SNOWDEN

Mauritania Copper Mines: Guelb Moghrein resource estimation

Project No. **L00131**

NI 43-101 Technical Report

March 2008

Prepared by Mr C J Bargmann CGeol, Pr.Sci.Nat
Principal Consultant - Resource Evaluation

EurGeol Dr S C Dominy CGeol CP
General Manager (London) and Principal Consultant

Reviewed by Mr I M Glacken FAusIMM(CP), CEng
Group General Manager Resources

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1 Summary

1.1 Introduction

This Technical Report describes a resource estimate for the Guelb Moghrein copper-gold mining project located in the northwest of Mauritania. Since October 2005 Snowden Mining Industry Consultants Limited (Snowden) has worked with First Quantum Minerals Limited (FQML) and its subsidiary Mauritanian Copper Mines Ltd (MCM) on several studies, including two site visits to Guelb Moghrein (in 2005 and 2007). The Snowden work presented in this Technical Report details the revised resource estimate for Guelb Moghrein and is written in accordance with Canadian National Instrument 43-101 (NI 43-101) for submission to the Toronto Stock Exchange (TSX).

1.2 History and development

The Guelb Moghrein copper-gold deposit is located in Northern Mauritania and consists of two separate deposits, known as the Occidental and Oriental zones. The current property owner is MCM, which is 80% owned by FQML. It is reported that the remaining 15% of MCM is held by Wadi Al Rawda Industrial Investments (WARII) and Guelb Moghrein Mines d'Akjoujt SA (GEMAK), with the remaining 5% held by other parties.

During the 1970s approximately 5 Mt of oxide copper ore was mined from the Occidental zone and treated to produce 0.15 Mt of copper concentrate. Tailings re-treatment in the early 1990s recovered 4.5 t (0.16 Moz) of gold from 2 Mt of oxide material from the existing dumps. Since December 2004 FQML, through MCM, has developed Guelb Moghrein into a producing copper-gold mine using open-pit mining to access sulphide resources. Currently the main focus is on the higher grade Occidental zone. Mining and stockpiling of ore commenced in April 2006, plant commissioning commenced in July 2006 and the first copper concentrates were produced in October 2006.

1.3 Evaluation database

MCM provided an evaluation database of over 250 drillholes (cumulative length > 25,000 m) and a total of 314 short grade control holes (6,766 m) to Snowden in late 2005. The assay database contained over 12,000 copper analyses and gold values were also available for a large proportion of these samples. Snowden undertook a thorough review of this database, documented sampling and analytical procedures used and compiled a verification sampling exercise on retained sample material during a site visit in 2005.

Due to the uncertainties associated with the age, QAQC procedures and audit trails for the older drilling data collected in the pre-1990 period, Snowden recommended that a confirmatory drilling programme be undertaken. As a result a total of 28 drillholes, totalling 4,011 m, were drilled within and around the perimeters of the Guelb Moghrein open pit. A total of 2,047 copper, gold and arsenic assays were undertaken at two independent laboratories – one in Canada and the other in Australia.

Snowden considers that the enlarged evaluation database, incorporating the 2006 drilling data, is suitable for use during resource estimation and the revised resource estimate for Guelb Moghrein is summarised below in Table 1.1 and Table 1.2.

1.4 Mineral Resources

Snowden has estimated in situ Mineral Resources for the Guelb Moghrein project in accordance with CIM guidelines (CIM 2005) which have been adopted as part of NI 43-101. The figures quoted in Table 1.1 and Table 1.2 are the remaining in situ mineral resources as of the end of July 2007. FQML is currently conducting a pit optimisation exercise which will generate revised in-pit Mineral Reserves, which will be reported at a later date. The Mineral Resources are quoted at copper cut-off grades of 0.75 % Cu and 1.00 % Cu. Additional gold rich Mineral Resources are quoted based on the operational cut-off for high gold, low copper material above a gold cut-off of 1 g/t Au.

Sulphide and oxide resources have been quoted separately to reflect the fact that the plant is designed to process sulphide material. MCM stockpiles oxide material, mined during stripping of the sulphide material, for possible future treatment. At present the oxide material is not regarded as economic and is not expected to be included in future Mineral Reserves.

1.5 Recommendations

Snowden has provided MCM with detailed recommendations for improving certain aspects of the Guelb Moghrein operation. These are summarised below.

Future drilling programmes – Occidental deposit

Recommendations have been provided by Snowden to MCM for a further drilling programme in the vicinity of the Guelb Moghrein open pit. This drilling is targeted at the south-eastern portion of the deposit in order to infill an area where the drilling density from the historical drilling coverage is poor. Snowden has recommended to MCM that the QAQC protocols for the new core drilling, and all future exploration drilling and trench sampling, should be revised to include the inclusion of certified international copper and gold standards and blanks. It is essential that the insertion of certified international standards is routine practice and is best undertaken through a sample preparation facility on site.

Sample preparation laboratory

MCM is planning to establish its own sample preparation facility, and discussions have taken place with independent laboratory groups regarding the establishment of such a facility. Snowden endorses this proposal. The primary focus for this facility should be to provide dedicated exploration sample preparation facilities under the control of the Geology Department, although consideration should also be given to the preparation of grade control samples. This will allow the Geology Department to establish a QAQC system for both exploration and grade control of samples independently of the respective assay laboratory and provide better control over the sample audit trail.

Future exploration – Oriental deposit

The Oriental deposit also contains copper-gold mineralisation. The bulk of the current exploration drilling is located on the Oriental hill within the oxidised gossan zone; however, there is down dip potential for sulphide mineralisation. During validation of the drillhole database it was noted the collar elevations for the Oriental drillholes did not match the topography and Snowden recommended to MCM that this be resolved by resurveying the borehole collars where possible. Once this is completed an initial geological wireframe model of the Oriental deposit can be constructed from which future exploration can be planned.

Future resource estimates

The current resource estimate is based on a combination wireframe comprising both the geological and mineralisation controls. Consideration should be given in future resource modelling exercises to generate specific grade shells for copper and gold (plus other minerals of interest). Software using implicit modelling techniques, such as Leapfrog, should be considered to generate the initial grade shells. The resultant grade shells would be independent of the host lithologies and should improve the geostatistical analysis and grade estimation processes.

During the 2006 drilling programme, areas of mixed lithology were identified and logged by MCM's geologists. This mixed unit was not identified in the database for the older drilling phases. Snowden have recommended that MCM reinterpret the core and borehole logs from the older drilling phases in order to identify this mixed lithology prior to any future resource modelling.

The underground development dating from the 1950's should be digitised which will allow for this information to be incorporated into future mine planning.

Guelb Moghrein mine laboratory

The existing laboratory facility is far from suitable and Snowden has confirmed that problems exist with sampling accuracy. The laboratory currently provides assays for copper, gold and arsenic, and this should be increased to include cobalt, nickel and silver which may be significant in the copper concentrates. QAQC procedures are in place at the laboratory, but need to be improved to meet international standards.

MCM is aware of these problems and is actively seeking solutions. Discussions have taken place with independent laboratory groups regarding the establishment of a new laboratory facility, to be run on a contract basis by an external organisation.

Grade Control procedures

MCM has generated a large grade control database which could be used in mine reconciliation, ongoing resource and reserve prediction and block model validation. In addition to the problems associated with the Guelb Moghrein laboratory, Snowden has made recommendations to improve the grade control sample collection and computer based modelling.

Table 1.1 Guelb Moghrein Mineral Resource estimate 2007. In situ copper Mineral Resources at a cut-off grade of 0.75% Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 0.75 % Cu cut-off		
		Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	12.38	1.59	1.38
	Indicated	20.64	1.44	0.93
	Total	**33.02**	**1.49**	**1.10**
	Inferred	2.43	1.36	0.72
Oxide	Measured	0.36	2.87	2.41
	Indicated	0.01	2.46	1.81
	Total	**0.37**	**2.85**	**2.39**
	Inferred	0.02	3.09	1.98

Table 1.2 Guelb Moghrein Mineral Resource estimate 2007. In situ copper and gold Mineral Resources at a cut-off grade of 1 % Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 1 % Cu cut-off			Additional gold resources at 1 g/t Au cut-off		
		Tonnes (Mt)	Cu %	Au g/t	Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	10.03	1.76	1.51	1.02	0.79	1.30
	Indicated	15.15	1.64	1.08	0.91	0.77	1.32
	Total	**25.18**	**1.69**	**1.25**	**1.92**	**0.78**	**1.31**
	Inferred	1.75	1.54	0.84	0.24	0.44	1.25
Oxide	Measured	0.35	2.91	2.43	0.013	0.48	2.04
	Indicated	0.01	2.46	1.81	0.002	-	2.04
	Total	**0.37**	**2.89**	**2.40**	**0.015**	**0.41**	**2.04**
	Inferred	0.02	3.09	1.98	0.007	-	2.25

2 Introduction

This Technical Report has been prepared by Snowden Mining Industry Consultants Ltd for Mauritania Copper Mines (a subsidiary of First Quantum Minerals Ltd), in compliance with the disclosure requirements of the Canadian National Instrument 43-101 (NI 43-101). The trigger for preparation of this report is the 12th February 2008 news release of First Quantum Minerals Ltd, disclosing an updated Mineral Resource estimate for the Guelb Moghrein project.

Unless otherwise stated, information and data contained in this report or used in its preparation has been provided by Mauritania Copper Mines.

The Qualified Persons for the preparation of the report are Mr C J Bargmann who visited the project site between 21st July and 4th August 2007, and Dr S C Dominy who has not made a current site visit.

The responsibilities of each author are provided in Table 2.1

Table 2.1 Responsibilities of co-authors

Author	Responsible for sections
Mr C J Bargmann	1 – 11, 15 - 23
Dr S C Dominy	12 – 14, 17

2.1 Background

The Guelb Moghrein copper-gold deposit is located in Mauritania, West Africa. Following its discovery by French military personnel in 1931, the deposit has been the subject of several different phases of investigation and changes in ownership during the 20th century.

The deposit consists of two separate zones, referred to as the Occidental and Oriental zones. During the 1970s approximately 5 Mt of oxide copper ore was mined from the Occidental zone and treated to produce 0.15 Mt of copper concentrate. Following the cessation of operations between 1978 and 1992, a tailings re-treatment operation was developed in the early 1990s. Two million tonnes of tailings from the oxide operation were subsequently re-treated between 1992 and 1996 for the recovery of 4.5 t (0.16 Moz) of gold.

Since 2004 the property has been held by MCM, which is 80% owned by FQML. It is reported that 15% of MCM is held by WARII and GEMAK and the remaining 5% by other parties. MCM commenced mining activities in April 2006, commissioning of the metallurgical plant commenced in July 2006 and the first copper concentrate was produced in October 2006. Copper concentrate has been exported from the port of Nouakchott since October 2006. The operation is currently producing copper/gold concentrate from the copper floatation circuit of the plant. Commissioning of the gold leach circuit, after modifications to the initial plant design, is expected in March 2008 from which point additional gold will be produced.

2.2 Terms of reference

In October 2005, Snowden was initially requested by FQML to initiate the first of a series of several studies at the Guelb Moghrein property. The main objective was to assess the work required to enable compilation of a Technical Report compliant with the NI 43-101 requirements for submission to the TSX. Snowden conducted a site visit in November 2005 and was also asked to provide recommendations for work required in order to improve the level of confidence of reserves to be mined in the early stages of the new mining operation.

In February 2006 Snowden was requested to prepare a new resource update based on the existing database for the project. In addition Snowden was asked to recommend a drilling programme within the planned ultimate pit shell area in order to allow the contained resource to be classified in the Indicated or Measured categories (Snowden 2006a). Following completion of the initial resource estimate in March 2006, Snowden was requested by FQML to prepare a preliminary report in NI 43-101 format (Snowden 2006b). This report was not released into the public domain.

In July 2007 the infill assay results from the drilling programme proposed by Snowden were available and MCM requested that the new drilling information be included in an updated resource estimate. The updated resource estimate was to be included in a NI 43-101 Technical Report. As additional drilling had been undertaken and Guelb Moghrein entered production since the previous site visit, Snowden conducted a second site visit in July 2007.

2.3 Sources of information

After commencement of Snowden's work in November 2005, drillhole assay data was provided in digital form by MCM staff at Guelb Moghrein. Further background information on the project history and the geology of the deposit was provided by Mr A Stephens (consultant to FQML). Copies of additional technical reports were provided by FQML's office in Perth in digital form. Additional information on previous resource estimates and reviews carried out by Snowden for previous owners of the deposit was obtained from the Snowden archives (Snowden 1995a, 1995b and 1997). Several digital data files and copies of various technical reports were obtained during the 2005 site visit.

Additional digital files were obtained during the 2007 site visit, including information relating to the new drilling, as well as the MCM grade control database. Snowden was also given access to new research information on the deposit geology, and sourced relevant research articles.

Technical reports and other documents used in the preparation of this report are listed in Section 21 of this report.

2.4 Site visits

Snowden conducted two site visits to Guelb Moghrein. The first of these was undertaken by EurGeol Dr E J Sides between 21st and 25th November 2005, during which time three full working days were spent on site at Guelb Moghrein. Relevant geological exposures, sampling locations and samples were inspected, and 47 verification samples totalling around 55 kg of core, reverse circulation chips and retained pulps were collected.

The second site visit was conducted by Mr C J Bargmann, CGeol, between 21st July and 4th August 2007. A total of 13 days were spent on site at Guelb Moghrein. Snowden was able to review the operation of the mine, plant, the mine assay laboratory, and the grade control procedures. In addition, Snowden reviewed the core from the 2006 drilling programme and collated all of the digital data. The grade control database and additional survey information was also obtained.

3 Reliance on other experts

This report is intended to be used by FQML and MCM and is subject to the terms and conditions of their contracts with Snowden. This report is intended to be read as a whole, and sections or parts thereof should therefore not be read or relied upon out of context.

Snowden has reviewed the geology and resource evaluation database and has estimated the Mineral Resources for the deposit. MCM's mine plans and production schedules have not been considered for this estimate and no Mineral Reserves have been declared.

Unless otherwise stated Snowden has relied on MCM personnel for details of the mining and exploration licence tenure, Mauritanian legal framework, MCM company structure, mine and plant design.

Snowden has relied on a report from Metallurgical Design and Management (Pty) Ltd (MDM) for details of mineral processing and metallurgical recovery (MDM, 2004). This information has been verified and amended as necessary based on verbal discussions with MCM staff during the 2007 site visit. This and other technical reports used by Snowden in the preparation of this report are listed in Section 21 of this report.

4 Property description and location

4.1 General description

The Guelb Moghrein property covers 81 km^2, representing Mining Concession 2C2 (previously referred to as CM2). This concession was originally granted to the Société Minière de Mauritanie (SOMIMA), a joint venture of Charter Consolidated (45%), Government of Mauritania (22%), International Finance Corporation (IFC - 15%); Penarroya (7%) and the Bureau de Recherches Géologiques et Minières (BRGM) in 1967.

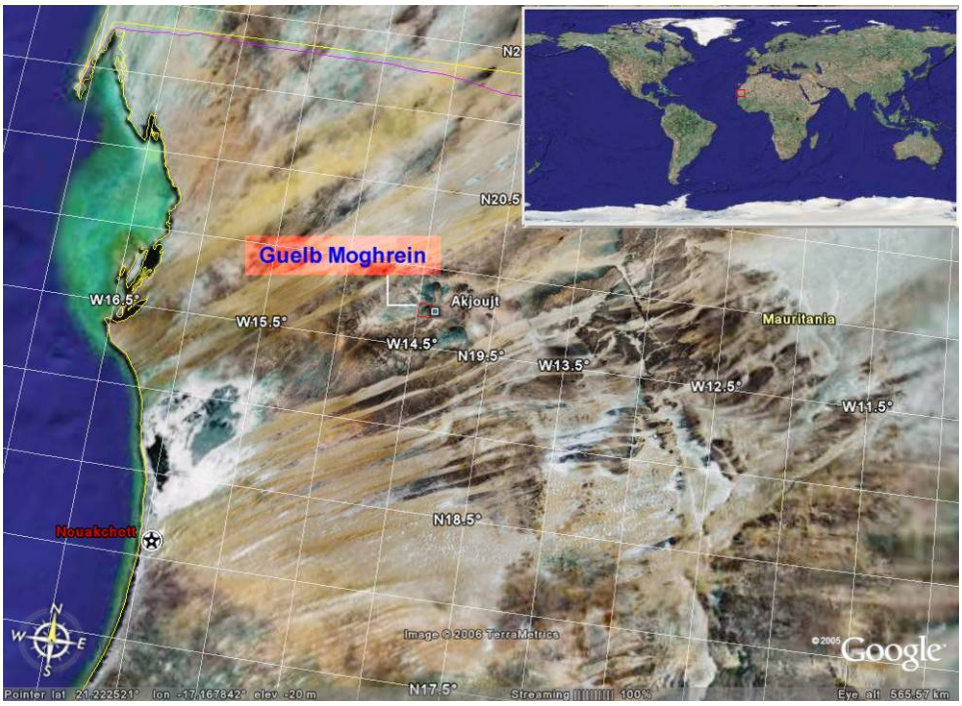
Since it was granted the mining concession has been the subject of a number of transfers of ownership. It is understood that it was transferred from GEMAK to MCM in December 2004.

