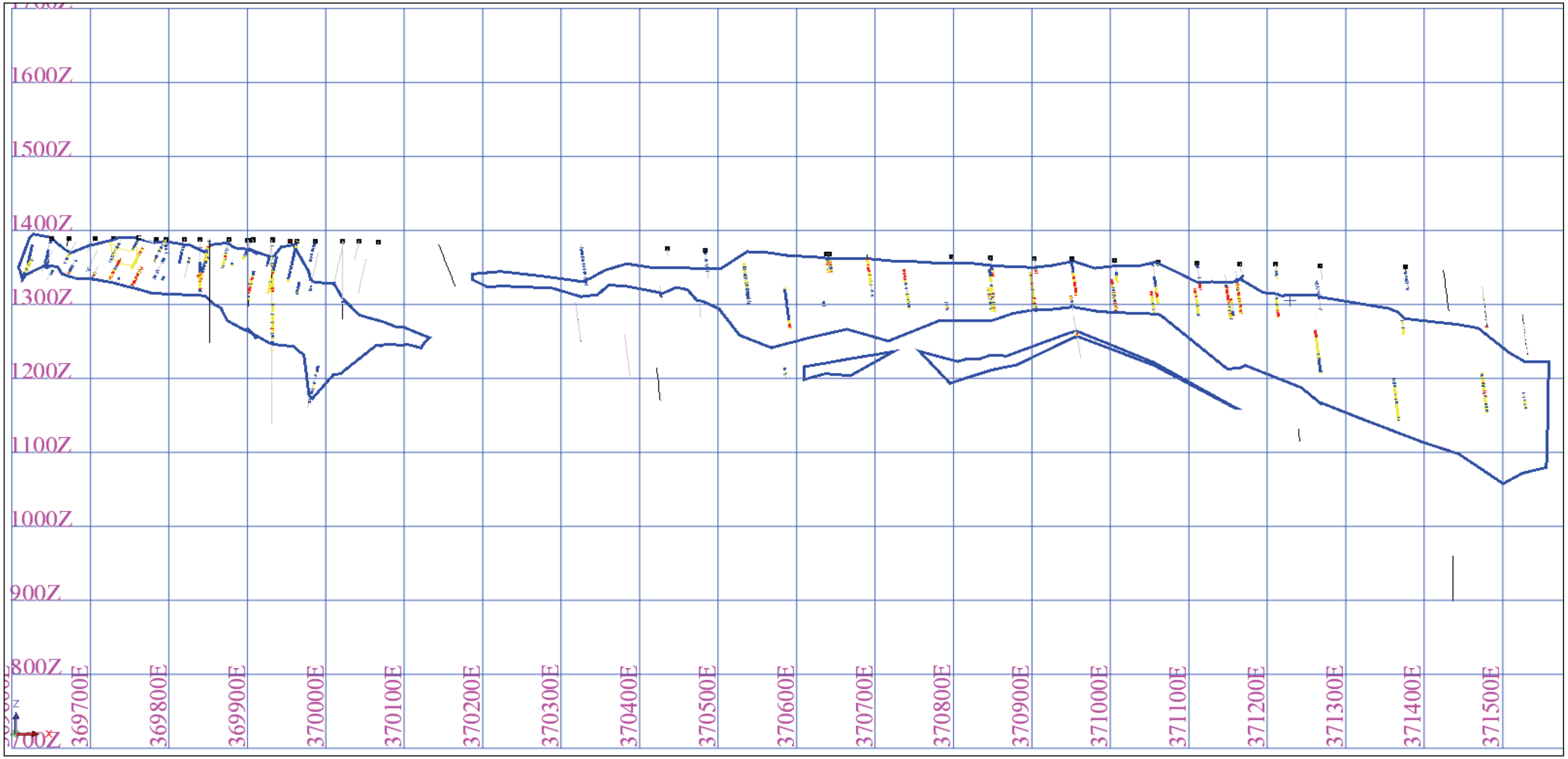

Figure 9: Vertical Long Projection through the Mutanda Central and East Orebodies

Note: the lower blue contact is the 0.4% Cu interpretation and grid lines are 100 meters apart

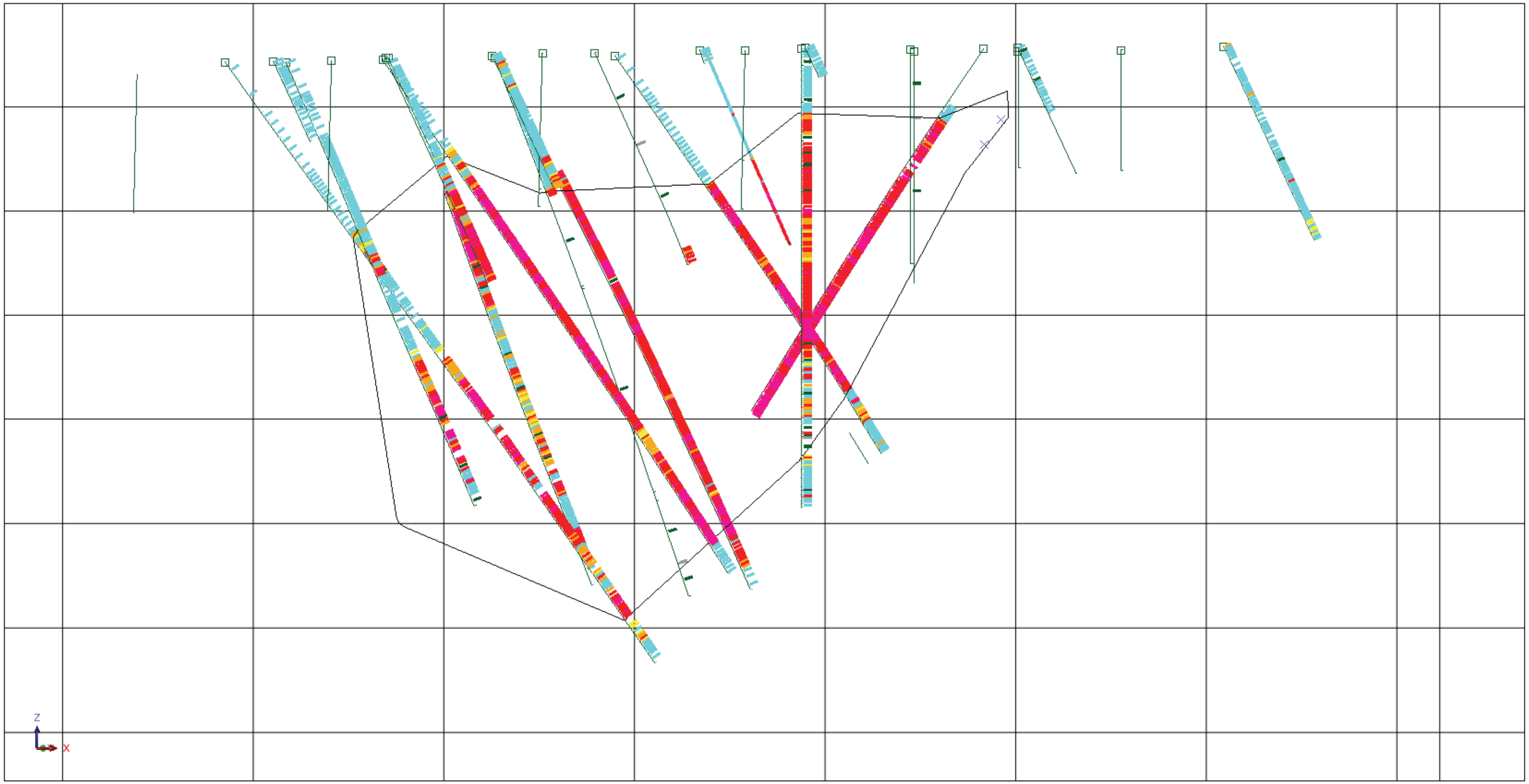

Figure 10: Vertical cross section through the Mutanda Central Northwest Orebody

2.2 Mineral resource estimation methodology

2.2.1 Exploration and Data

2.2.1.1 History

The Mutanda concession was first explored by Gecamines in the 1980s when they excavated a number of pits and from these mapped the stratigraphy and confirmed that the Roan 4 stratigraphic interval was present and that it contained mineralisation. In 2004 a programme of core drilling (“DD”) was undertaken and followed by Reverse Circulation drilling (“RC”), soil sampling and geophysical work. All of the significant near surface (to 100m) mineralisation has been defined.

2.2.1.2 Artisanal Mining

After the concession was awarded to Groupe Bazano, artisanal miners exploited a mineralised zone from the northern flank of the Mutanda Hill. This working subsequently became the platform for underground stoping. It is understood that these working eventually extended for some 70m beyond the bottom of the pit at an angle of 70°. This working was ultimately declared unsafe and mining stopped in 2005.

2.2.1.3 Soil Geochemistry

A soil sampling program was completed in June 2006 and the results showed a significant anomaly over the known mineralised areas which cover the northern third of the concession. There was also a strange anomaly running across the regional strike over two lines adjacent to a break in the southern range of hills. This was followed up by four holes with negative results and the source of this anomaly remains unknown.

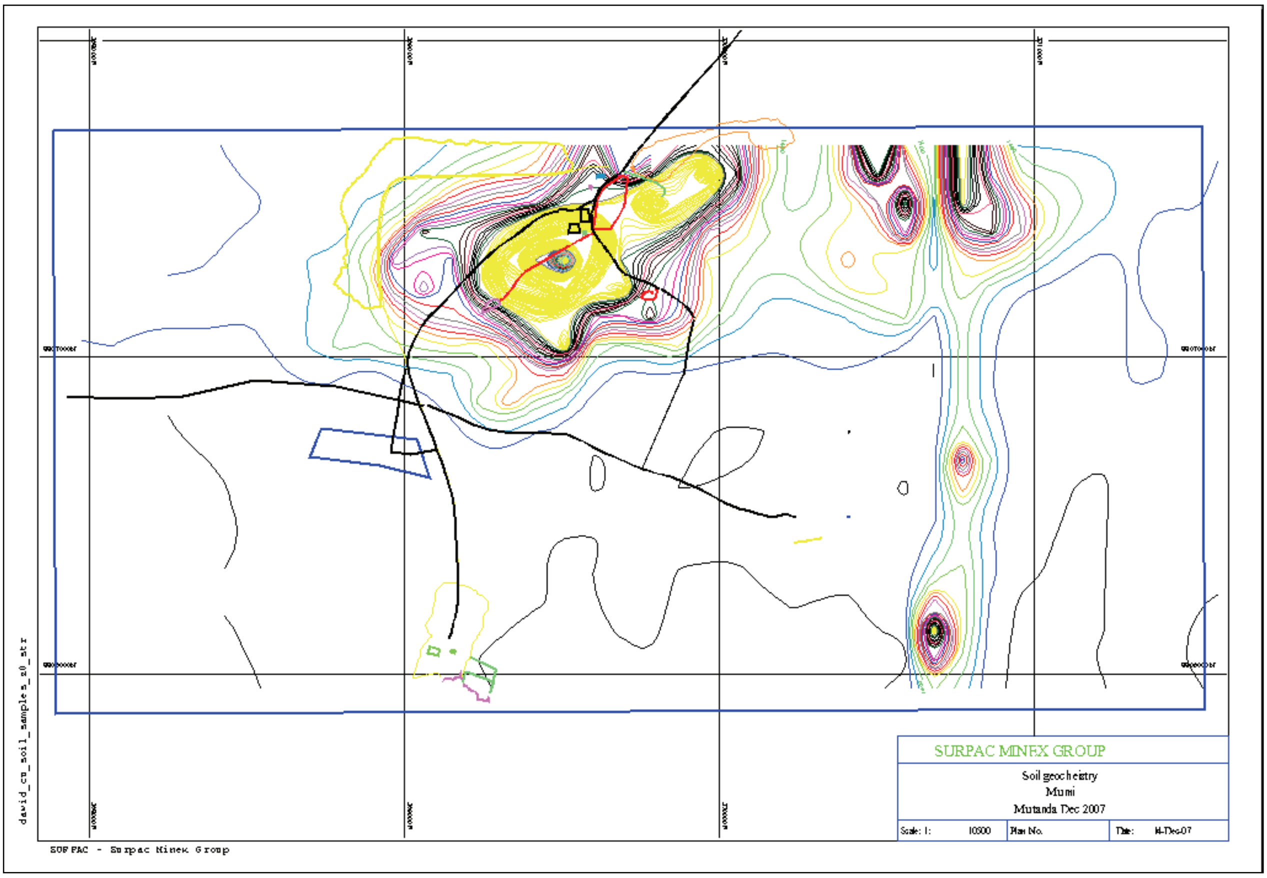

Figure 11: Soil Geochemistry Contours

2.2.1.4 Drilling

In 2005 Mutanda Mining contracted Gecamines to mount a drilling program around and to the east of the artisanal pit and 33 DD were drilled (1,780m). Part of this programme was targeted down dip of the artisanal pit and adjacent to old exploration pits to the east. These holes intersected ore-grade mineralisation over what is now known as the Central Zone, and the East Zone where four holes gave very good results. Only one hole indicated an extension of the artisanal pit mineralisation and it appears that this zone terminates not far from the bottom of the pit. Gecamines drilled 28 holes which proved to be very useful in planning the subsequent RC and later DD exploration campaigns.

Given the scattered indication of mineralised zones from the Gecamines exploration, a more systematic RC programme was initiated by Groupe Bazano in November 2005 and over a four week period 47 holes were drilled to an average inclined depth of 80m. Work was essentially complete over the Central Zone by September 2006 and the RC rig was moved to the East Zone and started work around the four Gecamines holes which obtained good results. This drilling was supplemented with a DD rig in June 2007 and the work over the up-dip portions of the Central and Eastern Zones is now complete.

The drilling grid over the Central Zone was nominally 25m by 25m. A similar pattern was established for the initial five lines of the Eastern Zone and this was widened to a 100m line spacing to the strike extents of the mineralisation and subsequently in-filled to 50m. The core drilling initially twinned the RC holes, partly to obtain samples for metallurgical tests and also to get better depth penetration which was limited to 80m with the main rig available through 2006 and into 2007. Other holes were drilled to obtain hydrological and geotechnical data. Most of the holes were inclined at 65° to the south and against the regional dip.

In addition to this work, condemnation and other RC drilling probed various parts of the concession and all of the holes drilled to end-2007 are shown on Figure 12 for the RC holes and Figure 13 for the core holes with the condemnation holes shown in Figure 14.

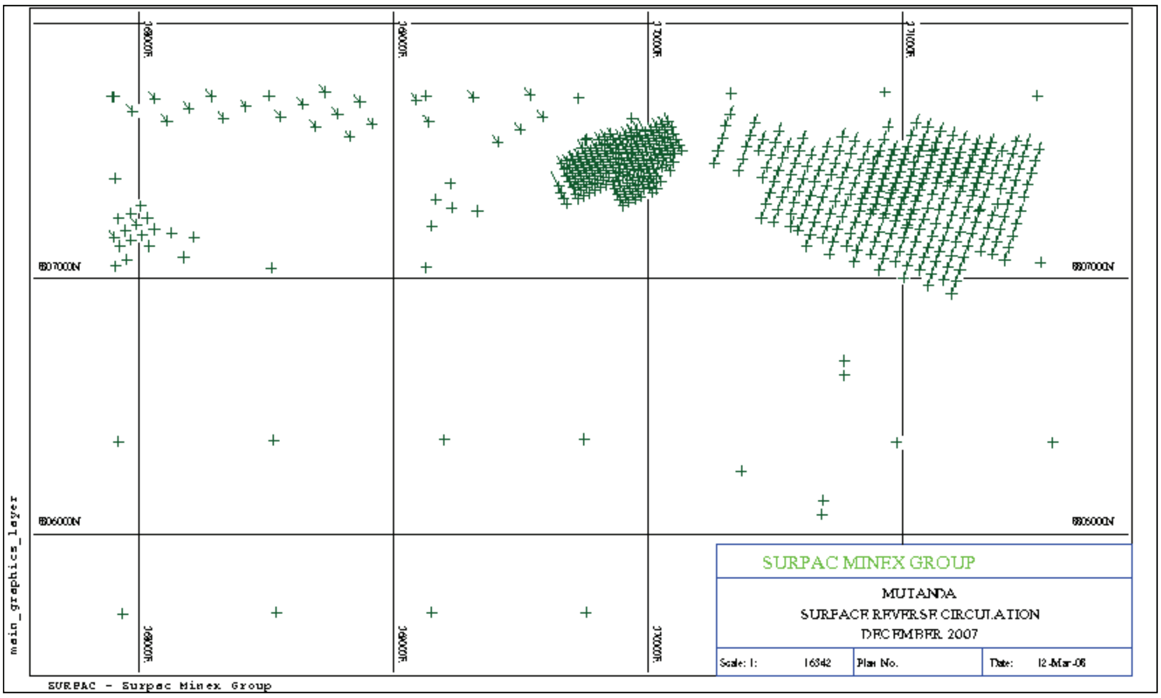

Figure 12: Reverse Circulation Drilling Layout

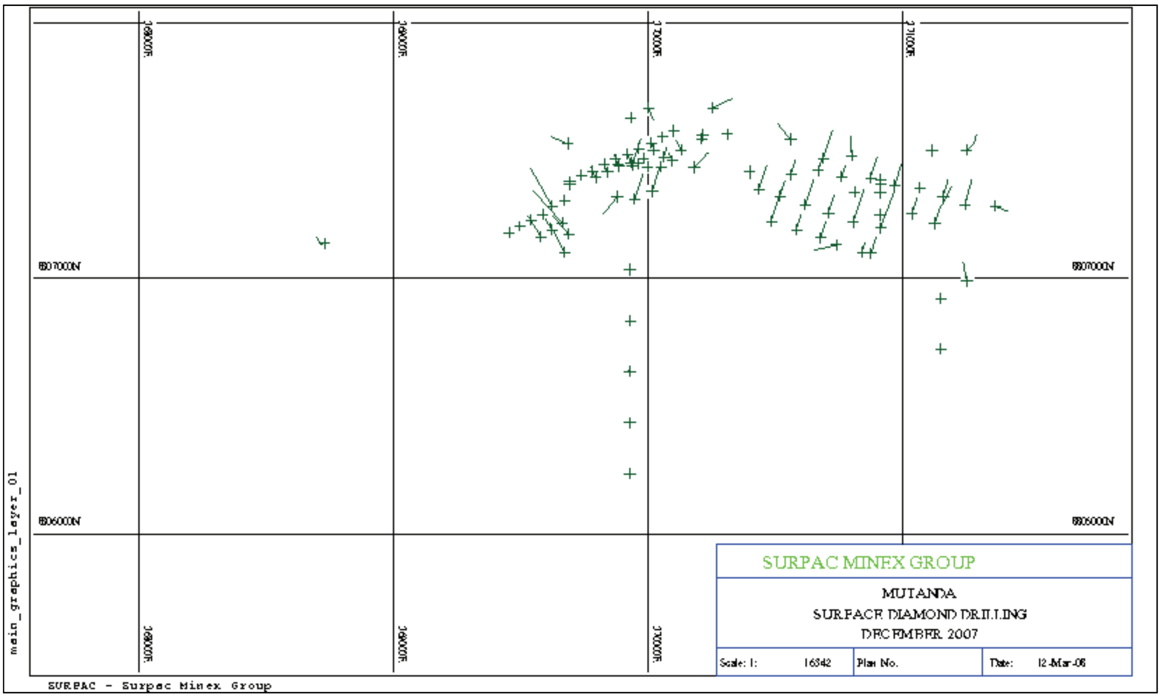

Figure 13: Core Drilling Layout

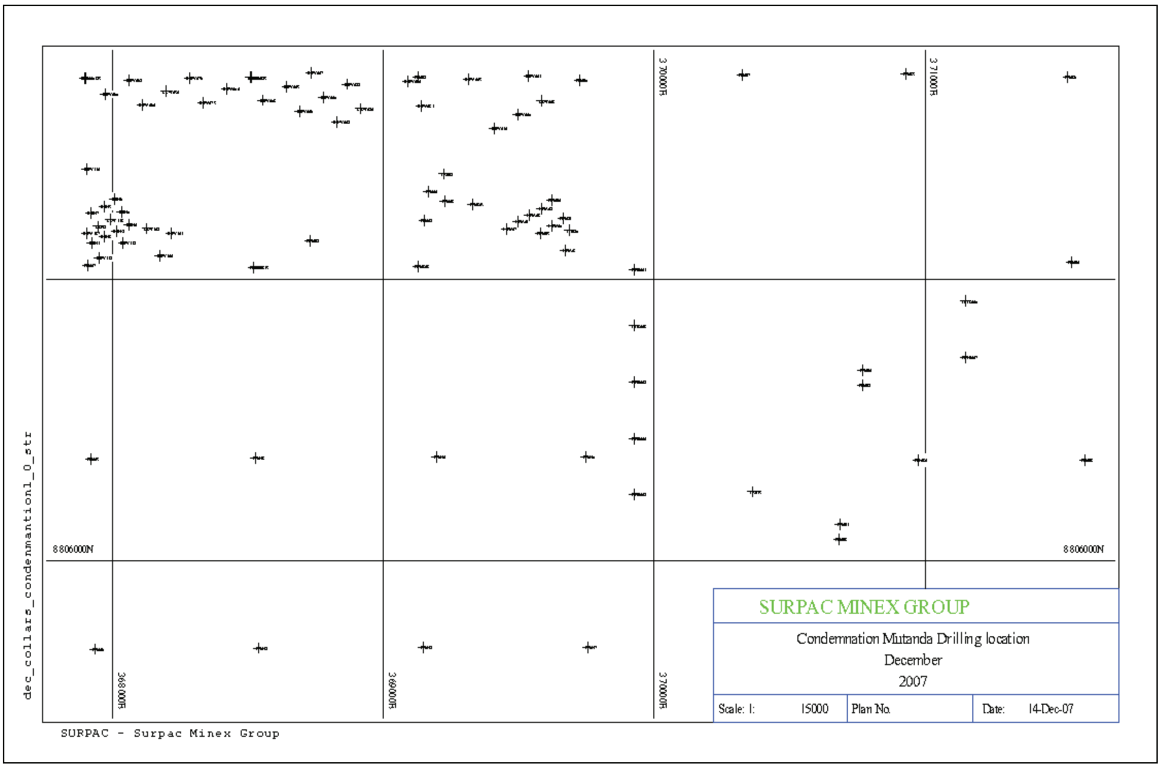

Figure 14: Condemnation Drilling Layout

To the end of December 2007 a total of 610 RC and 66 DD holes had been drilled for a grand total of 68,818m and the breakdown of these are shown in Table 2.

Table 2: Summary of Drillholes to December 2007

Area	DD	Meters	RC	Meters
South Area	-	-	4	320
Hydrological	-	-	6	1,200
Metallurgical	6	621	-	-
Geotechnical	12	1,908	-	-
West Zone	-	-	88	7,040
Condemnation	14	3,662	38	3,214
Central Zone	13	3,007	186	13,950
East Zone	21	5,097	288	28,800
Total	**66**	**14,294**	**610**	**54,524**

Eight of the DD holes collared within 5m of RC holes were drilled parallel to them to confirm the geology and mineralisation obtained from the RC drill chips (Table 3). The correlations between most of these holes were very good in terms of definition of the mineralised intervals and grades, and also confirmed the RC chip logging. Given the short-range variability of the oxide mineralisation where narrow high grade veins are known to exist, the grade variability in two of the areas (DD008/RC201 and DD016/RC268) does not detract from the fact that in both of these twinned holes the same mineralised intervals were identified, and both are relatively low grade.

Table 3: Comparison of Twinned RC and DD Holes

Hole ID	from	to	Interval.	TCu Ave.	TCo Ave.
	m	m	m	%	%
DD001	71.9	79.6	7.7	1.32	0.68
RC253	72.0	80.0	8.0	1.41	1.70
DD003	54.3	80.5	26.3	8.42	1.22
RC248	54.0	80.0	26.0	5.99	0.86
DD008	0.0	18.0	18.0	1.75	1.27
RC201	0.0	18.0	18.0	0.29	0.94
DD008	33.8	65.4	31.5	5.65	1.87
RC201	34.0	65.0	31.0	4.91	1.56
DD009	0.0	80.0	80.0	2.47	1.43
RC234	0.0	80.0	80.0	3.20	1.65
DD010	10.1	80.0	69.9	3.48	1.56
RC230	10.0	80.0	70.0	4.84	1.64
DD012	0.0	12.9	12.9	8.02	5.58
RC256	0.0	13.0	13.0	7.83	3.33
DD012	54.0	80.0	26.0	0.58	0.08
RC256	54.0	80.0	26.0	0.67	0.73
DD016	19.0	58.0	39.0	0.86	1.39
RC268	19.0	58.0	39.0	1.61	2.00
Average DD Holes				**3.32**	**1.51**
Average RC Holes				**3.54**	**1.57**

A further targeted phase 2 exploration programme continued from 2008 to expand the resource base in the Central and East ore zones. In addition to this holes were drilled around the original artisanal workings and a third major ore zone was discovered. The Central North West (CNW) deposit exploration drilling programme was completed in Nov 2010 increasing the number of exploration metres drilled to a total of 104,664 metres. This is split 800 RC holes and 184 DD holes.The CNW was drilled on a 25m x 50m spacing and has added significant resource to the Mutanda concession.

Table 4: Number of holes per project area

Area	Total drilled (m)	Number
Central	26,414	292
Central NW	20,931	126
East	42,122	411
South	7,348	68
West	7,850	87
Grand Total	104,664	984

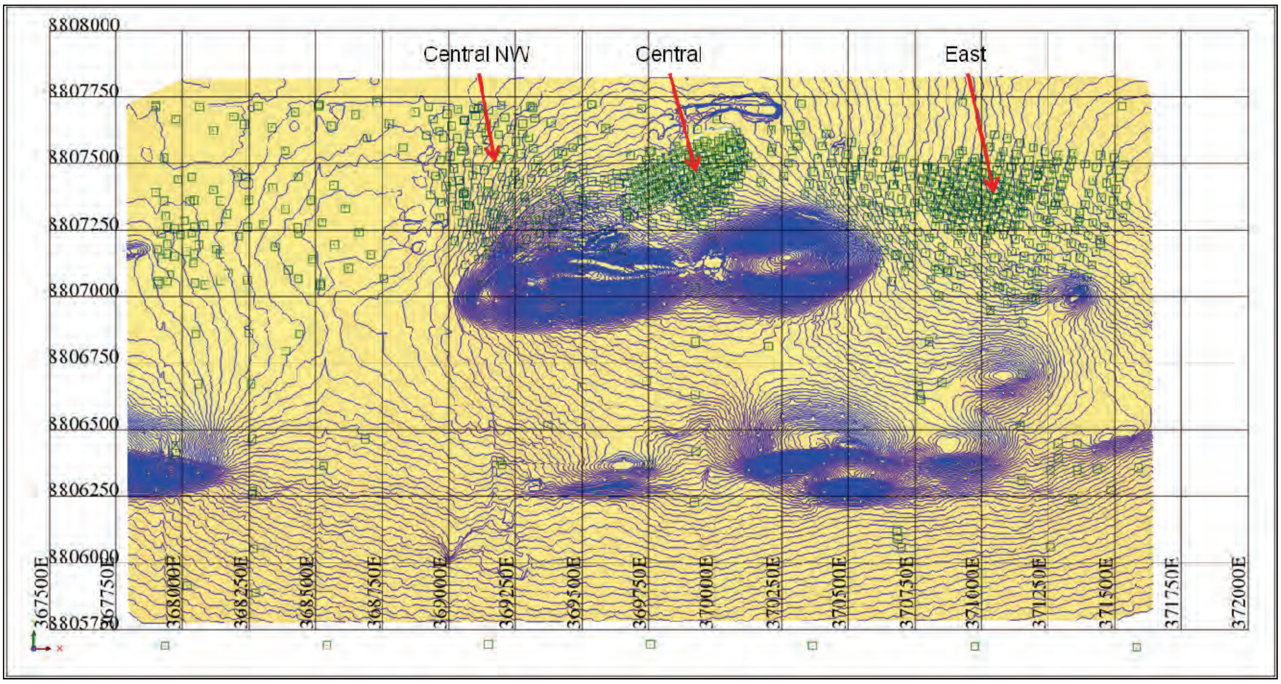

Figure 15: Drillhole distribution throughout the Mutanda concession

2.2.1.5 Condemnation and other drilling

Condemnation drilling was undertaken over the whole property on a 650-m grid and closer-spaced drilling has been completed over the plant site. On average, condemnation holes were drilled to 200m depth.

2.2.2 Geophysical Surveys

2.2.2.1 Magnetic Survey

A magnetic survey was conducted at Mutanda Mine from 25 August to 16 September 2007. The aim of this survey was to map the geological units and reveal any structural features that may be associated with, or control, the mineralisation.

The survey covered 35 lines running north south in the western parts of the concession and northeast southwest over the eastern parts. In addition six east-west tie lines were surveyed and one down the ramp of the pit. The survey lines were located on the ground using a GPS and 93 line kilometres were completed with readings taken at 10m intervals

The equipment consisted of two Envimag magnetometers manufactured by Scintrex from Canada. One magnetometer operated at a base station to monitor diurnal variations throughout each survey day and the other as a field magnetometer. The field measurements were corrected for diurnal variations using the base station data and all the data collected over three days were reduced to a single day.

Geosoft software was used to process the data and interpolated at a 35m grid cell size. A small upward continuation filter of 15m was applied to the data to suppress near surface noise such as boulders. The Magnetic data are presented as following images;

A survey conducted showed a significant magnetic high to the south of the mineralised zone but the results did not highlight any anomaly over the mineralisation, but several magnetic lineaments were visible on the magnetic image and they are interpreted as structural breaks.

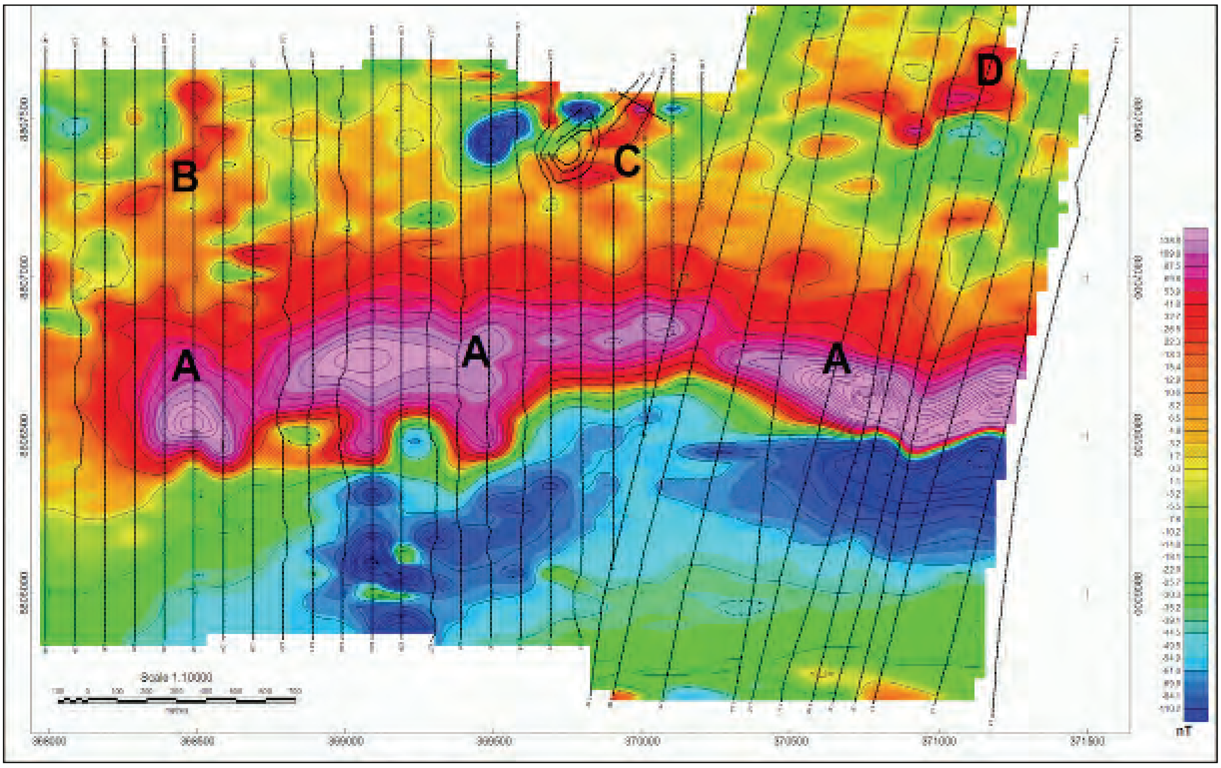

Figure 16: Total Magnetic Field Colour Contour

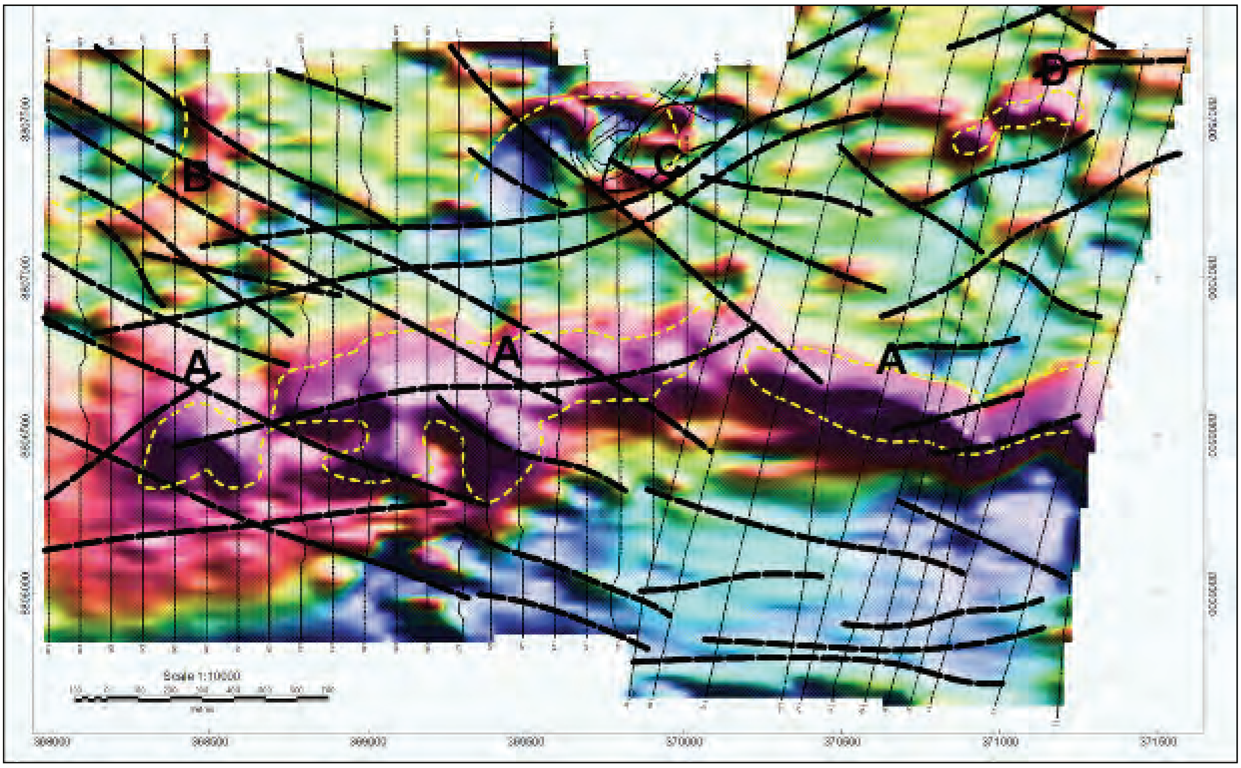

Figure 17: Pole Reduced Colour shaded with Fault Interpretation

The Total Field Colour image (Figure 18) was contoured at 20nT (or Gamma) intervals. The Pole Reduced Colour shaded images (Figure 19) give higher resolution between very close bodies and brings the causative body directly over the anomaly. They also enhance linear features such as faults, shear zones, dykes and contacts. The interpretation of the structural features is superimposed on the pole reduced colour shaded image (Figure 19).