The Mining Concession is surrounded by five exploration licences held by MCM.

4.2 Location

The property is located 250 km northeast of Nouakchott, the capital of Mauritania (Figure 4.1), and is situated 5 km west of the town of Akjoujt.

Figure 4.1 Location of the Guelb Moghrein property, (modified from Google Earth)



4.3 Mining investment in Mauritania

4.3.1 General

In recent years Mauritania has taken several steps to attract more investment in the mining sector in the country. This includes two major initiatives, namely:

- The Projet de Renforcement Institutionnel du Secteur Minier (PRISM – Project for Institutional Strengthening of the Mining Sector) initiated in 1999. This project, designed together with the World Bank, is aimed at improving the capacity and competitiveness of Mauritania to attract private investments in the mining sector. It is funded by the World Bank, the Islamic Development Bank, the French Cooperation Agency and the Government of Mauritania and is planned to continue until 2008. As part of this project a report entitled "Guide for the Mining Investor in Mauritania" was published in 2005 (GAFAG, 2005).
- A complementary study was funded by The Japan International Cooperation Agency (JICA), the Japanese Government's foreign aid agency which was initiated in November 2003. This involves preparation of a Strategic Plan of Mineral Resources Development for The Islamic Republic of Mauritania. As part of this study an information CD ("CD Guide To The Mining Sector"), providing details of the geological and legal framework of Mauritania, was published in 2006 (JICA, 2006).

4.3.2 Legal Framework

Details of the legal framework relevant to mining are outlined in the two reports referred to above (GAFAG, 2005 and JICA, 2006). The main legal codes relevant to the mining sector, as described in these reports, are as follows:

- The Mining Code of 1999 and its enforcement texts which offers special incentives for mining title holders, including tax exemption during exploration and the first five years of exploitation, plus guaranteed stability of the taxation regime and a low royalty rate.
- The Standard Mining Convention, which supplements the Mining Code and offers further protection through guaranteed stability of the taxation regime during exploitation over a 30 year period.
- The Investment Code of 2002, which offers substantial legal rights and incentives granted to national and foreign investors in a non-discriminatory manner.

In conjunction with the adoption of the new Mining Code in 1999, specific responsibilities were defined for the Ministry of Mining and Industry (MMI), and a Mining Cadastre Unit was established to handle the management of exploration and mining titles.

4.4 Property details

The Guelb Moghrein property is located immediately west of the township of Akjoujt (Figure 4.2). Mine personnel and contractors live in the township, which also has a military base. It is understood that a number of buildings in Akjoujt, including residential houses and a mine club, which were built when the mine was operated in the 1970's, are owned by the company. A simplified site location plan is provided in Figure 4.3. The plant site contains several generations of buildings from the earlier operations. Many of these have been or will be refurbished for use in the current operation.

Figure 4.2 Location of the Guelb Moghrein property in relation to Akjoujt town (modified from Google Earth, width of view 6.0 km)

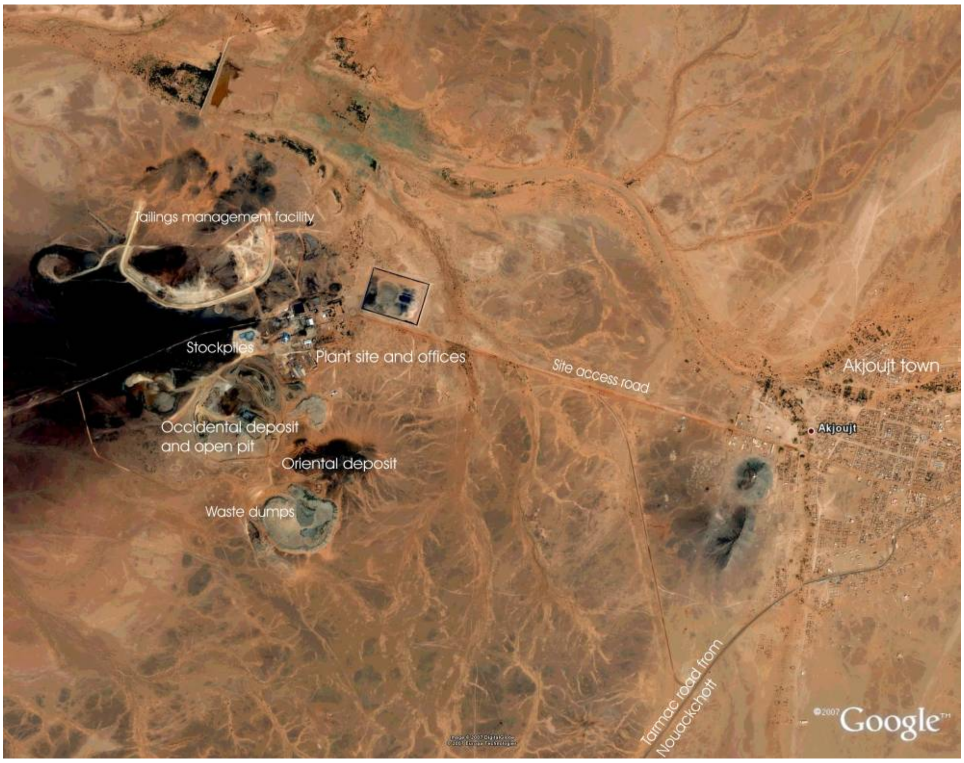
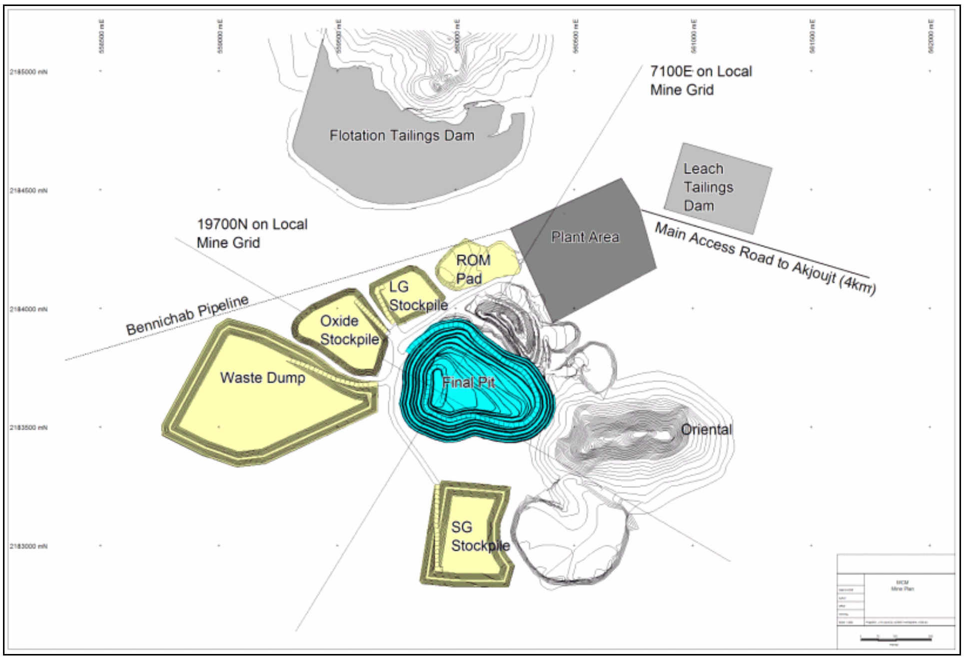


Figure 4.3 Site plan for the Guelb Moghrein property, showing the location of the open pit, stockpiles, wastedump, tailings dams and plant facilities (width of view 3.5 km)



4.5 Mineral tenure

4.5.1 Mining concession

The Mining Concession 2C2 (previously CM2) is reported to be defined as an 81 km^2 lease (9 km by 9 km) with the coordinates fixed by a point 4 km from the military compound in Akjoujt (MDM, 2004). The four corners of the concession are understood to be defined with reference to a trigonometric station on top of the Oriental hill, and are stated to be independent of UTM or any other grid (KSL, 1997). The limits of the concession are presented in Figure 4.5 adequately cover the extent of known mineralisation at Guelb Moghrein. Full details of the lease are reported to be contained in Annexure D attached to a Convention d'Etablissement between the Islamic Republic of Mauritania (IRM) and SOMIMA in 1967. Snowden has not seen copies of the original licence documents and have not been able to independently verify the details presented in this section.

In 2004 an agreement ("Acte d'Approbiation") was signed by the IRM, GEMAK and FQML. Under its terms the Mining Concession was transferred to Mauritanian Copper Mines Limited (MCM), a company set up specifically to manage the project, in December 2004. MCM is owned by FQML (80%), Wadi Al Rawda Industrial Investments and GEMAK (15%) and others (5%). The Mining concession is stated to be valid until the end of 2042.

The location of the Guelb Moghrein concession is consistent with the information and maps available at the website of the Mauritanian office for Geological Exploration (OMRG). The Guelb Moghrein mining concession and its surrounding exploration concessions (in yellow) are shown on Figure 4.4, which is a map of the Akjoujt area obtained from the OMRG website. The extent of the mining concession with respect to the town of Akjoujt, the plant site and the Occidental and Oriental zones is illustrated in Figure 4.5.

Snowden understands that the mining concession has not been surveyed and also that this is not required as the tenement is defined by UTM coordinates.

Figure 4.4 Map, dated February 2005, of the Akjoujt area showing mining and exploration concessions, (modified from OMRG website, width of view ~390 km)

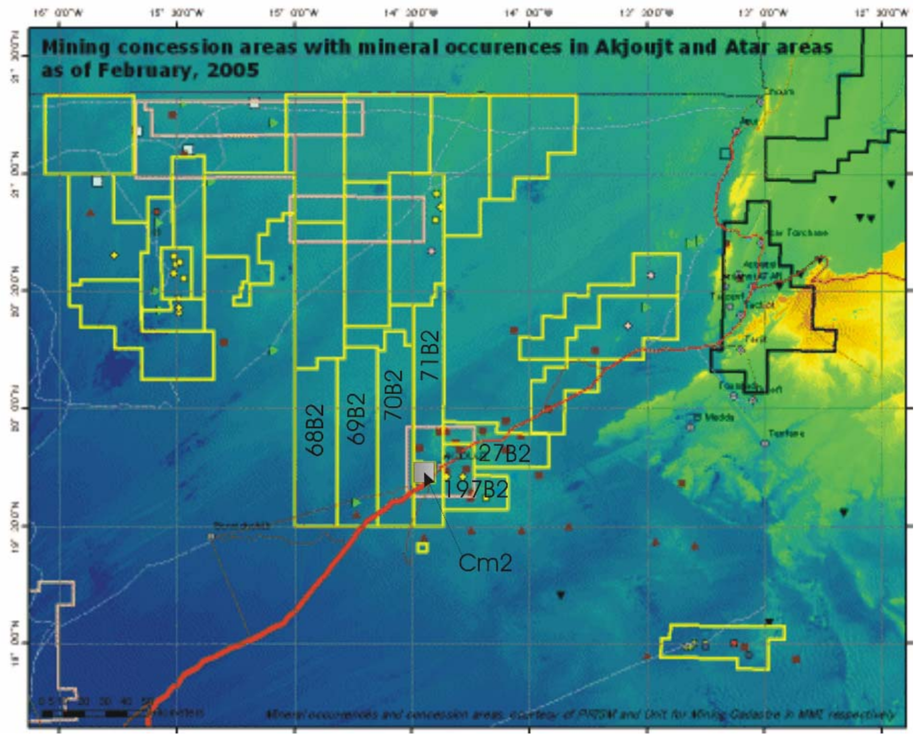
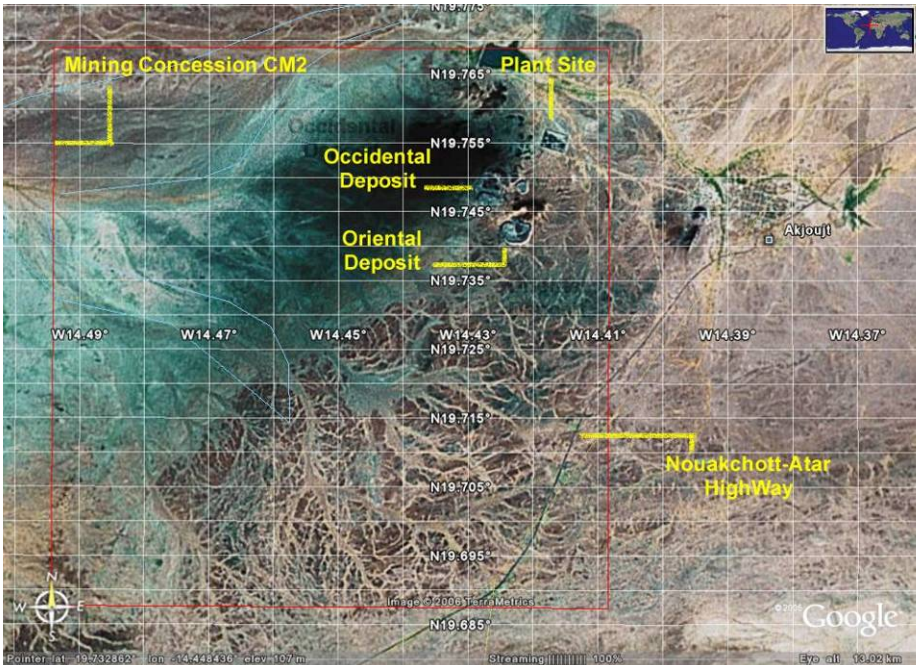


Figure 4.5 Location plan showing the extent of the Guelb Moghrein Mining Lease 2C2 (modified from Google Earth, width of view 15 km)



The UTM coordinates of the corners of mining concession CM2 as supplied by MCM are detailed in Table 4.1.

Table 4.1 UTM (Zone 28 North) coordinates of the limits of Mining Concession 2C2 (previously CM2)

Point	UTM Easting	UTM Northing
1	553,000	2,177,000
2	553,000	2,186,000
3	562,000	2,177,000
4	562,000	2,186,000

4.5.2 Exploration concessions

A summary of the exploration licences held by MCM is given in Table 4.2 based on details supplied by MCM. The UTM coordinates defining the boundaries of these concessions are listed in Table 4.3. Figure 4.6 shows the location of the exploration licences with respect to the mining concession (CM2). These coordinates appear to closely match the licence boundaries on the OMRG maps obtained by Snowden (Figure 4.4). Snowden has not seen copies of any of the original exploration licence documents and has not independently verified the details presented in this section. One licence originally held by FQML has been allowed to lapse (Licence number 27B2 – Tabrincout/Takoust on Figure 4.4).

Table 4.2 Details of MCM Mining and exploration licences (supplied by MCM)

Old code	New code	Name	Surface (km^2)	Last renewal	Expiry date
CM2	2C2	Guelb Moghrein	81		31-Dec-42
PRM 100	68B2	Khat Omat Elbid	1,451	30-Aug-05	30-Aug-08
PRM 101	69B2	Tamagot	1,497	30-Aug-05	30-Aug-08
PRM 102	70B2	Agdeijit	1,417	30-Aug-05	30-Aug-08
PRM 103	71B2	Atomai	1,315	30-Aug-05	30-Aug-08
197	197B2	Kdeyat El Ajoul	674	2-Jul-05	2-Jul-08

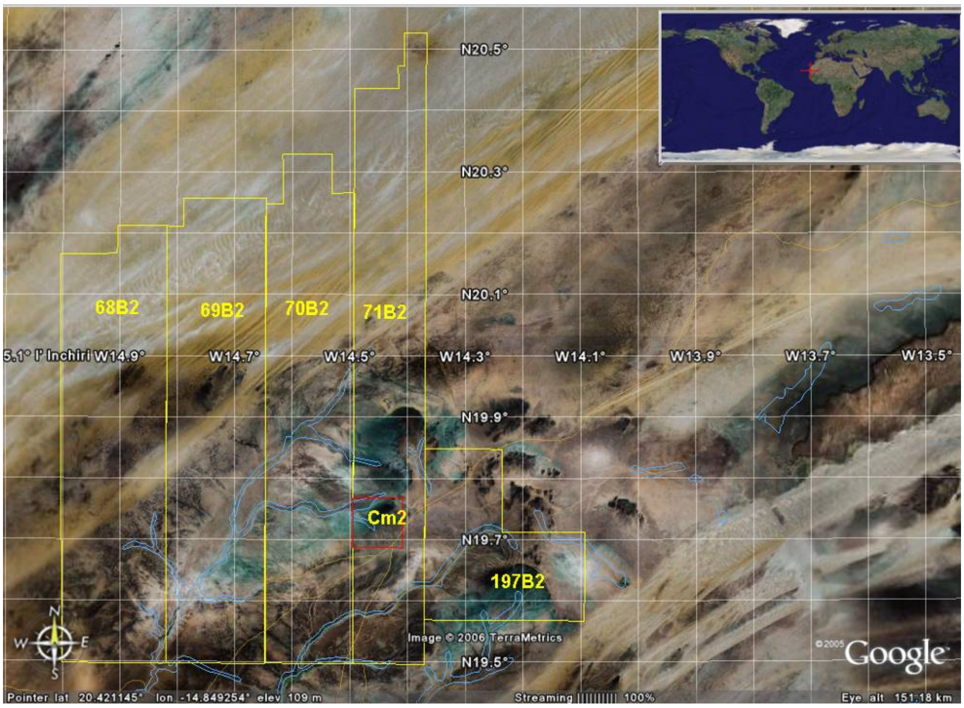
Notes:

1. Mining licence 2C2 (CM2) was transferred to MCM on 15-Dec-04.
2. Permit N0 56 (27B2) expired on the 15-Mar-06 and has not been renewed yet.

Table 4.3 UTM (Zone 28 north) coordinates defining the boundaries of MCM's exploration concessions in the Akjoujt area, Mauritania

Name	Application No.	Area (km^2)	Expiry	Vertex No.	UTM easting	UTM northing
Khat Oummat El Beid	68B2	1456	30/08/2008	1	500,000	2,230,000
				2	510,000	2,230,000
				3	510,000	2,235,000
				4	519,000	2,235,000
				5	519,000	2,156,000
				6	500,000	2,156,000
Tamagot	69B2	1503	30/08/2008	1	519,000	2,235,000
				2	522,000	2,235,000
				3	522,000	2,240,000
				4	537,000	2,240,000
				5	537,000	2,156,000
				6	519,000	2,156,000
Agdeigit	70B2	1422	30/08/2008	1	537,000	2,239,000
				2	540,000	2,239,000
				3	540,000	2,248,000
				4	549,000	2,248,000
				5	549,000	2,241,000
				6	553,000	2,241,000
				7	553,000	2,156,000
				8	537,000	2,156,000
Atomai	71B2	1320	30/08/2008	1	553,000	2,177,000
				2	562,000	2,177,000
				3	562,000	2,186,000
				4	553,000	2,186,000
				5	553,000	2,260,000
				6	561,000	2,260,000
				7	561,000	2,264,000
				8	562,000	2,264,000
				9	562,000	2,270,000
				10	566,000	2,270,000
				11	566,000	2,156,000
				12	553,000	2,156,000
Kdeiat El Ajoul	197B2	676	02/07/2008	1	566,000	2,195,000
				2	580,000	2,195,000
				3	580,000	2,180,000
				4	595,000	2,180,000
				5	595,000	2,164,000
				6	566,000	2,164,000

Figure 4.6 Plan showing the location of MCM's current exploration concessions in relation to the Guelb Moghrein mining concession (CM2) (modified from Google Earth, width of view ~170 km)



FQML advised Snowden that MCM has the following commitments with respect to the exploration licences:

- to make a detailed exploration plan and send the curriculum vitae of the project leader to the MMI
- to pay renewal taxes of 250 MRO[1] (0.97 US$) per km^2 for the first renewal, 500 MRO (1.95 US$) per km^2 for the second renewal and 1000 MRO (3.91 US$) per km^2 for the final renewal
- to spend at least 30 million MRO (117,400 US$) per annum on each exploration lease
- to submit copies of exploration reports to the MMI
- to recruit a Mauritanian geologist and other local labour for each exploration project.

There are no special environmental liabilities on exploration permits; however; each exploration company is required to rehabilitate its site as per the new mining code.

MCM commenced an active exploration programme in February 2007 with mapping and geophysical programmes in progress at the time of the site visit.

4.5.3 Agreements, royalties and other encumbrances

Snowden understands that for FQML to earn an 80% interest in the mineral property it must pay GEMAK the sum of US$ 10 million in three instalments as follows[2]:

[1] Mauritanian Ouguiya, 1 US$ = 255.6 MRO

1. US$ 2 million, 7 days after the Completion Date for the proposed operation
2. US$ 3 million, 12 months after the Completion Date
3. US$ 5 million, 24 months after the Completion Date or on commencement of full commercial production, whichever is earlier.

MCM have stated to Snowden that these payments have been made or are being made to GEMAK.

4.6 Environmental and other permits

The company's future operations are governed by a Convention d'Etablissement signed between the IRM and GEMAK in 1997. Under the Convention, the IRM has given the project unlimited rights to draw water from the Bennichab Aquifer to meet the project needs. In return, MCM has undertaken to search for, and utilise, local water sources where possible to reduce dependence on the Bennichab aquifer (MDM, 2004).

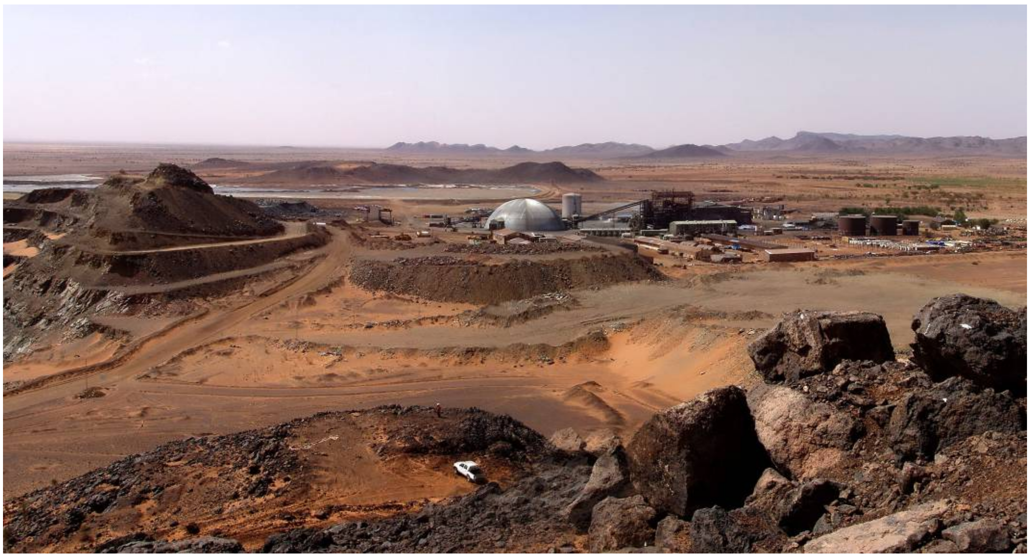
[2] Source www.first-quantum.com/i/pdf/Guelb_Moghein_FactSheet.pd, March 2006

5 Accessibility, climate, local resources, infrastructure and physiography

The topography around the deposit forms a peneplain at around 130 m above sea level (1,130 m elevation on the mine grid), with low hills further to the north (Figure 5.1). The siliceous gossan which marks the outcrop of the deposit gives rise to two steep hills rising about 80 m and 90 m above the peneplain (JICA, 2006).

The area is situated on the southwest fringe of the Sahara desert and has a desert climate. The weather is generally hot and arid, with summer temperatures regularly exceeding 38°C (100°F) during the day, but is made bearable by low humidity. Sandstorms occur throughout the year but are less frequent during the summer and autumn.

Figure 5.1 General view of the Guelb Moghrein plant site in July 2007, looking north from Oriental; Occidental and the edge of the open pit is to the left



The property is accessed via a 250 km paved road which connects the capital Nouakchott with the town of Akjoujt. A 5 km gravel road connects Akjoujt with the mine site. Akjoujt has a population of several thousand and a military garrison. There is more than adequate tenure to support location of mining waste dumps, process tailings storage areas and the process plant site.

Nouakchott has an international airport with regular flights to Europe, North and West Africa. Port facilities are available at Nouakchott and Nouâdhibou, with the latter being the export facility for Mauritania's iron ore production.

The Guelb Moghrein mine has its own power station, using diesel as a fuel source. Water is sourced from the Bennichab aquifer 113 km to the south-west of the mine site. Water from this source is also supplied to the town of Akjoujt.

6 History

6.1 Project history

The history of mining and exploration activity on the Guelb Moghrein property is summarised in Table 6.1. The pre-1997 project history is derived from the feasibility study report prepared by Kilborn SNC-Lavalin Europe (KSLE) in 1997. Information on the more recent history of the project has been obtained from press releases available on FQML's website and from discussion with MCM staff.

There is evidence of mining in the Akjoujt area since prehistoric times; however, recent mining activity dates from the rediscovery of the deposit in 1931 by French military personnel. Since that date the main mining activity took place in the 1970s when 5.3 Mt of oxide ore was processed to produce 145,500 t of copper concentrate. During the mid-1990s, 1.98 Mt of tailings from the oxide operation were reprocessed to recover 4.5 t (158,000 oz) of gold.

Table 6.1 History of activity at Guelb Moghrein (from KSLE, 1997 and other sources)

Dates	Description
Prehistory	Evidence for early smelting (6000 to 4000 BC ?) is reported
1931	Rediscovery by French military personnel
1946, 1952-1953	Investigation by Mines Department of the French West Africa Federation
1954-1956	Small pilot plant treated 22,000 t of ore from two underground levels
1958	Société des Mines de Cuivre de Mauritanie (MICUMA) attempted to treat oxide copper ore; project later abandoned
1964-1965	Société du Cuivre de Mauritanie (SOCUMA) took over the mining rights; an option was granted to a company formed by Homestake Mining Company of the USA, Southfield Mines of Canada and the French Bureau of Mines, but after completing some studies, the option was not exercised.
1966	Charter Consolidated Limited took on the project, which was then run by Société Minière de Mauritanie (SOMIMA) (45% Charter Consolidated, 22% Government of Mauritania; 15% International Finance Corporation (IFC); 7% Penarroya and 6% BRGM).
1966-1970	TORCO (Treatment of Refractory Copper Ores) processing plant and related infrastructure were built at a cost exceeding $ 100 million
1975	SOMIMA abandoned the project due to oil price increases and a collapse in copper prices.
1977	The Société Nationale Industrielle et Minière (SNIM – 78% controlled by the Government of Mauritania) took over SOMIMA and continued operating the mine
1978	The mine closed after having treated 5.3 Mt of oxide ore to produce 145,500 t of concentrate in the period 1970-1978. The mine facilities were transferred to the state.
1978-1982	Several studies of the property were carried out by various bodies
1982-1987	The Société Arab des Mines de I'Inchiri (SAMIN) carried out various activities on the property.
1988-1990	Minproc Holdings Limited (Minproc) of Australia carried out further studies. In 1990 Mines d'Or d'Akjoujt (MORAK) was incorporated as a joint company of

Dates	Description
	SAMIN and Minproc.
1991-1992	MORAK shareholding changed to SAMIN (45%), Minproc (42.5%) and IFC (12.5%), and construction of a 0.5 Mtpa gold recovery plant commenced. Minproc's interest was acquired by General Gold Resources NL (GGR) in 1992.
1992-1996	A 1.96 Mt parcel of tailings was treated to recover 4.5 t (158,000 oz) of gold. In 1994 a joint venture was formed between General Gold International SA (GGI) and SAMIN, each retaining a 50% interest. In December 1995 a local company Guelb Moghrein Mines d'Akjoujt SA (GEMAK) was incorporated to develop and operate the project.
1994-1997	GGI completed a detailed evaluation of the sulphide mineralisation culminating in the production of a feasibility study by KSLE in 1997
2000	GGR and its controlled entities went into voluntary administration. As part of a subsequent company reconstruction GGR's interest in the project was transferred to Wadi Al Rawda Industrial Investments LLC (WARII)
2004	FQML announced an agreement with GEMAK and WARII to purchase an 80% interest in the project.
2005	Construction commenced on the new plant and tailings facilities to produce approximately 30,000 t of copper in concentrate and 2 t (70,000 oz) of gold per year from sulphide ore.
2006	Mining commenced April, plant commissioning commenced July and first copper concentrate produced October.

6.2 Exploration and development work

The exploration history of the property is summarised in Table 6.2.

Table 6.2 Summary of the exploration history of the Guelb Moghrein property

Dates	Exploration work
1946	Geological investigations
1952-56	Underground development and pilot plant (sulphide ore?)
1964	Further evaluation work including metallurgical testwork
1966	Feasibility study by Watts, Griffiths and McOuat on behalf of Charter Consolidated led to construction of oxide plant
1970-1978	Continued evaluation of sulphide ores, with reports by Seltrust Engineering Limited and J.H. Evans in 1978.
1982	UN sponsored evaluation of gold potential of the oxide tailings
1987-1990	Metallurgical testwork on oxide tailings
1994-1995	Evaluation programme by SAMIN, reported as including 8,892 m of drilling plus a variety of different metallurgical studies
2004	Exploration work by FQML which included confirmatory drilling at the mine and exploration drilling on several targets on the adjoining exploration concessions
2006	Confirmatory drilling programme within and around the existing open pit. Total of 28 drillholes and 4011 m of drilling
2007	MCM commence active exploration on the surrounding exploration concessions. Regional mapping and IP geophysical surveys in progress

Evaluation drilling by previous operators is discussed in more detail in Section 11.

6.3 Historic Mineral Resource and Reserve estimates

6.3.1 Available estimates

No information is available on the resource estimates which were carried out by other operators (see Table 6.1) prior to GGI's work on the project.

In 1995 Snowden estimated the resources for the deposit, using median indicator kriging for estimation of copper and gold grades into blocks with dimensions of 10 mX by 10 mY by 3 mZ blocks (Snowden 1995a, 1995b). This resource was based on a single lithological domain and three weathering type domains. Resources were quoted above a cut-off of 1% copper, and were reported in the Measured, Indicated and Inferred categories according to the Australasian Joint Ore Reserves Committee (JORC) Code applicable at the time.

In 1997 KSLE generated a new resource estimate which was used as the basis for its feasibility study (KSLE, 1997). This resource estimate used median indicator kriging estimation of copper and gold grades, and was based on slightly different domains to those used in the earlier Snowden estimate. (Note: The feasibility study refers to the use of multiple indicator kriging; however, the description of the procedures used makes clear that it was actually median indicator kriging that was used).

In addition to the weathering domains used in the previous Snowden estimate, the KSLE estimate included separation of low grade copper and gold mineralisation as well as estimation of mineralised schist in the footwall and hangingwall of the main deposit. The KSLE resource and reserve estimates were audited by Snowden (Snowden, 1997) who considered that they were classified in accordance with the JORC reporting guidelines (JORC, 1996). A block cut-off grade of 1% Cu was again used for reporting.

In 1999 GGI generated an estimate based on a polygonal section approach (Strickland, 1999). The Mineral Resources for this estimate were reported in accordance with JORC (1999) guidelines above a 0.5% Cu cut-off grade.

Measured and Indicated Resource estimates for the Snowden and KSLE estimates of oxide ore are compared in Table 6.3 and for sulphide ore in Table 6.4. The GGI 1999 estimate has been excluded from these tables since the different estimation methodology and cut-off on which it is based (which Snowden believes does not comply with best international practice) may cause misleading conclusions to be drawn from comparisons with the other two estimates.

Table 6.3 Measured and Indicated Resource totals for historic estimates of oxide ore at the Guelb Moghrein project (based on a 1% Cu cut-off)

Source	Category	Tonnage (Mt)	Cu (%)	Au (g/t)
Snowden, 1995	Measured	1.38	1.97	2.41
KSLE, 1997	Measured	1.07	2.08	2.35

Table 6.4 Measured and Indicated Resource totals for historic estimates of sulphide ore on the Guelb Moghrein project (based on a 1% Cu cut-off)

Source	Category	Tonnage (Mt)	Cu (%)	Au (g/t)
Snowden, 1995	Measured	14.0	1.81	1.51
KSLE, 1997	Measured	13.9	1.87	1.55
Snowden, 1995	Indicated	10.7	1.63	0.93
KSLE, 1997	Indicated	8.7	1.88	1.05

The two sets of estimates presented above are based on essentially the same dataset so the differences will relate largely to differences in the domain control and estimation parameters used. It is likely that the high/low copper grade zone control used by KSLE will have caused the reduction in tonnage and increase in estimated grades compared to the Snowden resource. Snowden considers that these estimates are historical and do not comply with the current standards detailed in the current JORC (2004) or the CIM (2005) codes.

6.3.2 1997 Mineral Resource estimate

The Mineral Resource estimate being used by MCM for current mine planning work is derived from the 1997 KSLE model. After recovering this model from the archives, MCM reported that some further processing was carried out prior to the use of the model in the project engineering study (MDM, 2004).

Due to the lapse in time since this resource estimate was generated there are several uncertainties associated with it, as summarised in Table 6.5.