The total field magnetic image (Figure 18) indicates a broad and highly magnetic anomaly (A) that runs east-west across the entire grid. Other magnetic highs (B, C, and D) were mapped in the northern and north-eastern parts of the grid. The geological source of these anomalies has yet to be confirmed but anomaly A indicates a lithological unit with high magnetite content.

Figure 19 shows extensive faulting interpreted from the magnetic anomalies, but there is insufficient resolution to determine displacements along these lineaments. Two major fault directions are evident: a NW-SE trend and one to the NE-SW. The former dominates the western and southern parts of the concession, whereas the latter prevails over the eastern and northern parts of the grid.

2.2.2.2 Induced Polarisation

Following the magnetic survey, a preliminary Induced Polarisation ("IP") survey was initiated to detect possible sulphide zones at depth. This was completed in November 2007 and gave encouraging results but with the onset of the rains the work was deferred to March/April 2008. The real section surveys tested different electrode separations to investigate penetration depth levels from 50m, to 500m and electrode dipole separations of 25m and 50m were used.

The initial results over a previously drilled area indicated that the sulphide zones give medium amplitude (about 10mV/V) chargeability anomalies while carbonaceous shales exhibit very strong (20mV/V) anomalies.

The readings at each station were stacked at least ten times on average to ensure high quality readings and these were used to produce the pseudo-section.

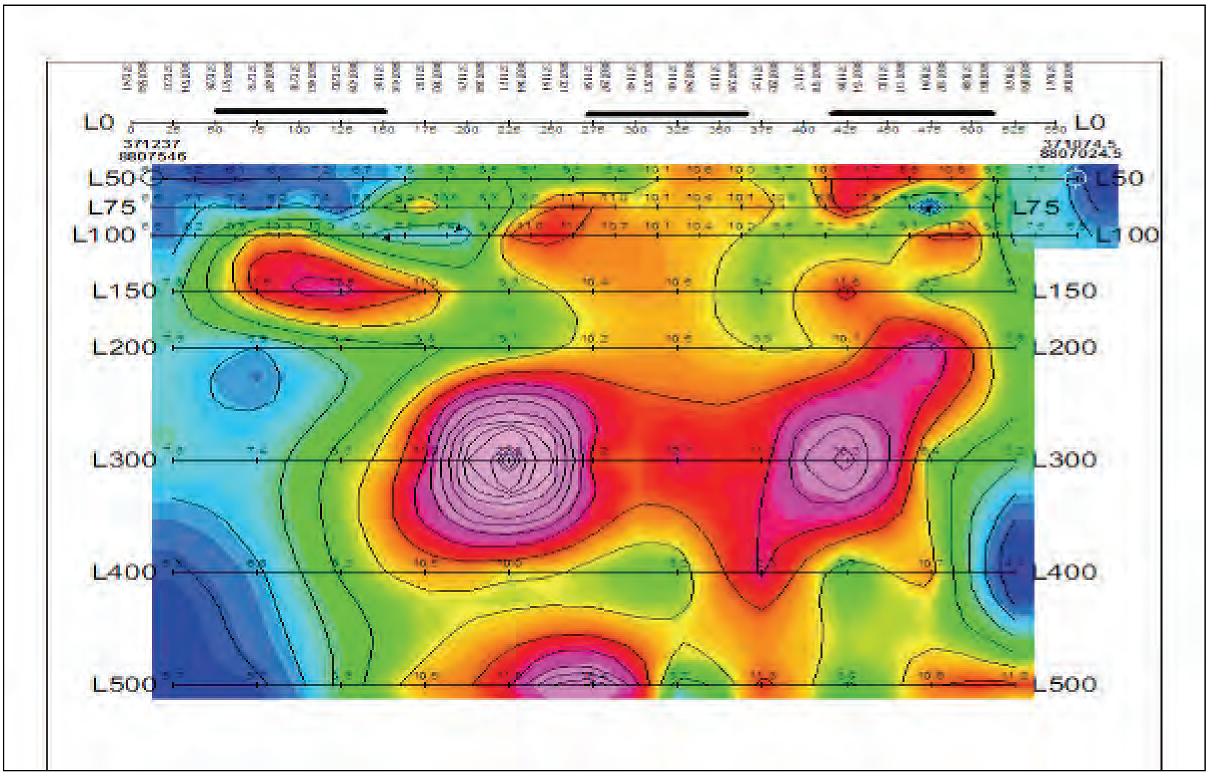

Figure 18: Real Section Chargeability of the Mutanda East Zone

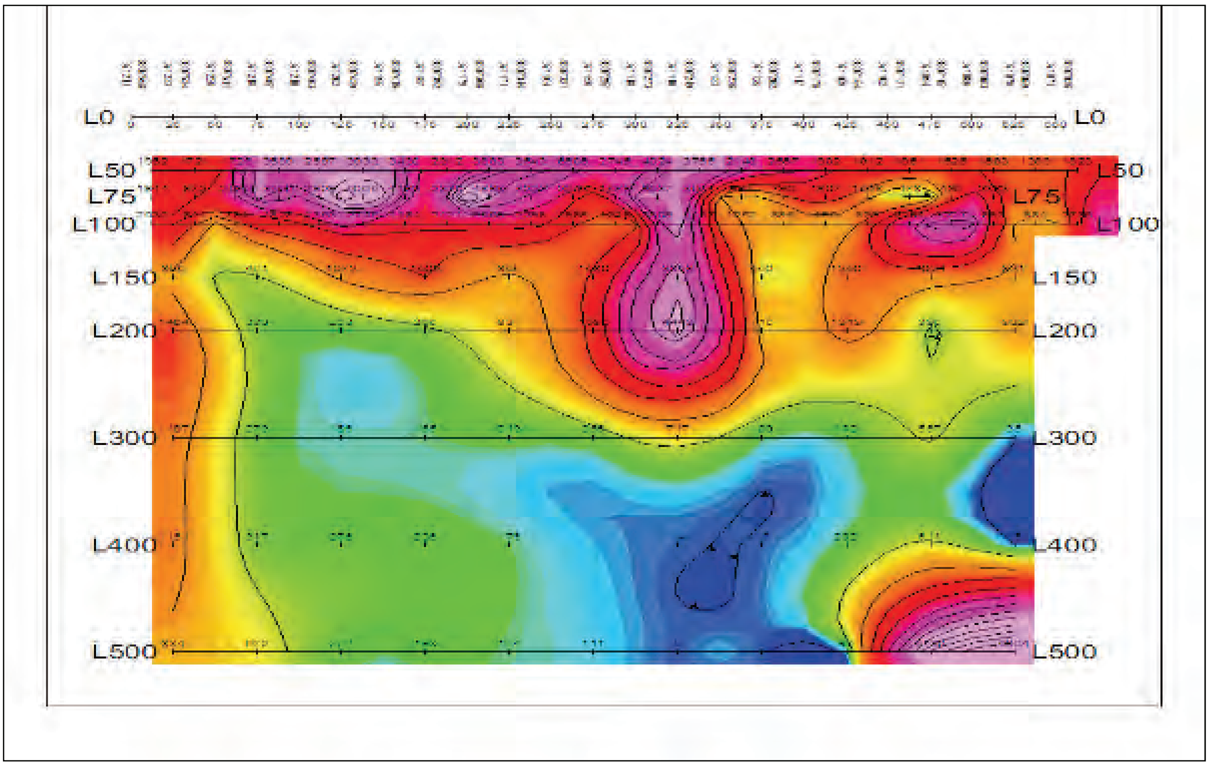

Figure 19: Real Section Resistivity Pseudosection of the Mutanda East Zone

These initial IP tests over a drilled area indicate that the method would be effective in mapping out the sulphide and shale zones, both of which contain mineralisation.

2.2.2.3 Digital Elevation Model

A Lidar airborne survey was flown by Southern Mapping in April 2007 to provide an accurate plan of the concession area with 0.5-m contours. The digital elevation model (“DTM”) has been imported into MapInfo™ and Surpac™ software and now forms part of the Resource estimation database. This DTM was at a stated RMS accuracy of 0.3m and in addition ortho-rectified photographs of the whole area were also supplied by the company. The DTM has been imported into Surpac to provide the upper limits of the Resource model and also into MapInfo.

2.2.2.4 Data Collection

Survey Data

Al digital survey data on the mine has been converted to the UTM WGS84 (35 South) system. An aerial survey was performed by Southern Mapping in April 2007 using Lidar survey method was used to obtain a digital terrain model (DTM). This survey was processed to a 0.5 meter resolution. The survey in the pit has been done by using ground survey techniques and involved picking the crest and toe positions of the benches as well as using spot-height positions for pit floors.

Drillholes were surveyed using ground survey methods, and reduced to the map coordinates. There were a good correlation between the topographical survey and the drillhole collars.

Drilling Methods

A total 984 holes were drilled on the concession, of which 800 were RC and 145 DD with 38, a combination of RC and DD holes. These have all been captured in the database. The database is updated regularly and maintained on site.

Downhole Surveys

There were 94 DD holes drilled of which only the vertical MDA and DDMET sequence were not surveyed down the hole (39 holes). Of the downhole surveys, 29 were deemed to be incorrect because of large changes in the azimuth. These discrepancies were probably due to magnetic deviations down the hole, and were taken out of the calculations. The majority of these samples were in DD001-DD004, which could also be explained by calibration errors. A total of 475 downhole surveys were accepted for the 55 holes.

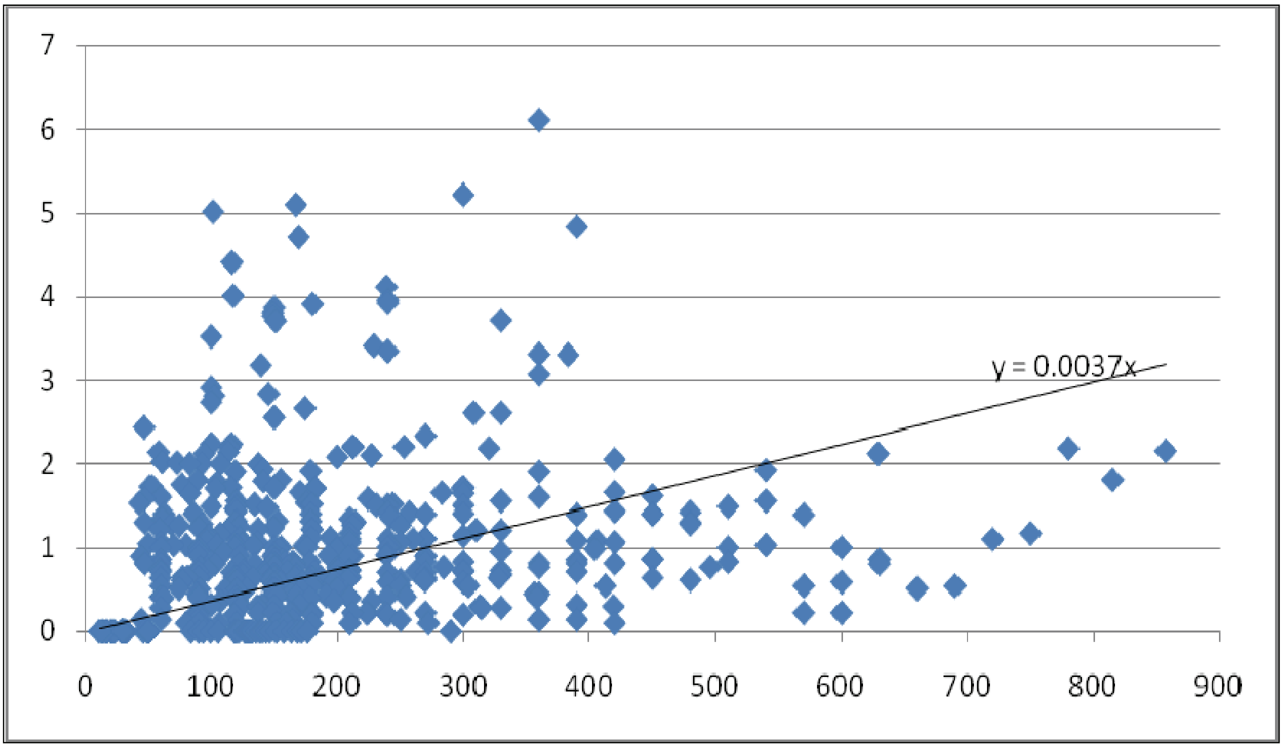

Figure 20: Total deviations measured for the 55 holes plotted vs depth

In our opinion these deviations are not excessive, and the total deviation at 900m is not expected to be more than 5m.

Drilling Procedures

The collars of the planned RC holes are plotted using Mapinfo or Surpac software and the coordinates extracted in WGS 84, UTM format for staking in the field using a combination of survey tools including a hand-held GPS, theodolite or tape measure with ranging rods. Upon completion of drilling the final collar coordinates are measured by a qualified surveyor using a total station theodolite and incorporated into the database.

Downhole surveys of the core holes are taken every 30m by the driller using a multi-shot electronic instrument and checked by the field technician while the survey is in progress, and these data are entered into the database and Surpac. Very few of the RC holes are deeper than 80m and these holes are not surveyed.

Sample Collection

RC samples are taken at one metre intervals and the hole and air hoses are blown clean and the cyclone is thumped with a hammer to minimise contamination between samples.

For the RC holes a geological technician is present at all times during drilling to ensure that the sample collection is done according to the standard procedures and that the hole number and sequential from – to values are written on each 50-litre sample bag and recorded on a standard sheet.

After completing a hole, samples are transferred by truck to a central preparation/logging facility at Mutanda.

Logging Procedures

The RC drill holes are logged using washed chips stored in the chip trays. During logging the chips are assigned to a specific stratigraphic unit and where possible any marker beds like the haematite layer or carbonaceous shale are logged. The oxide, sulphide and mixed zones are also logged. All the logs are captured into a central database using Geolog and more recently, Sable software. After logging is completed identification labels are placed in the chip trays at appropriate metre intervals corresponding to the logging data which are captured and imported into Sable software.

Core logs are recorded on a standard log sheet using standard lithological and stratigraphic codes which include structure, alteration, mineralisation and sample allocation against the drilled interval. In addition the core recoveries and RQD indices are recorded on a separate sheet. These logs are typed into Excel for export into Sable software and filed.

Sampling and Sample Storage Procedures

At the logging/preparation facility the RC sample receipts are recorded along with the mass of each bag.

The samples are riffle split into 300-g and 5-kg sub-samples, with the former sent for assay and the larger reference split retained in covered storage yards at Kolwezi and on site. The bags for the sample splits are numbered on the bag and those sent to the laboratory include a ticket inserted into the bag and one stapled to the bag using pre-numbered commercial ticket books. These numbers are recorded on a standard sheet showing hole number, drill interval and sample number. A portion of each sample is washed and the chips are placed in numbered plastic chip trays for logging and storage.

Core is taken from the field and transported on trucks to the sampling facility, where it is logged and photographed.

The core is halved longitudinally using a diamond blade saw following the sample marks on the core made by the geologist. One half is tagged, bagged and shipped for analyses by Mintek in South Africa and the remaining half of the core is returned to the core tray and stored.

Core samples are normally taken at metre intervals except where narrower intervals are dictated by the geology; samples are not taken across geological contacts.

The retained split core is stored in the covered shed in well marked core boxes indicating the hole number, box number as well as the metre marks, written on the core blocks. The core trays are placed on storage racks.

As part of the SRK QA/QC checks a random selection of sample numbers in the database were tracked back to the sample ticket books and the assay results. A few discrepancies were detected in the recent batches of samples sent to Zambia and these were corrected. None were detected in the samples sent to the Bazano laboratory.

Assay Procedures

The 300g samples are tagged and bagged before being sent to the laboratory at Bazano offices in Kolwezi where it is dried and pulverised before a 2-g aliquot is dissolved and analysed, using an Atomic Absorption Spectrometer (AAS).

Density

Density measurements were made on 399 samples of solid fresh core at Mutanda using a water displacement method and a commercial density balance. Three of these were anomalously high and removed from the database. The remainder had an average density of 2.75 t/m^3 with a standard deviation of 0.23. Forty-seven samples were above 3.0t/m^3 but these are considered to be realistic as checks showed that they are all well mineralised with malachite or heterogenite or both. However, this applies to the fresher parts of the ore zone.

A few density measurements were done by Mintek in Johannesburg as part of the ongoing metallurgical tests and by CSIR in Pretoria for the geotechnical assessment. These two laboratories record widely discrepant results and 2.5 t/m^3, the lower of these average values (CSIR), has also been considered to obtain an average value for the Resource mass estimation.

It proved to be difficult to determine the density of the near surface material given the friable nature of this material and the poor recoveries of solid core. In addition most of the samples were taken using an RC rig.

To address this gap in the database holes were dug in the floors of the existing pits and all material removed and placed in a sample bag with the recovered material dried and weighed to obtain the mass. The volume was measured by lining the hole with a thin sheet of plastic which was filled from a graduated bottle of water. The average density for 65 samples was 1.43 t/m^3 with a range from 1.83 to 1.00 t/m^3. This result is very similar to the reference density for unconsolidated silt provided by the AusIMM's Field Geologists Manual and therefore the results obtained appear to be low. The bulk of the samples were from the unmineralized R3 stratigraphic unit and samples with high heterogenite and malachite contents will be higher and perhaps around 1.6 t/m^3 to 1.7 t/m^3. Compounding the problem of assigning an accurate density is the unknown proportions of hard and soft rock.

Therefore SRK have assigned what they consider to be a reasonable weighted average density between 1.43 t/m^3 and 2.75 t/m^3, associated with unmineralised soft rock and hard rock respectively. Therefore an average of 2.25 t/m^3 is considered acceptable and comparable to other deposits in the DRC.

Data recording

All field data apart from survey measurements are recorded on paper and transferred to computer spreadsheets. This includes all drill holes with from-to intervals, lithological and stratigraphic logs, and sampled intervals against sample numbers. These are matched to electronic assay data when results are received and blank and repeat results are extracted to a separate file for assessment and the sample results are also kept separately for export into Surpac software.

In the early days of the program, laboratory results were received on hard copy and inputted manually into the computer. From the start Geolog software was used to store the main database and more recently the Sable package has been used. The latter has recently been commissioned, (January 2008) and is being modified to allow the software to extract QA/QC data into easily accessible files and to undertake the routine QA/QC checks which were previously done on spreadsheets.

2.3 Quality Assurance/Quality Control ("QA/QC") Practices

A QA/QC programme was initiated from the start of the RC drilling programme and for all DD holes drilled by Mutanda. While this mainly applied to the analytical results, systems were also set up to record the normal checks on field data such as weighing the RC drill chips over each sampled interval and recording core loss and marking these intervals in the core trays.

The weight of RC samples and DD core loss is very variable. The general ground conditions at Mutanda are reasonable but the mineralised zones are generally highly weathered, in places to a considerable depth, and fractured and brecciated portions exacerbated the problem of sample recovery. This is particularly true in some of the high cobalt zones where the heterogenite occurs as an earthy wad which produces very low sample returns from the RC drilling and is washed out of the hole during core drilling. The average recoveries of all holes to an 80m drilled depth are 68.6% for the RC and 63.5% for the DD holes. For the twinned holes shown in Table 3 the average recoveries were 41% for the RC and 57% for the DD holes to 40m, and 68% (RC) and 70% (DD) for the 40 to 80m intervals. Therefore sample integrity in some areas is poor, but given the ground conditions this is considered to be unavoidable.

In order to minimise contamination between RC samples the hole was thoroughly blown out and the collection cyclone beaten with a hammer to remove any caked material. All samples were transferred to a splitting shed were they were split through an appropriately sized riffle to produce approximately a 3kg aliquot sent for analysis. The riffles were cleaned with a paint brush between each split.

The bulk of the samples have been analysed at the Bazano laboratory in Kolwezi, which is not an accredited facility. However blanks were inserted into the sample stream after every seventh sample and a drill chip repeat after every twentieth sample.

Finding suitable blank material proved to be a challenge: the river sand initially used was found to be contaminated and barren drill chips obtained from condemnation holes also contained random non-zero values. Almost invariably the sporadic high blank values followed a lower grade sample suggesting that contamination was not causing the problem and the analyses were initially accurate. Eventually barren cement was inserted and when this material returned unacceptably high values the laboratory was suspected to be giving spurious results.

Similarly with the repeat samples there was initially very good correlation between the two sets of values with a coefficient of 98% for Cu and 99% for Co, Half Absolute Relative Difference ("HARD") values of 0.1% and 1.6% on the averages, acceptable bias for Cu at 98% and no bias for Co, and a tight spread of values around the regression line (Pearson's Correlation Coefficient Cu 97% and Co 98%). As much as anything these repeats are a measure of the quality of the splitting and sample homogeneity. As the programme progressed, the correlations between the repeats deteriorated slightly and although the averages between two sample sets were acceptable, the problem with the blanks remained. Part of this stemmed from sample overload at the laboratory but in addition to that the AAS machine developed a slow drift which was not detected by the laboratory's internal quality control systems, but was reported to them by the project geologist.

In March 2007 a set of 132 samples of milled pulp rejects from the Bazano laboratory were sent to SGS Lakefield in Johannesburg for umpire assays. These RC samples were obtained over the December 2006 period. There were large discrepancies with 12 samples, considered to be due to incorrect sample numbers and these were removed from this database. Scatter plots of the remaining 120 samples showed a bias of 5% for Cu and 14% for Co. In both instances the Bazano laboratory reported higher results.

A second set of 421 samples were sent to SGS Lakefield in Johannesburg and these showed biases of 5% and 11% but with SGS now reporting higher results. The averages of the samples were almost identical (Cu 2.97% Bazano and 3.01% SGS, Co 1.14% Bazano and 1.22% SGS) with correlation coefficients of 99% and 100% for Cu and Co respectively.

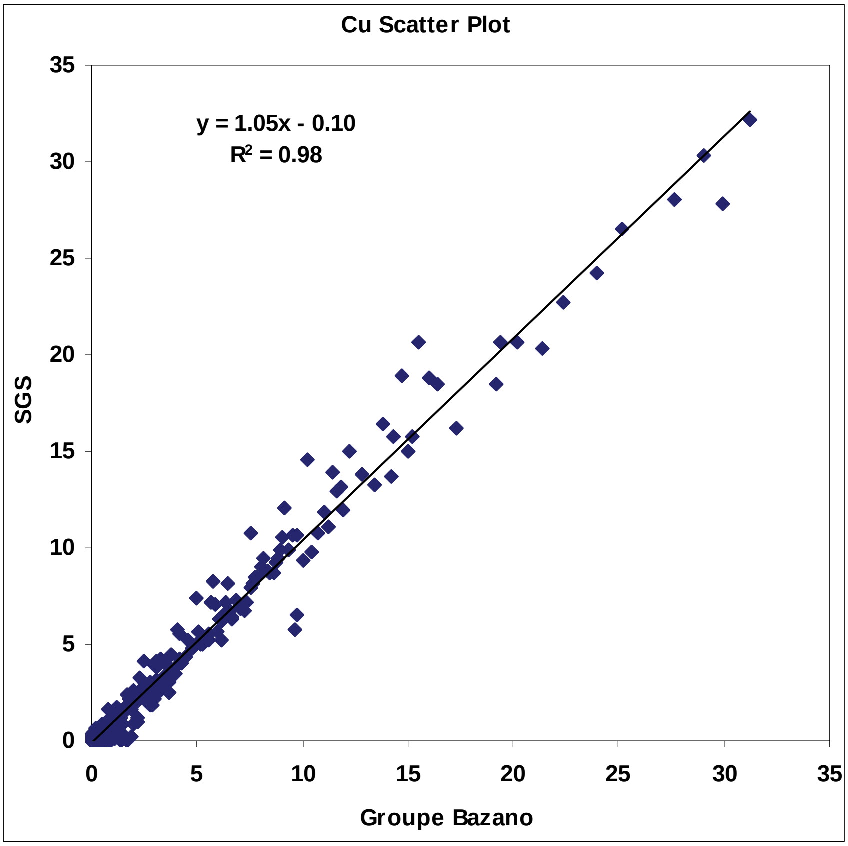

Figure 21: Depicts Copper Scatter Plot SGS vs. Groupe Bazano

These umpire samples covered all of the Central Zone drilling and most of the East Zone.

In both sets there were widely discrepant results (overall 4% of samples) which indicate transposition of sample numbers and these were removed from the comparative database. Similar problems have been experienced throughout the program and these can be detected where blanks report very high values and adjacent samples have near-zero values within a robust mineralised interval. Elsewhere they are difficult to detect but transposition of samples within a mineralised interval will not affect the grade averages. Where they may have an effect is on samples marginal to the mineralised zone. Given that over 40,000 samples have been analysed some errors of this nature are bound to occur.

In late 2007 an independent audit of the Bazano laboratory highlighted some problems associated with the laboratory and in particular a malfunctioning AAS which caused the instrument to lose sensitivity over a period of time. Accuracy was affected, particularly at lower concentrations and this was the most likely reason for the poor returns on the blanks and also the wide scatter of the correlation between repeat samples in the latter part of 2007.

In January 2008 an exercise to check the assays was initiated using the SGS laboratory in Kalalushi, Zambia for over 4500 results. These indicated that at lower grades (less than 1%) the Bazano laboratory is generally reporting higher results whereas at higher grades (plus 1%) the same laboratory reported lower values. The averages for the two laboratories for all values are almost the same with SGS at 1.85% Cu vs. 1.81%Cu for Bazano. The Co results showed a far greater discrepancy with 0.63% and 0.91% for SGS and Bazano respectively. In both cases the scatter plots showed very low regression slopes around 0.49 and low Pearson's correlation coefficients (R2) of 0.43 indicating a wide spread of values around the regression line. Inspection of these plots shows an unacceptable large number of values stretching along the SGS axis with high SGS results matched by very low Bazano equivalents. A smaller number of comparative values also lie along the Bazano axis. Between these spurious results there is a clearly discernable trend suggesting that a majority of the values show a reasonable comparison with far less bias. There are a number of reasons for these discrepancies and whilst sample number transposition has undoubtedly occurred, there were also problems with the AAS instruments. The most obvious clue to the inadequate laboratory performance was the high average value of the blanks submitted. It was for these reasons that a large number of samples were sent to the SGS umpire laboratory in Zambia.

Of the 4500 samples sent to SGS Zambia, a selection of 320 milled pulp duplicates were sent to the Alfred Knight laboratory in Zambia for re-assay. These umpire repeats showed a high degree of precision with a very acceptable average comparison of 8.15% Cu for Alfred Knight vs. 7.95% for SGS and a regression slope of 1.00 but with a slightly low Pearson's R2 value of 0.93. Similar results were obtained for Co with 1.30% and 1.31% for Alfred Knight and SGS respectively. The bias between the two sets of results at 0.97 was lower than for Cu but still very acceptable, although the R2 value, also at 0.97 was higher.

A decision was made on the phase 2 drilling from 2008 that all samples would be sent to SGS in Kalalushi (Zambia) for assay. The last of these samples was received back in late November 2010. There are currently no more assays outstanding from the exploration programme. Check samples were sent to Alfred Knight (Zambia).

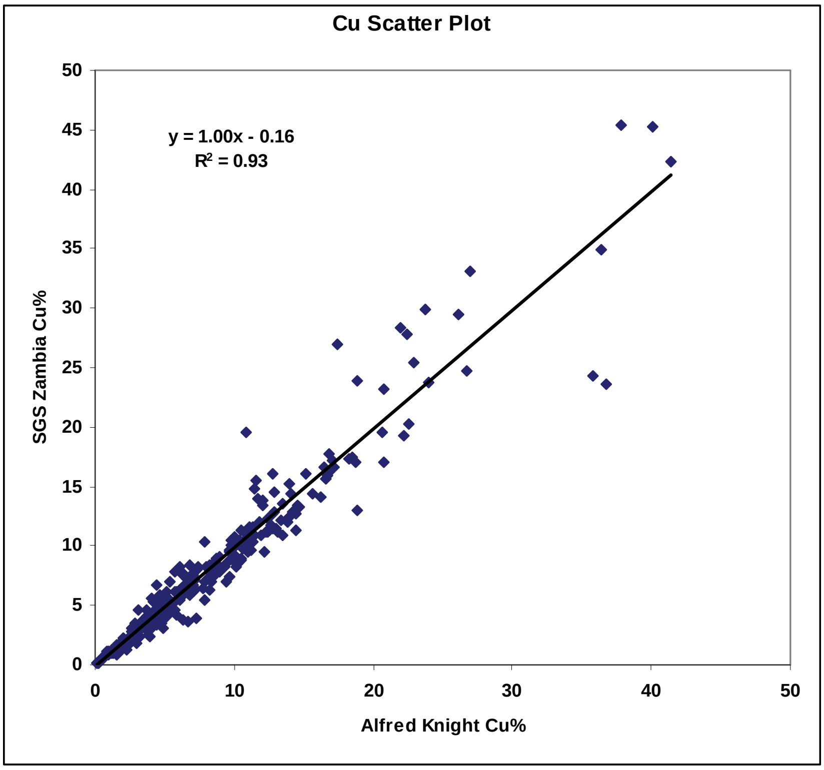

Figure 22: Depicts Copper Scatter Plot SGS vs. Alfred Knight

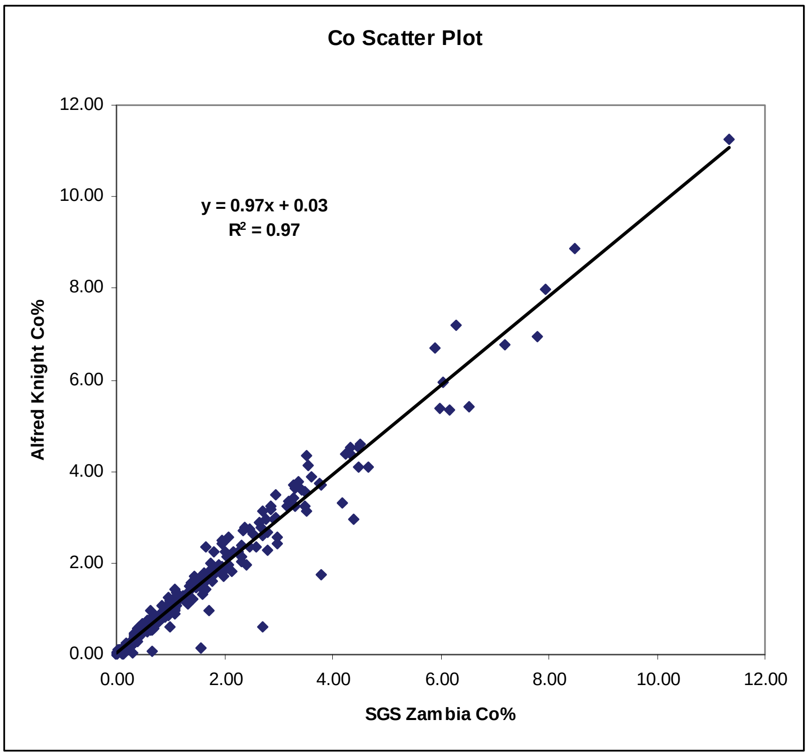

Figure 23: Depict Cobalt Scatter Plot SGS vs. Alfred Knight

The analyses accepted into the Resource database have given priority to SGS and where these were unavailable, to the Groupe Bazano results.

An inspection of the transverse sections plotted for stratigraphic unit and sample grade show few discrepancies and the integrity of the outline of the mineralised zones appears to be sound.

Although not perfect, the results from the Bazano analyses, where these have been used, are of sufficient quality to support the Resource estimates contained in this study and SRK do not believe that the overall integrity of the Resource is in doubt. This conclusion is further supported by the good correlation between the Bazano RC and Mintek DD results. GAA agrees with the methodology employed by SRK.

2.3.1 Variographic Analysis

2.3.1.1 Variography Results

The results for the variography to be used in the estimation are shown Table 5, and were derived from the statistical and geo-statistical study completed.

Table 5: Estimation Parameters used during estimation

Area	**ME**				**MC**				**CNW**	
Cut-off	**0.4%cutoff**		**1.0% cutoff**		**0.4%cutoff**		**1.0% cutoff**		**0.5% cutoff**	
Variable	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**
Search Type	**Ellipsoid**									
Min Samples In Block Estimation	5	5	5	5	5	5	5	5	4	4
Max Samples In Block Estimation	15	15	15	15	15	15	15	15	15	15
Maximum Search Distance For Block Estimate XYZ	91.727	114.693	77.559	48.842	158.236	108.051	67.265	169.552	66	66
Bearing For Major Axis	0	0	25	25	0	0	330	330	160	160
Plunge For Major Axis	0	0	20	20	0	0	20	20	0	0
Dip For Major Axis	0	0	25	25	0	0	0	0	60	60
Anisotropy: Semi Major / Major	1	1	1.5	1	1	1	1.5	1.5	1.5	1.5
Anisotropy: Semi Major / Major	1	1	3	1	1	1	3	3	3	3
Max number samples per drillhole	5	5	5	5	5	5	5	5	5	5
Interpolation Method	Ordinary Kriging									
Discritisation: Y	2	2	2	2	2	2	2	2	4	4
Discritisation: X	2	2	2	2	2	2	2	2	4	4
Discritisation: Z	1	1	1	1	1	1	1	1	4	4
Number of Structures	2	2	2	2	2	2	2	2	2	2
Nugget - C0	0.20536	0.17102	2.073121	0.83982	0.100827	0.227825	3.073465	0.75592	4.2	1.1
Sill - C1	0.215551	0.240437	14.01513	1.154885	0.144164	0.421375	9.489304	1.331542	13	1.27
Range - R1	10.75	48.571	18.519	9.111	6.318	60.041	11.671	34.869	25	18
Bearing :	0	0	25	25	25	0	330	330	160	160

Area	ME				MC				CNW	
Cut-off	**0.4%cutoff**		**1.0% cutoff**		**0.4%cutoff**		**1.0% cutoff**		**0.5% cutoff**	
Variable	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**	**%TCu**	**%TCo**
Structure 1										
Plunge : Structure 1	0	0	20	20	20	0	20	20	0	0
Dip : Structure 1	0	0	-25	-25	-25	0	0	0	60	60
Anisotropy: Semi Major / Major 1	1	1	1.5	1	1	1	1.5	1.5	1.5	1.5
Anisotropy: Semi Major / Major 1	1	1	3	1	1	1	3	3	3	3
Sill - C2	0.229818	0.226342	4.167792	1.450856	0.1029	0.241535	2.110826	1.742701	2.3	1.95
Range - R2	91.727	114.693	77.559	48.842	158.236	108.051	67.265	169.552	100	85
Bearing : Structure 2	0	0	25	25	25	0	330	330	160	160
Plunge : Structure 2	0	0	20	20	20	0	20	20	0	0
Dip : Structure 2	0	0	-25	-25	-25	0	0	0	60	60
Anisotropy: Semi Major / Major 2	1	1	1.5	1	1	1	1.5	1.5	1.5	1.5
Anisotropy: Semi Major / Major 2	1	1	3	1	1	1	3	3	3	3
Pass 2 : Factor	91.727	114.693	77.559	48.842	158.236	108.051	67.265	169.552	100	85
Pass 3 : Factor	137.5905	172.0395	116.3385	73.263	237.354	162.0765	100.8975	254.328	200	150
Pass 4 : Factor	183.454	229.386	155.118	97.684	316.472	216.102	134.53	339.104	300	200
Pass 5: Factor	229.3175	286.7325	193.8975	122.105	395.59	270.1275	168.1625	423.88	500	500

2.3.2 Estimation Parameters

2.3.2.1 Estimation Plan

The resources for three orebodies modelled, East ("ME"), Central ("MC") and Central Northwest ("CNW"), were estimated using Ordinary Kriging as estimation method. The estimation parameters used for the estimations, as shown in Table 5, were derived from the statistical and geo-statistical study completed. Block sizes used for the block modelling in all cases were:

- Parent block of 40m x 40m x 10m in the X, Y and Z directions respectively; and
- Sub-block of 5m x 5m x 2.5m

2.4 Mineral Resource Classification

The Australian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves, more commonly known as the JORC Code was used for Mineral Resource Classification. It describes a Mineral Resource as follows:

"A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are subdivided, in order of increasing confidence, into Inferred, Indicated or Measured categories."