Table 6.5 Uncertainties associated with the 1997 KSLE resource estimate

Item	Details	Comments/action required
Sampling data	1960s/70s diamond drilling and 1994/95 GGI data were treated equally	Uncertainties associated with the earlier drilling data should be taken into account by requiring >50% newer samples for estimation of Indicated and Measured blocks
Geological interpretation and domain control	Wireframe models and coding of high/low copper and gold zones for the block model and drillhole composites are no longer available.	
Sample analyses	Existing database contains some long sample intervals for copper, and many of the gold assays are repeated in consecutive records. Verification sampling has indicated higher Cu values than in original samples. Verification sampling indicates poor sampling precision for Au.	Check and filter out long sample intervals before doing variography. For gold, and possibly copper as well, use 2 or 4 m downhole or bench composites for variography and grade estimation. Try to confirm presence and magnitude of the underestimation of copper in the original analyses
Bulk density	Average values used for each of the main domains. A correlation with magnetite content is likely to be present.	Review data to verify values used for unmineralised wallrocks and to determine whether a correlation with magnetite content can be established for use in subsequent resource

Item	Details	Comments/action required
		estimates
Variography	Gold variograms used may have been distorted by splitting up of original composite intervals.	Generate fresh variograms after checking and editing the assay file.
Block size	Block dimensions: 10 m E-W, 10 m N-S and 3 m high; no sub-blocking was used.	Choice of block size should be validated using kriging neighbourhood analysis. It may be better to use a larger block size with sub-blocking to define domain boundaries, and the separate estimation of recoverable reserves.
Grade estimation	Median indicator kriging has been used in combination with some form of grade zone control.	Impact of high/low zonal control should be reassessed as it should not strictly be necessary if multiple indicator kriging is used
Digital file	Values for some blocks in the current model appear to have been lost or corrupted in the upper parts (above 1110 m RL). Resource totals for the oxide zone do not correspond with published values derived from the original model.	Compare model with original version from archive to see if problem blocks can be corrected. Update the surface topography wireframe to reflect any recent earth moving.

In view of the historic nature of this resource estimate, and uncertainties presented in Table 6.5, a new resource estimate was recommended by Snowden.

6.3.3 1997 Reserve estimates

The most recent historic reserve estimate for the project is the KSLE 1997 Mineral Reserve (Ore Reserve in 1997) estimate which is summarised in Table 6.6. This estimate has been reported in accordance with the JORC Code (1996).

Table 6.6 Proved and probable reserve totals for the previous feasibility study above a 1% Cu cut-off (KSLE, 1997)

Category	Tonnage (Mt)	Cu (%)	Au (g/t)
Proved - oxide	1.4	1.94	2.27
Proved - sulphide	14.5	1.75	1.48
Probable - sulphide	5.8	1.91	1.12
Total - sulphide	20.3	1.80	1.38

Since the start of mining operations MCM has conducted its mine planning using the version of this estimate that has been recovered from the archives and is consequently subject to the uncertainties discussed in Section 6.3 and summarised in Table 6.5.

6.4 Historical production

Between 1954 and 1956 a small pilot plant is reported to have treated 22,000 t of ore from two underground levels.

However, as noted in Table 6.1, the main period of previous production at Guelb Moghrein was between 1970 and 1978, during which time 5.3 Mt of oxide ore was mined. This material was processed in a TORCO (Treatment Of Refractory Copper Ores) plant which produced 145,500 t of copper concentrate during this period.

Following subsequent changes of ownership re-treatment of tailings to recover gold was carried out between 1992 and 1996. A total of 1.96 Mt of tailings were treated to recover 4.5 t (158,000 oz) of gold.

6.5 MCM production since commencement of operations in 2006

As noted above MCM commenced mining in April 2006 and commercial production of copper concentrate started in October 2006. Table 6.7 summarises the mined tonnages and sulphide ore processing statistics[3].

Table 6.7 MCM mining and production statistics since inception to end September 2007.

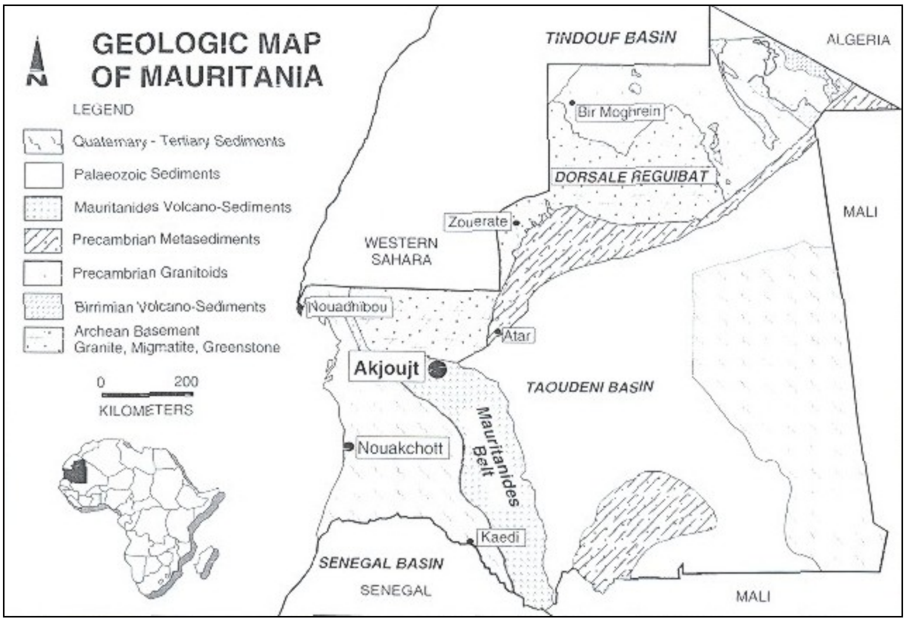
	2006					2007			
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Total YTD
Ore mined (Kt)	41	144	179	400	764	462	539	674	1,675
Grade (% Cu)	1.9	1.9	1.8	1.5	1.7	1.4	1.4	1.3	1.4
Ore processed (Kt)				334	334	410	464	509	1,383
Processed grade (% Cu)				2.0	2.0	1.9	1.9	2.0	1.9
Recovery (%)				78	78	83	79	81	81
Copper in concentrate (T)				5,031	5,031	6,446	7,050	8,101	21,597
Gold in concentrate (Kg)				322	322	423	399	457	1,278

[3] Based on FQML quarterly production statistics obtained from http://www.first-quantum.com/s/OperationalStatistics.asp

7 Geological setting

The Guelb Moghrein deposit lies immediately west of Akjoujt within the Mauritanides Orogenic Belt. The Mauritanides extend along the West African coast from Senegal to Western Sahara (Figure 7.1). The Mauritanides are generally considered to be a late Proterozoic, 'Pan African' event with a Palaeozoic (Devonian) overprint. The western parts of the Mauritanides are concealed by Mesozoic and Tertiary sediments and the Akjoujt area lies within 30 km of the outcrop of the basal thrust defining the eastern margin of the Mauritanides. Guelb Moghrein is located at a conspicuous oroclinal bend where the belt locally trends WNW to ESE. The general background geology is summarized from Strickland and Martyn (2002), Martyn and Strickland (2004), Kolb et al (2006a, 2006b) and OMRG website.

Figure 7.1 Regional map showing geological setting of Guelb Moghrein (immediately west of Akjoujt) in the Mauritanides (after Meyer et al, 2006)



The main tectonostratigraphic units are as follows;

Outside (east and north) of the Mauritanides Belt

- Amsaga crystalline basement (Archaean), which is comprised of high grade gneissic and granulite facies metamorphic rocks.
- Taoudéni Basin sedimentary rocks (Neoproterozoic to Devonian) which unconformably overlie the Amsaga basement. An unconformity separates the Neoproterozoic and Palaeozoic sequences. Neoproterozoic sequence comprises marine shelf claystones and siltstones with a basal unit of sandstones and conglomerates. Some continental facies sediments are also present. The Palaeozoic sequence contains conglomerates, sandstones siltstones and mudstones. The main basin area is undeformed.

Within the Mauritanides Belt

- Akjoujt series supracrustal (largely volcanic) rocks thrust eastwards over the Amsaga basement and Taoudéni Basin. This sequence is the host to the Guelb Moghrein deposit.
- Basement rocks outcropping to the west and southwest of Akjoujt, and thrust eastwards over the Akjoujt series. Consists of granitic gneiss, coarsely porphyritic monzogranite and low to upper amphibolite grade metasedimentary rocks. Possibly a continental basement to the Akjoujt series.

The Mauritanides in the Akjoujt area comprise a complex set of thrust sheets lying above a planar sole thrust and below a major thrust carrying an inverted Amsaga basement sequence. The sole thrust carries the overlying thrust complex across both Achaean basement and the sediments infilling the late Proterozoic - Palaeozoic Taoudeni Basin.

The geologic succession within the thrust zone has been established from the Atlis area, (northwest of Guelb Moghrein) which shows limited dissection by thrusts. Martyn and Strickland (2004) recognize two supracrustal sequences, the Eizzene and Oumanchoueima Groups, which are separated by an unconformity (Figures 7.2 and 7.3). Recently determined U-Pb ages of 2492 $\pm$9 Ma and 1742 $\pm$12 Ma from monazite and xenotime in the Guelb Moghrein mineralization indicate that this host sequence is of Archaean age (Meyer et al. 2006).

The Eizzene Group consists of a metabasalt formation and a siltstone formation with thin orthoquartzite and quartz magnetite banded iron formations (BIF). The stratigraphic order is unknown. Two outcrops of small (2-5 km diameter), fine to medium-grained, granodiorite cut the Eizzene Group and one of these is overlain unconformably by the Oumanchoueima sequence.

The younger Oumanchoueima Group shows a predominantly metasedimentary lower sequence and predominantly volcanic upper sequence. The metasediments show basal orthoquartzite, with sediments passing upwards into finer grained siltstones and metagreywackes. Thin BIF layers are present and become more abundant upwards. The highest metasediments include volcaniclastic materials and conspicuous BIF.

The volcanic upper sequence of the Oumanchoueima Group is separated into upper and lower portions (the St Barbe and Akjoujt volcanic units) by a thin, but sharply defined, BIF and pyritic chert unit, called the Lambeitih Formation. The BIF includes quartz-carbonate-magnetite, quartz-magnetite and quartz-haematite assemblages. The St Barbe volcanic unit contains basaltic and andesite to rhyodacitic flows and pyroclastics and the Akjoujt volcanic unit comprises metabasalt, locally dominated by intrusive metadolerite and metagabbro.

Figure 7.2 Regional geology of the Akjoujt area (from OMRG website)

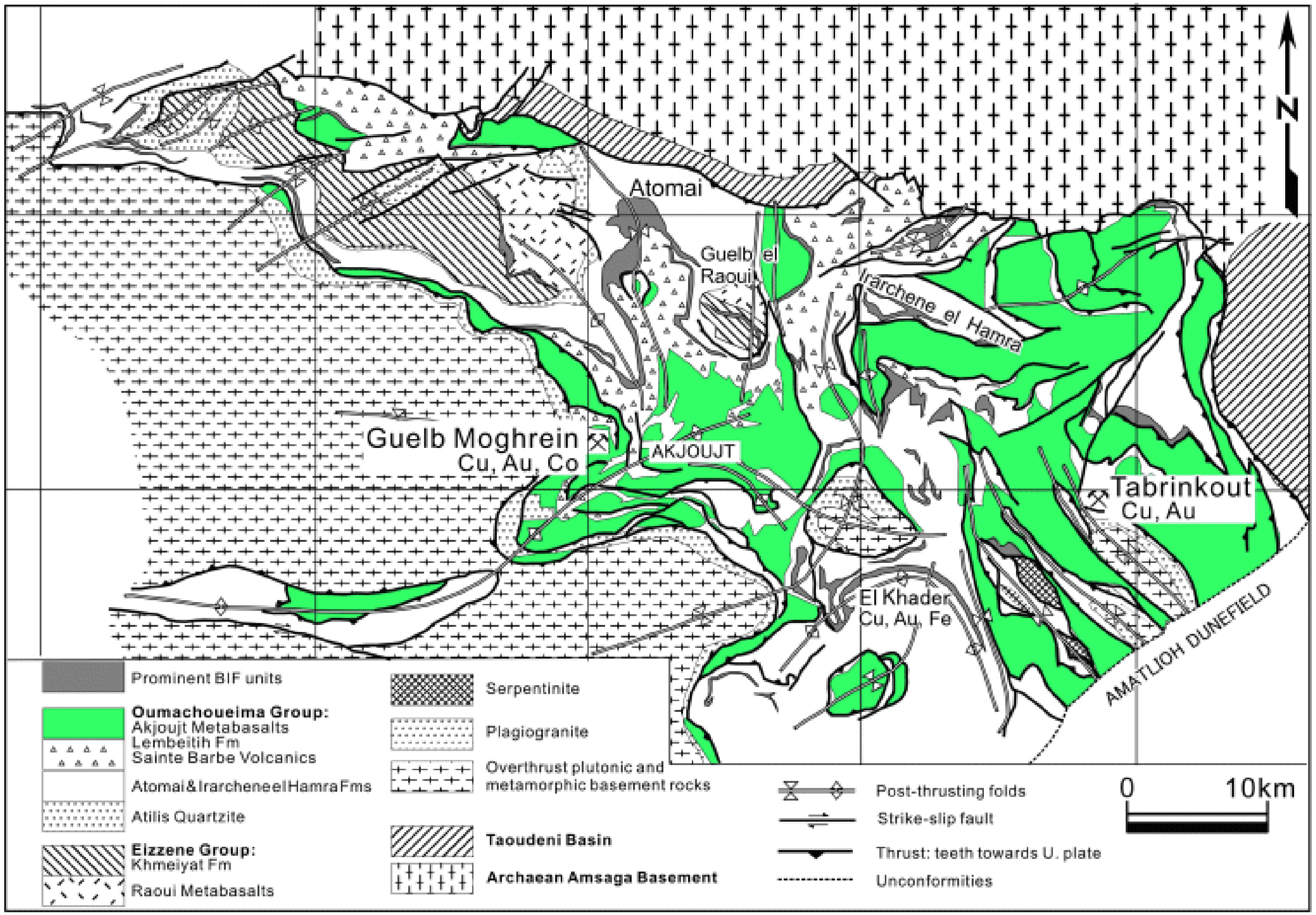
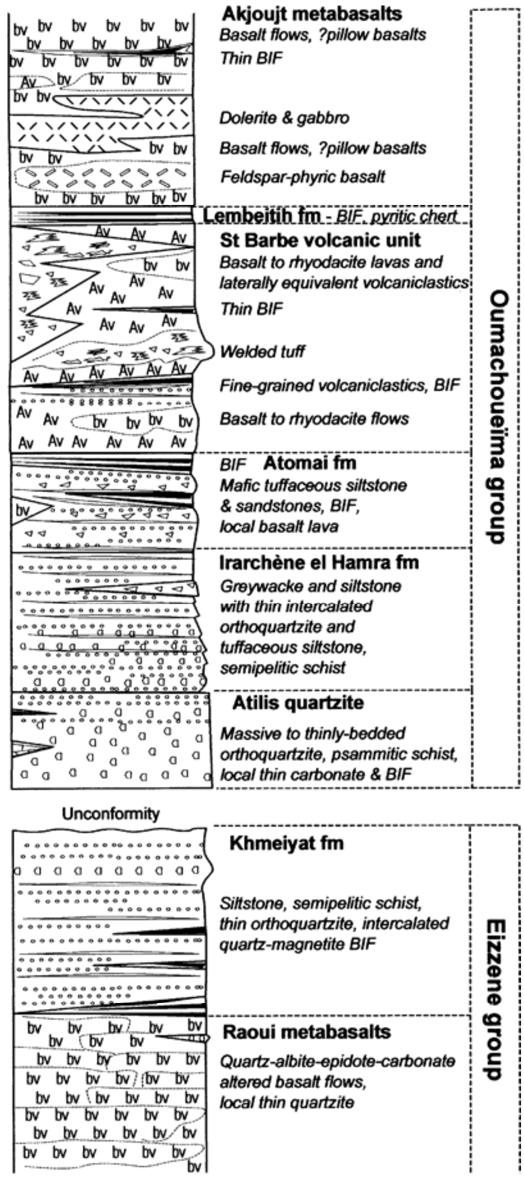


Figure 7.3 Summary of host succession to Guelb Moghrein Deposit. Deposit hosted in carbonate body within thrust Akjoujt metabasalts (Martyn & Strickland, 2004)



Four structural events have been identified which affect this succession. These are post the deposition of the Akjoujt basalts. These are detailed below and are based on the interpretation of Kolb et al (2006). The sole thrust is a late structure and carries the thrust stack across the sediments of the Taoudeni Basin. It may be associated with fold events D4 and D5.

- D2. Northeast directed recumbent folding and thrusting stacked the succession into the main thrust pile. Layer parallel schistosity and southwest plunging stretching lineations developed during this stage.
- D3. East-northeast directed thrusting dismembered the stack and generated layer parallel foliation and west to west-southwest stretching lineation.

- D4. North to northeast verging folds now control the gross outcrop pattern of the thrust sheets
- D5. Thrust stack is deformed by east-northeast directed folds with associated crenulation cleavage and minor thrusting.

Mineralisation is hosted in coarse grained iron-magnesium carbonate bodies and is considered to be associated with the D2 event as it is deformed and truncated by thrusts and foliations associated with the D3 event.

Metamorphism in the thrust sequence shows retrogression from amphibolite facies through upper and lower greenschist facies. These are represented in the metabasalts by ferropargasite-albite, actinolite-epidote-albite and finally chlorite quartz paragenesis (Kolb et al, 2006). The amphibolite and upper greenschist conditions are linked to the D2 event whilst the lower greenschist conditions are linked to D3 fabrics.

Dating of metamorphic, structural and mineralisation events in the Mauritanides is at an early stage of development. It is expected that some aspects of the geological history will be revised as additional data becomes available for both the regional setting and the local setting around Guelb Moghrein.

8 Deposit type

The Guelb Moghrein deposit is a carbonate hosted copper-gold deposit which was classified as an Iron Oxide Copper Gold (IOCG) deposit by Strickland and Martyn (2001). The mineralisation is hosted predominantly by a coarse grained ferro-magnesian carbonate (FMC) unit. The IOCG categorisation is maintained in subsequent papers by Martin and Strickland (2004), Kolb et al (2006) and Meyer et al. (2006). The main sulphide minerals are chalcopyrite and pyrrhotite with magnetite becoming abundant outside the sulphide bodies. Gold is associated with the sulphides. Other minerals include Fe-Co-Ni arsenides and Bi-Au-Ag-Te minerals. This metal and mineral assemblage is similar to those typically associated with IOCG deposits as defined by Hitzman (2002) and followed by other authors (e.g. Corriveau, 2005; Cox and Singer, 2007).

IOCG deposits form a varied group of mineral deposits, with diverse geological associations and consequently a variety of origins. The recognition of IOCG deposits as a distinct group is relatively recent, having been formalised by Hitzman et al (1992). The description and geological interpretation of these deposits is developing rapidly. Most are considered to be associated with calc-alkaline plutons, however some important examples related to alkaline or carbonatite magmatism. Current IOCG classifications are summarised in Tables 8.1 and 8.2 below, whilst Hitzman's tectonic settings are illustrated in Figure 8.1.

Table 8.1 Summary of tectonic settings of IOCG deposits based on Hitzman (2002)

Type	Characteristics and deposits
Orogenic basin collapse	Continental rift or rifted continental margin. Examples – Cloncurry District Australia, Grenville province Canada/USA, Lufillian Arc Southern Africa.
Anorogenic magmatism	Anorogenic magmatism in continental interiors. Examples – Gawler Province South Australia (Olympic Dam), Southeast Missouri.
Subduction related continental margin	Extensional environments along subduction related continental margins. Examples – Mesozoic of Northern Chile
Other possible IOCG deposits	Examples – Wernecke breccia pipes Yukon Canada, Mount Painter breccia pipes Australia, Vergoenoeg fluorite deposit South Africa, Bayan Obo Light rare earth deposit China.,

Table 8.2 Summary of IOCG classifications from Corriveau (2005)

Source → *Proximal* → *Distal*

Calc-alkaline magma

Iron Skarn-type	**Kiruna-type**	**Olympic Dam-type**	**Cloncurry-type**
Massive magnetite-garnet-pyroxene	**Massive magnetite-apatite-actinolite**	Breccia (one or more stages), magnetite-hematite matrix	Hydrothermal veins & disseminations in older 'ironstones' or FeOx mineralization
Stratabound lensoid & irregular bodies at intrusive contact	Tabular, pipe-like & irregular bodies, dykes & veins	Pipe-like & irregular bodies, vent or fault controlled	Stratabound, breccia or fault controlled
Monometallic Fe and related FeOx-Cu-Au deposits	Monometallic Fe & related Cu-FeOx porphyry deposits	Polymetallic: Fe, Cu, Au, Ag, REE	Polymetallic: Cu, Au, Ag, B., Co, W
Alteration: Sodic	Alteration: Sodic	Alteration: Potassic	Alteration: Potassic
Magnitogorsk deposit, Russia	Kiirunavaara deposit, Sweden	Olympic Dam deposit, Australia	Osborne & Starra deposits, Australia

Source → *Proximal* → *Distal*

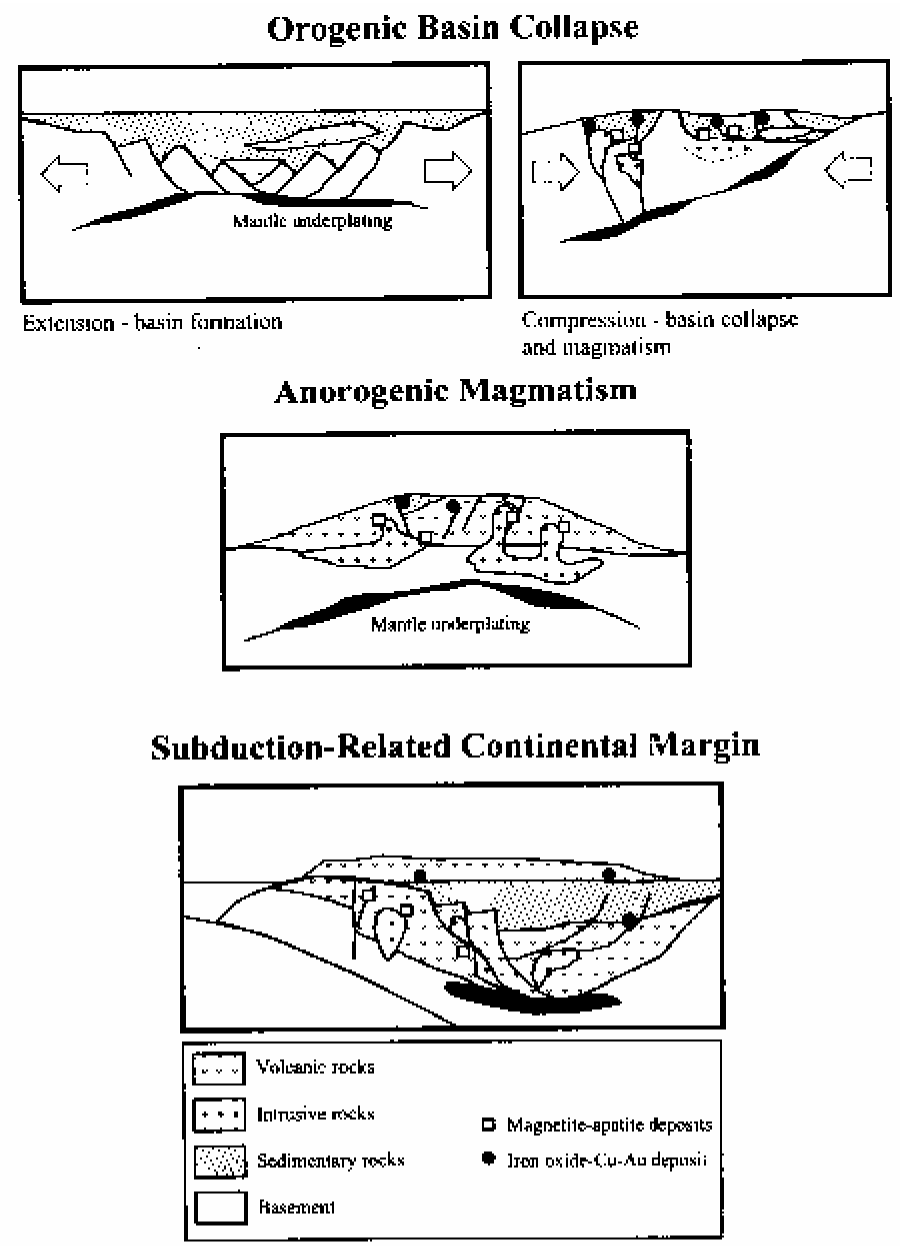
Alkaline-carbonatite magma

Phalaborwa-type	**Bayan Obo-type**
Within or marginal to intrusion	Hosted by country rock
Veins, layers, disseminations and aggregates; late intrusive phase	Veins, layers, disseminations and aggregates, stratabound lenses
Low Ti magnetite, apatite, olivine, phlogopite, carbonate, fluorite, Cu sulphides, pyrite, PGE, Au, Ag, uranothorianite, baddeleyite	Magnetite (replacive and/or pre-existing), hematite, bastnaesite, phlogopite, Fe-Ti-Cr-Nb oxides, fluorite, monazite, carbonate
Zoning in ore; Na & K alteration	Zoning in ore; Na & K alteration
Phalaborwa deposit, South Africa	Bayan Obo deposit, China

Both Hitzman (2002) and Corriveau (2005) recognise that mineral deposits with IOCG mineralogy also occur in geological settings that are not closely associated with plutonic intrusions. Hitzman (2002) describes 'Deposits associated with orogenic basin collapse' as a major subdivision of IOCG settings (Table 8.1). Corriveau (2005) follows a classification proposed by Gandhi (2003 and 2004) and includes a 'Cloncurry sub-type', which includes deposits that are distal with respect to any igneous source (Table 8.2).

As the understanding of IOCG deposits is still evolving both Hitzman (2002) and Corriveau (2005) describe deposits with IOCG mineralogy that do not readily fall in the main classification. Hitzman (2002) describes 'Other deposits which may be in the Iron Oxide-Cu-Au Family' and Corriveau (2005) 'Associated Mineral Deposits'. Some authors discuss IOCG ore fluids being related to connate fluids or brines where plutonic links are unclear or the deposits are hosted in fold and thrust belts (Haynes, 2002, Skirrow, 2002 and Skirrow and Walshe, 2002). The Guelb Moghrein IOCG deposit falls into the latter categories due to the lack of an obvious igneous association. The mineralisation postdates the volcanic sequences of the Eozzene and Oumachoueima Groups and also the minor granodiorite intrusions in the pre-unconformity Eizzene Group. It is, however, associated with the D2 thrust event in the Mauritanides, which emplaced hot metamorphic rocks onto the foreland. It is thus remote from any contemporaneous igneous activity and associated with contactonal tectonics. The latest event, the sole thrust, may have severed the mineralisation from its source region.

Figure 8.1 Tectonic settings of IOCG deposits (Hitzman, 2002)



Whilst the Guelb Moghrein deposit shares many characteristics with other IOCG deposits it lacks a direct association with contemporary igneous activity. However, the morphology of the Guelb Moghrein deposit is tectonically controlled and it appears likely that this has been a crucial factor in the formation of the deposit. As a result Guelb Moghrein can be regarded as being a structurally modified IOCG deposit which, through tectonic activity, appears to have no connection to contemporary igneous activity. Kolb et al (2006) draw a comparison with the IOCG deposits of the Tennant Creek Inlier (NT, Australia). These are also emplaced in folded and thrust sediments associated with oxide dominated ironstones and are difficult to link to significant plutonic activity (Skirrow, 2002; Skirrow and Walshe, 2002).

9 Mineralisation

9.1 General

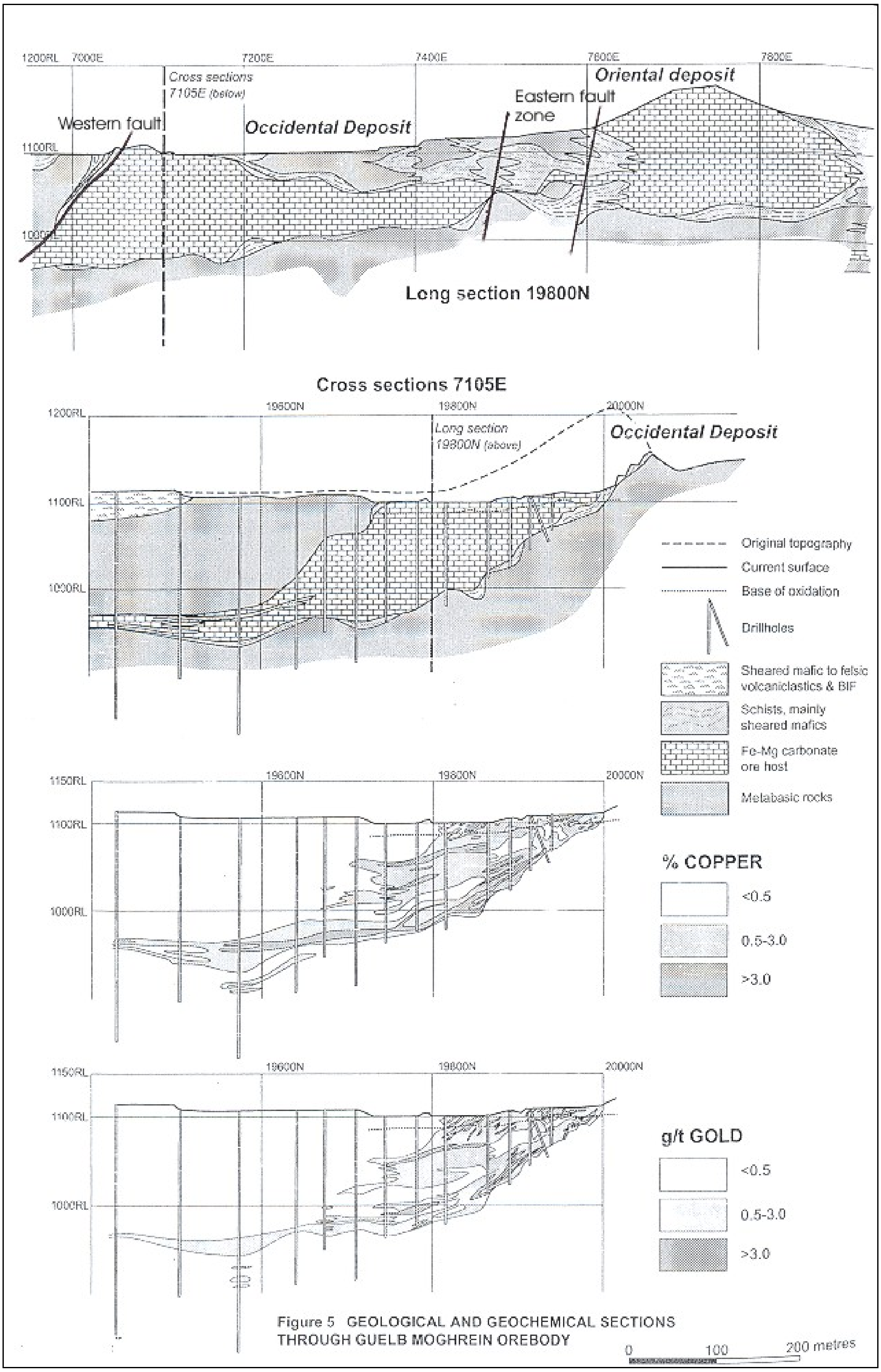
The topographic expression of the Guelb Moghrein deposit is dominated by two small hills containing the outcrop of oxidised FMC gossan in two mineralised zones, namely;

- Occidental - a tabular to lensoid shaped body which extends for 500 m to 600 m along strike and is generally between 25 m and 60 m in thickness in the east. The thickness increases to between 100 m and 150 m in the western portion of the zone. The Occidental zone strikes generally southeast - northwest and dips to the southwest at between 30 and 40 degrees. This zone has been drill tested to approximately 400 m depth and remains open below this level. The Occidental zone is bounded on the west and east by major northeast – southwest trending fault structures.
- Oriental - smaller in extent, particularly with regard to its continuation at depth. This zone appears as a trough-like structure, which may represent the keel of a syncline and which extends for about 450 m along strike and to 125 m depth. The zone is predominantly oxide material, outcropping on the Oriental hill, with limited sulphide intersections from exploration drilling. The sulphide portion of Oriental is under explored. The western side of the zone is formed by a major fault system which separates the Oriental and Occidental zones (Figure 9.1).

The Occidental deposit contains the bulk of the known mineralisation and has attracted the most exploration and mining interest. This section will focus predominantly on the mineralisation at Occidental and is based on Kolb et al (2006), Martyn and Strickland (2004), Strickland and Martyn (2002), Kirschbaum (2007) and Kolb et al (2006b).

The copper – gold mineralisation at Guelb Moghrein is spatially associated with FMC bodies and in gross terms the mineralisation is distributed throughout the FMC body (Figure 9.1). However, significant portions of the FMC body are unmineralised and mineralisation is noted in the surrounding schistose hostrocks, particularly in the footwall.

Figure 9.1 Summary geological and grade distribution sections through the Guelb Moghrein deposit after Strickland and Martyn (2002)



The Guelb Moghrein mineralisation comprises two components, the FMC hostrock and the sulphide mineralisation. Near surface material is oxidised, with secondary mineral assemblages. The oxide has been largely mined out at Occidental but remains unmined at Oriental due to lower grades.

9.2 The FMC hostrock

The FMC is composed of coarse (up to 5 cm) ferro-magnesium carbonate crystals. These lack traces of earlier structures and are interpreted to be recrystallised. In places two carbonate phases are present, early iron-rich and later magnesium-rich assemblages (Figure 9.2). Magnetite crystals and amphibole alteration accompany the carbonates.

The Occidental body forms a gently inclined lens-like deposit bounded by D2 shear zones on the upper and lower contacts (Figures 9.3 and 9.4). The Metacarbonate in Figure 9.3 represents the FMC body. Major D3 faults and shears form the western and eastern boundaries. The thickest parts of the FMC lens reach 140 m vertical thickness and taper down dip to <1 m.