It further describes an Inferred, Indicated and Measured Resource as follows:

"*An 'Inferred Mineral Resource' is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with only a low level of confidence. It is inferred from geological evidence and assumed but not verified geologically and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which may be limited or of uncertain quality and reliability."*

"An 'Indicated Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed."

A 'Measured Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and grade continuity."

2.5 Mineral Resource Statement

The results from the JORC Compliant resource estimation is summarised in Table 6. For the two operating pits, ME and MC, the surveyed compilation plan per pit layout as at 31 October 2010, as received from Mutanda, were used to deplete the resources of the areas.

Table 6: Consolidated Resource Statement of Mutanda as at 31 December 2010

Consolidated Resource Statement of Mutanda Mine as at 31 December 2010				
	Category	**Mt**	**%TCu**	**%TCo**
Central Orebody	Measured	7.8	1.62	0.81
	Indicated	5.3	1.16	0.67
	Inferred	7.6	0.95	0.91
	Total	**20.7**	**1.28**	**0.81**
	Category	**Mt**	**%TCu**	**%TCo**
East Orebody	Measured	29.0	2.67	1.13
	Indicated	18.4	1.65	0.87
	Inferred	164.6	1.03	0.45
	Total	**212.0**	**1.34**	**0.60**
	Category	**Mt**	**%TCu**	**%TCo**
Central Northwest Orebody	Measured	66.8	2.10	0.55
	Indicated	0.02	0.17	0.05
	Inferred			
	Total	**66.8**	**2.10**	**0.55**
	Category	**Mt**	**%TCu**	**%TCo**
MUMI Total	Measured	103.7	2.22	0.73
	Indicated	23.8	1.54	0.82
	Inferred	172.1	1.03	0.47
	Total	**299.5**	**1.48**	**0.59**

1) Mineral Resources have been reported in accordance with the classification criteria of the Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, 2004 Edition (The JORC Code).

2) Mineral Resources are inclusive of Ore Reserves.

3) Mineral Resources are not Ore Reserves and do not have demonstrated economic viability.

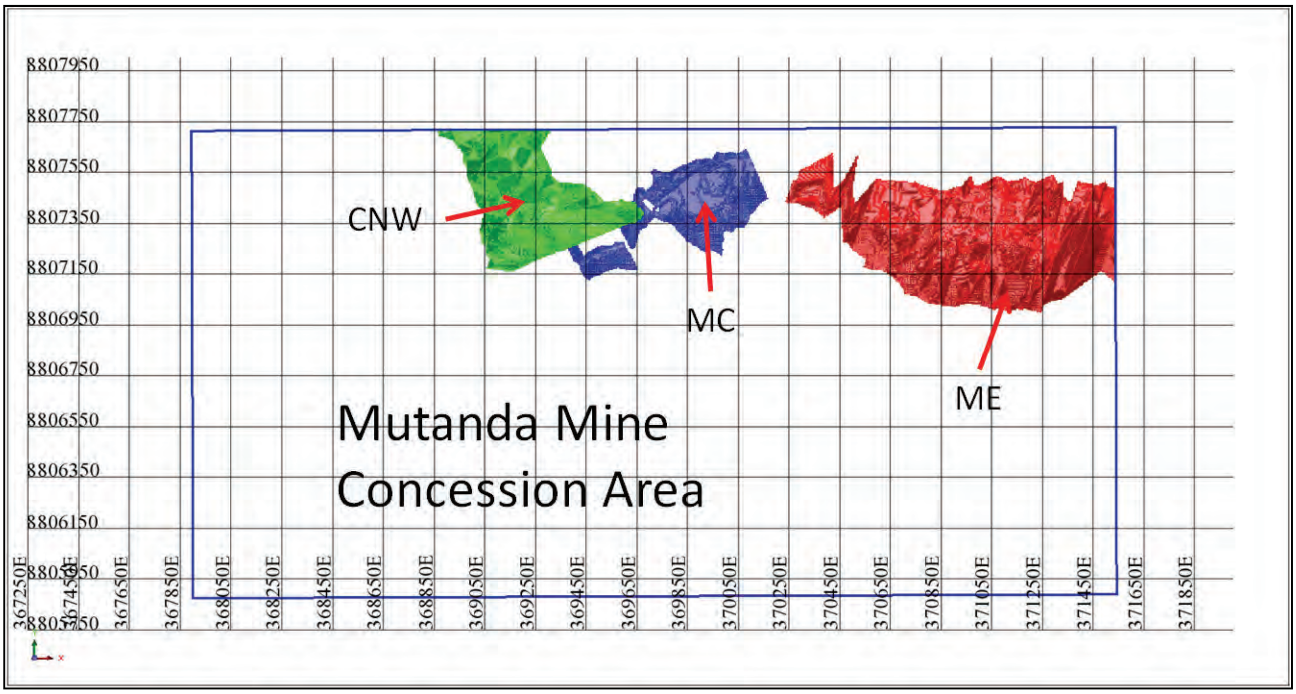

Figure 24: Long Term Prospects at Mutanda

2.5.1 Long term prospects

The long term prospects on the Mutanda concession lies to the south of the East orebody where drill holes finished within the orebody at depth. Significant underground sulphide potential exists and in fact forms a large percentage of the Mutanda concession ore resource.

3.0 RESERVES AND MINING

3.1 Surface Mining

3.1.1 Life of Mine ("LOM") Planning Process

The LOM planning process for surface mining operations can be summarised in the following steps:

- selective mining unit ("SMU") selection;
- pit optimisation;
- pit design;
- scheduling unit selection and design; and
- production planning.

The pits considered for the LOM Plan are Mutanda East, Mutanda Central and Central North-West of which the latter is not currently active.

3.1.1.1 SMU Model / Mining Model

The SMU is defined as the smallest mining unit that can be mined as a complete unit. The outcome of the SMU selection aims to determine an appropriate SMU enabling an informed decision on a modelling strategy that most realistically estimates actual practice and lower the overall mining risk.

Factors considered in determining a realistic SMU includes:

- mining equipment;
- structural complexity of the ore body in terms of dip, thickness and structural continuity;
- ore block continuity and the way it was modelled;
- mining rate;
- degree of continuity above the cut-off grade; and
- mining strategy consisting of blending (in-pit blending versus stockpile blending) and volume requirements.

This process usually includes resource block model re-blocking of a number of scenarios. It is important to note that the SMU can vary per pit at a single operation, based on the defined SMU drivers. Although the purpose of the SMU is not to determine dilutions and losses, it does support the appropriate modelling of dilutions and losses, based on the dips and structure of the ore. Outcomes of the SMU selection process should include:

- SMU models and cut-off grade strategy;
- initial indication on mining losses and dilutions; and
- scheduling and blending approach.

SMU's applied to the various resource block models are tabled below.

Table 7: Selected SMU dimensions

Mining Operation	Unit	SMU
Mutanda Mine	m	10 x 10 x 5

Dilution

Dilution is defined as the waste material intentionally added during the mining process. The site-specific dilutions are added to the Mineral Resources, defining a practically mineable unit. The methodology applied in determining the dilution is as follows:

- On the ore contacts (where the resource block consists of a percentage ore material and a percentage waste material) the tonnage and grade of the reserve block is defined as the weighted average tonnage and grade of the materials contained in the original resource block.
- In cases where the total resource block is ore, the corresponding reserve block is defined as a 100% ROM block with the same grade attributes as the blocks.

Mining loss

Mining loss is defined as those reported mineral resources which are contained in planned blocks that are not defined as Ore Reserve type blocks, in other words if scheduled these blocks are destined for waste dumps.

The methodology used in determining mining loss is as follows:

- Mining loss is addressed through the application of a Cu cut-off to the diluted ore material; and
- The ore blocks that originally had a high percentage of ore will normally fall above the cut-off grade, while ore blocks that originally had a low percentage of ore will fall below the cut-off.

Dilution and mining loss curves on a diluted SMU cut-off grade basis were produced for each of the pits and detailed later in this report.

3.1.1.2 Pit optimisation

One of the outputs of the pit optimisation process is to determine the position and extent of the final pit boundary. The GEMCOM Whittle pit optimisation software is employed for this purpose. For brevity the software will be referred to as “Whittle”.

Whittle uses the Lerchs-Grossmann algorithm to determine the optimal shape for an open pit in three dimensions. The method is applied to a block model of the ore body, and progressively constructs lists of related blocks that should, or should not, be mined. The final lists define a pit outline that has the highest total relative value, subject to the required pit slopes. This outline includes every block that "adds value" when waste stripping is taken into account and excludes every block that "destroys value". It takes into account all revenues and costs as well as mining and processing parameters.

Although a detailed description of the Whittle methodology is beyond the scope of this report, the following provides a brief summary. The optimisation process can be divided into two processes:

- Creation of a range of nested pit shells of increasing sizes. This is done by varying the product price and generating a pit shell at each price point.
- Selection of the optimal pit shell. This is achieved by generating various production schedules for each pit shell and calculating the net present value for each schedule. The output of this process is a series of “pit-versus-value” curves.

Three pit-versus-value curves are generated:

- Best case: corresponds to minimum stripping in which mining follows the sequence of nested pit shells. Although this method will give you the highest net present value, it is not practical. It serves to provide the upper limit with regards to pit size.
- Worst case: waste material is removed level for level corresponding to the maximum stripping scenario and therefore lowest relative value. It serves to provide the lower limit with regards to pit size.
- Specified case: a case between the best and worst cases and models the influence of pre-stripping on the value curve.

The optimum specified Whittle shell is identified where the specified case is maximised. A simplified illustration of the definitions can be seen below.

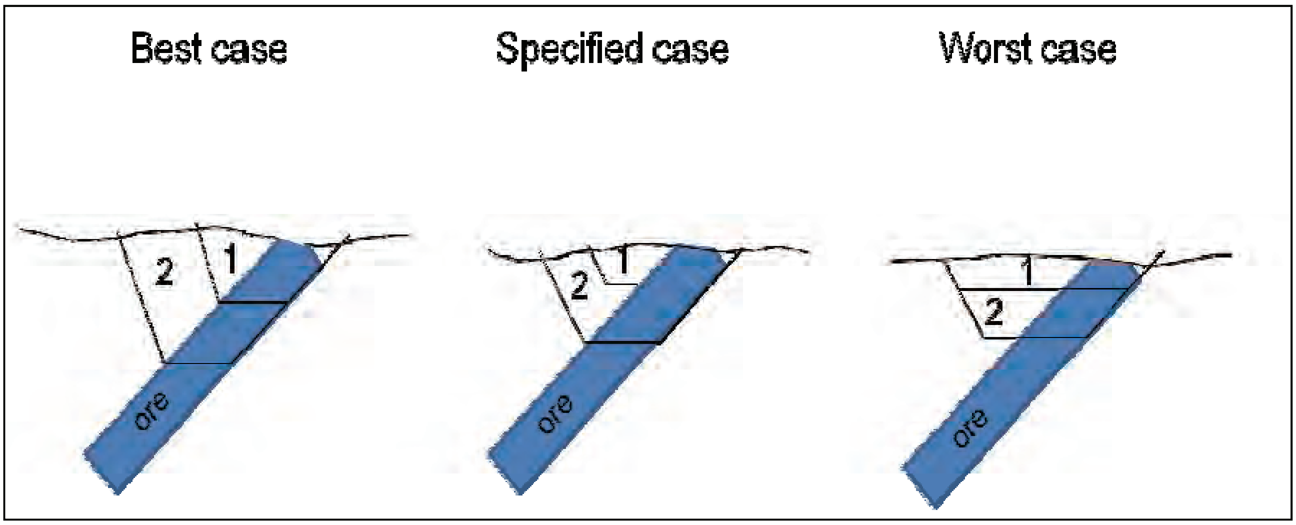

Figure 25: Best case, specified case and worst case illustration

Processing recoveries to determine the revenues required during the optimisation process, are tabulated below. These are based on the designed and planned recoveries of the phased processing plant currently being built.

Table 8: Processing recoveries

Processing Recovery	Cu	Co
Oxides	90%	80%
Mixed (70% oxide portion)	90%	80%
Mixed (30% Sulphide portion)	Not processed	Not processed
Sulphides	Not processed	Not processed

3.1.1.3 Pit Design

The mining method applied is conventional open pit mining, consisting of drilling, blasting, loading and hauling. All historic mining is currently being done by a mining contractor. All future mining is planned based on contractor mining.

A pit design is undertaken once an optimal pit shell has been selected. The pit design process considers:

- safe operations;
- continuous access to individual blocks and the working benches;
- equipment units and movement requirements;
- geotechnical recommendations;
- water handling;
- backfill opportunities; and
- the phasing of operations or pre-stripping.

Design work was performed in GEMCOM Surpac mine planning software. The selected optimum pit shell is used as the design limits. All the input parameters are incorporated to create a three dimensional pit design. The pit design is used to evaluate the tonnage and grades of the different ore types.

Pit designs were created based on the current mining methodology that includes mining at 5m or 10m benches. Ramp and pit access designs considered the largest envisaged hauler dimension specifications ensuring safe and practical execution. Pit designs were conducted based on the optimum pit shell. All pit designs adhere to current geotechnical requirements.

3.1.1.4 Scheduling units

Block designs are conducted based on typical blast block or practical bench and production block dimensions. Ramps are designed and scheduled separately at appropriate rates. The block designs simulate the scheduling units. Each block could contain a range of material types that could be selectively loaded to separate locations (ROM stockpile, various stockpiles or waste dumps etc.). The figure below is a representation of a typical block design with ramps indicated in blue.

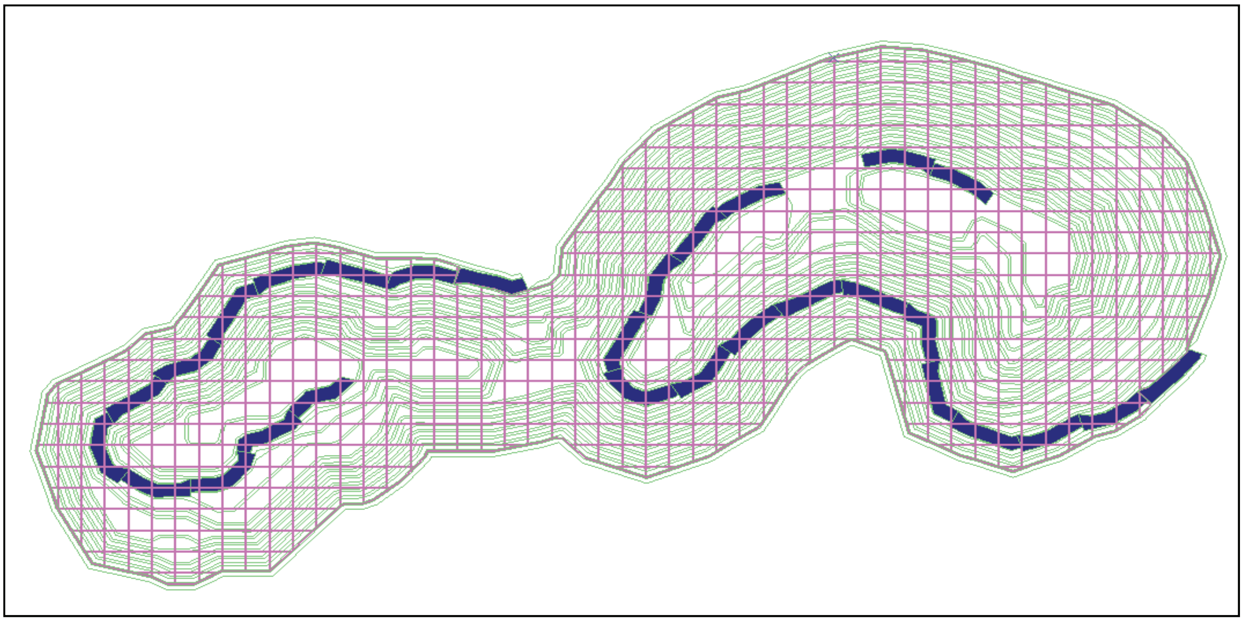

Figure 26: Typical block and ramp design

3.1.1.5 Production Scheduling

Schedules were produced in RUNGE Xpac. Operating slope angles for each pit are maintained and increased when the ultimate pit is reached. Schedules consider the available pit space, number and size of excavators required and the practical constraints of each pit.

3.1.2 Stockpiles

A range of stockpiles have been constructed from January 2009 to December 2010 in preparation for the commissioning of the process plant. These stockpiles are classified into low grade stockpiles with an average copper grade of less than 1 %Cu, high grade stockpiles of ore above the cut-off grade and high copper stockpiles that is a result of stringent in-pit grade control practices applied by Mutanda.

3.1.2.1 High Grade Stockpile

The "R5" high grade stockpile has been incorporated into the LOM Plan and Reserve statement. Volumes were determined from supplied survey digital terrain model ("DTM"). The survey DTM was verified against recent local aerial surveys to confirm the location thereof. A drilling programme of the stockpile was undertaken by Mutanda to confirm the average grades. Samples were taken in 2.5m intervals up to the final stockpile height at the point. Drill hole collar elevation were checked spatially relative to the survey DTM for a reasonable match. The figure below shows the drill hole collar match of the "R5" high grade stockpile (in purple) relative to the aerial survey DTM.

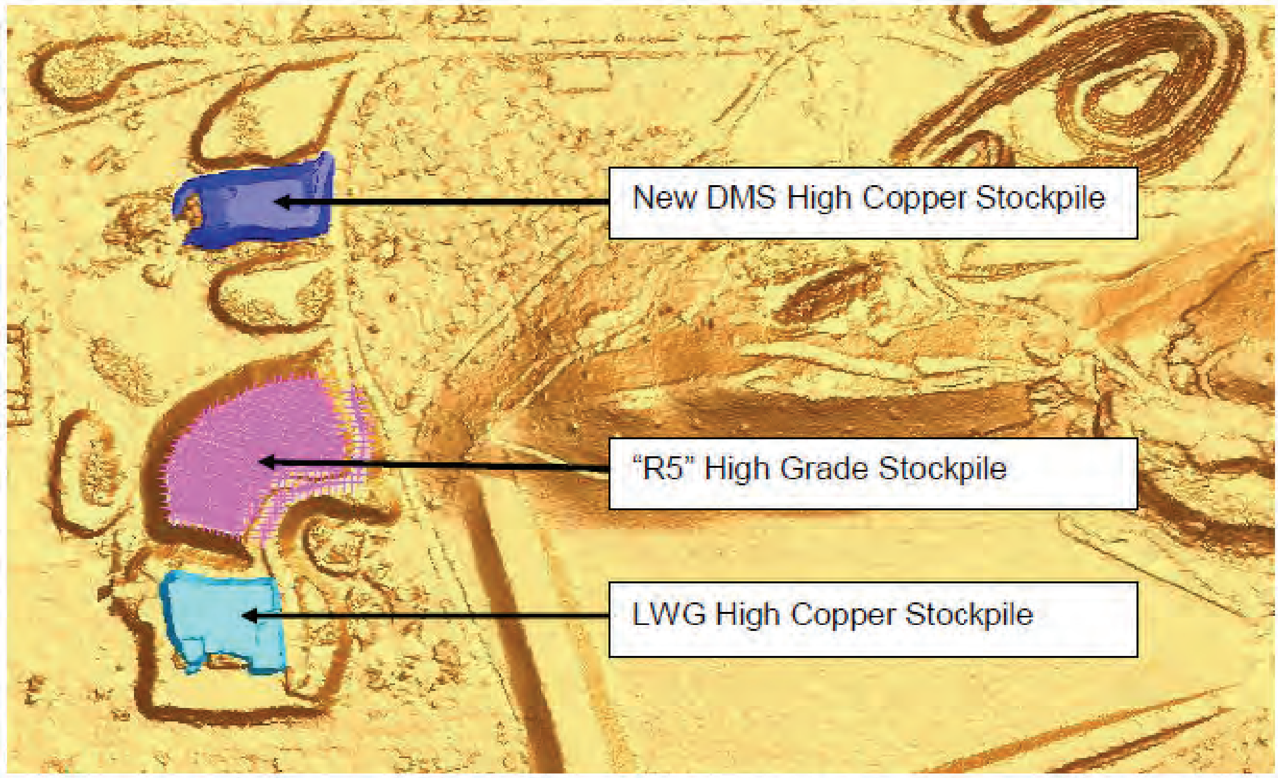

Figure 27: High grade stockpile

Weighted average grade calculations on the stockpile assays resulted in an average grade of 3.37 %Cu and 2.31 %Co assigned to the survey volume of 1.31 million m^3. A swell factor of 1.3 was applied which is in line with the Mutanda density testing for the "R5" high grade stockpile. A histogram of the sample distributions on a copper and cobalt sample grade basis is shown in the figure below.

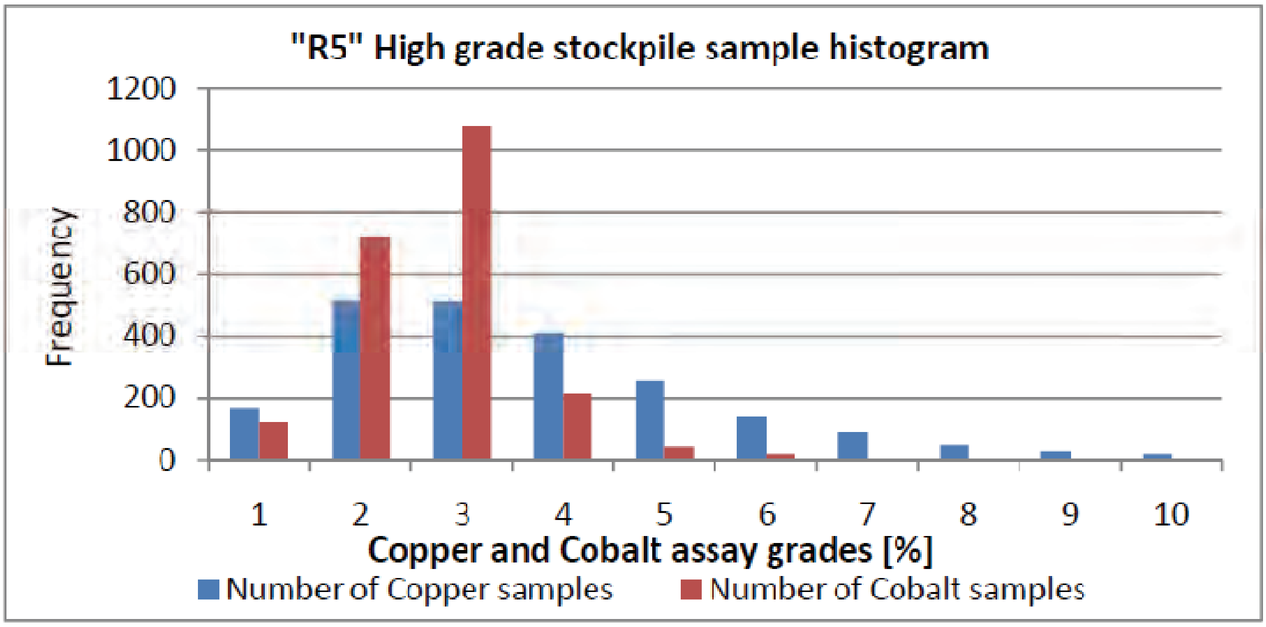

Figure 28: Stockpile High grade stockpile histogram

3.1.2.2 High Copper Stockpiles

Volumes were estimated from a survey DTM and verified with the recent aerial surveys. A reasonable match was achieved. The two stockpiles in question are the New DMS stockpile to the north (160 500 m3) shown in dark blue in the figure above and the LWG high copper stockpile (109 100m3) shown in light blue. Whilst volumes could be verified, there was not enough information to verify loose density therefore this could not be included in the schedule or reserve model and consequently the financial valuation.

No stockpile drilling information was available to estimate average grades. To verify the grades, the material mined was tracked back to the pit for 2009 and 2010 in the Central pit and 2010 in the East pit. The grade control and short term block model was evaluated to estimate the total high grade material that exists in the pits over the established time period. Assuming that grade control practices are enforced during the mining process, it was found that the Mutanda estimate of 9.7 %Cu and 3.0 %Co, including 5% dilutions, was reasonable.

3.1.2.3 Low Grade Heap Leach Stockpiles

Volumes were determined from supplied survey digital terrain model (DTM). The survey DTM was verified against recent local aerial surveys to confirm the location thereof. A drilling programme of the stockpile was undertaken by Mutanda to confirm the average grades. A sample was taken and assayed for each 10m grid point. Drill hole collar elevations were checked spatially relative to the survey DTM for a reasonable match. The figure below shows the drill hole collar match of the two low grade stockpiles relative to the aerial survey DTM for a combined volume of less than 1 million m^3. Whilst volumes could be verified, there was not enough information to verify loose density therefore this could not be included in the schedule or reserve model and consequently the financial valuation.

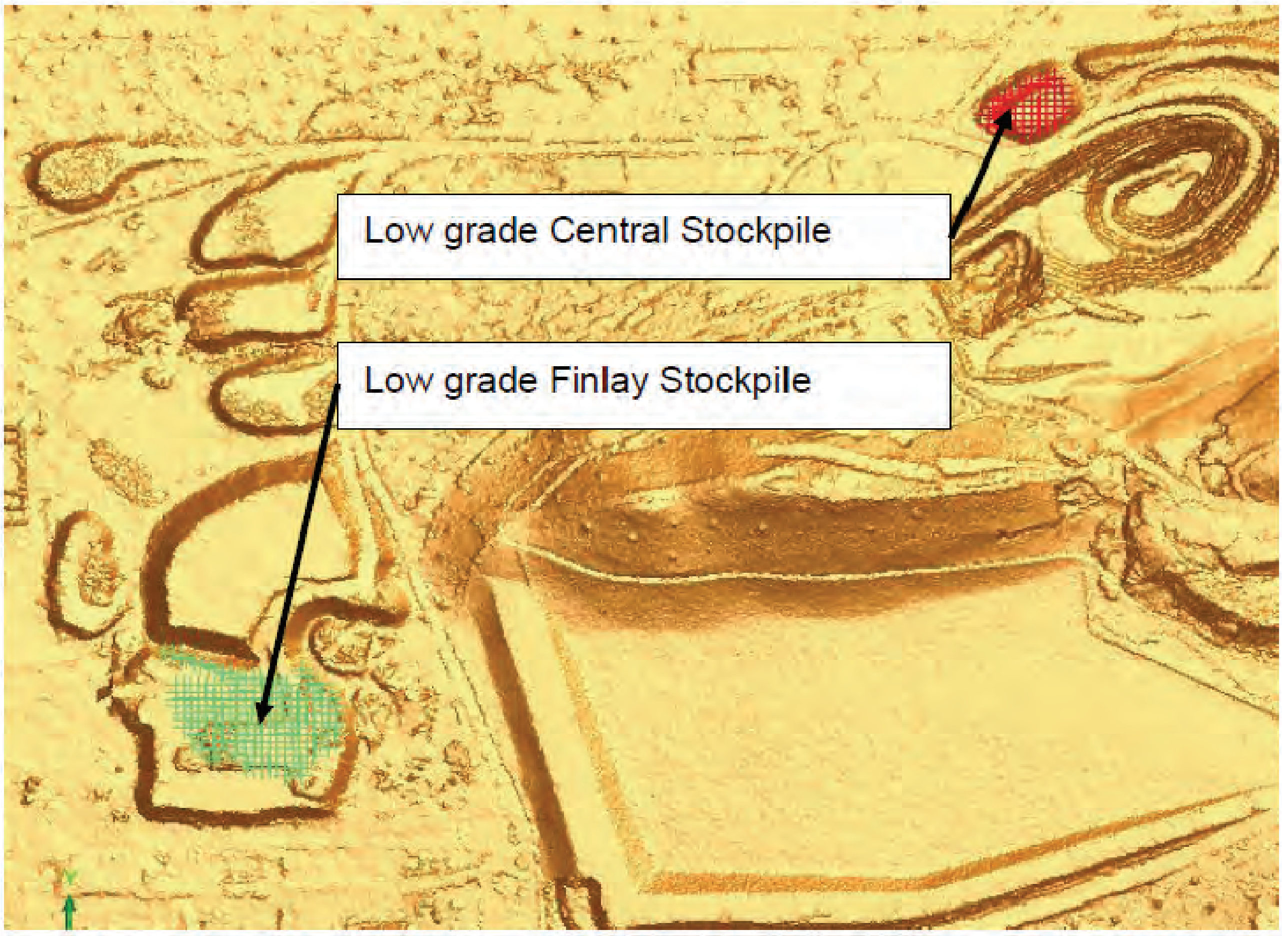

Figure 29: Low grade heap leach stockpiles

Average stockpile grades were estimated by weighted average grade calculations of the stockpile assays. This resulted in an average grade of 0.7 %Cu. This material is scheduled as heap leach ore at an overall copper recovery of 70%. A histogram of the sample distributions on a copper and cobalt sample grade basis is shown in the figure below.

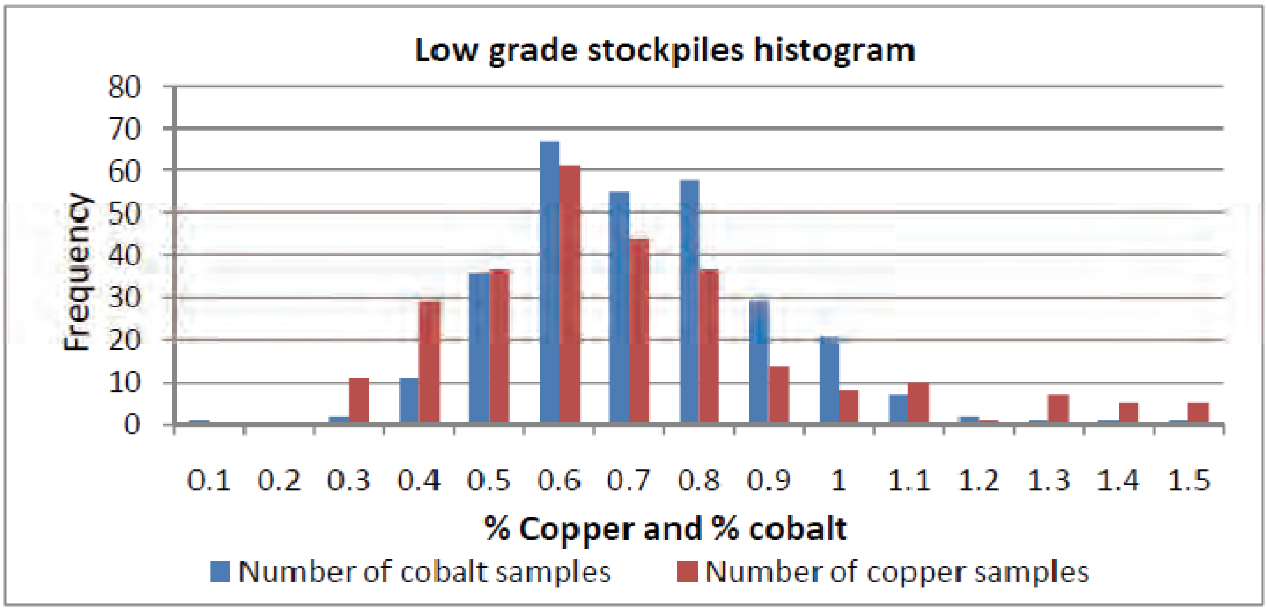

Figure 30: Low grade stockpiles histogram

3.1.3 Pit Development

The figure below is a graphical representation of the various production areas for the Mutanda operation. The available area for dumps and surface infrastructure is limited and careful consideration is required. The impact on potential high wall stability of the proximity of the planned workings to the tailings dam should be studied further.

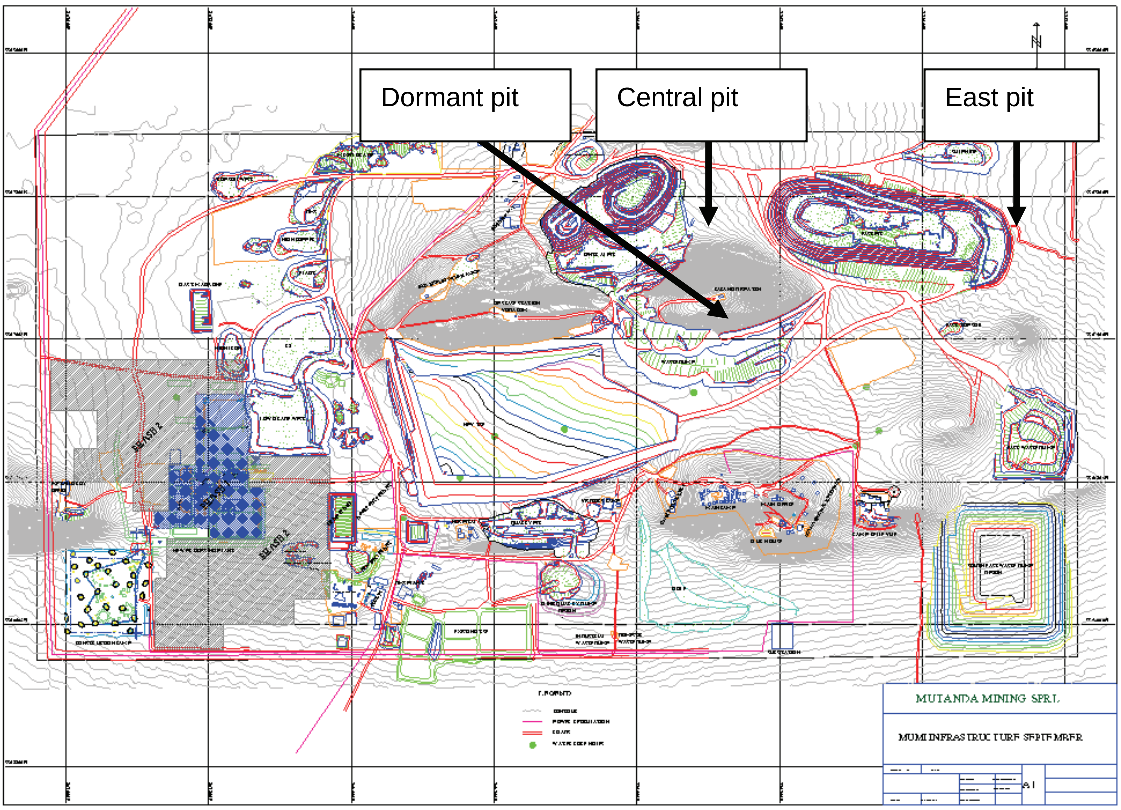

Figure 31: Locality plan with current design of surface infrastructure

3.1.3.1 Modifying factors

A total of 5% geological losses have been applied. This implies that 5% of the material modelled as ore are mined as waste due to structural Resource losses. This is a tonnage loss that does not impact the ROM head grade.