Figure 9.2 Coarse-grained iron and magnesium-rich carbonates (Kirschbaum, 2007)

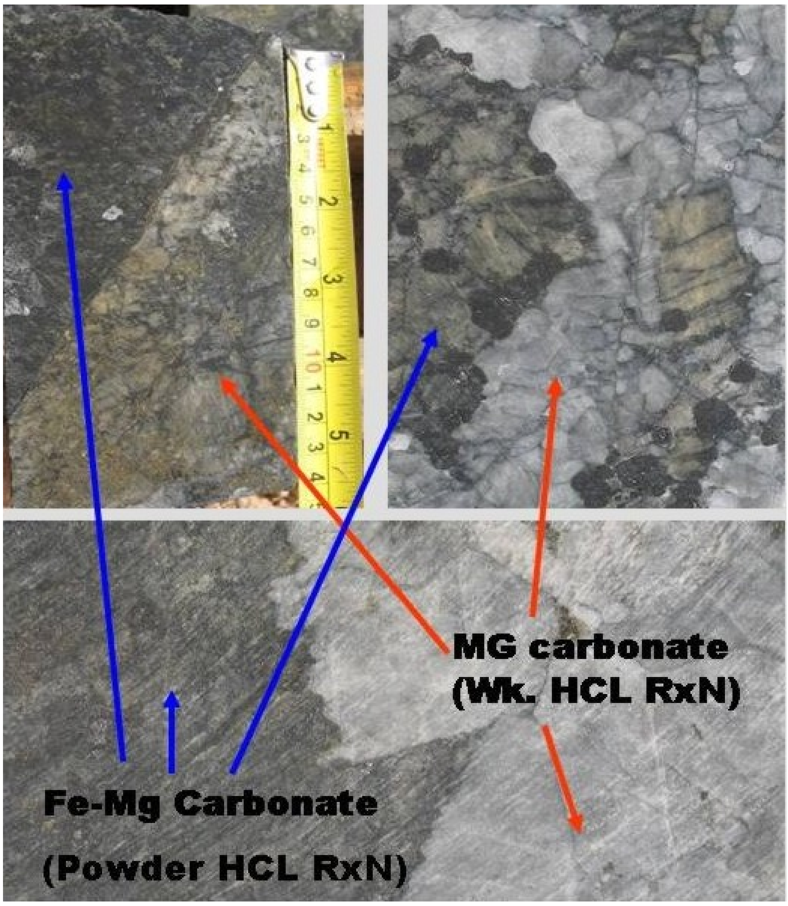


Figure 9.3 Geological map of the Occidental open pit (Kolb et al 2006)

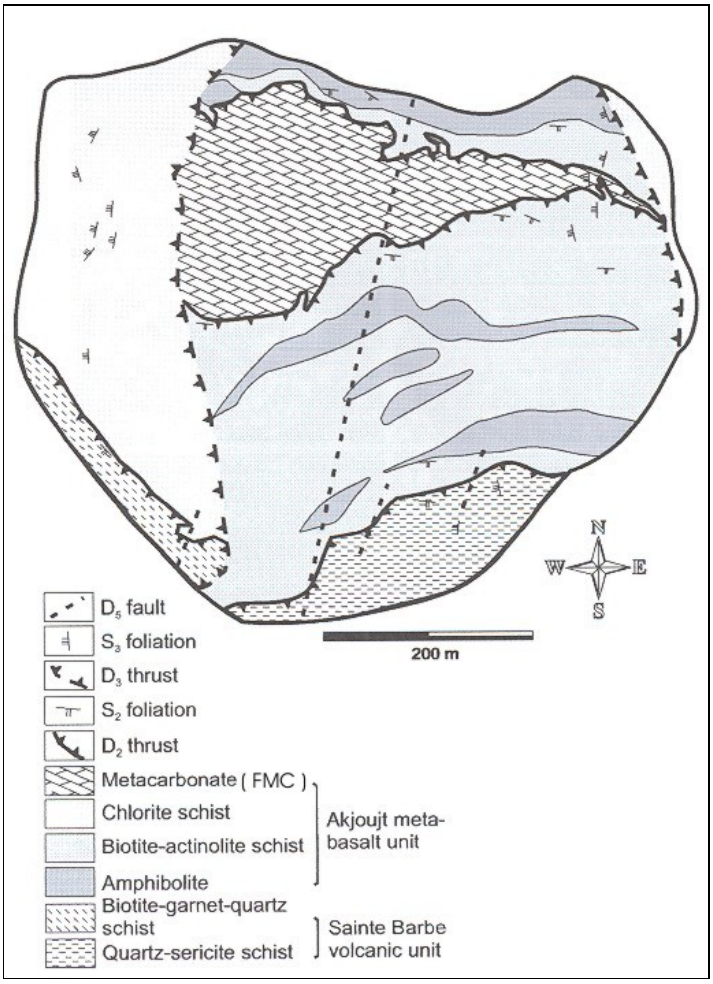
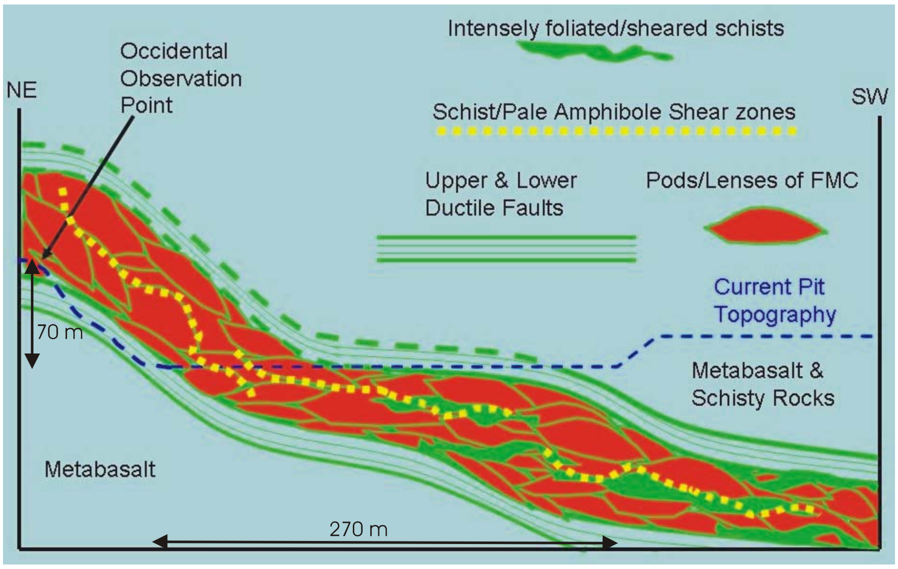
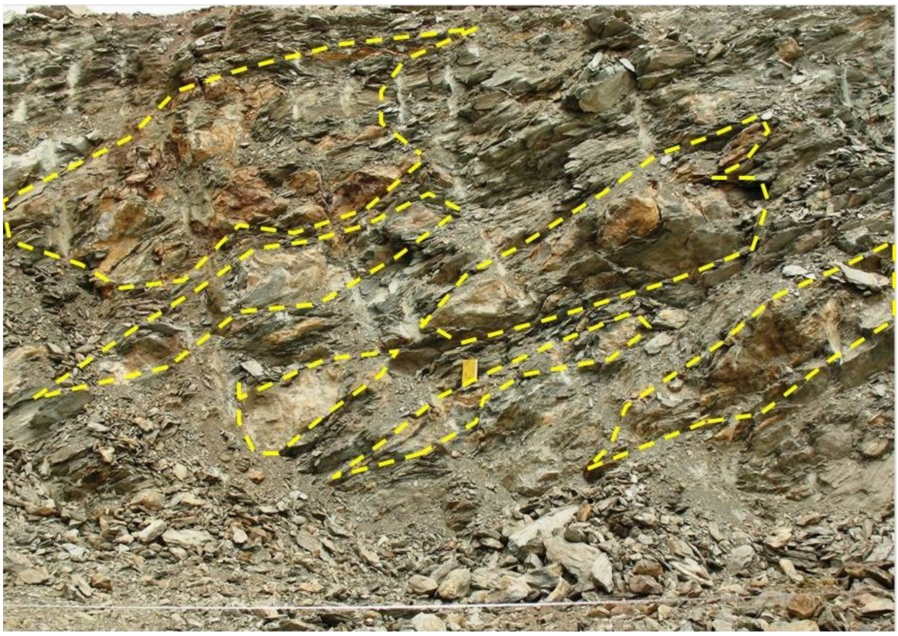


Figure 9.4 Schematic cross section and geological model of the Occidental FMC body (Kirschbaum, 2007)



Geological modelling for the current resource estimate suggests the Occidental deposit may have formed as a combination of three large FMC lenses or pods. These pods are internally dissected into smaller lenses separated by sheets of Fe-Mg clinoamphibole-chlorite schists, as illustrated schematically in Figure 9.4. The schists form thin anastomosing networks through the FMC but locally small FMC lenses are dispersed in a schist matrix, as shown in Figure 9.5 (width of view ~4.0 m). The schists contain a distinctive accessory assemblage of apatite and monazite which differentiates them from schists derived from the main volcanic sequence above and below the FMC lens. The tectonic fabrics in the schist are correlated with D2 events.

Figure 9.5 Lenses or pods of FMC (yellow outlines) dispersed in schist matrix, illustrating matrix dominated area of FMC body (Kirschbaum, 2007)



Although the contact of the FMC body with Akjoujt metabasalts is described as sharp an alteration halo extends up to 40 m above and below the bounding D2 shears. Alteration zones show Fe-Mg amphibole-chlorite alteration adjacent to contact and biotite-chlorite-calcite alteration in more distal locations (Kolb et al, 2006)

At present the origin and formation of the fault-bounded FMC body is uncertain. Iron carbonate is present in some of the sediments and BIF layers comprising the Eizzene and Oumanchoueima Groups and locally shows development of exceptionally coarse, porphyroblastic, siderite crystals. Whilst the mineralised FMC does not show relicts of sedimentary bedding or banding, Kolb et al (2006) suggest a marine origin for the siderite based on carbon isotope data. At other sites in the district coarse carbonate occurs as veins cutting bedding and in some cases cutting across early recumbent folds. The sheared nature of the internal and external boundaries of the FMC at Guelb Moghrein prevents the recognition of any such original contacts.

9.3 Copper – gold mineralisation

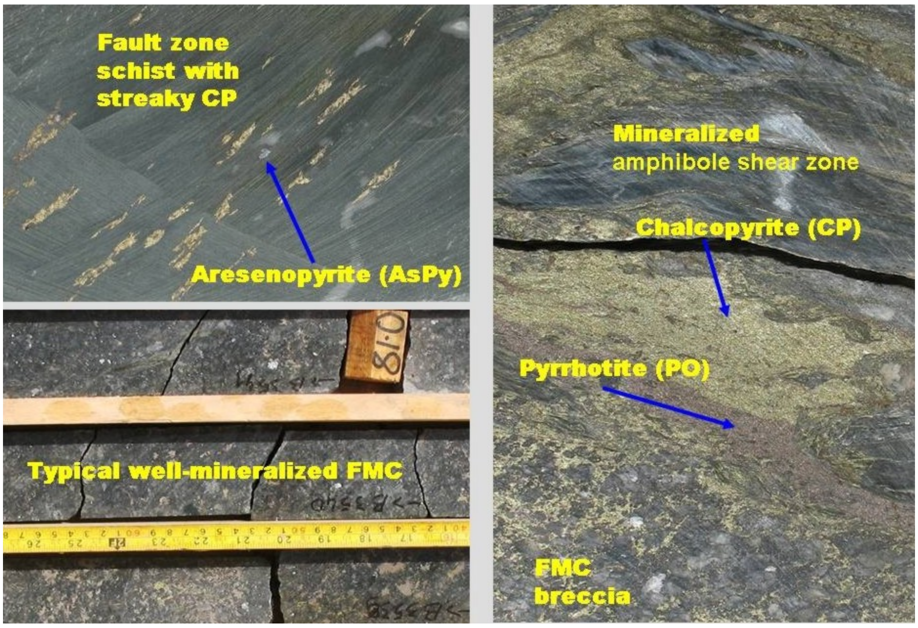
The current Guelb Moghrein deposit is represented predominantly by sulphide mineralisation as a result of the near surface oxide mineralisation being exploited during the earlier mining activity in the 1970s. Oxide mineralisation occurs near surface, generally extending down to between 30 m and 40 m below the original peneplain surface. A thin zone, generally <2 m and not exceeding 10 m, of transitional mineralisation occurs. This section will focus on the sulphide mineralisation as this represents the bulk of the remaining orebody.

Kolb et al (2006) suggest that the hydrothermal mineralisation is closely related to D_2 deformation under retrograde metamorphic conditions in the upper greenschist facies. The siderite within the FMC is considered to have provided a reactant for hydrothermal Cu-Au-Co bearing fluids. The rheological differences between the carbonate unit and the surrounding metavolcanic and metasedimentary rocks led to the localisation of mineralisation within the more competent FMC body.

The sulphide mineralization occurs predominantly within the gross limits of the FMC, although portions of FMC are sulphide poor (Figure 9.1). The magnetite distribution appears to be distinct from that of the sulphides, resulting in magnetite-rich and sulphide-poor zones within the FMC. The sulphide mineralisation is particularly well developed close to the footwall of the FMC, with minor mineralisation within the surrounding metabasic, rocks particularly in the footwall. There is evidence from hangingwall outcrops and drillhole intersections for narrow mineralised veins to extend some distance from the main FMC body.

The sulphide mineralisation appears to form discontinuous, gently inclined tabular or lenticular zones that are approximately parallel to the D2 thrust zone. In general the sulphide mineralisation is of a disseminated type with smaller scale patches (up to 1m scale) of more massive mineralisation. Matrix and clast supported FMC fragments within the sulphide clearly show that sulphide mineralisation postdates the FMC (Figures 9.6 to 9.8). The morphology of the mineralised zones is distinct from that of the FMC, and sulphide mineralisation is observed within the Fe-Mg amphibole schists that separate individual FMC lenses. Sulphide rich domains show both sharp and gradational boundaries on a decimetre scale (Figures 9.6 and 9.7).

Figure 9.6 Sulphide mineralisation styles shown in core (Kirschbaum, 2007)[4]



The distribution of mineralisation based on assay data shows two domains of sheet-like mineralisation (Figure 9.1), an extensive sheet of Cu-Au mineralisation parallel to the footwall, and mineralisation within the FMC body that forms internal lensoid zones.

The gross internal features of the sulphide ores are variable in character over short distances. Sulphide-rich bodies may be all chalcopyrite, mixed chalcopyrite and pyrrhotite, or show chalcopyrite and pyrrhotite dominated domains on the decimetre scale (Figures 9.6 to 9.8). Sulphides are diluted by enclosed FMC clasts or dispersed as fracture fills of shattered rock in the FMC hosted bodies. They also occur as dispersed small lenticular bodies in the schist layers (Figure 9.6).

Chalcopyrite and pyrrhotite grains are coarse, 1 – 10 mm, and equant in the bulk of the sulphide rich domains (Figures 9.6, 9.7 and 9.8). Pyrrhotite occurs as small (< 50 micron) exsolution lamellae of troilite and pentlandite. In FMC breccia domains sulphide grains or aggregates are constrained within the pores or fractures and occur as networks. These areas show little evidence of penetrative deformation damaging the rock fabric. Localised areas show evidence of deformation and streaky or foliated textures (Figures 9.6, 9.7 and 9.8).

[4] Massive sulphide with discrete chalcopyrite and pyrrhotite domains passing into FMC breccia with chalcopyrite matrix (Right). Schist layers with small bodies of disrupted chalcopyrite and minor arsenopyrite (Top Left).

Figure 9.7 Sulphide mineralisation from drillhole PL 06 [5].

Figure 9.8 Sulphide mineralisation from drillhole Pl 13 [6].

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[5] Massive sulphide bodies showing sharp and gradational boundaries, granular texture, and local centimetre scale layering. Sulphides filling fractures and pore space between FMC. Non foliated and foliated contacts between sulphide bodies and host.

[6] Chalcopyrite showing sharp and gradational boundaries against brecciated FMC. FMC clasts <5 mm abundant in sulphide rich zone. Sulphide poor areas show sulphide and dark minerals along anastomosing fracture net in FMC. Some network fill sulphides and smaller FMC clasts appear streaked and deformed.

The individual sulphide bodies are cut and locally bounded by shear zones (Figure 9.7 and 9.8). Small sulphide bodies in the amphibole-chlorite schists are elongated and possibly deformed (Figure 9.6). The gross outlines of both the FMC and the mineralisation are truncated by the major eastern and western boundary D3 fault zones. These show that mineralisation was an early event and possibly synchronous with part of the D2 deformation and associated metamorphism. It is not clear how much these shears disrupt the original form and continuity of the individual sulphide bodies.

The generation of extensive fracturing and void space in the FMC, synchronous with development of shear zones and foliations, is interpreted by Kolb et al (2006a, 2006b) to be the result of extreme contrast between ductile amphibole bearing schists and brittle iron rich carbonates under metamorphic conditions. This scenario is illustrated on a smaller scale by the FMC lens surrounded by more ductile schists in Figure 9.9.

Figure 9.9 Small ±1m length FMC pod within schistose metavolcanics, illustrating the competency contrast between the rocktypes

9.3.1 Mineralogical studies

The predominant sulphide minerals are chalcopyrite and pyrrhotite. These, however, carry a complex assemblage of minor mineral phases, including native gold, arsenopyrite, Fe-Co-Ni arsenide, cobaltite, uraninite and Bi-Au-Ag-Te minerals. Chlorite, magnetite and Fe-Mg clinoamphibole are common and accessory apatite, monazite and xenotime are reported. Graphite is also present and was observed as coatings on fracture and fault surfaces during the 2007 site visit.

Diverse assemblages such as these are distinctive features of the IOCG deposits. The significance of graphite is uncertain as IOCG are generally considered to result from oxidised hydrothermal fluids. However, Corriveau

(2005) refers to a graphite bearing iron sulphide-copper deposit in a discussion of IOCG associated mineral deposit types. The occurrence of the graphite on fracture surfaces suggests that this may be a post mineralisation feature.

Systematic variation is reported for magnetite and Fe-Mg clinoamphibole, which increase with increasing content of FMC clasts. Variation in the minor mineral components is not described, although the assay data shows broad correlation between copper and gold-rich mineralisation (Figure 9.1). There is a poor correlation between arsenic and both copper and gold. The limited assay data available for nickel and cobalt shows a good correlation. Magnetite-rich zones are reported near the footwall and hangingwall contacts (Kolb et al, 2006b).

Mineralogical studies of selected core samples carried out by Ashford Metallurgical Laboratory (AML) on behalf of Charter Consolidated are reported in the MDM's Project Engineering Report (MDM, 2004). Their conclusions were as follows:

- The ore consists of chalcopyrite and cubanite in pistomesite (Mg-rich siderite), magnetite and pyrrhotite.
- The ratio of chalcopyrite to cubanite varies between 3:1 and 9:1, averaging 5.5:1.
- 95% liberation of copper minerals occurs at 104 microns, with the unliberated copper minerals occurring as intergrowths with magnetite and other gangue.

Studies of some cobalt rich samples by Amdel (1995) concluded that the cobalt present largely occurs in cobaltite.

The occurrence of gold has been reported in a limited number of studies, including the following:

- The AML study reported gold to occur as free gold, electrum and sylvanite or associated with carbonate gangue and not associated with arsenopyrite (MDM, 2004).
- A study of a panned concentrate was carried out by Amdel for Triangle Exploration in 1995, based upon a composite sample on four 1 m samples from four different RC holes. Two samples were from the oxide zone and two from sulphide (Amdel, 1995). The non-magnetic 20 μm to 1.4 mm fraction was separated in a Superpanner to allow identification of any gold particles present. Twenty five gold particles ranging in size from 0.2 mm by 0.1 mm up to 1.0 mm by 0.8 mm were identified in the panned concentrate, confirming the presence of some coarse gold. No gold particles were observed in the +1.4 mm fraction. As the panned concentrate is derived from a composite it is not possible to define whether the coarse gold occurs uniformly within the oxide and sulphide samples or is specific to one domain.
- A mineralogical study of four polished sections of four high density (>3 t/m3) part crushed ore samples was performed by Roger Townsend and Associates in 2004 on behalf of FQML. This study reported two examples of gold in one of the samples, namely a 150 μm particle of electrum (27% Ag) with a little magnetite attached, and a 10 μm low silver

gold particle in magnetite (Independent Metallurgical Laboratories (IML), 2004).

The presence of conspicuous amounts of a fibrous amphibole mineral (FAM) within and adjacent to the mineralised zone has raised concerns about a possible asbestos health hazard. The AML study reported that asbestos comprised approximately 3% by volume of the sample examined and the mineral was identified as amosite.

Samples of what is probably the same mineral were also examined by Roger Townsend Associates on behalf of FQML as reported by IML (2004). This study of three samples concluded that the mineral is an unusual composition anthophyllite. Kolb et al (2006) identify grunerite as a component of the biotite, chlorite and calcite alteration within the 40 m wide alteration halo around the contacts of the FMC.

MCM is aware of the potential health hazards of FAM and has established routine safety procedures for all staff working in the open pit, plant, laboratory and other potentially hazardous areas. This includes the provision of respirators as part of the personal protective equipment issued to staff and the prominent placement of warning signs around the site.

9.3.2 Oxide mineralisation

During the Snowden site visits exposures of oxide mineralisation were inspected. The oxide mineralisation is characterised by green and blue secondary copper minerals on fractures in generally massive oxidised FMC forming an ironstone gossan. The ironstone was generally very dark in colour, quite dense and highly magnetic. In some outcrops residual carbonate minerals could still be recognised within the ironstone.

As a brief summary of the oxide mineralisation the findings of mineralogical studies carried out on two composite oxide ore samples (Lakefield, 1997) included the following:

- the samples were dominated by magnetite and siderite, with moderate amounts of haematite and goethite and one unidentified mineral
- non-opaque minerals present included siderite, dolomite, quartz, amphibole, talc, chlorite and mica
- iron oxide/oxyhydroxide mineral present included magnetite, haematite and goethite
- copper mineralisation in one of the samples was dominantly contained in chalcopyrite (65-70%) with lesser amounts of chalcocite, covellite, cuprite, malachite, native copper and possible cubanite
- the other sample contained a higher proportion of oxidised copper phases and was dominated by native copper (35-40%), malachite (20-25%), cuprite (20-25%) and chalcocite (15-20%) with trace chalcopyrite, covellite and bornite.

The location(s) from which these two samples were obtained is not indicated in the Lakefield report. The high proportion of chalcopyrite in one of them suggests that it may in fact represent a sample of transitional material.

Earlier studies (Amdel, 1995) indicated a sharp change from oxide to sulphide mineralisation in a vertical sequence of samples taken from one of the holes drilled for metallurgical purposes. This generally sharp change from oxide to sulphide was confirmed from the visual inspection of the core from the 2006 infill drilling programme during the 2007 site visit. The presence of minor chalcocite at the base of the transitional mineralisation was interpreted as representing minor supergene mineralisation.

10 Exploration

Exploration prior to FQML's acquisition of Guelb Moghrein is summarised in Section 6.2.

In early 2004 FQML undertook 4985 m of reverse circulation drilling within a 4 km radius of Guelb Moghrein. A total of 31 boreholes were drilled on targets based on the following criteria;

- the presence of a strong magnetic anomaly
- the presence of a supporting electro-magnetic anomaly
- the presence of surface indications of copper mineralisation

The results were negative and no further drilling was planned at that time. A short mapping programme was also undertaken near the mine during 2004. The geophysical anomalies were identified during survey work undertaken in 2002 prior to FQML acquiring Guelb Moghrein.

In February 2007 MCM re-commenced exploration on the Guelb Moghrein exploration licences. For logistical reasons this is focused on the areas on and surrounding the mining concession and in particular the Kadeiat El Ajoul concession (197/B2, Figure 4.6). MCM has recruited field geologists and commenced exploration operations. In April 2007 Spectral Geophysical commenced gradient and dipole- dipole array IP surveying work over areas of known magnetic anomalies within ~25 km radius of Guelb Moghrein. A drilling contractor was mobilised to Guelb Moghrein in September 2007 and core drilling commenced during the same month. Drilling is focussed on an infill programme around the Occidental open pit and on drill testing geophysical anomalies defined during the recent survey work.

11 Drilling

11.1 Pre 2006 drilling data

The exact dates of the earlier drilling are somewhat uncertain and are not recorded in the available digital databases. During the Snowden 2005 site visit the details of the operators responsible for several different groups of holes were obtained from a drillhole location plan dating from 1973. This information has been used to split up the earlier drilling into different campaigns as presented in Table 11.1.

Within the northern part of the Occidental pit the drill spacing approximates a 35 m by 35 m grid. Further to the south the continuation of the deposit at depth has mainly been evaluated on a 70 m by 70 m grid. The drilling grid is based on the mine coordinate system which has the grid north axis oriented at an azimuth of 31 degrees 30 minutes east of UTM grid north. Mine elevations are specified in metres Reduced Level (mRL) based on sea level plus 1000 m. The 1973 drillhole location plan indicated several drillholes which are not stored in the current digital database and the sites for two of these were noted in the field by Snowden in 2005. The reasons for these drillholes not being included in the database are unknown.

Figure 11.1 Satellite image of the Guelb Moghrein property showing the 2005 pre MCM mining pit (left centre), dumps (pale colours), plant site (top right), and pre 2006 drillhole collar locations (yellow dots) – UTM grid (width of view 1.4 km)

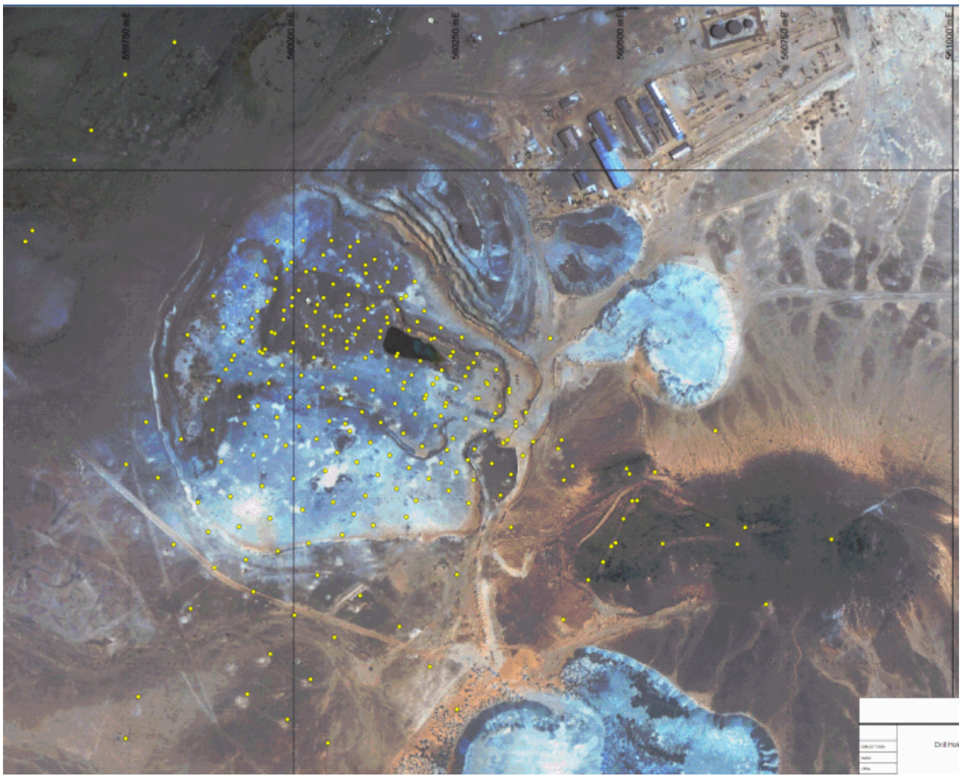


Table 11.1 Summary of pre 2006 exploration and evaluation drilling database for Guelb Moghrein

Dates	Company	Type of work	Hole numbers	Number of holes	Length drilled (m)	Average depth (m)
DEPOSIT EVALUATION DRILLING						
Pre-1968 1968 -1973	MICUMA SOMIMA	Diamond drilling Diamond drilling	A3, B0, B1, Shallower holes on letter/number based grid AB4.5, J2, I2,.. Infill and deeper holes on letter/number based grid	98	16,035	164
Mid-1970s ?	SOMIMA ?	Diamond drilling ?	13_2, 13_3, …21_1	9	288	32
Mid-1970s ?	SOMIMA ?	Diamond drilling ?	36, 37, 38 …55	12	1,286	107
Mid-1970s ?	SOMIMA ?	Diamond drilling	C11 to C30	20	3,101	155
1994-1995	GGI	RC drilling	RCGM1 to RCGM105	105	6,107	68
1994-1995	GGI	Diamond drilling – evaluation	"Tails" of 18 of the RCGM holes	(18)	1,055	59
1994-1995	GGI	Diamond drilling - metallurgical and geotechnical	DCGM-1 to DCGM-8 and DDTD-1 plus DDTD-2	10	468	47
1997	GGI	RC drilling - Grade Control	GC1 to GC314 - grade control holes in base of current pit	314	6,766	22
2004	FQML	RC drilling – validation	FQM001, FQM002, FQM017	3	325	108
SUB-TOTAL				**571**	**35,431**	**62**
EXPLORATION DRILLING						
1997	GGI	RC drilling – exploration	97*	27	1,850	69
2004	FQML	RC drilling – exploration	FQM003 to FQM031 (excluding FQM017)	28	4,660	166
SUB-TOTAL				**55**	**6,510**	**118**
OVERALL TOTAL				**626**	**41,941**	**67**

The pre-2006 drilling campaigns focussed on the copper potential of the Occidental zone. Figure 11.2 shows the spatial distribution of copper grades from the drilling in relation to the limits of the FMC on a typical transverse cross-section through the centre of the Occidental zone. Figure 11.3 shows the gold grades on the same section. The different sample intervals and incomplete sampling for gold can be noted in some of the older holes on the left-hand side of this figure.

Figure 11.2 Transverse section 7210E showing downhole copper grade histograms, key geological boundaries and the current ultimate pit design

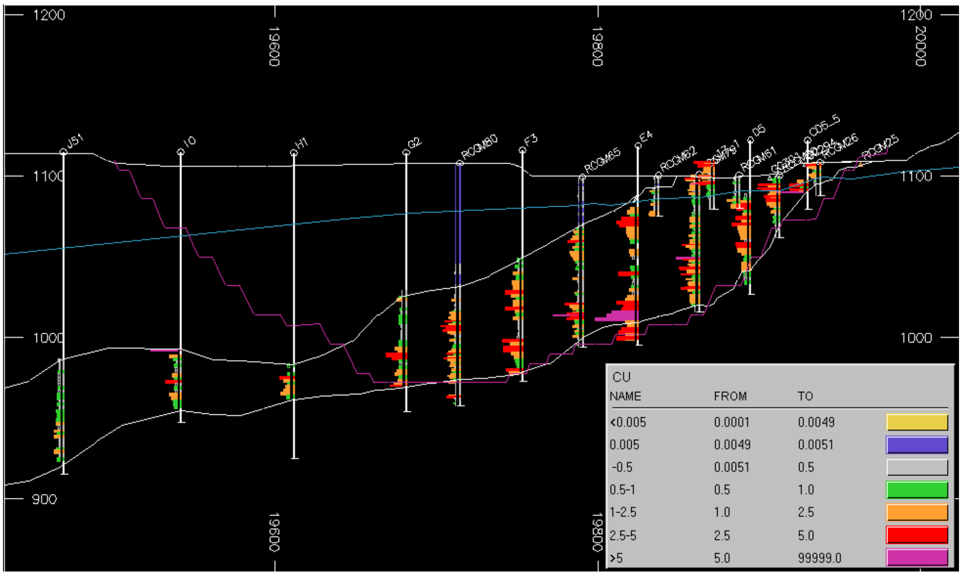
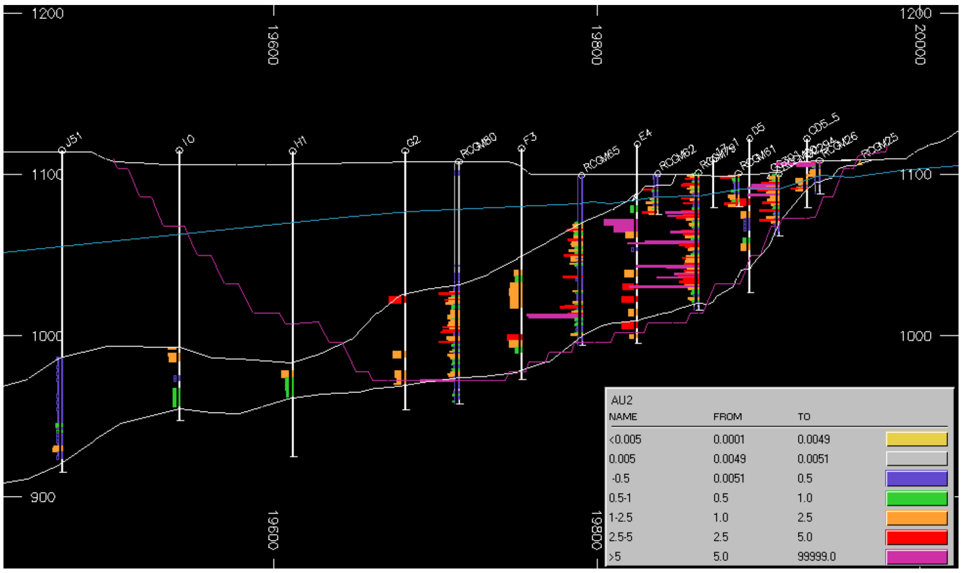


Figure 11.3 Transverse section 7210E showing downhole gold grade histograms, key geological boundaries and the current ultimate pit design



11.2 2006 drilling programme

Due to the uncertainties associated with the age, QAQC procedures and audit trails for the older drilling data collected in the pre-1990 period, Snowden recommended that a confirmatory drilling programme be undertaken (Snowden 2006a, 2006b). As a result a total of 28 core drillholes, totalling 4011 m, were drilled between June and September 2006. These vertical drillholes are located in and around the perimeters of the Guelb Moghrein open pit. Where possible the core size was maintained as HQ throughout. A total of 2047 copper, gold and arsenic assays were undertaken at two independent laboratories – SGS Mineral Services, Lakefield, Canada and Genalysis Laboratory Services Pty Ltd, Australia. The location of the 2006 drillholes is shown on Figure 11.4, and the drilling information is summarised in Table 11.2.