Dilution and losses are applied on an SMU basis. Due to the high production requirement and size of the loading and hauling units planned (and other factors considered), a SMU unit of 10mx10mx5m was selected. This project is unique as no sulphide processing capacity exists. This implies that all sulphide material is stockpiled as future opportunity. It is assumed that 70% of the ore in the mixed zone consist of oxide ore and the balance is sulphide ore. This indicates significant upside should a sulphide process facility be installed.

Tonnage and grade profiles were constructed to illustrate the effect of material below the stated cut-off grades, the impact of dilution and the impact of the inclusion of sulphide material. These tonnage and grade profiles were constructed on an unconstrained basis over the complete ore body.

The figure below is a tonnage and grade profile, unconstrained for the complete available resource that illustrates the undiluted resource portion (green) with the dilution portion (brown) in a cumulative area profile for the Mutanda ore body, considering only oxide and 100% of the mixed material in the first graph and including sulphides in the second graph. The effect of the dilutions can be seen in the difference between the diluted ROM %Cu (black) head grade line profile and the undiluted resource grade line profile in green.

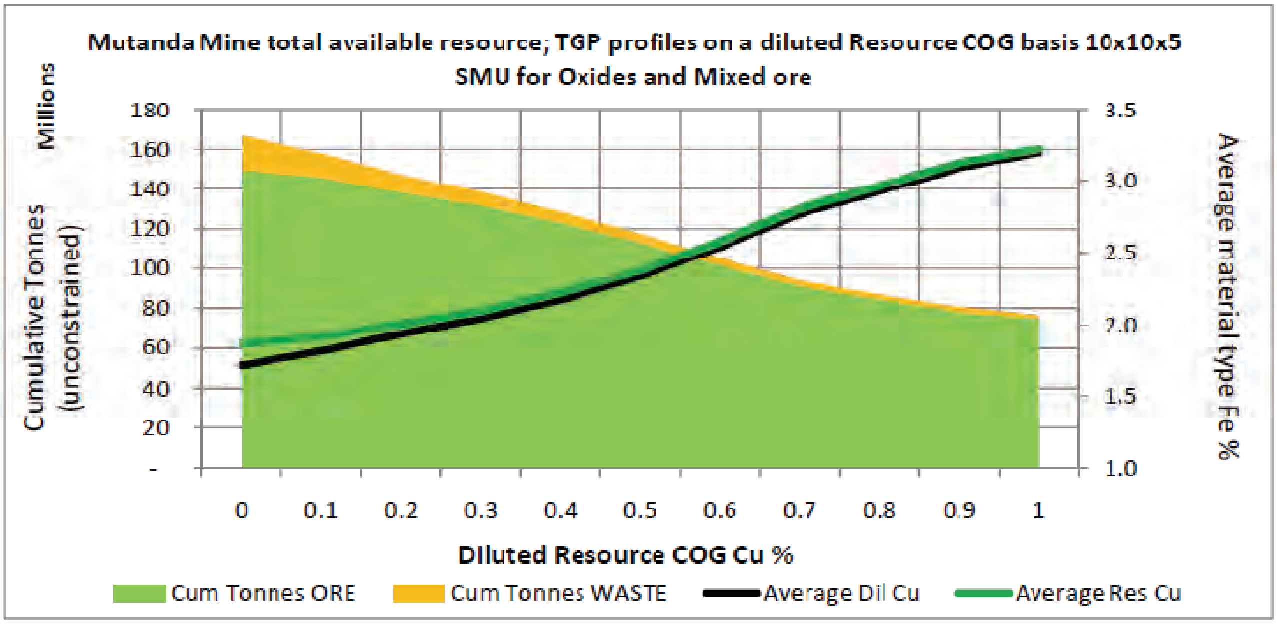

Figure 32: Mutanda tonnage and grade profile excluding sulphides

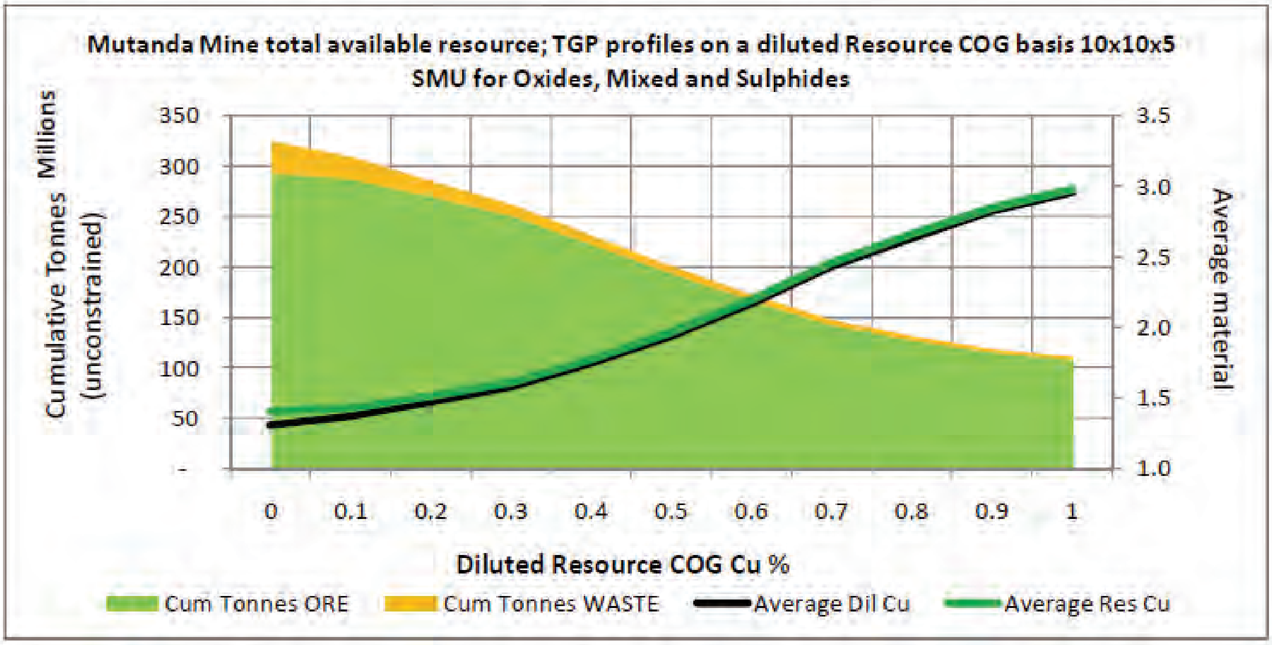

Figure 33: Mutanda tonnage and grade profile including sulphides

A cut-off grade of 0.85 %Cu was applied at the Mutanda pits. The basis of the cut-off grade calculation is to determine the break even cost, based on selling, processing and royalty costs. The cut-off grade considers revenues generated from copper and cobalt with the appropriate processing recoveries applied.

A total of 46% resource losses of material below the SMU cut-off grade are estimated, while 3% mining dilutions are expected in the planning case (excluding sulphides). The first graph shows oxide and mixed material while the second includes sulphide material.

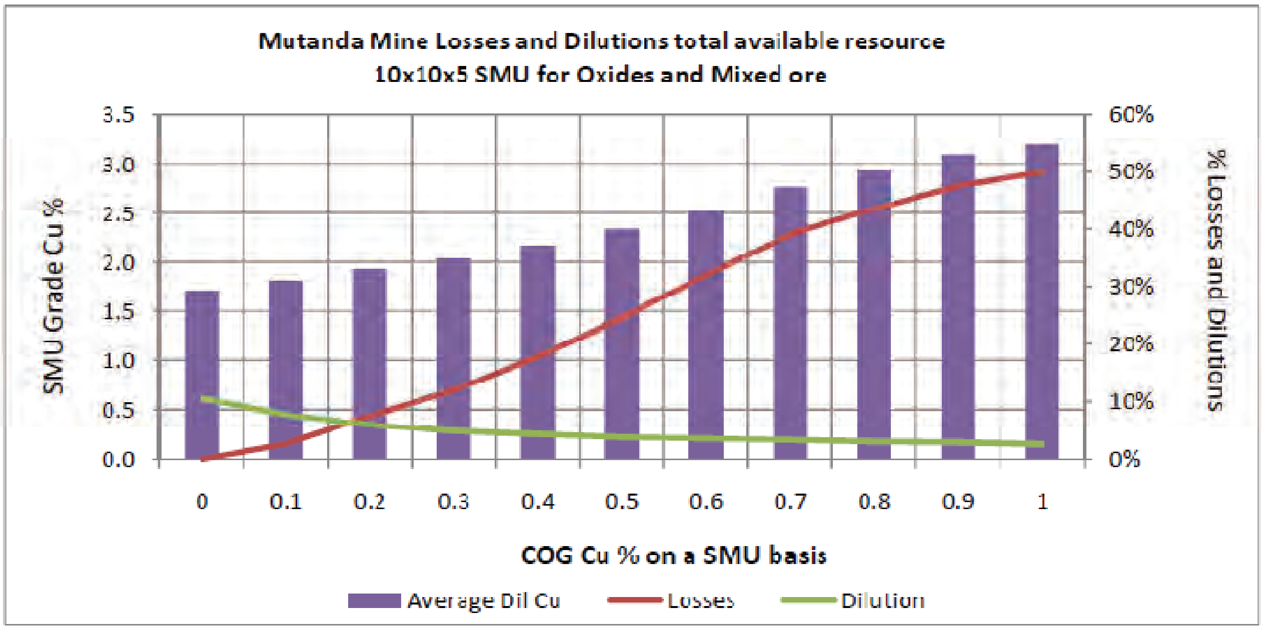

Figure 34: Mutanda dilution and loss curves excluding sulphides

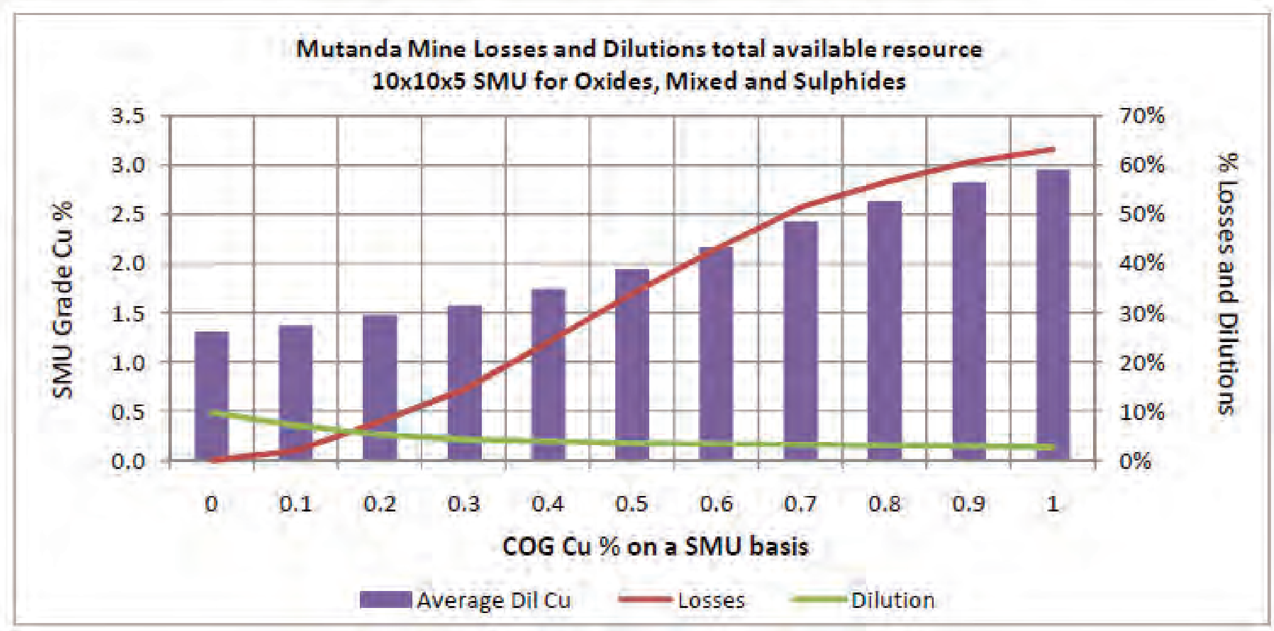

Figure 35: Mutanda dilution and loss curves including sulphides

It can be seen that material upside exists to increase the reserve estimate, if processing capacity for the sulphide material can be established towards the end of the current oxide mine life. It should be noted that the average copper grade in the sulphide material is lower, which would result in more resource losses below the stated cut-off grades, although the dilution would remain unchanged.

Continuous grade control is essential to achieve or improve on the assumed losses and dilutions, to maximise the value of the mining operation. Grade control functions are performed by mine personnel. Various grade demarcations are pegged on the production blocks indicating the material boundaries and destinations of the specific mined materials.

A picture of an active bench grade control demarcations is shown in the figure below.

Figure 36: Grade control demarcation

3.1.3.2 Pit Optimisation

The Mutanda technical team supplied a Whittle pit optimisation project where three scenarios were modelled. The scenario that is constrained by the current mining area and allows resources from the Measured, Indicated and Inferred Recourse classifications to be considered, were used.

The Whittle software package was used to conduct an open pit optimisation as part of the review process.

The pit optimisation parameters assumed for Mutanda are tabled below.

Table 9: Mutanda optimisation parameters

Optimisation Parameter	Unit	Mutanda Parameter
Reference mining cost	US$/t	3.93
Processing cost	US$/t	89
Selling cost - Cu	US$/t Cu	1 487
Selling cost - Co	US$/t Co	7 054
Discount rate	%	10
Cu recovery	%	90
Co recovery	%	80
Cu Price	US$/t	5 500
Co Price	US$/t	24 250

3.1.3.3 Pit design

The Central pit contained areas with small slope failures from the original workings by the previous owners. The selected optimal Whittle shell was used to design the final pit. The bulk of the material is mined by free digging and benches are well maintained. A picture of the Central pit taken in a southern direction is shown in the figure below.

Figure 37: Picture of the Central pit

The picture below is of the East pit taken in a eastern direction. The footprint area of this pit is larger than the Central pit. All pits have dual access ramps to ensure safety and reduce the risk of production losses caused by small slope failures.

Figure 38: Picture of the East pit

A graphical representation of the current face positions of the East and Central pits are shown in the figure below.

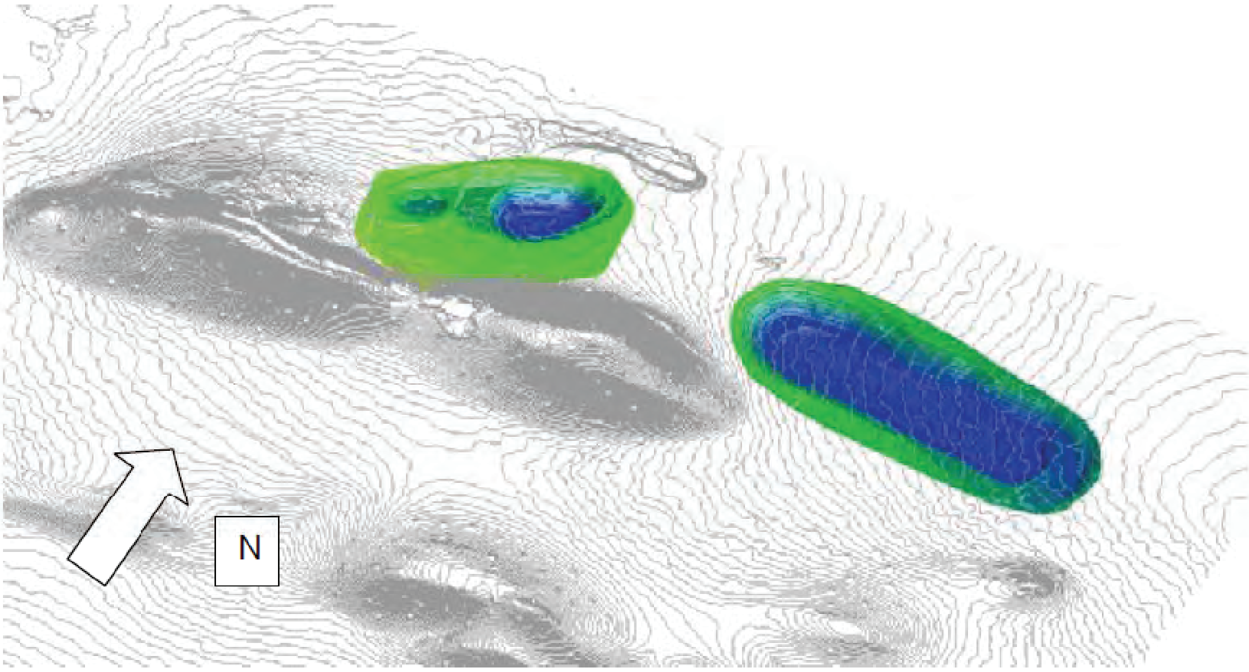

Figure 39: Mutanda current pit survey

A graphical representation of the final pit design with current topography is shown in the figure below. This design is based on the pit design criteria applied to the optimum Whittle pit shell. It should be noted that this pit design includes only the sulphide ore mined as a result of exploiting the oxide reserves. Significant sulphide resource exists in addition to this and is included in the resource model.

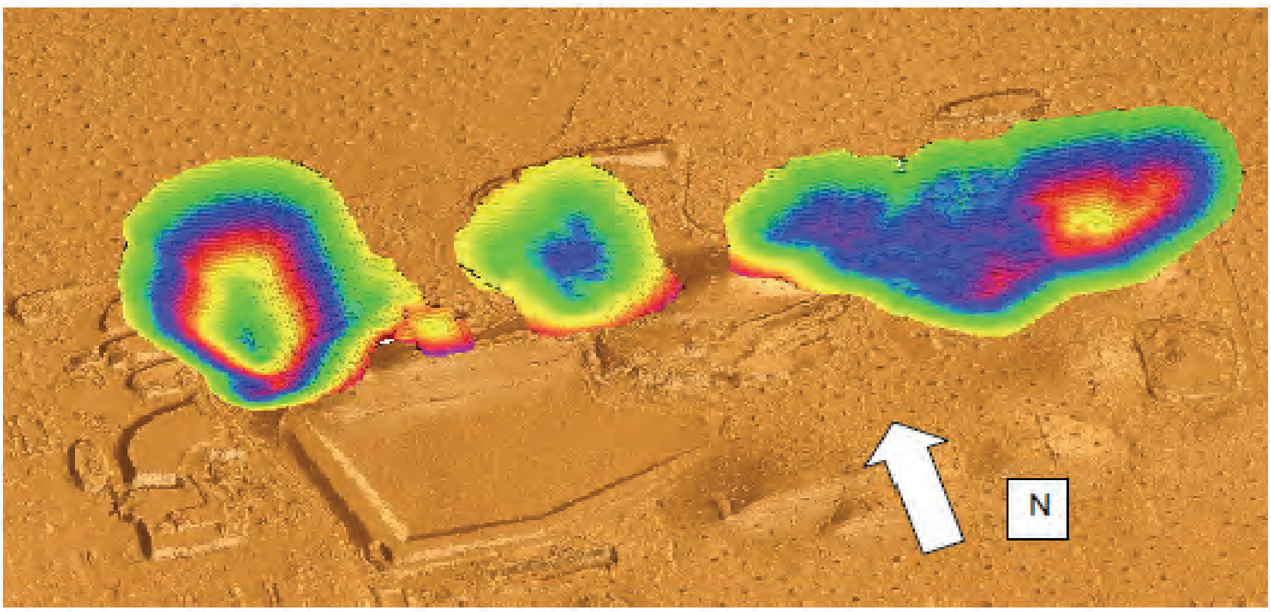

Figure 40: Mutanda pit design

The pit design criteria are based on current practice and can be seen in the table below.

Table 10: Mutanda pit design criteria

Pit Design Criteria	Unit	Mutanda
Bench height	m	5.0
Berm width	m	4.0
Batter angle	degrees	65.0
Ramp width	m	20.0
Ramp gradient	degrees	5.2 (1 in 11)

3.1.4 Production Scheduling

3.1.4.1 Process Plant

Production capacity from the Mutanda pits is planned up to 110 000 tonnes of recovered copper with a processing constraint of 23 000 tonnes of recovered cobalt. A total of 59.9 million tonnes of ore is processed with a maximum of 4.2mtpa ex-pit ore in 2022. Copper production is achieved from current stockpiles in 2011 and 2012. A total of 2.2 million tonnes of ore is processed from the high grade stockpile. The high copper and low grade stockpiles (sections 3.1.2.2 and 3.1.2.3 respectively) have been excluded from the scheduling (and therefore the overall reserve estimate and financial model) until loose density information can be verified to convert volume into tonnes is complete. This represents significant upsides as there are an additional 269 600m^3 grading 9.7% Cu, 3% Co and approximately 1 million m^3 at 0.7% Cu not included in the current schedule. This will in effect smooth the waste stripping requirement in early years as more immediate plant feed will be available to meet process plant requirements. The mine planning criteria is tabulated below.

Table 11: Mutanda scheduling criteria

Scheduling criteria	Unit	Mutanda
Production rate (Recovered Copper constraint excluding heap leach)	ktpa	100
Production rate (Recovered Cobalt constraint)	ktpa	23
Schedule start date		2011

The LOM Plan plant feed production profile including stockpiles is tabulated below.

Table 12: Mutanda LOM production profile (including high grade stockpiles)

Mutanda	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ore tonnes	*000t	706	2 247	2 389	2 751	2 774	3 241	3 208	3 622	3 173	3 507
Recovered Cu	*000t	24	80	100	100	100	100	100	100	100	100
Recovered Co	*000t	13	23	23	23	23	23	23	16	15	19
Waste tonnes	*000t	6 952	12 484	14 286	13 903	13 880	13 389	13 423	12 988	13 460	13 108
Cu grade	%	3.78	3.96	4.65	4.04	4.01	3.43	3.46	3.07	3.50	3.17
Co grade	%	2.22	2.03	1.45	1.18	1.40	1.22	1.29	0.56	0.59	0.66
Cu content	*000t	27	89	111	111	111	111	111	111	111	111
Co content	*000t	16	46	35	33	39	40	41	20	19	23

Mutanda	Unit	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Ore tonnes	*000t	3 906	4 185	3 756	3 211	3 465	3 850	3 265	2 794	3 302	278
Recovered Cu	*000t	100	100	100	100	100	100	100	100	100	8
Recovered Co	*000t	23	23	21	14	11	23	23	21	23	3
Waste tonnes	*000t	12 688	8 985	1 908	1 899	4 243	5 503	5 237	1 799	2 291	65
Cu grade	%	2.84	2.66	2.96	3.46	3.21	2.89	3.06	3.98	3.36	3.35
Co grade	%	0.86	1.00	0.69	0.55	0.41	1.11	1.23	0.95	1.13	1.35
Cu content	*000t	111	111	111	111	111	111	111	111	111	9
Co content	*000t	34	42	26	18	14	43	45	26	37	4

The graph below shows the plant feed tonnages from the R5 highgrade stockpile, the ex-pit oxide ore and the 70% oxide material in the mixed ore. The average plant feed grade over the first 5 years of the operation is 4.14 %Cu. Stripping to expose sufficient oxide material and to open sufficient pit room for a relatively large operation requires waste production of more than 13 million tonnes per annum up to 2021.

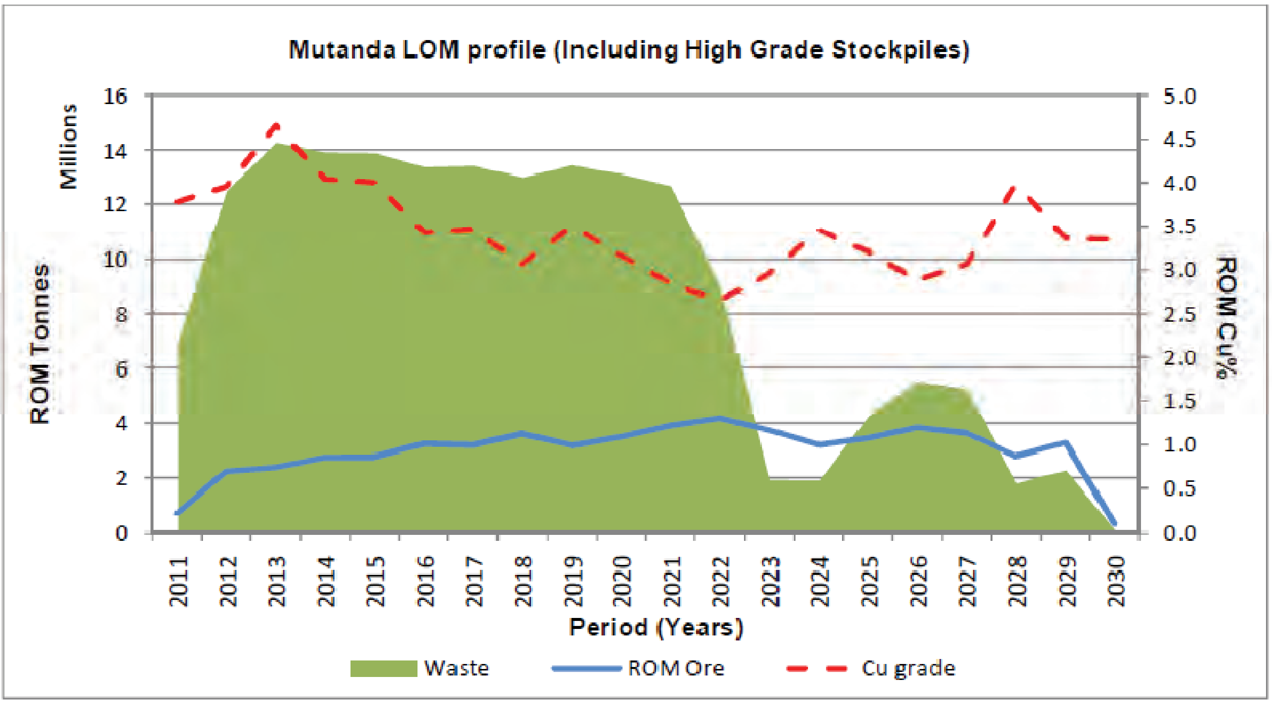

Figure 41: Mutanda production profile including high grade stockpiles

Full ore production from the pits commences in 2013, with the bulk of the plant feed material in the initial two years coming from the existing stockpiles.

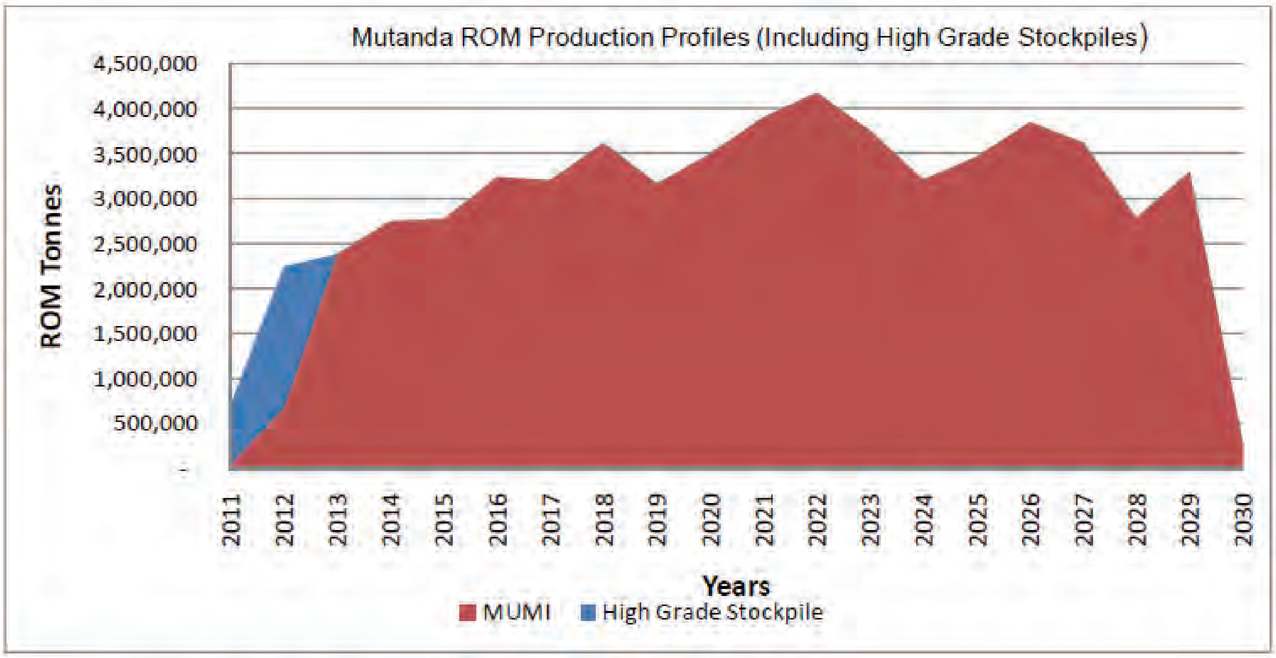

Figure 42: Mutanda plant feed tonnage profile

Sulphide material generated from the mining operation is from sulphide ore within the optimised pit shell and pit design and 30% of the mixed ore. Selective mining is required in the mixed ore where the 30% sulphide material is loaded and hauled on a selective basis. Existing sulphide stockpiles are used and expanded.

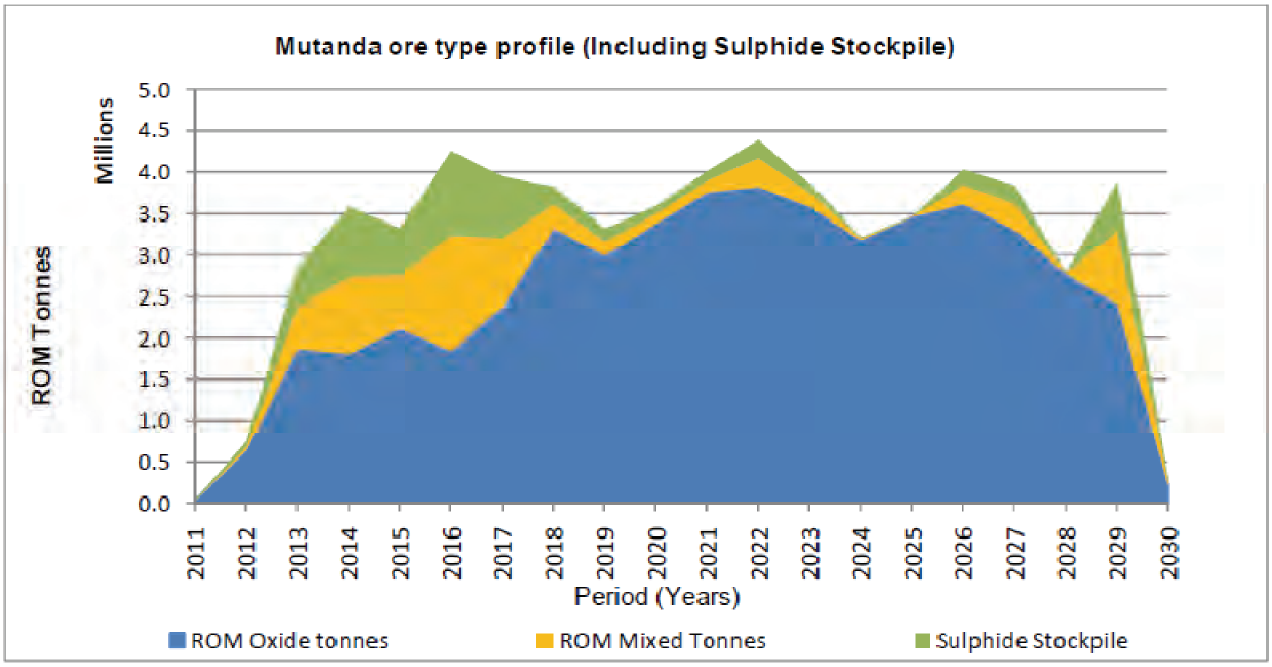

Figure 43: Mutanda operation ore type profile

Production at Mutanda is planned based on a recovered copper processing constraint of 100 000 tpa, excluding heap leach of recovered copper. Full production is achieved in 2013.

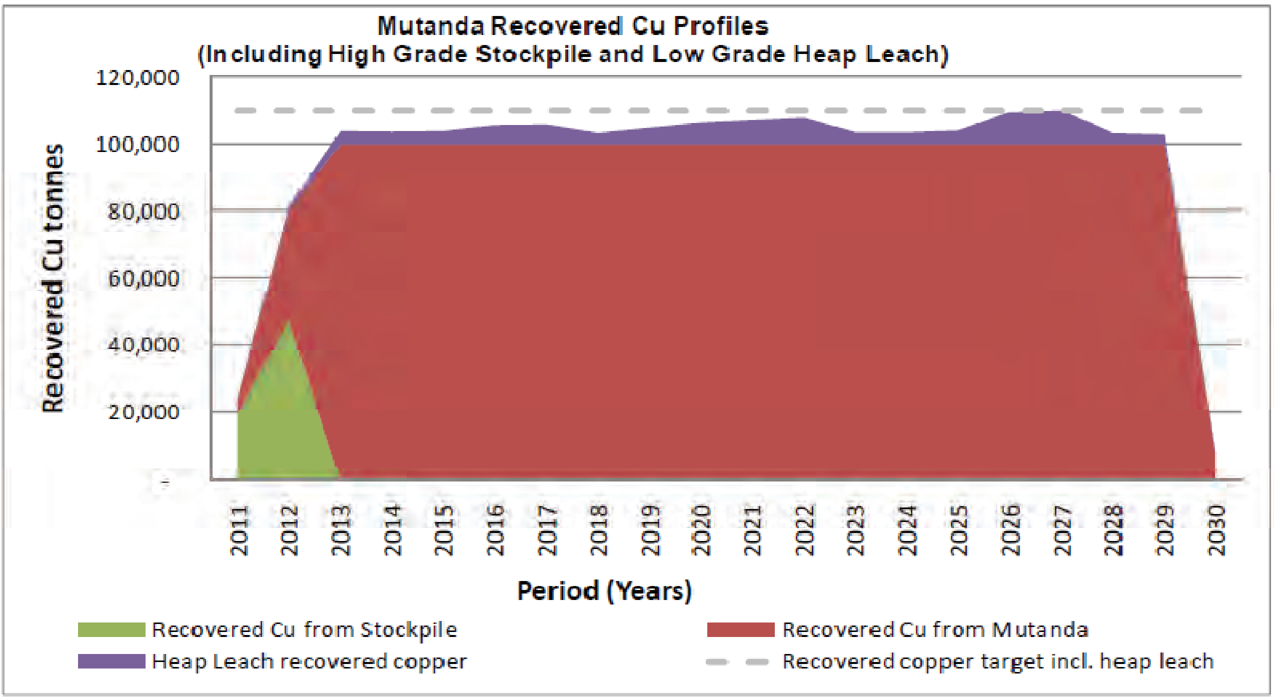

Figure 44: Mutanda operation recovered copper profile

The scheduling driver for the LOM Plan is copper. Cobalt is recovered based on the mining sequence established to sustain up to 100 000 tpa, excluding heap leach of recovered copper. It can be seen that the effect of the copper and cobalt ratio that declines with an increase in depth, results in a cobalt recovered tonnes of less than the processing target. There are numerous options available to resolve this issue, which would include:

- utilisation of low grade stock pile material;
- utilisation of spent ore from the copper heap leach; and
- stock piling separately ore which does not meet copper cut off grades, but has a colbalt value deemed suitable for plant feed.

Further investigations and modelling is required to optimise the schedules and hence this has not been included in this MER.

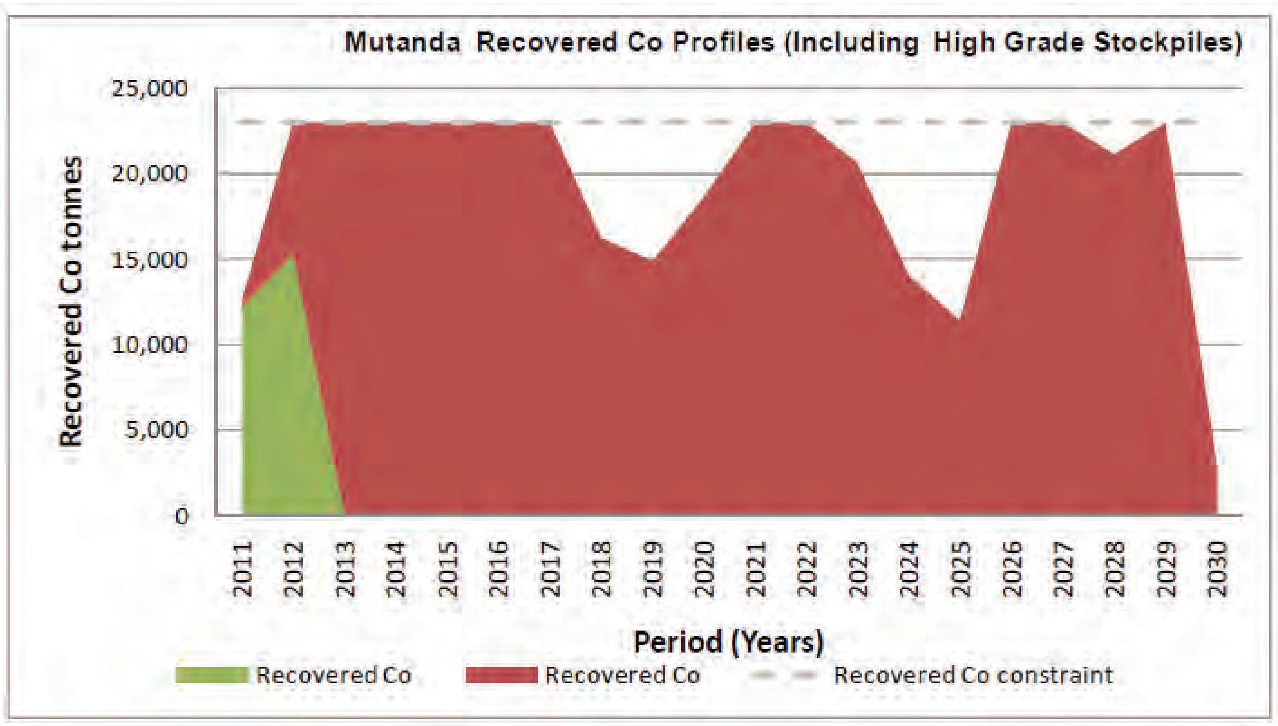

Figure 45: Mutanda operation recovered cobalt profile

Reserves are declared on the stockpiles and ROM production. It is clear that the material from the Inferred Resource category is mined at very low volume.

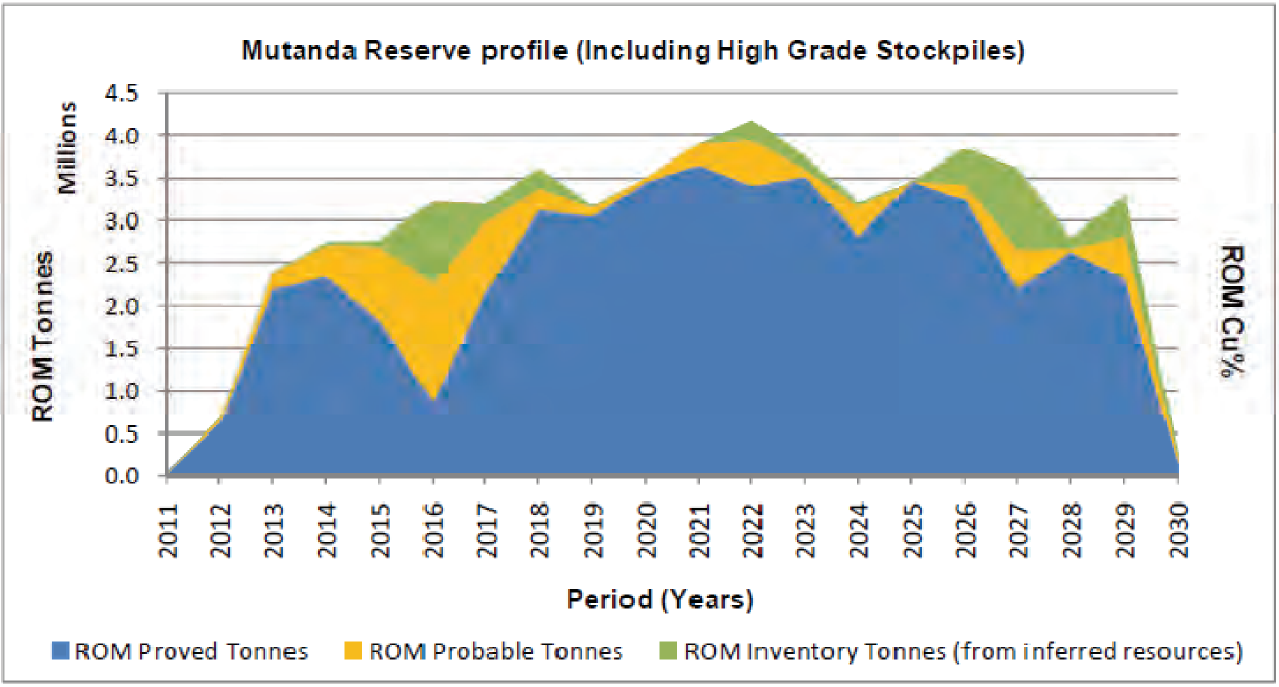

Figure 46: Mutanda Reserve profile

3.1.4.2 Heap leach

The ex-pit and low grade stockpile for planned heap leach processing is tabled below.

Table 13: Mutanda heap leach LOM production profile (including low grade stockpiles)

Heap Leach stockpile	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Low Grade Ore	*000t	20	314	880	765	852	1265	1300	670	1075	1399
Heap Leach Cu%	%	0.49	0.57	0.57	0.60	0.58	0.58	0.59	0.61	0.58	0.59
Heap Leach recovered copper	t	68	1 255	3 537	3 217	3 481	5 111	5 351	2 867	4 373	5 807
Heap Leach recovered copper target	t	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000

Heap Leach stockpile	Unit	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Low Grade Ore	*000t	1517	1717	708	722	896	2187	2164	700	610	21
Heap Leach Cu%	%	0.63	0.60	0.63	0.62	0.58	0.58	0.63	0.60	0.61	0.65
Heap Leach recovered copper	t	6 679	7 254	3 105	3 136	3 646	8 955	9 504	2 937	2 608	98
Heap Leach recovered copper target	t	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000

It can be seen that the average recovered copper tonnages for the heap leach operation is 5 000 tonnes of recovered copper per annum.

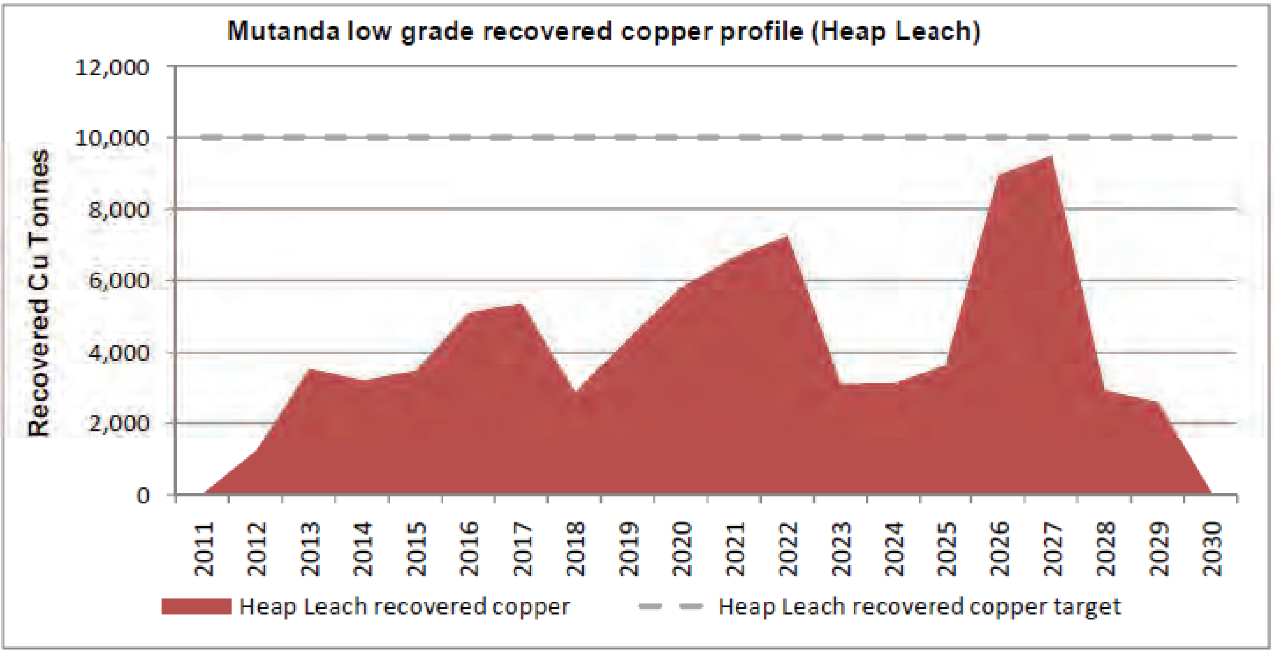

Figure 47: Mutanda heap leach Recovered Copper production profile

3.2 Reserve Estimate

The reserve estimation at Mutanda is based on the 2010 pit optimisation, pit designs and production schedules generated with a 31 December 2010 base date. The Mineral Reserve estimate is tabled below.

Table 14: Mutanda combined reserve table

Mining operation	Proved			Probable			Total		
	Tonnes (*000)	% T Cu	% T Co	Tonnes (*000)	% T Cu	% T Co	Tonnes (*000)	% T Cu	% T Co
Mutanda pits	47,176	3.4	0.9	6,570	3.1	1.2	53,746	3.4	0.9
ROM High Grade Stockpile	2,227	3.4	2.3				2,227	3.4	2.3
TOTAL	49,403	3.4	1.0	6,570	3.1	1.2	55,973	3.4	1.0

3.3 Opportunities

There are several opportunities which reflect potential upside such as:

- Sulphide material contained in the transitional zone is mined and stockpiled over the life of the operation. This amounts to 5.6 million tonnes of sulphide material with a grade above the operational cut-off grade.
- As the depletion of the current oxide operation occurs, the sulphide orebody will become exposed. Material upside could exist at the end of life of the current operation, should copper sulphide processing

capacity be established since most of the pre-stripping has been completed by the current copper oxide pits.

- Various high and low grade stockpiles exist, additional to the incorporated R5 High Grade stockpile, that has not been included in the LOM Plan. Additional work is required on the re-modelling of grades and loose density before it could be included in the LOM Plan and Reserve estimate.
- Potential for underground exploitation of the remaining oxide resource in CNW area.

3.4 Risk

The potential risks associated with Mutanda are:

- Mutanda has been a small operation, mining low volumes on a selective basis. With this LOM Plan the operation has to adjust to a higher volume operation with reasonable losses and dilutions.
- The dormant pit to the south of Central pit includes some limited underground workings that cannot be fully mapped. This could have a negative impact on mining rates in the area, although this does not impact any mining in the East and CNW pits.
- An additional waste dumping space of 4 km^2 is required for waste dumping on the Kansuki project area. This can be a potential high risk issue to the project since the waste backfill opportunity is limited. However this may be mitigated by the processing of existing stock piles.
- A total of 5.6 million tonnes of sulphide ore is planned in the current LOM Plan. Dedicated stockpile areas are required. Due to the limited space available, this could increase mining costs should continuous re-handling be required.
- A total of 11.9 million tonnes of low grade ore is scheduled in the current LOM Plan. Dedicated stockpile and heap leach areas are required. Due to the limited space available, this could increase mining costs should continuous re-handling be required, though all ROM low grade material will be placed onto the heap when mined. Rehandling of “spent” ore and possible use of existing stockpiles will attract a rehandling costs.
- Waste stripping is allowed for and required on the Kansuki project area. This LOM Plan assumes that a suitable agreement could be reached. No ore from the Kansuki area has been included in this estimate.

4.0 PLANT AND EQUIPMENT

4.1 General Process Commentary

The Mutanda ore deposits appear to offer considerable upside potential for the exploitation and recovery of the valuable copper and cobalt components of the surface deposits discovered to date; with considerable further potential from underground exploitation of the oxide resource.

At the time of our visit the initial process module to produce 20 000 tons per annum (“tpa”) of copper metal was well into the construction phase with full copper plant start up programmed for mid November 2010, this seems a realistic target but is dependent upon the availability of materials and the performance of the contractor’s construction work force on site. As of 1st January 2011, the plant was ramping up according to the commissioning schedule and 2010 copper targets were exceeded, with a total of 1,851 mt of copper cathodes produced in 2010.

The process plant will produce copper cathode sheets to commercial quality and a cobalt salt in the form of hydroxide at 40% grade.

At the time of our visit the Solvent Extraction ("SX") and Electro-winning ("EW") plant was in the process of being commissioned using Pregnant Liquor Solution ("PLS") generated from a small heap leach operation to meet budgeted copper production targets, with first copper cathode being produced on budget.

The plant has been established on a Greenfields site with the benefit of unrestricted access within the Mutanda concession upon an area with no known mineralisation.

From the initial breaking of ground in May 2009, the plant will have taken only 18 months to construct and put into operation.

Mutanda is in the process of commissioning phase 1 of a three phased expansion project. This will ultimately deliver a processing plant able to produce up to 110,000t Cu and 23,000t of contained cobalt in the form of a hydroxide salt.

Phase 2 construction is well underway with mechanical completion targeted for 31st August 2011. A fast track project to bring on line SX-EW #2 (20,000t capacity)in early April 2010 utilising the phase 1 copper circuit at a higher feed grade and SX-EW#3 (20,000t capacity) from a newly constructed heap leach by July 2011. This heap leach is included as part of the phase 3 expansion which is being fast tracked to produce additional copper in 2011. By the time the phase 2 plant is commissioned it is targeted to have SX-EW processes for phase 2 running at or close to nameplate capacity.

Phase 3 has been designed as a fast track 40,000t Cu expansion module which consists of upgrading transformer capacity in the tankhouses and increase copper production from 20,000t to 25,000t in EW#1, EW#2 and EW#3 respectively. In addition a 4th tankhouse rated at 35,000t will be installed for an overall tankhouse capacity of 110,000t Cu per annum. Additional investment in phase 2 SX plants in phase 3 will enable phase 2 to produce 80,000t per annum through its copper circuit, with phase 1 contributing 20,000t. The additional make up tonnage (10,000t) is expected to come from the NW heap leach. Phase 3 completion is scheduled as Q1-2012.

As at 1st January 2011, Mutanda has exceeded all budgeted copper targets for 2010.

Once phase 3 is fully commissioned, the heap leach will treat low grade Mutanda ore (0.5-0.85%Cu) and potentially increase output of the Mutanda processing plant to 110,000tpa of copper cathode.

The phase 1 cobalt circuit is anticipated to be mechanically complete by end-January 2011 with commissioning to take place in February.

A 390tpd acid plant and 73tpd liquid SO2 plant is under construction with completion date forecast for 31st August 2011. Whilst Mutanda maintains acid stock levels of more than 30 days in acid, and supply from Zambia is reliable, the cost of production of acid / SO2 at Mutanda will translate to significant operational cost savings.

Engineering design for all plants was modelled in 3D as can be seen for the detailed model of the 20K plant. The schematic of the integrated phase 1 and phase 2 plant as shown in Figure 48.

Figure 48: 3D Model – 20 000 tpa Copper Plant

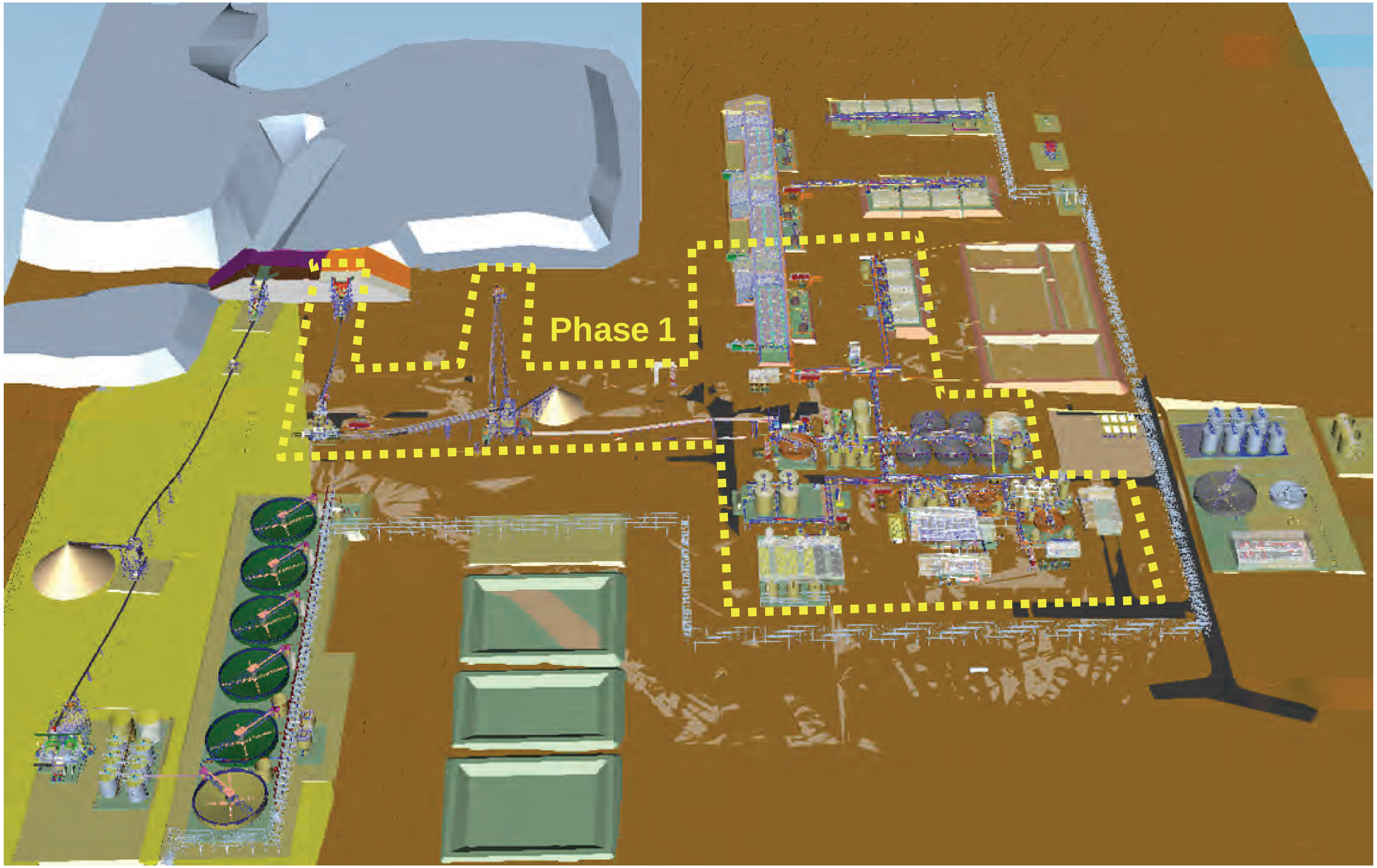

Figure 49: Schemaic integrated phase 1 and phase 2 layout

Figure 50: Electrowinning Building under Construction with phase 2 building in background

4.2 Plant Valuation

As the process plant has not yet run the current costs must be considered as a liability on the balance sheet until production occurs to offset the Capex and ongoing Opex costs. However a plant does effectively exist with which to exploit the deposits and this should be viewed as a positive for the project.

The project has been split into capital and operating cost budgets. The capital cost budget incorporates all elements of an EPCM project including owner's costs as well as first fill spares and first fill reagents. Due to the remote location of the plant it was decided to carry a minimum of 30 days reagents as first fill. An operating cost budget has been submitted for 2010 and 2011 based upon the plant process design criteria, developed from test work and industry standards on consumption.

The value of the plant and equipment has been taken into account in the economic evaluation set out in Section 10.0.

4.3 The 20 000 tpa Process Plant

The initial 20 000 tpa Cu production plant was under construction at the time of our visit and it is intended to start this plant in mid November 2010. Construction was well advanced with the proposed start date appearing a reasonable assumption.

The proposed plant is scoped, assuming the treatment of 0.56 million tpa of Run of Mine ("ROM") ore at a design head grade of 4% copper and 2% cobalt. This plant throughput is expected to give an annual copper production of approximately 20 000 tpa commercial copper cathodes and 11 000 tpa of contained cobalt as a hydroxide salt.

The proposed process facility comprises the following sections:

- crushing and Scrubbing;
- milling and Classification;
- pre Leach Thickening;
- leaching;
- counter Current Decantation (CCD) and PLS Clarification;
- solution Storage;
- tailings Disposal;
- copper Solvent Extraction;
- copper Electrowinning;
- iron/Manganese Precipitation, Thickening and Filtration;
- cobalt Precipitation, Thickening and Filtration;
- cobalt Hydroxide Cake Drying and Packaging;
- reagents Services; and
- air and Water Services.

The 20 000 tpa Cu flow sheet is shown overleaf.

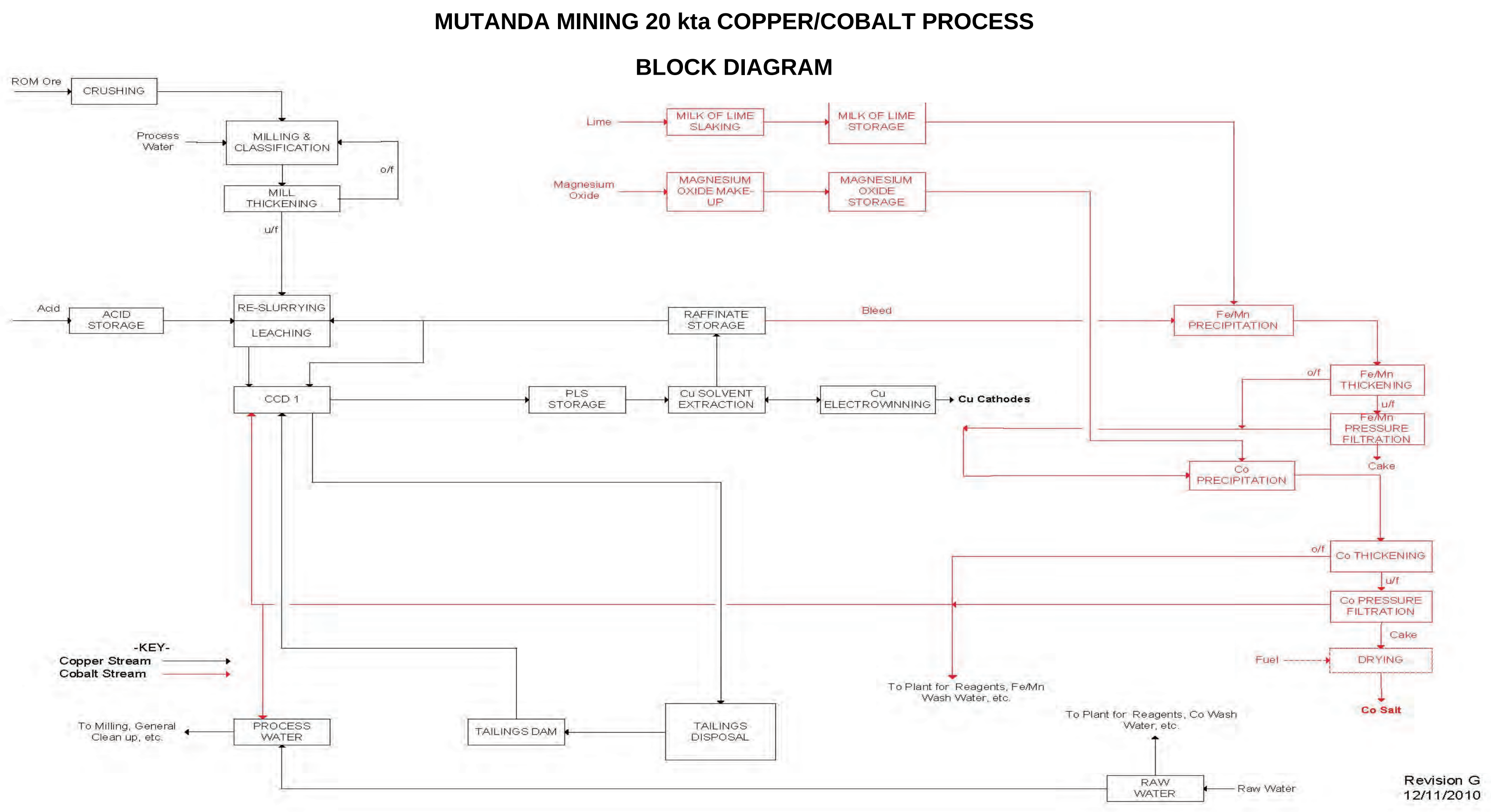

Figure 51: 20 000 tpa Cu Flow Sheet

4.4 Crushing and Milling

The ROM ore will be tipped into a ROM tip bin equipped with a static grizzly which will ensure that oversize material will not report to the primary crusher (oversize material can choke the crusher). Ore will be withdrawn from the ROM tip bin using a variable speed apron feeder to a vibrating grizzly feeder (to scalp off fines) ahead of the primary crusher. A single toggle jaw crusher will be sized for the purpose of primary crushing.

Ore from the primary crusher will be scrubbed ahead of secondary and tertiary crushing to remove clay associated with the ore. The scrubber will be equipped with a trommel screen and oversize material from this screen will be crushed using an open circuit secondary impact crusher while trommel undersize will be wet screened on a double deck screen. Oversize from this screen will be crushed using a tertiary impact crusher, intermediate product will be conveyed to the mill feed bin and the undersize slurry pumped to the mill discharge sump. Both products from secondary and tertiary crushers will be screened on a single deck screen, with the oversize recycled to the tertiary crusher for further size reduction and the undersize reporting to the mill feed bin. A feed bin will be installed ahead of each impact crusher to ensure consistent feed to the crushers.

A dust suppression system will be incorporated in the design of the crushing area. A water spray system will be used to control both process and fugitive dust emissions.

The comminution characteristics of the ore were used as a basis for the design of the crushing circuit. Conveyors will be designed to transport the wet equivalent of the rated dry capacity at the design bulk density.

Figure 52: Primary Crusher

Figure 53: Feed Preparation

Figure 54: Milling Area

A bin with a six hour storage capacity will be installed ahead of the milling circuit for the storage of crushed material. A two way splitter will be located above the bin to divert crushed product to a stockpile during periods when the bin is full. Material can be reclaimed from this stockpile back into the milling facility using a front end loader.

Milling and classification of the crushed ore will be through an overflow discharge wet ball mill operating in closed circuit with a hydrocyclone cluster. Crushed ore will be fed to the ball mill using a variable speed belt feeder and mill feed conveyor. The primary screen undersize will be pumped to the mill discharge sump to join the ball mill discharge. The mill discharge together with the primary screen undersize will be pumped to a hydrocyclone cluster. The overflow from the hydrocyclone cluster will be the circuit product and will gravitate to pre leach thickening while the underflow from the hydrocyclone cluster will gravitate to the ball mill for further size reduction.

The design of the milling area will incorporate a hoist which will be used for grinding media addition into the mills.

The comminution characteristics of the ore were used as a basis for the design of the milling and classification circuit.

4.5 Pre Leach Thickening

The hydrocyclone cluster overflow will gravitate to a thickening facility. Due to the need to further dilute the cyclone cluster overflow in the thickener before thickening to ensure optimum settling of solids, a high rate thickener with auto feed dilution will be incorporated in the design. Thickener overflow will gravitate to a process water tank. This water will be reused as process water to reduce the amount of fresh water introduced to the plant. The thickener underflow will be pumped to the leach circuit.

Bench Top thickening and rheology test work results were used to design the pre leach thickening circuit.

4.6 Leaching

The pre leach thickener underflow will be mixed with acidified raffinate from solvent extraction in a mechanically agitated mixing tank in order to dilute it to the required percent solids concentration for optimum leaching as well as to utilise the free acid in the raffinate. Use of acidified raffinate will also reduce the amount of fresh water introduced to the plant.

Leaching, using acidified raffinate and/or sulphuric acid, will take place in four mechanically agitated tanks operating in a series overflow cascade configuration under atmospheric conditions. A 25% W/w Sodium Metabisulphite solution will be also added to the leach tanks to facilitate the leaching of the Co^{3+} species by reducing the Co^{3+} to Co^{2+}.

Results from the leach test work on similar ore supplied by Mutanda Mining and information from similar operating plants were used as a basis for the leach design.

Figure 55: Leach Tanks

4.7 Counter Current Decantation ("CCD") Circuit

The slurry from the final leach tank will be washed, with cobalt effluent solution topped up with return dam solution, and then thickened in a series of five counter current decantation CCD thickeners. Alternate wash water will be sourced in order of preference from process water, raw water or raffinate.

The overflow from the first CCD thickener will be treated in a clarifier to reduce the amount of suspended solids in the pregnant leach solution ("PLS"). Overflow from the clarifier will gravitate to the PLS pond while the underflow from the final CCD thickener will be pumped to the tailings disposal tank. The clarifier underflow will be pumped back to the CCD circuit or the clarifier feed tank. Due to the need to further dilute the discharge from the final leach tank in the CCD thickeners before thickening to ensure optimum settling of solids, high rate thickeners with auto feed dilution will be incorporated into the design.

Figure 56: Counter Current Decantation Vessels with PLS ponds in the background

4.8 Solution Storage

Clarifier overflow will be stored in a lined pond and pumped to solvent extraction (SX). Raffinate from solvent extraction will be stored in another lined pond and pumped to leaching. Part of the raffinate will also be bled to the cobalt circuit.

An emergency solution pond will be incorporated in the design to capture overflow from the PLS pond and the raffinate pond thus preventing discharge to the environment. A provision will be included for the emergency pond to receive solution from solvent extraction as a result of an SX fire event. A plant catchment pond will also be included in the design.

The basis of the design of the solution storage ponds was to have adequate storage between leaching and solvent extraction to ensure 24 hours operation per day in the solvent extraction and the cobalt circuit. Residence times of 24 hours and 30 hours for the pregnant leach solution pond and for the raffinate pond were therefore used respectively.

4.9 Solvent Extraction (“SX”)

The PLS (aqueous phase) will be pumped to two extraction mixer settlers where it will be mixed with an organic solvent solution consisting of an extractant and diluent (organic phase). The solvent solution will extract the copper from the PLS producing a copper loaded organic stream (loaded organic) and a copper depleted aqueous stream (raffinate).

The loaded organic will be mixed with a solution from electrowinning (spent electrolyte) in two stripping mixer settlers where it will be stripped of the copper producing an advance electrolyte. This advance electrolyte will be filtered using dual media filters to remove entrained organic solution, to prevent ‘organic burn’ on the deposited copper. The advance electrolyte will then be heated using a heat exchanger prior to it being fed to electrowinning. The stripped solvent solution (stripped organic) will be returned to the extraction mixer settlers.

Crud will be treated in a tricanter centrifuge. The organic and aqueous phases will be returned to the circuit. The solid phase will be disposed of. Two fire traps on the lines from solvent extraction to the emergency ponds will be included in the design.

Information from previous projects and similar operating plants was used as the basis for the solvent extraction design.

Figure 57: The Solvent Extraction (SX) Plant

4.10 Electrowinning

Figure 58: Tank House External

Figure 59: Tank House Inside during construction

Advance electrolyte will be pumped to 16 polishing cells before being pumped to 66 commercial cells. Each cell will have 48 cathodes and 49 anodes. Copper will plate onto the cathodes by the process of electroplating. Blank stainless steel cathodes and lead anodes will be used in the cells. The spent electrolyte from the electrowinning banks will be pumped back to the strip section of solvent extraction. After the plating cycle, the cathodes will be removed from the electrowinning cells, washed in a hot water tank, the deposited copper stripped from the cathodes using a semi automatic stripping machine and the blank cathodes returned to the cells. The copper stripped from the cathodes will be the finished copper product.

In order to meet first copper and year end production targets, a number of cells eighteen (18) were brought on line in conjunction with the heap leach and SX plant. This enabled fast commissioning of rectifiers and tank house whilst generating revenue.

Figure 60: Lead Anodes being fitted to the Electrowinning Cells during construction

Figure 61: Copper Cathode from the Heap Leach Operation in September 2010

4.11 Cobalt Circuit

The cobalt circuit will have two sections, namely iron manganese removal and cobalt hydroxide recovery. Both sections will treat solution at elevated temperatures.

4.11.1 Iron and Manganese Removal

A portion of the raffinate solution from the storage pond will be recycled to leach and the balance will contacted with lime slurry and a sodium metabisulphite solution in a series of four mechanically agitated tanks at a pH of 3.5. Steam will be directly introduced into the tanks to heat the solution to approximately 40 degrees Celsius. Low pressure air will also be introduced in the tanks using a low pressure air blower. Iron, manganese, some aluminium and a little copper will be precipitated under these oxidising conditions. The slurry from the last tank will be thickened and filtered with the resulting solution pumped to cobalt precipitation and the residue disposed of. Some of the thickener underflow will be recycled to the first iron manganese precipitation tank as a reseed to promote crystal growth during precipitation.

Test work results and information from previous projects and operating plants were used as the basis for the Iron and Manganese Removal Circuit design.

4.11.2 Cobalt Hydroxide Recovery

The combined thickener overflow and filtrate from the iron manganese circuit will be contacted with 20% m/m magnesium oxide slurry in a series of five mechanically agitated tanks at a pH of 8.2. Steam will be directly added to the tanks to heat up the solution to 50 degrees Celsius. Cobalt and remaining copper in solution will be precipitated under alkaline conditions. The slurry from the last tank will be thickened and filtered in filter presses. Some of the thickener underflow will be recycled to the first cobalt precipitation tank. The resulting effluent solution will be pumped to a lined storage pond for plant use distribution. The resultant cobalt hydroxide cake will be dried in a belt dryer and packaged in bulk bags as the finished cobalt product.

Test work results and information from previous projects and operating plants were used as the basis for the Iron and Cobalt Hydroxide Recovery Circuit design.

4.12 Reagents and Consumables

Facilities to make up, store and distribute reagents and consumables will be allowed for in the design. These reagents and consumables will include concentrated sulphuric acid, hydrated lime, sodium metabisulphite, magnesium oxide, flocculants, extractant, diluents, crusher liners, grinding media and mill liners. The reagent consumptions obtained during test work and information from previous projects were used to estimate the size of the equipment associated with mixing, storage and distribution of most of the reagents.

4.12.1 Sodium Metabisulphite

Partitioned tanks have been incorporated in the design to cater for mixing and storage of Sodium Metabisulphite. The design of make up and storage facility will be based on three make ups per day and approximately 10 hours storage and dosing.

4.12.2 Magnesium Oxide

The design of the make up and storage facility will be based on 673 make ups per day and approximately 4 minutes storage and dosing.

4.12.3 Flocculants

Except for the larger flocculant tanks, partitioned tanks have been incorporated in the design to cater for mixing and storage of flocculants.

Cobalt Sulphate solution will be obtained from a small bleed off the stream after iron manganese precipitation. Capacity of the storage tank will be one day.

4.12.4 Diluent and Extractant

The diluents will be stored in a single storage tank which will hold approximately 40% of the organic inventory of the solvent extraction circuit. The diluent will be periodically added to the solvent extraction circuit.

The extractant will be stored in the iso containers it is delivered in and will be periodically added to the solvent extraction circuit directly from the containers using a pump.

4.12.5 Grinding Media

The ball mill grinding media consumption is based on Bond's estimating method using abrasion index results obtained from comminution test work.

The ball mill liner consumption has been based on Bond's estimating method using abrasion index results obtained from comminution test work.

4.13 Air and Water Services

4.13.1 Air Services

High pressure air will be supplied to the plant in general plus iron manganese thickening and filtration, Cobalt thickening and filtration and instrument air by four screw compressors, three working and one standby.

Low pressure air is required in iron/manganese precipitation and will be supplied by four low pressure compressors. A bare shaft low pressure air compressor will be procured and installed in the event that one of the duty low pressure air compressors breaks down.

4.13.2 Water Services

A breakdown of the water requirements is shown below and will be used as the basis for sizing of the transfer pumps. The water streams to be catered for are:

- process water;
- raw water (raw water and fire water);
- potable water;
- gland Water; and
- safety Shower header tank.

4.14 Other Mineral Processing Activities

A 50 tph Dense Media Separation ("DMS") plant has been in operation for three and a half years producing a low grade cobalt/copper concentrate. This is shipped out in 1t Bulk Bags and has contributed significantly to the project cash flow and enabled the establishment of infrastructure on site prior to the hydrometallurgical plant coming on stream.

The intention is to continue to use the 50tph plant during the 2011 financial year to supplement the ramp up in copper cathode by producing 17,133 mt of copper contained in a 25% copper oxide concentrate which will be shipped to Zambia.

4.14.1 Acid Plant

A 390 tpd sulphuric acid plant and 73 tpd liquid SO^2 plant is under construction, with a planned completion date of August 2011. This will offset the requirement to truck in sulphuric acid by road and will limit the amount of trucks required to carry the acid plant reagents. The liquid SO^2 plant will substitute Sodium Metal bisulphite in the liberation of cobalt. This will enable significant cost savings of ± USD30 million per annum based upon the current costs of importing these reagents.

Figure 62: Cobalt DMS Plant

Figure 63: Screening Plant

4.15 Expansion Programme

The next phase of 40 000 tpa of additional Cu and 12 000 tpa of Co (Phase 2) is already under construction, with civils and mechanical erection well underway. This is due for completion in August 2011.

Figure 64: 40 000 tpa Module Electrowinning Cells Already in Position

The plant is similar in construction to the 20 000 t plant, though has been designed to be robust and flexible to significantly expand production ultimately up to 80 ktpa Cu through the second phase plant as part of the phase 3 expansion project.

A Phase 3 plant design is underway to utilise flexibility in the Phase 2 plant to expand production up to 110 ktpa Cu with no envisaged expansion in Cobalt. This is expected to cost USD103 million and completion is anticipated in Q1-2012. Phase 3 and Phase 2 will be constructed concurrently.

From the block flow diagram overleaf, it can be seen that the phase 1 and phase 2 plants are integrated and where possible exact “copy and paste” designs have been used to minimise engineering design costs and fast track construction.

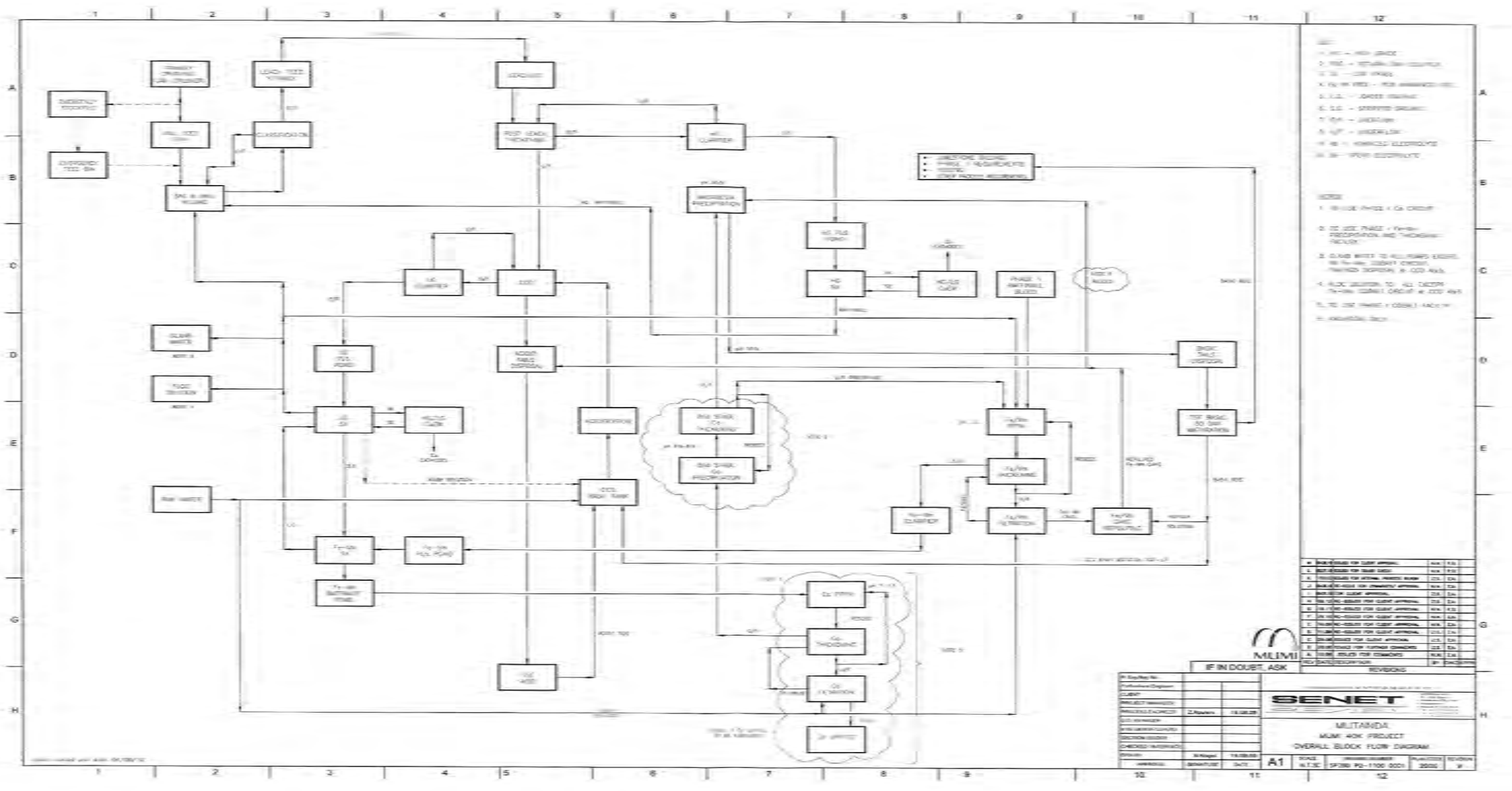

Figure 65: 40 000 Block Flow Diagram

4.16 Risk

One significant risk to the operation is the logistics associated with bringing materials into the country. Mutanda has gained valuable experience in both inbound and outbound logistics, as a result of the capital expansions (inbound freight) and concentrate exports (outbound freight). Mutanda, through its partners expedite approximately 400 - 500 trucks per month out of the DRC and manages 300 - 400 trucks coming in with consumables and capital items. There are other potential risks in transporting by road and where possible Mutanda attempts to mitigate these as they occur. In addition 3 000 - 4 000t per month of outbound exports are transported via rail to Ndola and then trans-shipped by road to South Africa.

Power, whilst supply has been negotiated and agreed, actual power delivery still has a level of associated risk which the project team have worked hard to integrate.

Social risks, the DRC cannot be considered stable in the first world sense and may be subjected to various levels of labour unrest. It should be noted, however, that to date Mutanda has not had one day of labour related unrest on site and works to employ from local villages to enhance the quality of life in the surrounding area. Mutanda is involved in a large number of social projects including projects in healthcare, agriculture, water and infrastructure, as part of its ongoing commitment to social responsibility.

4.17 Summary

The first 20 000 tpa Cu and 11 000 tpa Co production phase for Mutanda was nearing completion at the time of our visit. At the same time, the 40 000 tpa Cu and 12 000 t Co production expansion was also underway with an estimated start date of August 2011 and with further expansion planned to ultimately take copper production to 100 000 tpa by Q1-2012.

The plant design utilises modern technology coupled with the selection and installation of industry proven equipment.

Once copper and cobalt production commences, the revenue generated can be used to not only cover the ongoing Opex costs but commence payback of the Capex.

5.0 TAILINGS AND WASTE

5.1 Background

The Mutanda Mine's Tailings Storage Facility ("TSF") covers an area of approximately 65 ha. Construction of the dam is still in progress and December 2010 is the expected date of completion of Phase 1. Phased construction of the embankment is being implemented with the initial construction up to elevation 1392 metres above mean sea level (mamsl). This will provide two years of storage for 1 million dry tonnes of tailings. The embankment will be raised by 10.6 m, increasing the life of the TSF to ten years. After ten years the TSF is expected to store approximately 5.0 million dry tonnes of copper tailings. The rate of deposition is therefore expected to be 500 000 tonnes per annum. The downstream method of phased construction will be used to raise the embankment. The embankment spans from the western flank, all the way around to the south eastern corner (see Figure 66). The northern part of the dam is formed by a natural hill, higher than the starter wall. Due to some of the acidic properties of the tailings, the TSF is fully lined with a composite liner consisting of a 1.5 mm HDPE geomembrane (see Figure 67 and Figure 68) overlaying a 300 mm thick layer of compacted clay. A series of toe drains below the liner, for seepage detection, are located at the upstream toe of the embankment. These drain to a sump on the south eastern part of the embankment.

The main delivery pipeline will be a NB 160 carbon steel pipe. A spigot system will be used to deposit slurry into the dam from the upstream edge of the starter embankment. The rate of rise for the tailings dam deposition is to be limited to between 1.8 to 2.0m per annum. A pump barge will be installed to pump supernatant water from the TSF into the return water pond ("RWP") located at the south western corner of the TSF (see Figure 66). The supernatant water will be returned back into the plant for re-use. Due to the acidic nature of the water, the same composite liner system will also be adopted in the RWP. The drainage and seepage interception trenches in the TSF lead to a sump on the south part of the embankment. This water is then pumped into the RWP.

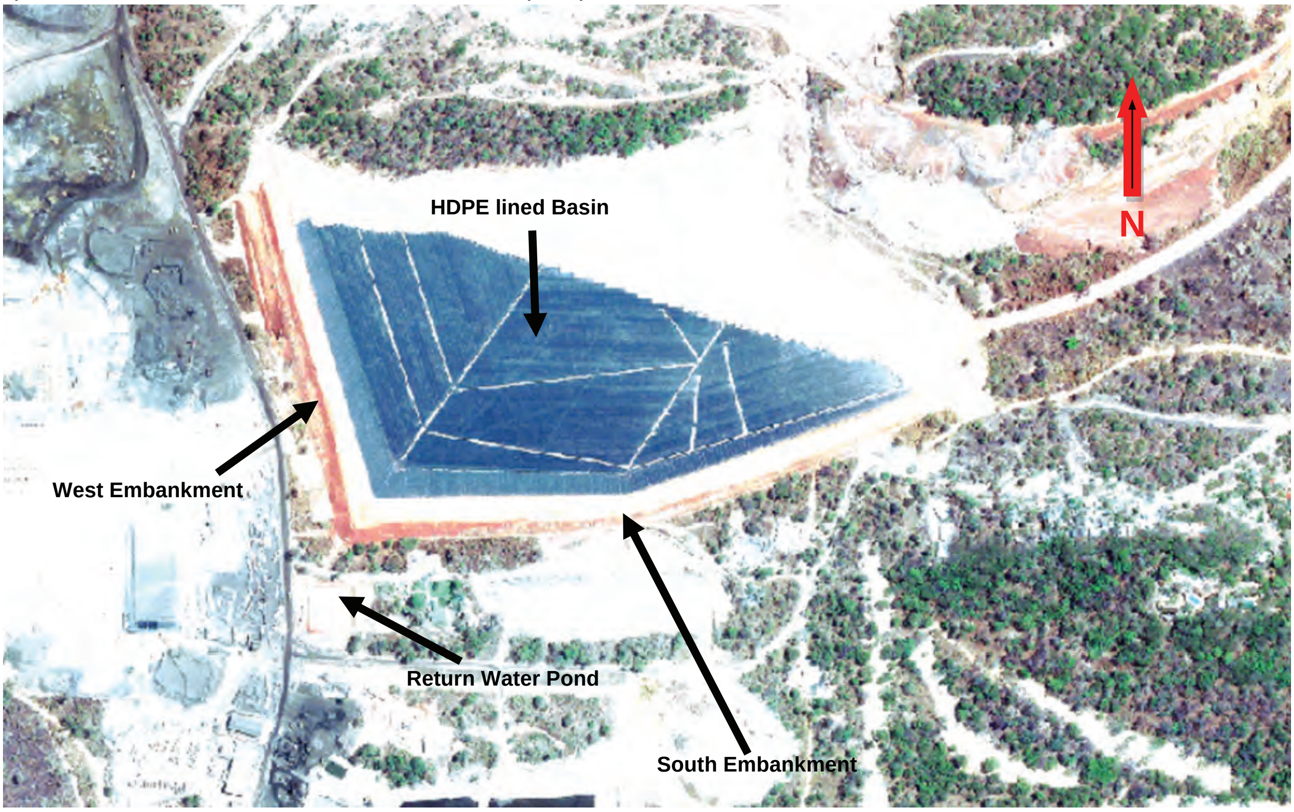

Figure 66: Layout of the Mutanda Tailings Storage facility

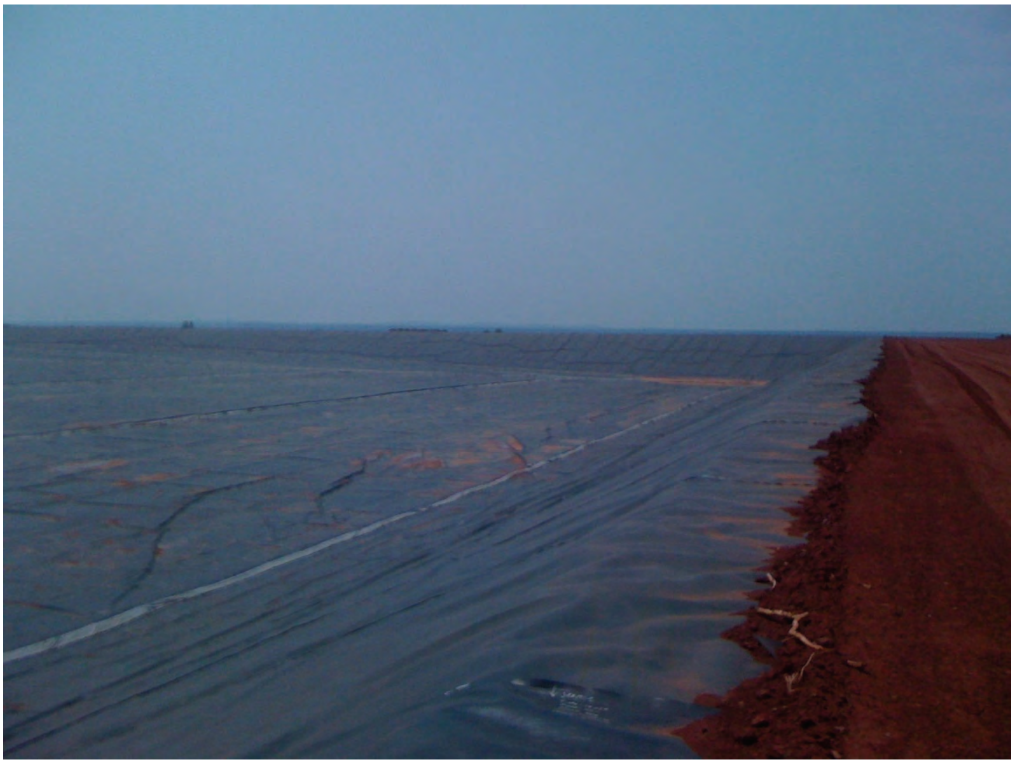

Figure 67: Basin of Mutanda Tailings Dam as seen from the western embankment

Figure 68: Mutanda Tailings Dam during liner installation

5.2 Desktop Review of Available Environmental Reports

The following reports were presented for the review of the operation, maintenance and closure of the Mutanda Tailings Storage Facility:

- Mutanda Tailings Storage Facility: Design and Initial Operation Requirements, Report No. 01 Final, December 2009, Metago Environmental Engineers (Metago 2009).
- Mutanda Ya Mukonkota Project Environmental Adjustment Plan, Report No. MUTANDA/CG/LM/002/07, 2007, MUTANDA SPRL.

5.3 Assessment of Compliance with Statutory Requirements

According to Article 64 of the Democratic Republic of Congo's ("DRC:) mining code, to own and operate a tailings facility, a mine only requires an operating license or "Certificate d'Exploitation" for the concession on which it intends to construct a tailings storage facility. As part of the process of obtaining this license, the method of tailings containment or effluent discharge must be referenced in either the Feasibility Study or Environmental Impact Statement ("EIS"), submitted by the mine to the Ministry of Mines ("CAMI"). Mutanda submitted an Environmental Adjustment Plan ("EAP"), which is also acceptable . Mutanda has an operating license for concession PE662, which is the concession on which the Mutanda Tailings Storage Facility is constructed. Article 64 then allows for Mutanda to mine the resource and develop / construct the necessary supporting infrastructure (i.e. tailings facilities), effectively rendering Mutanda the license to own and operate the Mutanda Tailings Storage Facility.

Due to the fact that the tailings dam is still under construction, assessment of the tailings dam can only be based on the design report (Metago 2009) and the measures that are put in place to operate the dam once it is commissioned.

The following routine operation procedures are listed in the design report:

- repair any erosion damage on the outside of the embankments;
- rotate and reverse the tailings delivery pipeline every three or four years;
- reinstate any signs;
- remove and reinstate any damaged or blocked valves, pipes and spigots;
- ensure firebreaks are maintained, as necessary; and
- movement of HDPE pipes.

The above operating procedures are the responsibility of Mutanda.

5.4 Identifying the Main Areas of Environmental Risk and Performance

The main areas of environmental risks associated with the operation of the facility are listed below. Some of the planned mitigation measures are listed, as stated in the design report of the tailing dam.

- **Dust:** Dust monitoring along the perimeter of the TSF should be implemented once the TSF is operational.
- **Groundwater:** Installation of monitoring boreholes has been planned, as stated in the design report, in order to monitor the groundwater quality around the TSF.
- **Seepage/Leakage:** Leakage detection drains have been installed underneath the HDPE at the upstream toe of the embankment. The flow rate at the outlets to these drains is to be measured weekly.
- **Surface water:** Stormwater trenches will be constructed on the upstream side of the northern and eastern access roads to intercept any stormwater and ensure the separation of clean and dirty water.
- **Freeboard:** A minimum freeboard of the 900 mm between the pool and the crest of the outer embankment is to be maintained throughout the life of the dam. The pump barge that will be installed will help pump the supernatant pool water out of the tailings dam into the RWP, to maintain the specified freeboard level.
- **Stability**: Piezometers are to be installed at the south west corner of the tailings dam and will be extended as the level of the embankment increases. They are to be monitored on a weekly basis.
- **Closure:** Careful attention has to be paid to the downstream slopes of the embankment. The gullies that may form must be repaired as soon as they appear, until vegetation has started for long term rehabilitation of the embankment. The southwest corner is of importance since it is the highest part of the embankment. Short term vegetation should be implemented to prevent the erosion of the slopes.

5.5 Review of Rehabilitation Provisions and Liabilities

The closure and rehabilitation objectives for the Mutanda tailings dam are included in the TSF design report (Metago 2009). The closure plan has not yet been completed but this is standard practice for a facility that has not yet been commissioned. A detailed closure plan and cost estimate for the TSF is therefore required. The plan can then be incorporated into the mine's overall closure plan which has been completed and submitted as part of the EAP but currently excludes the TSF.

5.6 Summary of Assessment of Health and Safety Management Programmes

As part of the EAP, a health and safety management plan was drawn up for the mine, which includes the Mutanda tailings storage facility. The responsible personnel are listed for the safety of the people and infrastructure on the site. An emergency preparedness plan is to be prepared and included as part of the operating and maintenance manual.

5.7 Details of Injury and Fatality Statistics

There are no statistics of injury and fatality for the tailings dam available because it is still under construction.

6.0 CLOSURE

6.1 Approach and Limitations to Closure Cost Review

6.1.1 Approach

An indicative closure cost estimate, based on available information, was conducted to serve as a basis for the review of the provided closure costs. The approach followed is summarised as follows:

- Identification and delineation of the relevant mining areas and associated infrastructure, primarily from Google Earth imagery and limited available plans;
- Identification of infrastructure and land use sub-categories within the above mining operations area characterised by similar conditions, for example light, medium or heavy infrastructural areas, waste rock and spoils stockpiles, and moderately or severely disturbed surface conditions, etc;
- Interpretation of the type, nature and sizes of structures from available information and measurement of the delineated areas in AutoCAD;
- Determination/verification of unit rates for plant dismantling and demolition, as well as associated reclamation, as per recent tenders available to GAA, similar work conducted recently in Africa, as well as consultation with demolition practitioners;
- Application of the above unit rates and associated quantities in spreadsheets arranged into sub-categories to illuminate the respective closure cost components for the cost review;
- Objectively determining the indicative closure cost based on the approach and criteria adopted by GAA for this review and comparing the findings from this costing to the existing closure costs conducted by the other consultants; and
- Compilation of a report reflecting the approach applied by GAA in determining the closure costs, as well as the cost comparison. Matters requiring attention to ensure that future closure costing is improved and more realistic are also listed.

6.1.2 Limitations

- This review of the existing closure costs was conducted as a desktop assessment as a result, the closure cost estimation provided by GAA is **indicative only**, acting as a basis for comparison of the available costs and to assess whether these are appropriate (order of magnitude). An overall one day site visit to the mine site in support of the overall project, also addressing closure cost aspects, was conducted. This time on site was not sufficient to gain a full understanding of the closure related site aspects;
- Maps delineating the exact areas under control of the mine and/or that have to be covered by their closure cost provision were not available at the time of this review. Hence assumptions had

to be made, reflecting GAA's "best" understanding of the closure cost related battery limits of the mine and related sites.

6.2 Available Information

The sources of information used for the closure cost estimate were as follows:

- closure Cost Schedule of Quantities.xls, by Knight Piesold Consulting; and
- Mutanda Copper and Cobalt Mine, 2010 Closure Cost Assessment for Mutanda Mining, by Knight Piesold Consulting. Report no 301-00293/02.

The above Knight Piesold report primarily focuses on the break down and delineation of sub-areas and/or closure cost components for calculation purposes, with limited information on the approach and methodology applied with the determination of the closure costs.

6.3 Battery Limits

The above reports and associated information do not clearly stipulate the battery limits for which the documented closure costs apply. Battery limits were assumed from the available information and the interpreted Google Earth imagery.

These limits are described below and reflected on (Figure 69). The infrastructure description obtained from the available information is listed separately from those aspects inferred from the imagery.

The key surface areas identified from the imagery can be summarised as follows:

- developed and fugitive disturbed areas: 266ha;
- main infrastructural area and related areas : 7ha;
- tailings storage facilities overall delineation: 53.2ha; and
- tailings storage facilities already filled by tailings: 0ha (under construction).

Figure 69: Battery limits assumed for GAA's cost review

6.3.1 Available information

The infrastructure inventory and description obtained from the existing closure costs are as follows:

- administrative offices and accommodation;
- open pit mining operation;
- 20K plant;
- 40K plant;
- TSF (under construction);
- stores area;
- DMS plant;
- heap leach dump;
- general areas; and
- electrical sub-station.

6.3.2 Additions by GAA

The following closure costing components and related activates were also considered by GAA in the determination of the indicative closure cost estimate:

  - handling and disposal of demolition waste;
  - reclamation of disturbed areas, including the collection, handling and disposal of contaminated soil as well as the removal and disposal of fugitive concrete.
  - additional allowances, including preliminaries and general (“P&Gs”) and contingencies.

- Although there could be the possibility of ongoing management of contaminated excess mine water arising from the reclaimed mine workings, involving collection, handling, treatment and safe disposal of the treated mine water, the need and nature of this is unknown and hence has been omitted from the closure cost estimate. If required, this could add a notable additional cost.

6.4 Assumptions and Qualifications

The assumptions and qualifications listed below have been made with respect to the closure cost estimate.

6.4.1 General

- The closure costs for the plant site could comprise a number of cost components. This report only addresses the decommissioning and reclamation/restoration costs, equating to an outside (third party) contractor establishing on-site and conducting the decommissioning and reclamation-related work. Other components such as staffing of the plant site following decommissioning, the infrastructure and support services (e.g. power supply, etc.) for the staff, as well as workforce matters such as separation packages, re-training/re-skilling, etc., are outside the scope of this report;
- Based on the above, dedicated contractors would be commissioned to conduct the demolition and work on the mining site and associated areas. This would *inter alia* require establishment costs for the demolition and reclamation contractors and hence, the allowance of P&Gs in the cost estimate. Allowance has also been made for third party contractors and consultants to conduct post closure care and maintenance work, as well as compliance monitoring;

- It is foreseen that demolition waste, such as concrete and building rubble, would be largely inert and that a dedicated waste disposal facility will be licensed and constructed for the purpose of disposal of demolition waste. Provision has also been made for the reclamation and closure of the waste disposal site. Steel and related material from the plant demolition which has salvage value will remain on-site for sale to third parties;
- Although the existing plant and related surface infrastructure could have salvage or resale value at closure, no cost off-sets due to possible salvage values were considered in terms of accepted practice and thus only **gross** closure costs are reported;
- Concrete footings and bases would be demolished to a maximum of 1 000 mm below the final surface topography;
- All useable stockpiles of raw and/or saleable material would have been processed and removed off-site at closure and none of these would remain on site, thus requiring reclamation; and
- The existing villages would not be demolished, but would be transferred to third parties. This also applies to the services related to the village such as water supply and sewage treatment.

6.4.2 Site specific

It has been assumed that at mine closure the mine site and associated disturbed areas will be reclaimed to a sustainable predetermined final land use. This will not only require the dismantling of the physical infrastructure and addressing the aesthetic effects of the reclaimed mine site, but also addressing the residual impacts of the operations on the receiving environment. Therefore, the GAA closure cost estimate addresses, as far as reasonable, the possible latent and residual effects. In this regard the following site-specific closure measures have also been included in the cost estimate:

- The rehabilitation of evaporation/pollution control ponds will include the following:
  - removal of sediment up to a depth of 400mm;
  - removal of synthetic liner;
  - removal of contaminated soil that could have occurred in those places the liner has leaked; and
  - collection, transport and disposal of the contaminated sediment and soil.
- Different shaping, levelling and re-vegetation methods will apply for disturbed areas based on the nature, extent and severity of disturbance. The following categories have been assumed:
  - generally disturbed areas, characterised by transformation or partial absence of vegetation with limited erosion or soil contamination;
  - areas from which infrastructure has been removed, characterised by severe transformation of the landscape and significant soil contamination and harmful material; and
  - severely disturbed areas characterised by excessive erosion and complete transformation of the land cover.
- Dedicated rates for the shaping, levelling and reclamation have been applied for the above categories.
- Removal of contaminated soil from disturbed areas as part of general surface reclamation is required for approximately 2 percent of the reclaimed infrastructural footprint areas;
- Allowance has been made for a nominal amount of fugitive concrete to be removed and disposed of; and

- Allowance has been made for care and maintenance as well as surface and groundwater quality monitoring to be conducted for a minimum period of 5 years to ensure and assess success of the implemented reclamation and closure measures;

6.4.3 Additional allowances

- Fixed ratios for P&Gs (12 percent) and contingencies (10 percent) have been applied;

6.5 Closure Cost Comparison

To provide a structure for the cost comparison, the costs are presented in a format routinely used for closure cost determinations, addressing the following categories:

- infrastructural areas;
- mining areas;
- general surface reclamation;
- water management;
- post closure aspects; and
- additional allowances.

The closure costs determined by Knight Piesold Consulting and GAA are reflected in Table 15 and Table 16. Table 15 provides an overall summary of the cost comparison, whilst Table 16 provides a comparison of closure measures and related costs. The indicative costs by GAA indicate that the costs by Knight Piesold are most likely too low. This could mainly be due to the following:

- a general discrepancy in the battery limits adopted for the respective closure cost estimates;
- over emphasis on the demolition of the surface infrastructure by Knight Piesold and too little attention to reclamation of disturbed areas;
- allowance for the safe disposal of demolition waste and the creation and final reclamation of a dedicated site for this purpose by GAA; and
- clean-up and safe disposal of contaminated soils and fugitive contamination.

Table 15: Overall cost comparison

Closure component	Knight Piesold Consulting 2010 (NPC 2010)	GAA 2010
1. Infrastructural areas	$1,283,515.58	$1,700,869.38
2. Mining areas	$1,559,985.22	$1,545,574.44
3. General surface reclamation	$683,176.95	$3,045,152.00
4. Water management	$0.00	$93,100.00
Subtotal 1 (for infrastructure and related aspects)		**$6,384,695.82**
5. Post closure aspects	$0.00	$313,320.00
Subtotal 2 (for post-closure aspects)		**$313,320.00**
6. Additional allowances	$352,667.78	$1,404,633.08
Subtotal 3 (for additional allowances)		**$1,404,633.08**
GRAND TOTAL	**$4,302,546.86**	**$8,102,648.89**

Table 16: Detailed comparison of closure measures and related costs

Category with sub-categories	Evaluation
6.5.1 Infrastructural areas	
■ Dismantling of processing plant and related structures; ■ Demolition of steel buildings and structures; ■ Demolition of reinforced concrete buildings and structures; ■ Reclamation of access roads, railways and power lines; ■ Demolition of offices, workshops and residential buildings; ■ Stream diversions; ■ Fencing; and ■ Disposal of demolition waste.	■ The respective battery limits for the surface infrastructure appears to be different. Since no map was supplied with the Knight Piesold costing this could not be clarified; ■ The Knight Piesold costing for dismantling of processing plant is to a greater level of detail than the GAA costs. However, it appears that the costs associated with general surface reclamation for each battery area was included with the infrastructural area. Hence, it is difficult to compare the infrastructural areas. The GAA costing was based on the extrapolation/adaptation of verified costs for similar mining/industrial complexes; ■ The GAA costing includes the establishment, operation and closure of a dedicated waste disposal site for the decommissioning and restoration as it is assumed that another suitable site is not available; and ■ The GAA costing for infrastructural areas is more expensive than the Knight Piesold costing mainly due to the waste collection, handling and disposal that was included in the GAA costs.
6.5.2 Mining areas	
■ Opencast reclamation including final voids and ramps; ■ Excavations; ■ Sealing of shafts, adits and inclines; ■ Shaping of stockpiles, waste rock and overburden dumps; ■ Vegetation of stockpiles, waste rock and overburden dumps; ■ Reclamation of processing waste deposits and evaporation ponds; and	■ The Knight Piesold appears to have costed for reclamation of overburden and spoils. However, these costs are compounded into different battery areas and thus difficult to compare to the GAA costs; ■ The Knight Piesold costing allows for the reclamation of infrastructure, a tailings dam and a golf course which has not yet been constructed, whereas the GAA costing does not. ■ The Knight Piesold costing allows for the reclamation of a heap leach which is not evident from the Google image; ■ GAA costs allow for the reclamation of all generally disturbed areas and the

Category with sub-categories	Evaluation
■ Reclamation of subsided areas.	clean-up of possible contamination over these areas; and ■ GAA costing is more expensive due to the greater attention to surface rehabilitation
6.5.3 General surface reclamation	
■ Shaping of disturbed areas; and ■ Vegetation of disturbed areas.	■ The Knight Piesold costs allow for the general surface reclamation at an inclusive rate per battery area, whereas the GAA costs allow for the reclamation (shaping and vegetation) of 266 hectares of disturbed areas as identified and delineated from the aerial imagery; ■ The GAA costs allow for clean-up of contaminated soils over 20 percent of the infrastructural area, which appears to not be included in the Knight Piesold costs; ■ In addition, the GAA costs allow for the removal and disposal of 500m³ of fugitive concrete; and ■ The GAA cost is less expensive, which could be attributed to differences in reclamation assumptions.
6.5.4 Water management	
■ Reinstatement of drainage lines; and ■ River reclamation.	■ The costs under this cost category cannot be compared, because there are no drainage lines.
6.5.5 Post closure aspects	
■ Surface water quality monitoring	■ GAA cost allows for surface, groundwater and reclamation monitoring, as well as care and maintenance for a minimum period of 5 years over an area of 266

Category with sub-categories	Evaluation
■ Groundwater quality monitoring ■ Reclamation monitoring ■ Care and maintenance ■ Ongoing water treatment	hectares; ■ GAA has not made any allowance for ongoing water treatment, but due to the nature and extent of contamination this could be required. This could have a notable effect on the computed closure costs. ■ The costs cannot be compared, because the Knight Piesold costing appears to have omitted post-closure aspects.

6.5.6 Additional allowances

■ Preliminary and general ■ Contingencies	Both the Knight Piesold and GAA costs allow 12 percent for preliminaries and general and 10 percent for contingencies.

6.6 Conclusions

The findings as reflected in this report have primarily been based on the interpretation of Google Earth images of the respective sites, with limited input from the supporting information provided by the mine. Moreover, in those instances where the required information was not available, estimates were made based on experience. Unit rates for the purpose of the review were obtained from GAAs' existing data base and/or from demolition practitioners. Where required, these were adapted to reflect site-specific conditions.

The review of the existing closure costs as well as recommendations in this regard has been completed from a risk-averse perspective and mainly errs on the side of caution. This approach allows for the costs to be refined as appropriate information becomes available, as opposed to possible under-estimation and associated provision that could lead to liability shortfalls.

This review concludes that the Knight Piesold Consulting closure costs estimate (US$ 4,3 million) are most likely not adequate to address the envisaged decommissioning and restoration requirements, albeit that a large portion of the site is still under construction. GAA believe that fair and reasonable closure estimate would be approximately US$ 8,1 miilion.

7.0 ENVIRONMENTAL, HEALTH AND SAFETY

The key objective of this audit was to identify major environmental or social impacts and stakeholder concerns associated with Mutanda Mine operations which might represent a significant liability in regard to the proposed listing of Glencore International plc on the London and Hong Kong Stock Exchanges.

Specifically this involved assessing the following items:

- the scope and content of the Environmental and Social Impact Assessment ("ESIA") and EMP;
- the status of environmental authorisations;
- compliance with permit and statutory conditions;
- compliance with the Equator Principles where sufficient site information was available to do so;
- major environmental and social risks and liabilities, specifically in regard to mine closure.

The geographical extent of the audit was limited to mining-related facilities and activities in the Mutanda Mine concession Area as defined in Section 3.0 of this report.

7.1 Mining Infrastructure

Mining assets associated with the Mutanda Mine include:

- the East Pit, which is currently being mined at a depth of approximately 40 m below surface;
- the Central Pit, which is currently being mined at a depth of approximately 60 m below surface;
- the Central Northwest ("CNW") Pit which will be mined in 2011; and
- the Clinic Quarry Pit which is mined for aggregate.

The estimated LOM has been provisionally set at 20 years.

7.2 Mineral Processing Infrastructure

Mutanda is in the process of constructing a treatment plant to recover copper and cobalt from the feed being obtained from the open pits. The process plant at Mutanda will produce copper cathode sheets and a cobalt salt. Current and proposed mineral processing facilities are discussed in the subsections that follow.

7.2.1 Phase I (20 000 tpa processing plant)

The first module is a 20 000 tpa plant, of which the Cu Plant had been operational since September 2010 whilst the Co Plant was expected to be commissioned in February 2011. The planned feed grade for the Phase I plant is 4% Cu and 2% Co, with a copper recovery of 90%.

The process flow for the 20 000 tpa plant includes: crushing and milling; leaching with sulphuric acid and recycled raffinate; counter-current decantation (“CCD”); solvent extraction (“SX”) and electrowinning (“EW”).

7.2.2 Small-scale site processing facilities

The following small-scale mineral processing facilities were operational on site at the time of the audit:

- A Dense Media Separation (“DMS”) plant which upgrades the cobalt content to produce cobalt concentrate. Significantly increased production against budgeted targets had resulted in bags of concentrate being stacked all over the site at the time of the audit. The DMS plant was operational before the formation of the Joint Venture and will be decommissioned at the end of 2011 (pers. comm. A van der Merwe).
- A heap leach operation had been established to provide a copper-rich solution to the electrowinning circuit prior to the plant being commissioned. Mutanda intends establishing a second heap leach facility in the northwest corner of the concession to feed to the third electrowinning tank house which was under construction at the time of the audit. Both heap leach facilities will operate on a permanent basis as and when suitable ore is available. (pers. comm. A van der Merwe).

7.2.3 Phase II (40 000 tpa processing plant)

Construction of the Phase II expansion plant (at a 40 000 tpa of copper production) was underway at the time of the audit, with commissioning expected by the end of the third quarter of 2011. The 40 000 tpa flow sheet is similar to that of the 20 000 tpa plant, with the addition of up-front SAG milling for the increased throughput.

A phase 3, 40,000t copper expansion module is being constructed concurrently with phase 2, and is due for mechanical completion in Q1-2012 to push production up to 110,000 tonnes of copper cathode and 23,000t of cobalt in the form of a cobalt hydroxide.

7.2.4 Tailings storage facilities (TSFs)

The following TSFs are present on the Mutanda site:

- old tailings associated with the DMS plant; and
- a new 65 ha TSF which was established for the project processing plant (Mutanda TSF).

The DMS tailings will be recovered into the new processing plant and all further discussion below therefore relates to the Mutanda TSF.

The current design life of the TSF is 10 years and it is expected that 5.0 million dry tonnes of Cu tailings will be deposited during that period. The starter wall spans from the western flank all the way around to the south eastern corner. The northern part of the dam is formed by a natural hill, higher than the starter wall. The TSF is in the process of being raised approximately 10m higher than at the time of the audit to draw level with this hill.

Deposition is via a spigot system, with the main delivery pipe being located on the higher northern side of the TSF. A pump barge will be installed to pump the water into the fully lined return water dam (RWD). TSF seepage interception trenches lead to a sump on the southern extent of the embankment and this water is also then pumped to the RWD. RWD water will be recycled back to the processing plant. The TSF is fully lined with one layer of 1.5mm HDPE on top of a compacted 300mm natural clay layer to prevent the possibility of acid seepage.

In terms of Article 64 of the DRCs' Mining Code, no specific permits are required to own and operate a TSF provided that:

- an operating license or "Certificate d'Exploitation" has been issued by the DRC Mining Ministry ("CAMI") for the concession on which the tailings facilities or discharge effluent have been constructed.; and
- the method of tailings containment or effluent discharge is referenced in either the Feasibility Study or Environmental Impact Statement ("EIS") which has been received by CAMI.

7.2.5 Stockpiles and mine residue deposits

Numerous mine stockpiles and mine residue deposits occur on the Mutanda concession, including:

- two topsoil dumps, located towards the eastern and western extent of the concession respectively;
- a sulphide dump located northeast of the East pit;
- three waste rock dumps ("WRDs") serving the East and Central open pits and one WRD serving the Clinic Quarry Pit;
- the following stockpiles: Low grade stockpiles (West and Central); mixed grade stockpile; New DMS stockpile; High grade Cu stockpile; float stockpile; old DMS stockpile and high iron stockpile.

7.2.6 Additional site infrastructure

Site infrastructure that is ancillary to mining and processing activities includes:

- the following camps: Main camp, single quarters, management residence, Camp Bellevue, visitors camp, old exploration camp and the construction camp;
- the following office complexes: Main offices, main gate security office and weighbridge, the old and new Groupe Bazano offices, mine technical offices and the metallurgy office;
- the mine clubhouse;
- an electrical substation;
- a mine golf course;
- the mine stores, store yard and core shed;
- the Groupe Bazano dispatch area;
- the mine hospital including a morgue, waste incinerator and waste pit;
- an explosives magazine; and
- an industrial waste dump and a domestic waste dump (at which domestic waste is dumped to the pit and burned).

7.3 Information Sources Reviewed

The information sources on which the audit was based included:

- site documentation provided to GAA;
- limited interviews which GAA conducted with site personnel on 9th December 2010; and
- GAA observations during the site visit of 9th December 2010.

These sources are discussed further below.

7.3.1 Site documentation

Site documents which provided background to the Mutanda Mine audit included:

- Interim Feasibility Study Report for Mutanda ya Mukonkota Project PE 662, including:
  - Environmental Impact Study (“EIS”);
  - Environmental Management Plan (“EMP”);
  - Environmental Adjustment Plan (“EAP”);
  - Environmental Opinion No. 403/CPE/2007, issued by the DRC Ministry of Mines: Permanent Evaluation Committee. Letter dated 20th January 2007; and
  - Decision No. 404/CPE of 22/01/2007: Approval of Mutanda Sprls’ EAP for PE662 by the DRC Ministry of Mines: Permanent Evaluation Committee. Letter dated 22nd January 2007.
- EMP compiled by SiVEST as a component (Section 12) of the Mutanda Mining Feasibility Study dated March 2008.
- A social needs assessment for Mutanda Mine, compiled by Paradigm Project Management as a component of the Mutanda Mining Feasibility Study dated March 2008.
- A technical report on the geology and exploration of the Mutanda Property compiled by SRK in March 2008.
- Mutanda Mining SPRL technical drawing: “Mutanda Infrastructure November 2010”, dated 1st November 2010 (Rev. A1).
- Mutanda spreadsheet of accident / incident reports for 2010 (updated 2nd December 2010). No environmental incidents were reported in 2010.

7.3.2 Interviews with site personnel

The following site personnel participated in the audit interviews and site visit:

- Mr. Danny Callow: Mutanda Project Manager;
- Mr. André van der Merwe: Mutanda Mining Manager;
- Mr. Dawid Myburgh: Chief Geologist; and
- Ms. Kasia Murawiecka: Community Development and Liaison.

7.3.3 Site areas visited

A site visit of the Mutanda Mine concession was conducted on 9th December 2010. Emphasis was placed on visiting specific areas and facilities of the concession which were identified in the site documentation and/or site interviews as presenting potentially significant environmental liabilities of concern.

7.4 Limitations of the Audit

This report is based on a high level overview of the Mutanda mine operations by GAA staff. The review involved a one day visit to the mine, with the time divided between travel, the identification and review of available documents, discussion with key personnel and a brief visit to areas of greatest concern on site. The review therefore focuses only on critical environmental and social issues, so as to identify risks that could be major liabilities. Wherever possible, existing documentation has been used as a basis for conclusions drawn.

7.5 Results of the Audit

The results of the environmental audit of Mutanda operations and activities are presented in the subsections that follow.

7.5.1 Authorisations

7.5.1.1 Operating licences

Article 64 of the DRC Mining Code (Law No 007/2002 of 11th July, 2002) requires a mine to hold an operating license or “Certificate d’Exploitation” from the DRC Mining Ministry (“CAMI”) before mining the resource or developing the necessary supporting infrastructure.

Mutanda holds an approved operating licence for concessions PE662 and PE4959. In terms of this licence, Mutanda may mine the ore resources and develop the necessary supporting infrastructure (such as TSFs and WRDs), provided that the method of containment or effluent discharge is referenced in either the Feasibility Study or Environmental Impact Statement (“EIS”) which has been received by the Ministry of Mines.

7.5.1.2 Environmental Impact Study and Environmental Management Plan

In terms of the DRC Mining Code and the DRC Mining Regulations (Decree No 038/2003 of March 2003) the applicant of an exploitation licence is required to submit an EIS and Environmental Management Plan (“EMP”) to the Department for the Protection of the Mining Environment (“DPEM”).

The consulting firm Des Amenageurs de la DRC (“GAC SPRL”) compiled the EIS, EMP and Environmental Adjustment Plan (EAP) components of the Interim Feasibility Study Report for the Mutanda ya Mukonkota Project (PE 662) dated February 2007. Approval was received from the DRC Ministry of Mines: Permanent Evaluation Committee per Approval Decision No. 404/CPE.

The subsequent Feasibility Study Report for the Project, dated March 2008, contained a revised EMP compiled by SiVEST. The management actions listed in the EMP were of a generic nature relevant to the level of project knowledge available in the feasibility phase and may now require revision to account for subsequent changes made during detailed design.

7.5.2 Compliance against Equatorial Principles

Table 17 set out below provides an account of Mutanda’s compliance with Equator Principles and IFC requirements for environmental and social management.

Table 17: Compliance of Mutanda operations with Equator Principles and IFC requirements

Equator Principle	Requirement	Compliance Rating	Reasons for Compliance /Non Compliances
Principle 1: Review and Categorisation	Projects are categorised on the basis of the magnitude of potential impacts and risks	Compliant	At the time of the Feasibility Study and the preparation of the EIS, the project was correctly identified as Category A which is the most stringent of three project categories recognised by the IFC.
Principle 2: Social and Environmental Assessment	Social and Environmental Assessment Process required to address impacts and risks of construction, operation and closure. Mitigation required which is appropriate and implementable	Partial Compliance	Interim Feasibility EIS, EMP and EAP (GAC SPRL, 2007) and Feasibility EMP (Sivest, 2008) were completed. Limitations are as follows: ■ EIS had a number of apparent flaws and inaccuracies identified by SiVEST (2008) during preparation of the EMP. Since 2009, the EIS is updated annually and once approved the EMP is updated ■ Feasibility Phase EMP was based on preliminary information that has changed over time (acknowledged to be likely in the EMP). An updated EMP is budgeted for 2011 to coincide with the hydrometallurgical plants coming on line as part of the ongoing submissions to government by Bureau d'Assistance et d'Expertise Environnementale Minière ("BAEEM"); ■ No formalised EMS in place to structure ongoing environmental management and monitoring, although Mutanda has a full set of environmental policies and procedures in place The following are noted in regard to the assessment, management and mitigation of site environmental impacts and risks: ■ There are no licensed hazardous waste disposal sites in the DRC, however Mutanda may lawfully operate a waste disposal site, provided they are constructed according to industry norms and standards. ■ Water and waste management was taken into account as part of the development of the Mutanda site and the current expansion projects in the form of a water balance incorporating raw water demand, potable and process water demands. ■ The potential for mine geological and waste materials (TSF, WRDs, sulphide and ore stockpiles, deeper sulphide ores which may be mined in future, etc.) to pollute water resources has not been adequately quantified. Testing and monitoring are required to characterise the geochemical behaviour of these materials and particularly to confirm their acid generation potential, though the host rock offers significant neutralisation potential. ■ Currently, DMS Plant effluent is discharged into dedicated tailings facilities. During the

			rainy season (November to April), spillage from the spirals plant discharges overland to a small silt settling facility located on the Mutanda concession. Any overflow of this into a neighbouring concession not owned by Mutanda is cleared up as and when spillage occurs. At present there is no evidence of this effluent (which consists of a fine grained ore and minute traces of Ferro Silicon which is used as a reagent in the separation process) discharging into the Kando River. This arrangement represents a moderate risk to Mutanda. ■ Environmental monitoring data provided to GAA for review was limited at the time of the site visit, though weekly samples at all potable water sources are taken and analysed for bacterial, sulphides, nitrates and heavy metals. Historically the lack of a robust site environmental monitoring programme, and the implementation thereof, represented a significant risk to Mutanda as the DPEM has previously expressed concern at the inadequacy of the environmental monitoring / reporting programme proposed in the EAP (Environmental Opinion No. 403/CPE/2007 of 20th January 2007). Since early-2009 Mutanda has implemented a more systematic approach to environmental monitoring. ■ There appeared to be no formal system of progressive rehabilitation of the TSF. Resultant dust fall impacts represent a risk to Mutanda operations, though it should be pointed out that the tailings dam is in the process of phase 2 construction to extend the west and south walls by an additional 10.6m in vertical height. This should be completed by 2012 and thereafter rehabilitation can begin.
Principle 3: Applicable Social and Environmental Standards	IFC PS 1: Social and Environmental Management System	Compliant	■ A SHEQ department was established in November 2007. The current staff complement for the SHEQ department is 15 people. ■ The SHEQ department is assisted by the Corporate Social Responsibility department which has 4 staff members. ■ While the Mutanda site is being expanded, and additional infrastructure being added to the site, the SHEQ requirements for the construction is managed by the Engineering, Procurement, Construction and Management ("EPCM") contractor on site. On completion and handover of the plants, Mutanda SHEQ department will assume responsibility and therefore will need to be expanded and its personnel capacity increased accordingly. ■ The SHEQ department is responsible for implementing the EMS system. ■ The company's Corporate Social Responsibility programme, albeit relatively newly structured, is in the process if undertaking a number of ambitious projects, related to the Governments key strategic initiatives. Additional CSR work on behalf of Mumi

			employees who donate into a Trust fund is carried out by a motivated single volunteer. ■ No reporting system is in place to systematically document interactions with the community, issues raised, requests and grievances and the company actions taken, however this has always been handled through regular meetings with the local village Chiefs who represent the communities in the area. All correspondence between the Chief and Mutanda (and vice versa) is kept as a record of the interaction.
	IFC PS 2: Labour and worker conditions	Compliant	■ All employee contracts meet all legal requirements, salaries are above the DRC legal minimum and contracts are approved and signed off by the regional Labour Inspector. Likewise all benefits required by DRC law (as well as additional benefits provided by Mutanda) are included as part of the overall employee employment contract. ■ It is noted that the company employed a progressive approach to the management of issues relating to artisanal miners at the start of construction, all of whom were offered jobs and training as an alternative to having to find employment elsewhere. Approximately 200 of these miners are currently employed by the mine in various capacities. Detailed documentation in this regard was not available for review or requested due to time constraints.
	IFC PS3: General requirements	N/A	N/A
	IFC PS 4: Community Health, Safety and Security – Community Health and Safety	Compliant	■ Mutanda has built two community clinics since 2009 and has a weekly mother and baby clinic that have significantly reduced the infant mortality rate in the local area. In addition both clinics are registered with the Department of Health to administer vaccinations for key childhood illnesses. Mutanda has also built a new 200 student primary school in 2009 which provides education to the local village where a large proportion of Mutanda employees come from. ■ Mutanda also provides boreholes for potable water, HIV education, farming skills and has a 10 hectare farming project to teach villagers farming techniques. ■ Mutanda is in the process of constructing a fish farm to feed 3000 villagers and to reduce the reliance upon the river Kando as a sole source of food, therefore allowing the river to replenish its fish population. ■ Health and Safety impacts in communities near the mine are limited by its isolation and the relatively small scale of the operations. Nevertheless, while there are few negative impacts at the mine that will affect neighbouring villages, traffic along the main access road creates the potential for a significant safety hazard, due to the large number of heavy vehicles employed by the mine to transport materials and product. It is understood that while incident reports are prepared, the reporting of this is independent of on-mine incidents. In the event of an accident along the National road,

			Mutanda treats the injured personnel in the Mutanda hospital as a social responsibility. ■ Contracts with hauliers do not enforce particular safety codes and standards in respect of driver competence and performance nor is there any mechanism for monitoring driver behaviour or auditing compliance with performance standards.
	IFC PS 4: Community Health, Safety and Security – Security	Partially Compliant	■ Where staff is screened for criminal records it is virtually impossible from this evidence alone to ascertain whether the individual has been implicated in human rights abuses.
	IFC PS 5: Land Acquisition and Involuntary Resettlement – general requirements	N/A	■ No resettlement has been required by mining activities to date. The mining area is perimeter fenced so that there is no direct interaction between mining activities and the community, except along the main road.
	IFC PS 7: Protection of Indigenous Peoples	N/A	■ Indigenous peoples are not affected by the mining activities.
	IFC PS 8: Cultural Heritage – protection of cultural heritage in project design and execution	N/A	■ Not cultural heritage issues were applicable during the project design or execution of current mining operations.
	IFC PS 8: Cultural Heritage – project's use of cultural heritage	Compliant	■ The mine does not use cultural heritage resources.
Principle 4: Action Plan and Management System	Environmental and Social Action Plan	Compliant	■ EMP provides a basis for more detailed procedures (Action Plans) that are required to manage performance. A revision of the existing (Feasibility Phase) EMP is recommended and has been budgeted in the 2011 financial year to coincide with the start up of the processing plants.
Principle 5: Consultation and Disclosure	Ongoing consultation with affected communities in a structured and appropriate manner	Compliant	■ Systematic minutes of community interactions are not maintained, however monthly meetings with the local Chief occurs on a formal basis. All projects undertaken in local villages are with the consent and approval of the local Chief.
Principle 6: Grievance Mechanism	Formal grievance mechanism required as part of the management system	Compliant	■ A formal community grievance procedure is not in place nor is a register kept that logs grievances or complaints and the actions taken to address them, however these grievances are brought up in the regular meetings with the Chief whereby documented grievances are raised requiring action from Mumi.
Principle 7: Independent Review	Independent social or environmental expert not directly associated with the borrower to review the assessment, consultation process and Equator Principle compliance	N/A	N/A

Principle 8: Covenants	The following covenants to be included in financing documentation: The borrower will: ■ Comply with all host country social and environmental laws, regulations and permits; ■ Comply with the action plan during construction and operation in all material respects; ■ Provide reports (not less than annually) to document compliance with laws, regulations and permits; and ■ Decommission the facilities in accordance with an agreed decommissioning plan	N/A	N/A
Principle 9: Independent Monitoring and Reporting	An independent, experienced external expert to verify monitoring information on a regular basis	Compliant	■ An annual review of the environmental practice by a DRC registered company is in place to ensure that Mutanda meets all DRC legal requirements.

7.5.3 Mutanda key environmental aspects and risks

In regard to current environmental management at Mutanda, the following is noted:

- Environmental issues are currently managed by the Safety, Health, Environment and Quality ("SHEQ") Manager. There is a budgeted full time Environmental Manager position for 2011 to tie in with the hydrometallurgical plants coming into operation. Prior to the recruitment of an Environmental Manager, this represented a risk to Mutanda, particularly as site operations expand.

- The EIS and EMP compiled during the Feasibility Study will require revision to include subsequent changes to the current operations or infrastructure. Submission and approval of these documents by DPEM will assist Mutanda in managing environmental aspects to meet DRC regulatory requirements, Equator Principles and the IFC performance standards. A DRC registered company BAEEM are submitting the revised EIS and annual environmental report as per the requirements.

- The 2011 budget makes appropriate provision to support site implementation of an EMS to drive the EMP.

- There are full environmental monitoring processes in place for hazardous chemicals, waste disposal, water monitoring, however dust and noise emission monitoring is not in place at this stage

- Currently most site environmental impacts appear to be of relatively low risk to Mutanda operations, though this is largely due to the fact that construction and commissioning of processing facilities is still underway.

Current and future site environmental impacts of potentially significant risk include:

- Current discharge of effluent from the DMS plant is into tailings dams fit for purpose. Overflow from the bunded area of the spirals plant is by way of a trench and settling pond system located on the Mutanda concession; the settling ponds are monitored daily and any spillage is cleaned up as and when it occurs.

- The handling and disposal of site hazardous wastes represents a low level environmental and safety risk to Mutanda, however these facilities are operated lawfully and according to industry standards.

- Mine geological and waste materials (including deeper sulphide ores which may be mined in future) should be sampled and tested to confirm their geochemical behaviour and acid drainage potential.

7.5.4 Mutanda key social aspects and risks

With reference to Table 17, it is pertinent to note that the negative social impacts associated with the Mutanda mine appear to be **limited**. Conversely, there have been a number of positive impacts resulting from various company initiatives to fund CSR projects, motivated mainly through the voluntary commitment and initiative of the partner of one of the expatriates working at the mine. The company's relationship with these villages is consequently extremely good.

7.6 Concluding Statement

To reduce the environmental and social risks of operation, and to maintain compliance with statutory requirements and Equator Principles, Mutanda will need to invest resources into site environmental management, and to actively drive and support environmental management programmes. Additional capacity will be required as the construction of the plant is completed and responsibility is handed over to Mutanda. Given the current and projected expansion of site operations it is suggested that these initiatives start as soon as possible to avoid incurring environmental and social liabilities that may affect financial provision for closure.

7.7 References

- DPEM (20 January 2007). Environmental Opinion No. 403/CPE/2007 in regard to the Environmental Adjustment Plan ("EAP") compiled for the Interim Feasibility Study Report for Mutanda ya Mukonkota

Project (PE 662). Letter authored by the DRC Ministry of Mines ("DPEM"): Permanent Evaluation Committee: 20th January 2007.

- DPEM (22 January 2007). Decision No. 404/CPE of 22/01/2007 in regard to approval of Mutanda SPRLs' EAP (PE662). Letter authored by the DRC Ministry of Mines ("DPEM"): Permanent Evaluation Committee: 22 January 2007.
- GAC SPRL (2007). Environmental Impact Study ("EIS"), Environmental Management Plan ("EMP") and Environmental Adjustment Plan ("EAP"). (Compiled for the Interim Feasibility Study Report for Mutanda ya Mukonkota Project PE 662).
- Mutanda Mining SPRL (2010). Technical drawing: "Mutanda Infrastructure November 2010", dated 1st November 2010 (Rev. A1).
- Mutanda Mining SPRL (2010). Spreadsheet of accident / incident reports for 2010 (updated 2nd December 2010).
- Paradigm Project Management (2008). Social needs assessment for Mutanda Mine. (Compiled as a component of the Mutanda Mining Feasibility Study dated March 2008).
- SiVEST (2008). Mutanda Mining Project environmental management plan (EMP). (Section 12 of the Project Feasibility Study Report dated March 2008).
- SRK (2008). Geology and exploration of the Mutanda Property.

8.0 MARKET

8.1 Copper

Copper is a major industrial metal (ranking third after iron and aluminium by consumption) because it is highly conductive (electrically and thermally), highly ductile and malleable, and resistant to corrosion. Electrical applications of copper include power transmission and generation; building wiring; motors; transformers; telecommunications; electronics and electronic products; and renewable energy production systems. Copper and brass (an alloy of copper) are the primary metal used in plumbing pipes, taps, valves and fittings. Further applications of copper include decorative features; roofing; marine applications; heat exchangers; and in alloys used for gears, bearings and turbine blades.

Global copper mine production was 15.7Mt in 2009, with 5.4Mt (or 35%) produced in Chile, by far the largest producer. Zambia and the DRC produced 0.6Mt (3.8%) and 0.3Mt (1.9%) respectively. Global refinery production in 2009 was 18.4Mt, including 2.9Mt of secondary refined production. Global consumption was slightly lower at 18.2 Mt. The International Copper Study Group (1 October 2010) estimates global mine production for 2011 at 17Mt, with global consumption at 19.7Mt. Table 18 shows the historical and 2011 forecast global refined copper market balance.

Table 18: Global refined copper market balance (Source: USGS)

Thousand metric tonnes	2006	2007	2008	2009	*2010 Jan-Sept*	2010 forecast	2011 forecast
Global Mine Production	14 991	15 474	15 528	15 754	*11 853*	16 235	17 076
Primary Refined Production	14 678	15 191	15 399	15 466	*11 729*		
Secondary Refined Production	2 613	2 743	2 823	2 911	*2 513*		
Total World Refined Production	17 291	17 934	18 222	18 377	*14 242*	19 278	20 498
Consumption	17 058	18 239	18 056	18 198	*14 678*	18 882	19 729
LME Copper Price (USD/t avg)	6 727	7 126	6 952	5 164	*7 175*	7 543	

The copper price has demonstrated significant volatility in the last 5 years, as shown in Figure 70. The price was USD4 585/tonne on 1 January 2006, at that point a near-record high. The price rapidly increased, reaching a high of USD8 800 /tonne in May 2006. By February 2007 it had declined to USD5 302 /tonne. In the immediate wake of the collapse in the housing bubble that precipitated the global financial crisis, the price of copper increased, reaching a new high of USD8 900 /tonne by July 2008. Thereafter, as the financial crisis took effect on the global economy, the price declined to USD2 810 /tonne in December 2008, the lowest level in almost 5 years. Since then, the price has generally trended upward, reaching a new record high of USD9 695 /tonne on 12 January 2011.

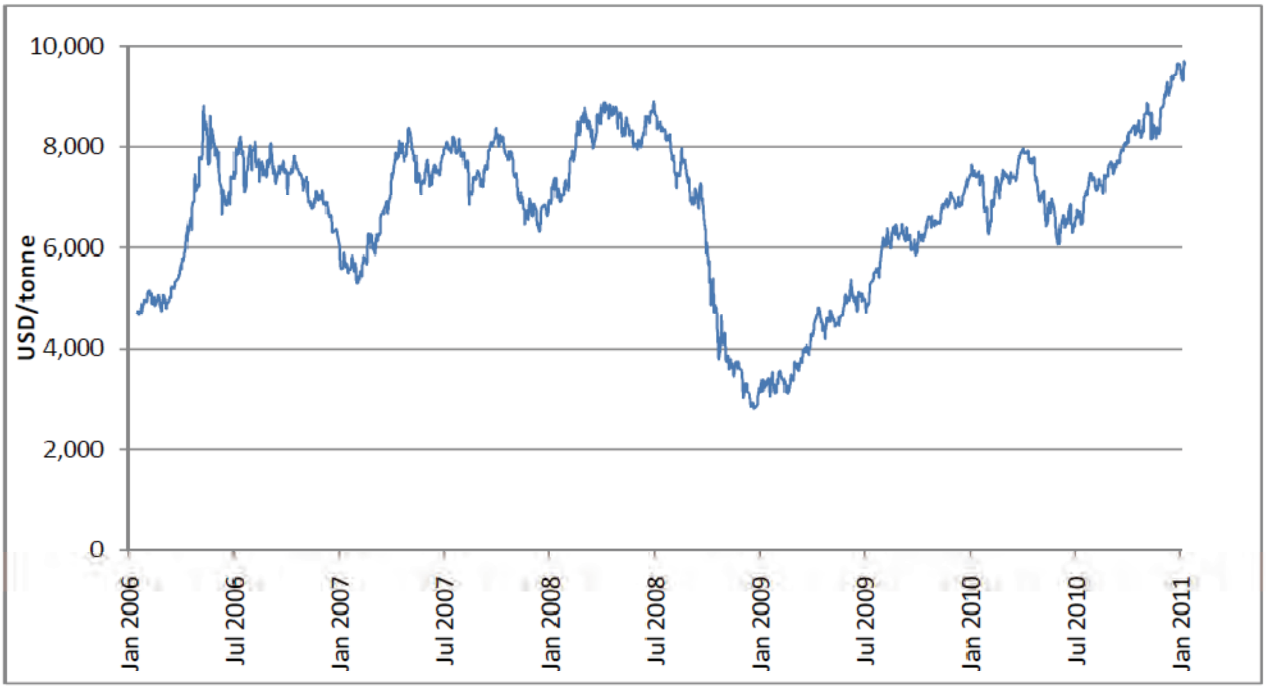

Figure 70: The London Metal Exchange copper price from January 2006 to date (Source: LME)

The copper price forecast used in the economic evaluation of the project is shown in Table 19. The forecast is based on published London Metal Exchange ("LME") monthly futures prices, using the June contracts as the basis for each respective year through to 2019. These publically available prices are quoted in nominal terms. The financial model used for the economic evaluation is in real terms (2011 USD), and the real copper price forecast is derived from the nominal prices using the US CPI estimates in Table 19. The forecast nominal average price for 2011 is USD9 600 /tonne, declining to USD6 800 /tonne in 2019.

Table 19: Copper price forecast

Copper Price (USD/tonne)	2011	2012	2013	2014	2015	2016	2017	2018	2019	Long Term
Nominal	9 600	9 300	9 000	8 600	8 200	7 800	7 500	7 100	6 800	6 861
Real	9 600	9 208	8 822	8 347	7 880	7 240	6 859	6 397	6 036	6 000
US Inflation Rate	1.0%	1.0%	1.0%	1.0%	1.0%	1.5%	1.5%	1.5%	1.5%	

8.2 Cobalt

Cobalt has many commercial, industrial and military applications. The leading use of cobalt is in rechargeable battery electrodes. The temperature stability and heat- and corrosion-resistance of cobalt-based superalloys makes them suitable for use in turbine blades for jet turbines and gas turbine engines. Other uses of cobalt include vehicle airbags; catalysts for the petroleum and chemical industries; cemented carbides and diamond cutting and abrasion tools; drying agents for paints, varnishes, and inks; dyes and pigments; ground coats for porcelain enamels; high-speed steels; magnetic recording media; magnets; and steel-belted radial tyres.

Far less cobalt is produced than copper: global mine production of cobalt was 62 000 tonnes in 2009, with 25 000 tonnes (or 40%) produced in the DRC, the largest producer. Australia, China and Russia each produced about 6 200 tonnes (10%). Global refinery production in 2008 was 57 600 tonnes, with global consumption slightly higher at 60 654 tonnes. Table 20 shows the historical global refined cobalt market balance. Roskill Information Services, a mineral industry information research group, has forecast cobalt demand of 72 500 tonnes in 2011 (October 2010).

Table 20: Global refined cobalt market balance

Metric tonnes	2004	2005	2006	2007	2008	2009
Global Mine Production	60 300	66 200	69 800	72 600	75 900	62 000
Total World Refined Production	48 500	54 100	53 800	53 300	57 600	No publicly available data
Consumption	51 400	54 685	54 685	56 250	60 654	59 000
Cobalt Price (USD/t avg)	22.77	14.56	15.35	28.31	36.16	15.89

Source Cobalt News (Oct 2005 – Jan 2011) Published by the Cobalt Development Institute

The cobalt price reached a record of USD48.63 /pound in March 2008, falling in line with other commodities to a 5-year low of USD11 /pound in December 2008. The price has recovered, and since cobalt started trading on the LME in May 2010, the price has averaged USD17.55 /pound, with a maximum of USD19.64 /pound and a minimum of USD15.94 /pound.

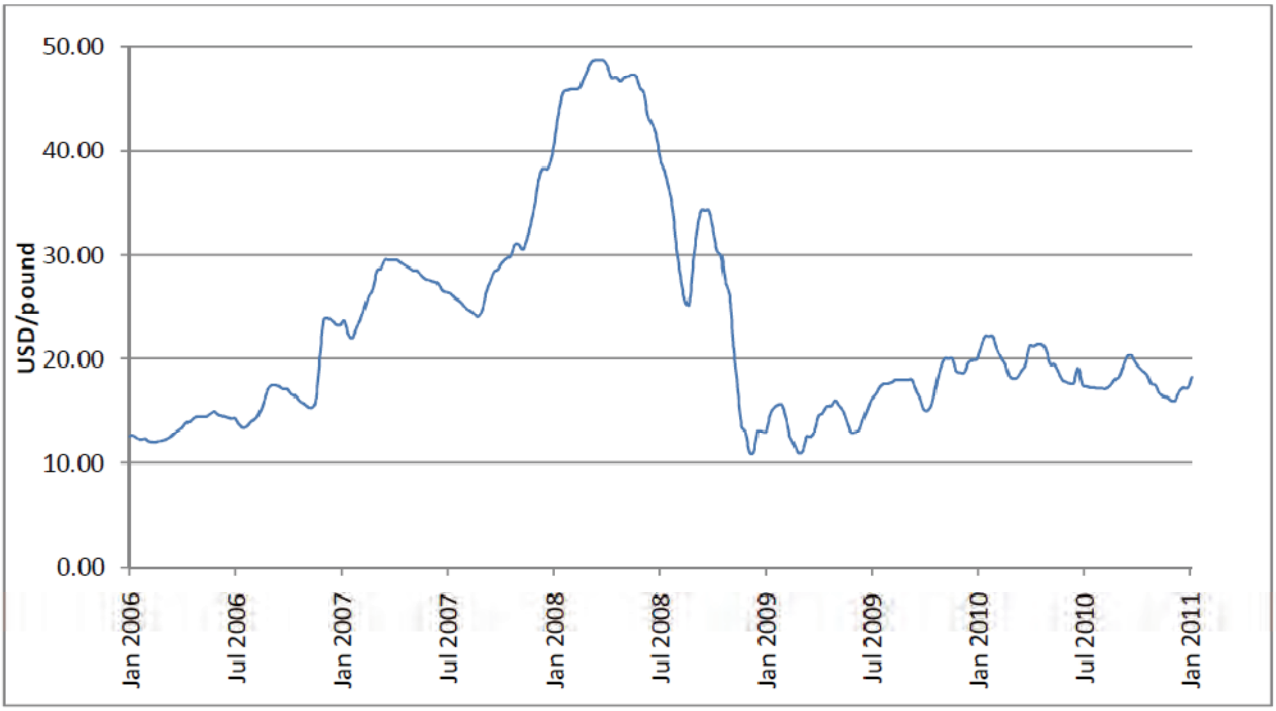

Figure 71: The cobalt price from January 2006 to date (Source: Inet Bridge)

The cobalt price forecast used in the economic evaluation of the project is shown in Table 21. The forecast is based on the Metal Bulletin 99.8%Co USD/pound price (in nominal terms) available for the next spot delivery. The forward curve is assumed to gradually decline for the next three years, before falling to its long term value. The financial model used for the economic evaluation is in real terms (2011 USD), and the real cobalt price forecast is derived from the nominal prices using the US CPI estimates in Table 21. The forecast average price for 2011 is USD17.24 /pound, declining to USD13.00 /pound in 2019.

Table 21: Cobalt price forecast

Cobalt Price (USD/pound)	2011	2012	2013	2014	2015	2016	2017	2018	2019	Long Term
Nominal	17.24	16.78	16.00	15.00	15.00	15.00	13.00	13.00	13.00	13.00
Real	17.24	16.62	15.68	14.56	14.41	13.92	11.89	11.71	11.54	11.00
US Inflation	1.0%	1.0%	1.0%	1.0%	1.0%	1.5%	1.5%	1.5%	1.5%	

9.0 TECHNICAL AND ECONOMIC ASSUMPTIONS

9.1 Revenue assumptions

Glencore has the life of mine offtake for 100% of all Mutanda Cu and Co production pursuant to which Glencore will purchase 100% of the quantities of Cu and Co produced by Mutanda.

9.2 Capital Cost Estimate

A summary of the capital cost estimate by major cost items is presented in Table 22 below. The capital expenditure items are as follows:

- **Phase 1 Plant:** Remaining capital expenditure for the completion of cobalt circuit on the 20ktpa plant;
- **Phase 2 Plant:** Capital expenditure for the completion of the 40ktpa plant;
- **Phase 3 Plant:** Capital expenditure to expand the combined phase 1 and phase 2 Plants to produce 110ktpa. Additional investment in 2015 on the plant will be spent to compensate for the drop in copper feed grade in 2016;
- **Acid Plant:** This capital expenditure relates to the construction of the 390 tpd sulphuric acid plant and 73 tpd liquid SO2 plant;
- **General Power Plant:** Capital expenditure for the development and refurbishment of power supply infrastructure as described in Section 9.2;
- **Operational:** Capital expenditure is for unallocated infrastructure of a general nature required to sustain the operations of Mutanda.

Table 22: Capital Expenditure

USD Thousands	2011	2012	2013	2014	2015	2016 - 2030	Total
Processing							
Phase 1	16,425	-	-	-	-	-	**16,425**
Phase 2	174,532	-	-	-	-	-	**174,532**
Phase 3	103,763	-	-	-	50,000	-	**153,763**
Acid Plant	31,293	-	-	-	-	-	**31,293**
Electricity Plant	26,000	26,000	24,000	8,000	-	-	**84,000**
Processing subtotal	**352,018**	**26,000**	**24,000**	**8,000**	**50,000**	**-**	**460,018**
Other Cost Centres							
Operational	30,578	25,000	35,000	35,000	35,000	492,000	**652,578**
Other subtotal	**30,578**	**25,000**	**35,000**	**35,000**	**35,000**	**492,000**	**652,578**
Total capital expenditure	**382,596**	**51,000**	**59,000**	**43,000**	**85,000**	**492,000**	**1,112,596**

9.3 Operating Cost Estimate

The major operating costs are as follows:

- **Mining:** costs are based on contractual mining contractor rates charged by Groupe Bazano, a mining contractor, and includes USD 8.5/bcm for mining which includes mining and haulage.;
- **Phase 1 Plant:** the LOM weighted average cost per pound of finished Cu is $1.29. The average LOM cost directly attributable to Co production is $2.93 per pound of finished cobalt. This includes plant costs for reagents, consumables and electricity;
- **Phase 2 and Phase 3 Plant:** LOM weighted average cost per pound of finished Cu is $1.06. The average LOM cost directly attributable to Co production is $1.17 per pound of finished cobalt. Reduced cobalt production costs in phase 2 and 3 are attributable to use of Sulphur dioxide ("SO2") as the leaching agent of cobalt as opposed to Sodium Metabisulphite in phase 1. The SO2 is a product of Mutanda's Acid Plant. These costs includes plant costs for reagents, consumables and electricity;
- **Heap Leach Plant:** the LOM weighted average cost per pound of finished Cu is USD1.67. This includes plant costs for reagents, consumables and electricity; and
- **Other:** includes costs associated with transport, clearance costs, sampling and assaying, and export tax.

The major operating items are detailed on an annual basis in Table 23 below.

Table 23: Major Operational Expenditure

USD Thousands	2011	2012	2013	2014	2015	2016-2030
Operating Costs						
Mining	36,788	67,005	84,204	84,110	84,105	820,047
Phase 1 Plant	92,106	89,996	86,577	89,114	89,394	1,320,376
Phase 2 and Phase 3 Plant	33,132	183,834	201,655	210,701	211,137	3,235,460
Heap Leach	594	4,951	13,516	11,852	13,117	261,223
Other	44,102	102,190	115,001	114,818	114,970	1,528,731
Total Operating Costs	206,721	447,976	500,953	510,595	512,723	7,165,837

9.4 Taxation, Royalties and Other Business Parameters

The major parameters which govern royalties, tax capital allowances and import duties applicable to the project are shown in Table 24.

Table 24: Royalty, tax and import duty assumptions

Description	Application	Rate
DRC Royalty	% of revenue less selling expenses	2.0%
Rowny Royalty	% of revenue	2.5%
DRC Corporate Tax		30%
DRC Capital Allowance:		
Year 1		60%
Years 2 - 10	Reducing balance	12% to 1%
Import Duty	Charged on certain imported items	3% to 5%

According to DRC legislation, taxation can be offset against capital and deferred. All capital expenditure is subject to a DRC Capital Allowance of 60% in the first year and is depreciated on a reducing balance each year thereafter.

10.0 ECONOMIC ANALYSIS

This section presents a valuation of Glencore's interest in Mutanda. Glencore owns 40% of Mutanda via various joint venture agreements. It is understood that Rowny Assets Limited (as a successor to Gecamines) is entitled to receive royalty, dividend and Pas de Porte payments from Mutanda over the life of the mining project. The valuation presented is of the value of Mutanda attributable to Glencore, comprising the 40% shareholding and shareholder's loans.

10.1 Valuation Methodology

Mutanda is an operational mining company. Its resources and reserves are well-defined, and a comprehensive body of technical information on its current and planned operations is available. This information allows the future cash flows of Mutanda throughout the life of the mine to be projected. This is compatible with the discounted cash flow ("DCF") methodology, which determines the value of an asset by calculating the net present value of the future cash flows over the useful life of that asset.

The DCF valuation approach provides a "going concern" value, which is the value indicated by a company's future economic capabilities. Using this technique, value is calculated by the summation of the present value of projected cash flows, both income and expenditure, for a determined period, plus the present value of the residual or terminal value at the end of the projection period. When using the DCF technique, the following four key areas must be assessed for accuracy and appropriateness:

- the assumptions underlying the projection of cash flow;
- the length of the projection period, in this case the life of mine; and
- the discount rate, which is usually the risk adjusted weighted average cost of capital ("WACC") of the project.

The valuation was based a financial model provided by Glencore. GAA verified the integrity and structure of the model to ensure that calculations are performed correctly and that the model is comprehensive and fully accounts for all cash flows of the project. The input assumptions of the model were checked against contracts and the results of the studies by the Competent Persons who produced this report to ensure that the assumptions are reasonable. Historical results are available but were not relied on in the valuation due to the change in operational scope that results in historical and forecast amounts not being comparable..

Additional analysis was added to the model to produce some of the results, graphs and tables presented in this report.

10.2 Valuation Assumptions

The following assumptions were used in the valuation model:

- the valuation date is 1 January 2011;
- the discount rate is set at 10% in real terms, which is the discount rate used by Glencore across its portfolio. The valuation model was prepared on a quarterly basis.
- mining and processing production rates, head grades and recoveries are as described in Sections 3.0 and 4.0:
- commodity prices are as described in Section 8.0;
- capital expenditure is as described in Section 9.2;
- operating expenditure is as described in Section 9.3;
- royalties, tax, capital allowances and exchange rates are as described in Section 9.4;
- Glencore's equity share in Mutanda is 40%; and
- Glencore's attributable economic interest in Mutanda is derived after taking into account the repayment of loans from Mutanda's free cash flow and Glencore's attributable portion of Mutanda's free cash flow.

10.3 The Valuation of Glencore's Interest in Mutanda

The results of the DCF model are shown in

Table 25, presenting the free cash flow attributable to Mutanda. The cash flow projections are based on expected future mining, production, metal sales, capital expenditure, operating costs and other expenses over the life of the project.

10.4 Mutanda MER Extraction Table

* Capacities refer to annualized capacity at year end - 31 December

		2011E	2012E	2013E	2014E	2015E
Finished metal production capacity	**Units**					
Copper	t	60,000	110,000	110,000	110,000	110,000
Cobalt	t	23,000	23,000	23,000	23,000	23,000
Actual / forecast production						
Copper Conc.	t	17,133				
Copper Cathode	t	24,068	81,251	103,531	103,214	103,477
Cobalt	t	12,548	23,000	23,000	23,000	23,000
Cash cost (excl. royalties, realisation charges, before by-product revenues)	US$m	163	346	386	396	398
By-products revenues	US$m	384	590	557	517	511
Royalties (as a % of net revenue)	%	4.50	4.50	4.50	4.50	4.50
Depreciation & amortisation	US$m	284	117	63	53	47
Statutory Tax rate	%	30%	30%	30%	30%	30%
Capex						
Sustaining	US$m	31	25	35	35	35
Expansionary	US$m	352	26	24	8	50

Table 25: Project cash flows over the LOM

Cash Flow Analysis	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Revenue	**KUSD**	**616,501**	**1,341,922**	**1,473,677**	**1,383,329**	**1,330,029**	**1,258,362**	**1,148,554**	**956,103**	**900,157**	**954,958**
Freight, insurance and Sales Costs	KUSD	(44,102)	(102,190)	(115,001)	(114,818)	(114,970)	(115,910)	(116,046)	(98,430)	(95,970)	(105,769)
Royalties	KUSD	(26,860)	(58,343)	(64,015)	(59,953)	(57,552)	(54,308)	(49,364)	(41,056)	(38,588)	(40,858)
Net Revenue	**KUSD**	**545,539**	**1,181,389**	**1,294,661**	**1,208,558**	**1,157,507**	**1,088,144**	**983,144**	**816,617**	**765,599**	**808,331**
Operating Costs	KUSD	(162,619)	(345,786)	(385,952)	(395,777)	(397,753)	(418,761)	(418,330)	(421,073)	(412,768)	(428,767)
Change in Working Capital	KUSD	51,059	(45,792)	(10,042)	(2,456)	(494)	(5,252)	108	(686)	2,076	(4,000)
Total Expenses	**KUSD**	**(111,560)**	**(391,578)**	**(395,994)**	**(398,233)**	**(398,247)**	**(424,013)**	**(418,222)**	**(421,759)**	**(410,692)**	**(432,767)**
Taxation	KUSD	0	(15,253)	(187,902)	(243,250)	(227,161)	(213,586)	(185,416)	(155,985)	(105,266)	(93,550)
Capital Expenditure	KUSD	(382,596)	(51,000)	(59,000)	(43,000)	(85,000)	(35,000)	(35,000)	(35,000)	(35,000)	(35,000)
Net Free Cash	**KUSD**	**51,382**	**723,558**	**651,765**	**524,074**	**447,099**	**415,546**	**344,505**	**203,873**	**214,642**	**247,014**
Cash Flow Analysis	**Unit**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Revenue	**KUSD**	**1,034,384**	**1,037,847**	**973,019**	**861,164**	**819,056**	**1,048,104**	**1,051,448**	**980,089**	**1,009,802**	**102,162**
Freight, insurance and Sales Costs	KUSD	(116,808)	(117,138)	(109,099)	(93,200)	(87,074)	(118,115)	(118,434)	(110,151)	(114,467)	(12,120)
Royalties	KUSD	(44,211)	(44,360)	(41,604)	(36,888)	(35,116)	(44,8020	(44,946)	(41,901)	(43,1520	(4,355)
Net Revenue	**KUSD**	**873,365**	**876,349**	**822,316**	**731,075**	**696,866**	**885,187**	**888,068**	**828,037**	**852,183**	**85,687**
Operating Costs	KUSD	(443,941)	(438,950)	(372,904)	(352,176)	(375,209)	(416,598)	(407,018)	(336,790)	(356,800)	(45,123)
Change in Working Capital	KUSD	(3,793)	1,248	16,512	5,182	(5,758)	(10,347)	2,395	17,557	(5,003)	79,945
Total Expenses	**KUSD**	**(447,734)**	**(437,702)**	**(356,392)**	**(346,994)**	**(380,967)**	**(426,945)**	**(404,622)**	**(319,233)**	**(361,803)**	**34,822**
Taxation	KUSD	(99,989)	(115,227)	(119,328)	(127,688)	(103,294)	(82,982)	(125,814)	(133,491)	(276,972)	(27,323)
Capital Expenditure	KUSD	(35,000)	(35,000)	(35,0000	(35,000)	(35,000)	(35,000)	(35,000)	(35,000)	(35,000)	(2,000)
Net Free Cash	**KUSD**	**290,642**	**288,419**	**311,596**	**221,393**	**177,605**	**340,259**	**322,631**	**340,314**	**178,409**	**91,185**

The base case DCF model uses the values of the input parameters as described in Section 3.0. The valuation of Mutanda as a whole is USD 3,089. The base case valuation of Glencore's interest in Mutanda is USD 1,318 million, with an upper limit of USD 1,483 million (discount rate of 8%, reflecting a high outlook) and a lower limit of USD 1,067 million (discount rate of 14%, reflecting a low outlook).

Table 26 to Table 28 present the sensitivity of the NPV to changes in the discount rate applied and revenue, capital expenditure and operating costs respectively.

Table 26: Sensitivity of NPV to discount rate and changes in metal prices

NPV (USD million)		*Change in metal prices*				
		-20%	**-10%**	**0%**	**10%**	**20%**
Discount Rate	8.0%	929	1,197	1,483	1,771	2,059
	10.0%	829	1,064	1,318	1,572	1,826
	12.0%	746	954	1,181	1,408	1,635
	14.0%	676	862	1,067	1,272	1,476

Table 27: Sensitivity of NPV to discount rate and changes in operating costs

NPV (USD million)		*Change in operating costs*				
		-20%	**-10%**	**0%**	**10%**	**20%**
Discount Rate	8.0%	1,691	1,587	1,483	1,380	1,276
	10.0%	1,499	1,408	1,318	1,227	1,137
	12.0%	1,341	1,261	1,181	1,101	1,021
	14.0%	1,209	1,138	1,067	996	925

Table 28: Sensitivity of NPV to discount rate and changes in capital expenditure

NPV (USD million)		*Change in capital expenditure*				
		-20%	**-10%**	**0%**	**10%**	**20%**
Discount Rate	8.0%	1,541	1,512	1,483	1,454	1,434
	10.0%	1,372	1,345	1,318	1,290	1,272
	12.0%	1,233	1,207	1,181	1,155	1,139
	14.0%	1,116	1,091	1,067	1,042	1,027

The sensitivity of the base case valuation to all three factors is shown graphically in Figure 72.

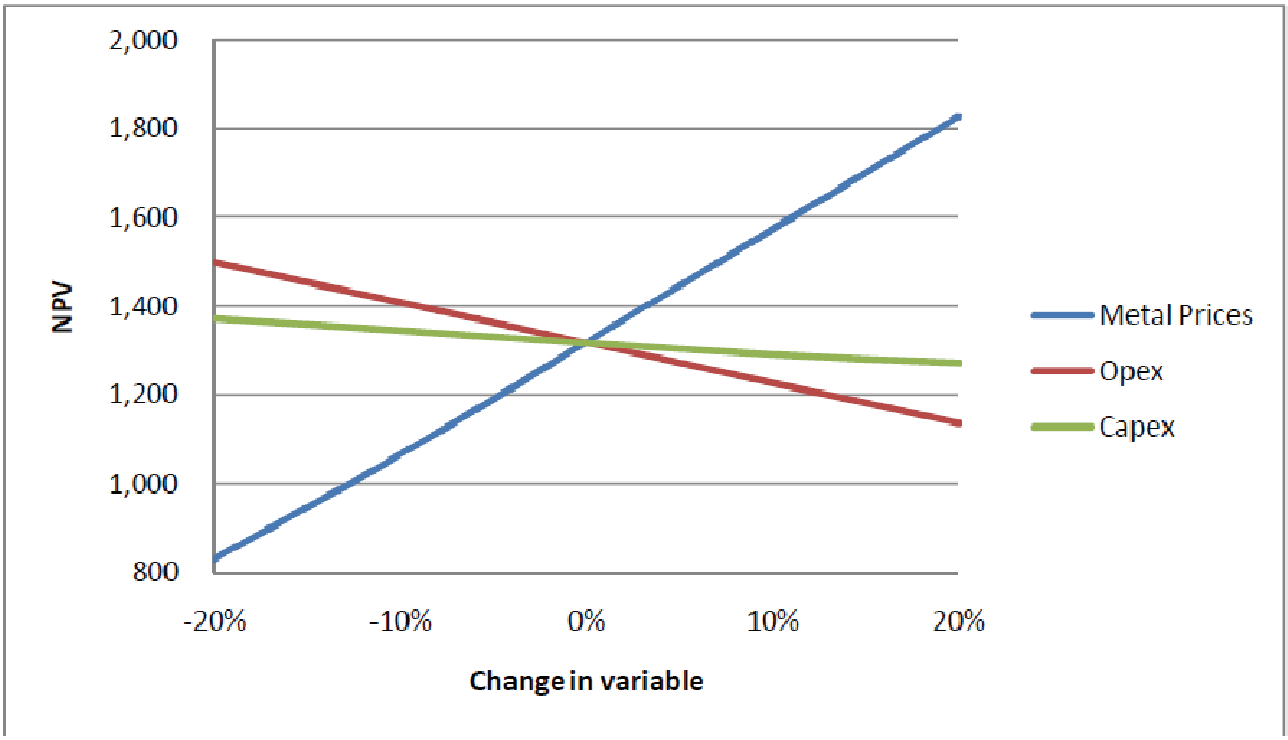

Figure 72: The sensitivity of Base Case NPV to changes in metal price, opex and capex

The project is most sensitive to metal prices – a 1% increase/decrease in metal prices causes a USD 25 million increase/decrease in NPV. A 1% increase/decrease in operating costs causes a USD 9 million decrease/ increase in NPV. The project is least sensitive to changes in capital expenditure – a 1% increase/decrease causes a USD 3 million decrease/ increase in NPV.

11.0 RISK ANALYSIS

The Competent Persons involved in the technical analysis of the project were briefed to identify and document project risks during the course of their work.

11.1 Mining risks

The major risks that could have a negative impact on the planned production profile are:

- access and slope failures,
- available pit space,
- available waste dumping space, and
- grade control considered low risk as all mining areas (except soft waste) is drilled and reconciled to resource model monthly.

11.2 Processing risks

Unavailability and Quality of Key Reagents for Metallurgical Processing:

There is a risk that critical process reagents (such as lime) may not be available in the required quantities or quality, leading to reduced production of copper and cobalt. This risk has a high rating, but can be managed with a detailed supply management plan

Power Availability and Supply Fluctuations:

Power requirements to operate at the scheduled production profile are approximately 80-100MW and there are risks that this power may not be available through the national grid and may lead to power disruptions or supply fluctuation. Mutanda has entered into an agreement with the state utility, Société Nationale d'Electricité ("SNEL"), to refurbish the DC link between Kinshasa and Kolwezi SCK / RO stations to increase power availability to Mutanda to a minimum 60MW in 2011. Mutanda is also in advanced negotiation with SNEL to provide capital to refurbish additional power infrastructure within the DRC to increase to availability of power supply from the Inga hydroelectricity facility to 450MW to the Katanga Province by 2015.

11.3 Capital risks

Escalation of Costs:

Projects in the mining industry world-wide have recently experienced unpredictable capital cost overruns due to various macroeconomic and microeconomic factors that cannot be predicted with any reliable degree of certainty. Capital cost overruns require more funding and reduce project returns. This risk is rated as high but is being mitigated by management through regular reviews of capital cost estimates by the Mutanda project team and their appointed independent engineers who provide certified project control software and an extensive an up-to-date database of capital costs for many aspects of the development.

11.4 Operating risks

Poor Condition of Railway Line:

The poor condition of the railway line may impede production by not allowing the efficient, on-time delivery of finished products or the supply of key input materials on time, leading to reduced production of copper and cobalt and higher logistics costs. This risk is rated very high. Possible mitigation measures include:

- rescheduling production plans to match rail capacity;
- engaging with governments and railway operators;
- engaging with other potential rail users; and.
- resorting to road transportation (at a higher cost) for logistics, although road costs have been factored into the financial model.

Availability of Rolling Stock:

Locomotives and wagons may not be available on time to transport the planned increases in finished products and key input materials, also leading to reduced production of copper and cobalt and higher logistics costs. This risk is rated very high. This risk may be mitigated by establishing required capacity and negotiating with SNCC (the rail operator) and other railway groups to ensure sufficient capacity.

Logistics to and from site present an issue which needs to be carefully planned around and will result in Mutanda holding a larger than normal critical spares holding, however this has also been factored into the financial model.

It should be noted that no rail transport was planned for inbound logistics for any of the projects, with minimal export of cobalt and copper concentrate by rail planned. Any improvement in the rail network and rolling stock will lower costs of inbound and outbound logistics significantly.

Underdeveloped in-country institutional infrastructure and capacity:

The DRC's national and local governments and their agencies may not have the ability to deliver on the infrastructure requirements of the Project, reducing the project feasibility or causing delays. This risk is rated high, and may be mitigated by developing relationships with other stakeholders, governments and agencies; and supporting capacity development initiatives.

Senior Management and Technical Expertise:

Recruiting and retaining senior management and operation-critical technical expertise to manage and operate the mines and processing plants is an issue, rated as a high risk. It potentially affects the ability of the project to run optimally and comply with legislation. Mitigation measures include reviewing the company's employment strategy, recruitment and retention plan; and facilitating the provision of contractor's services with Government and other service providers. Glencore has appointed a significant proportion of expatriate employees amongst its management level.

Artisanal Miners:

There are a large number of artisanal miners working within a 10km radius of Mutanda, though none in the immediate vicinity adjacent to Mutanda. There is a chance of injury or loss of life to artisanal miners as a result of Mutanda (or contractor) vehicles travelling in the vicinity of these artisanal mining communities.

11.5 Sovereign risk

The DRC has in the past been subject to political and civil unrest. Although such unrest has historically taken place in parts of the country away from Mutanda's operations which are located in the Kolwezi District of the Katanga Province in the DRC, the DRC (as a whole) continues to be at risk of being affected by varying degrees of political and economic instability in the future which is outside of Mutanda's control and which may adversely affect Mutanda's operations in this region. Furthermore, the developing legal system in the DRC may expose Mutanda's operations in this region to changing new laws and regulations, which may lead to increased operational risks and/or compliance costs.

11.6 Economic and Market risk

Commodity prices:

Copper and cobalt market prices are significant drivers of the profitability for Mutanda and the value of Glencore’s interest in Mutanda. These prices are subject to wide fluctuations beyond the control of the company due to factors such as demand for the commodities caused by global economic conditions and prospects, supply from various sources, currency and interest rate changes, and speculative activities. Sustained commodity prices below the costs of production may cause the curtailment or suspension of operations. There is some scope to manage market risk through hedging, but this may lead to loss of upside during periods of high commodity prices.

Operating costs:

Project operating costs also affect the profitability of Glencore and the value of the Mutanda project. These are subject to a wide range of pressures such as energy prices, oil prices, chemical prices, labour costs and inflation.

Currency risk:

Project revenues are in USD, but input costs may be in other currencies, specifically South African Rand. Variations in currency exchange rates can affect production costs and affect project profitability.

11.7 Environmental and Social risks

These risks were identified during an environmental and social audit conducted by GAA at Mutanda on 8th December 2010 and are covered in Section 7.0.

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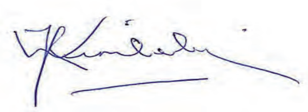

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APPENDIX A

List of Abbreviations and Glossary of Technical Terms

LIST OF ABBREVIATIONS

Abbreviations

3D	Three dimensional
AAS	Atomic Absorption Spectroscopy
ASCu	Acid Soluble Copper
BAEEM	Bureau d'Assistance et d'Expertise Environnementale Minière
CAMI	DRC Ministry of Mines
CCD	Counter Current Decantation
CNW	Central North West
CSR	Corporate Social Responsibility
CV	Coefficient of variation
DCF	Discounted Cash Flow
DD	Diamond Drilling
DDMET	Diamond Drilling Metallurgical Hole
DMS	Dense Media Separation
DPEM	Department for the Protection of the Mining Environment
DRC	Democratic Republic of Congo
DTM	Digital Elevation Model
EAP	Enviromental Assessment Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPCM	Engineering Procurment Consturction and Management
ESIA	Environmental and Social Impact Assessment
GAA	Golder Associates Africa (Pty) Ltd
HARD	Half Absolute Relative Difference
HDPE	High Density Polyethylene
HG	High Grade
IFC	International Finance Corporation
IP	Induced Polarisation
JORC	Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, 2004 Edition
JVA	Joint Venture Agreement
LG	Low Grade
LOM	Life Of Mine
MC	Modelled Central
ME	Modelled East
MER	Mineral Experts Report
MW	Megawatt
NPV	Net Present Value
P&Gs	Preliminaries and General
PE	permis d'exploitation
PLS	Pregnant Liquor Solution

PPM	Paradigm Project Management
QA/QC	Quality Assurance and Quality Control
QC	Quality control
R 1	RAT Lilas
R 2	RAT Grises
R 3	Greyish to dark red or brown stratified shales and micaceous schist
R 4	Altered stratified greyish siliceous dolomitic rock with oolitic horizons and a few bands of light-yellow, talcose schist. Nodules of hematite often occur.
RC	Reverse Circulation
RHC	Riaan Herman Consulting
ROM	Run of Mine
RWP	Return Water Pond
SG	specific gravity
SHEQ	Safety, Health Environment and Quality
SI	International System of Units
SRK	SRK Consulting (South Africa) (Proprietary) Limited
SX-EW	Solvent Extraction - Electrowinning
TSF	Tailing Storage Facility
WACC	Weighted Average Cost of Capital
WRD	Waste Rock Dumps

Units

%	percentage
%ASCu	percentage Acid Soluble copper
%CaO	percentage calcium oxide
%Cu	percentage copper
%CuO	percentage copper as oxide
%TCo	percentage total cobalt
%TCu	percentage total copper
±	plus or minus
°	Degrees
ha	hectare
ha/yr	hectare per year
kg	Kilogram
kg/t	kilogram per tonne
km	kilometre
km/h	kilometres per hour
km2	square kilometres
kt	kilo tonne
m	metre
m3	cubic metres

Ma	Million years before present
mg/l	milligram per litre
mm	millimetre
Mm3	Million cubic metres
Mt	Million tonnes
Mt	Million tonnes
Mtpa	Million tonnes per annum
sec	second
sq. km	square kilometres
T	tonne (1000 kg)
t/m3	tonnes per cubic metre
tpa	tonnes per annum
tph	tonnes per hour
USD	United States Dollars

Chemical Elements

$(Co,Cu)_2S_4$	Chemical composition of carrolite
(Co,Cu,Mn,Fe)O(OH)	Chemical composition of heterogenite
$(Cu,Co)_2(CO_3)(OH)_2$	Chemical composition of kolwezite
(Fe,Co)O(OH)	Chemical composition of goethite
$(Mg,Fe)_5Al(Si_3Al)O_{10}(OH)_8$	Chemical composition of chlorite
As	Chemical composition of arsenic
$Ca,Mg(CO_3)_2$	Chemical composition of dolomite
$CaCO_3$	Chemical composition of limestone
CuO	Chemical composition of copper oxide
CaO	Chemical composition of lime
Co	Chemical composition of cobalt
$Co(OH)_2$	Chemical composition of cobalt hydroxide
Cr	Chemical composition of chrome
Cu	Chemical composition of copper
$Cu_2(OH)PO_4$	Chemical composition of liberthenite
$Cu_2CO_3(OH)_2$	Chemical composition of malachite
Cu_2O	Chemical composition of cuprite
Cu_2S	Chemical composition of chalcocite
$Cu_3(PO_4)(OH)_3$	Chemical composition of cornetite
$Cu_5(PO_4)_2(OH)_4.H_2O$	Chemical composition of pseudomalachite
Cu_5FeS_4	Chemical composition of bornite
CuS	Chemical composition of covellite
Fe	Chemical composition of iron
Fe_2O_3	Chemical composition of hematite
H_2S	Chemical composition of hydrogen sulphide
H_2SO_4	Chemical composition of sulphuric acid
K-Al-Mg-Fe silicate hydroxides	Chemical composition of clay

$KMg_3Si_3AlO_{10}(F,OH)_2$	Chemical composition of mica
MgO	Chemical composition of magnesium oxide
Mn	Chemical composition of manganese
NaHS	Chemical composition of sodium hydrogen sulphide
Ni	Chemical composition of nickel
NO_2	Chemical composition of nitrogen dioxide
Pb	Chemical composition of lead
Se	Chemical composition of selenium
SiO_2	Chemical composition of Silica / quartz
SO2	Chemical composition of sulphur dioxide

GLOSSARY OF TECHNICAL TERMS AND DEFINITIONS

Argillaceous	Term describing sedimentary rock with modal grain size in the silt fraction
Assay	The chemical analysis of mineral samples to determine the metal content
Assaying	The chemical analysis of mineral samples to determine the metal content
Basal conglomerate	A conglomerate formed at the earliest portion of a stratigraphical unit
Capital expenditure	All other expenditure not classified as operating costs
Concentrate	A metal-rich product resulting from a mineral enrichment process such as gravity concentration or flotation, in which most of the desired mineral has been separated from the waste material in the ore
Crushing	Initial process of reducing ore particle size to render it more amenable for further processing
Dip	Angle of inclination of a geological feature/rock from the horizontal
Dolomite	The name of a sedimentary carbonate rock and a mineral, both composed of calcium magnesium carbonate
Drill-hole	Method of sampling rock that has not been exposed
D Strat (Stratified Dolomite or Dolomie Stratfie)	This is a well bedded to laminated, argillaceous dolomite, which forms the base of the traditional "Lower Ore Zone" in Gécamines' nomenclature
Effective Date	Effective date of the Technical Report
Fault	The surface of a fracture along which movement has occurred
Filtration	Process of separating solid material from a liquid
Geochronological	The measurement of time intervals on a geological scale
Gecamines	La Generale des Carrieres et des Mines
Grade	The measure of concentration of copper or cobalt within mineralized rock
Hanging wall	The overlying side of an ore body or slope
Haulage	A horizontal underground excavation which is used to transport mined ore or the transport of mined ore from an open pit to a treatment plant

Hydrogeology	A science that deals with sub-surface water and with related geologic aspects of surface water
Indicated Mineral Resource	The part of a mineral resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed
Intrusives	A body of igneous rock which has forced itself onto pre-existing rocks, either along some definite structural feature or by defamation or cross-cutting of the invaded rocks
Lithology or lithogical	Geological description pertaining to different rock types
LoM plans	Life-of-mine plans
Material Assets	Collectively, East, Central and Central North West pits, Hydrometallurgical plant, Acid Plant and Liquid SO2 Plant and Dense Media Separation Plant.
Measured Mineral Resource	The part of a mineral resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and grade continuity
Meta-sedimentary	Metamorphosed sedimentary rock
Mica	Layer-lattice minerals of the three-layer type, and may be divided into the dioctahedral muscovite group and the trioctahedral phlogopite-biotite group
Milling	A general term used to describe the process in which the ore is crushed and ground and subjected to physical or chemical treatment to extract the valuable metals to a concentrate or finished product.
Mineral Reserve	The economically mineable material derived from a measured and/or indicated mineral resource. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, including consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified. Mineral reserves are sub-divided in order of increasing confidence into probable mineral reserves and Proved Mineral Reserve
Mineral Resource	A concentration or occurrence of material of economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable and realistic prospects for eventual economic extraction.

	The location, quantity, grade, continuity and other geological characteristics of a mineral resource are known, estimated from specific geological evidence and knowledge, or interpreted from a well constrained and portrayed geological model. Mineral resources are sub-divided in order of increasing confidence, in respect of geoscientific evidence, into inferred, indicated and measured categories
Mining Code	DRC Law No. 007/2002 of 11 July 2002
Mwashya or R4	Altered stratified greyish siliceous dolomitic rock with oolitic horizons and a few bands of light yellow talcose schist
Orogeny	An orogeny is a period of mountain building leading to the intensely deformed belts which constitute mountain ranges
Probable Mineral Reserve	The economically mineable material derived from a measured and/or indicated mineral resource. It is estimated with a lower level of confidence than a Proved Mineral Reserve. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, and including consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified.
Proterozoic	Era of geological time between $2,5x10_9$ and $570x10_6$ years ago
Proved Mineral Reserve	The economically mineable material derived from a Measured Mineral Resource. It is estimated with a high level of confidence. It is inclusive of diluting materials and allows for losses that may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, including consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified
Roches Argilleuses Talceuse (RAT)	The RAT is considered the boundary between the R2 and R1 units and consists of an upper RAT Grises (R2) and a lower RAT Lilas (R1)
Roches Siliceuses Feuilletées Foliated (Laminated) and Silicified Rocks (RSF)	This is a grey to light brown thinly bedded laminated and highly silicified dolomites
Roches Silicieuses Cellulaires or Siliceous Rocks with Cavities (RSC)	Vuggy and infilled massive to stromatolitic silicified dolomites
SAMREC code	South African code for reporting of Mineral Resources and Mineral Reserves
Samref Congo	Samref Congo Sprl
Schist/s	A regionally metamorphased rock characterised by a parallel arrangement of the bulk of the constituent minerals
Schistes De Base or Basal	Reddish-brown to grey silty and nodular dolomite to siltstone

Schists (SDB)	
Sedimentary	Rocks formed by the accumulation of sediments, formed by the erosion of other rocks
Shales Dolomitiques Superieurs or Upper Dolomitic Shales (SDS)	Yellowish, cream to red bedded laminated dolomitic siltstones and fine-grained sandstones.
Stratigraphy	Study of stratified rocks in terms of time and space
Schistes De Base or Basal Schists (SDB)	Reddish-brown to grey silty and nodular dolomite to siltstone
Sedimentary	Rocks formed by the accumulation of sediments, formed by the erosion of other rocks
Tailings	Finely ground waste rock from which valuable minerals or metals have been extracted
Volcanics	One of three groups into which rocks have been divided. The volcanic assemblage includes all extrusive rocks and associated intrusive ones
Volcanoclastics	One of the three groups into which rocks have been divided. The volcanic assemblage includes all extrusive rocks and associated intrusive ones