A portion of this drilling was for twin hole purposes and deepening of existing Reverse Circulation (RC) intersections which had stopped within the FMC unit. A summary of the twin hole drilling is presented in Table 11.3.

Table 11.2 Summary of the 2006 confirmatory drilling programme[7]

Drillhole	Y Collar	X Collar	Z Collar	Length (m)	FMC top (m)	FMC base (m)	FMC thickness (m)
PL001	19,819.74	6,994.80	1,098.26	128.80	48.96	117.00	68.04
PL002	19,680.34	7,035.02	1,097.13	194.80	31.42	188.00	156.58
PL003	19,642.88	7,072.78	1,104.67	177.10	92.68	152.20	59.52
PL004	19,609.34	7,106.14	1,105.75	221.70	128.62	175.49	46.87
PL005	19,683.53	7,170.43	1,098.68	158.80	65.38	136.84	71.46
PL006	19,644.02	7,209.33	1,106.28	153.00	97.75	142.59	44.84
PL008	19,753.10	7,280.31	1,097.52	127.80	56.52	119.21	62.69
PL010	19,773.63	7,342.36	1,100.92	110.50	57.56	99.32	41.76
PL011	19729.95	7,391.34	1,108.41	122.70	68.05	111.67	43.62
PL012	19,808.73	7,383.39	1,107.09	101.00	43.30	95.18	51.88
PL013	19,734.44	7,419.55	1,108.85	129.20	102.00	111.86	9.86
PL014	19,751.40	7,441.25	1,109.69	104.90	87.59	94.00	6.41
PL015	19,794.76	7,458.58	1,117.01	124.00	47.23	93.29	46.06
PL016	19,799.00	7,482.70	1,118.03	89.30	54.27	76.30	22.03
PL018	19,771.23	6,994.60	1,097.58	158.10	66.32	140.75	74.43
PL019	19,644.20	7,139.80	1,106.46	155.70	98.93	141.40	42.47
PL020	19,744.36	7,315.60	1,099.33	123.00	61.75	107.32	45.57
PL021	19,800.08	7,434.04	1,116.24	125.50	46.77	98.48	51.71
PL022	19,865.65	7,405.62	1,100.89	69.00	2.53	63.00	60.47
PL023	19,751.72	7,000.05	1,097.71	156.00	61.71	139.90	78.19
PL024	19,630.07	6,999.82	1,096.72	192.10	76.11	115.67	39.56
PL025	19,615.05	7,034.63	1,097.66	210.00	130.24	157.38	27.14
PL026	19,646.32	7,173.52	1,106.71	152.70	99.76	143.44	43.68
EXPL01	19,690.00	7,485.00	1,115.00	159.10	123.18	123.95	0.77
EXPL02	19,650.00	7,535.00	1,120.00	186.00	145.60	175.53	29.93
EXPL03	19,770.00	7,640.00	1,130.00	179.50	116.95	119.64	2.69
EXPL04	19,700.00	7,575.00	1,125.00	30.60	0.00	30.60	30.60
EXPL05	19,800.00	6,940.00	1,100.00	170.00	83.05	131.91	48.86

[7] Coordinates in mine grid format

Figure 11.4 Locations of the 2006 confirmatory drilling programme drillholes in relation to the Guelb Moghrein pit (width of view 1.0 km)

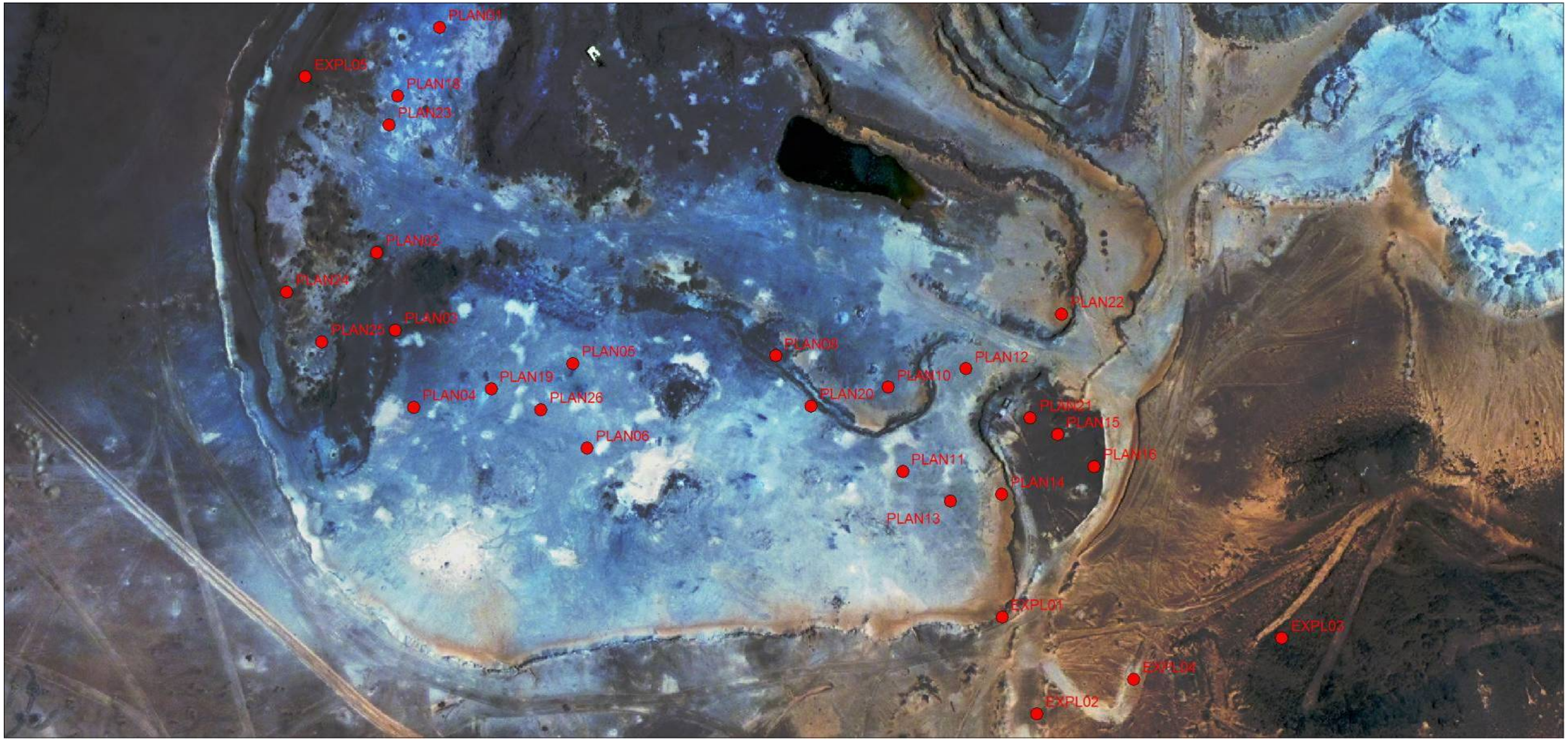


Table 11.3 Summary of twin drillholes from the 2006 drilling programme and earlier drilling phases.

2006 drilling					Original drilling					Comments
Drillhole	**Logged FMC (m)**	**Interpreted FMC unit (m)**	**Cu %**	**Au g/t**	**Twinned hole**	**Logged FMC (m)**	**Interpreted FMC unit (m)**	**Cu %**	**Au g/t**	
PL 14	9.86	14.00	1.77	1.16	52	33.75	15.60	2.22	0.31	Bh 52 sampling incomplete (12.25m)
PL 01	68.04	70.12	0.98	0.86	B1	61.50	76.80	0.67	0.67	Missing sampling at top (62.2m sampled)
PL 23	60.47	90.37	0.30	0.34	C0	23.10	90.30	-	-	Bh C0 poorly sampled
PL 26	43.68	45.68	1.57	1.26	G1	46.00	46.70	1.38	0.61	
PL 08	62.69	65.00	0.78	0.93	G4	64.00	64.00	0.90	0.60	Missing sampling at base (61.0m sampled)
PL 02	68.04	155.58	0.28	0.38	RCGM67	0.00	35.00	-	-	RC hole not drilled to full FMC depth
PL 05	71.46	74.00	1.25	0.63	RCGM78	1.00	18.00	-	-	RC hole not drilled to full FMC depth
PL 19	42.47	52.85	1.11	0.49	RCGM91	48.00	54.00	0.94	0.57	
Average[8]			1.24	0.94				1.22	0.55	

[8] Average of comparable intersections PL014/52, PL001/B1, PL026/G1, PL008/G4 and PL019/RCGM91

In general a very good geological correlation between the original drilling, original FMC wireframe interpretation and the new drilling is seen. This serves to confirm the overall accuracy of the original geological logging. Certain areas of discrepancy are noted, particularly with the RCGM series of RC drilling. Comparison between the RC drilling and the new core drilling using Datamine showed that the FMC wireframe boundaries appear to have been underestimated. This has resulted from the misinterpretation of mixed FMC / metabasalt units in the RC drill chip logging. In some cases this mixed zone is clearly mineralised. The example in Figure 11.5 illustrates new core hole PL 19 (on the left) and RCGM91 (on the right). The white line represents the original FMC wireframe interpretation and the red the new Snowden interpretation. Based on the new core drilling, the lower contact of the FMC/mineralisation boundary is interpreted to extend into the footwall. Such discrepancies from RC drilling are not unusual as the geological logging is based on rock chips rather than whole core.

Figure 11.5 Example of 2006 drillhole (PL19) and twin hole (RCGM91) from the RCGM phase (2004 – 2005)

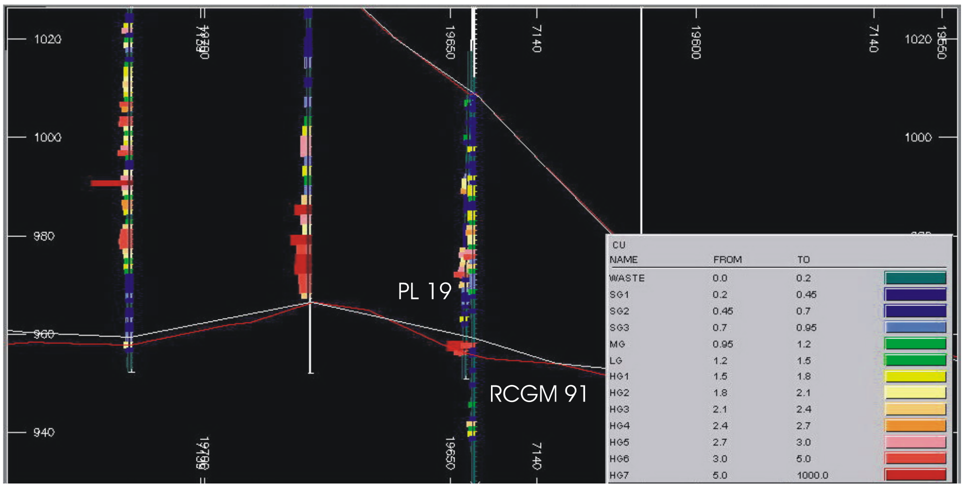


Figure 11.6 Example of 2006 drillhole (PL 26) and twin hole (G1) from the older series core drilling

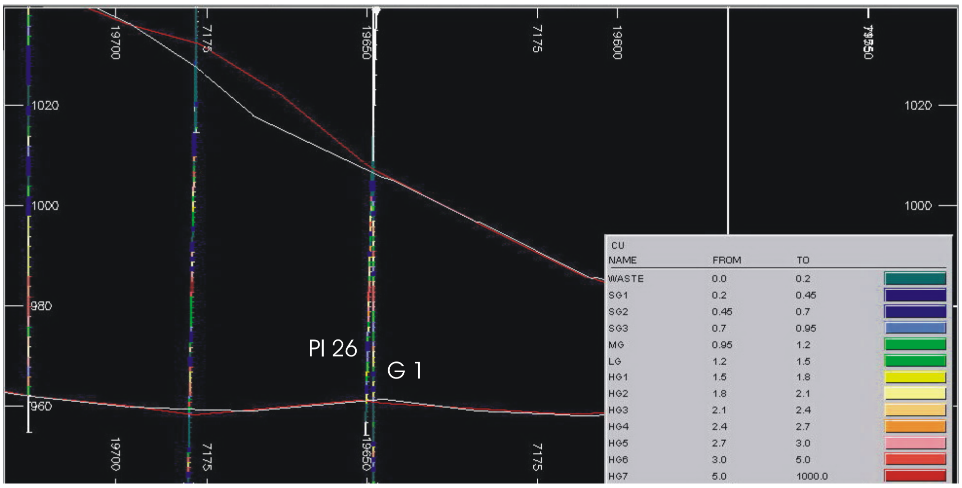


Figure 11.6 illustrates the comparison between the two generations of core drilling. In this case the geological boundaries show a very close correlation.

Comparison of average grades from the twin holes detailed in Table 11.3 shows a wider variation. Because of the lens-like nature of the FMC hostrock and variability of the sulphide mineralisation (comprising both disseminated and massive styles, which vary in distribution over short distances), short range grade variability is expected (Figures 9.6 to 9.8). It should also be noted that the sampling of the original drilling was not complete for the full intersection thicknesses within the revised geological and mineralisation wireframe. The average copper grade for the five boreholes compares well at 1.22% Cu for the old drilling and 1.24% Cu in the new drilling. Gold averages show a greater variation at 0.55 g/t Au and 0.94 g/t Au respectively. Whilst this variation is a concern the clustering of fine gold particles to form a pseudo nugget effect is a potential explanation (See Section 14.4.2).

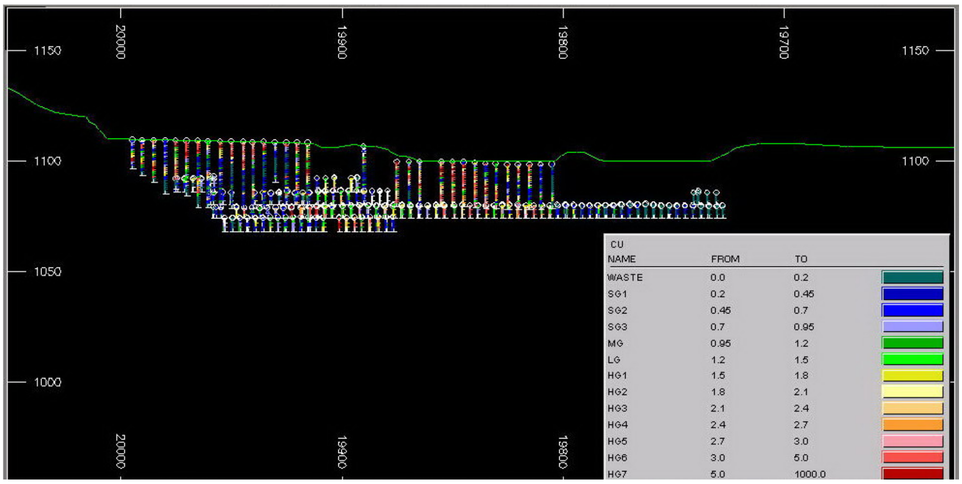
The twin holes were designed to confirm the suitability of the older drilling for resource estimation purposes. Despite the twin holes representing a small proportion on the drilling database, Snowden believes that the small scale variations between adjacent drilling results reflect the geological variability of the Guelb Moghrein deposit and as a result can be used in the resource estimation process.

11.3 Grade control drilling

Two sets of grade control drilling data were available, all of which is located on the northern side of the Guelb Moghrein pit. A series of 314 grade control holes were drilled by GGI in 1997 in the Guelb Moghrein open pit (GC1 to GC314: Table 11.1). This close spaced RC drilling with an average depth of 22 m was treated separately to the evaluation and exploration drilling for resource evaluation purposes. These drillholes cover predominantly the oxide portion of the Guelb Moghrein pit and are seen on Figure 11.7 with collars on the pre-MCM mining surface.

During the Snowden 2007 site visit the current MCM grade control database was obtained. As there were numerous unsampled drillholes in the original database the data was edited by Snowden to produce a revised database of drillholes containing valid assay samples. The MCM grade control drilling is on a closely spaced grid of approximately 3.75 m by 3.75 m with an average hole depth of 6.95 m. All of the MCM grade control drillholes were assayed through the Guelb Moghrein site laboratory. These drillholes were drilled by MCM as the mining operation advanced and show the gradual advance of the open pit cover with collar positions below the pre MCM mining surface on Figure 11.7.

Figure 11.7 Section 7110E showing the location of GGI and MCM grade control drilling in relation to the pre MCM mining topographic surface.



11.4 Surveys

11.4.1 Pre-1990 drillholes

No details of the surveying methods used to locate the pre-1990 drillholes are available. An Appendix to the 1997 feasibility report (McGay, 1995) indicates that the present coordinates for the drillholes were derived by transforming coordinates to a different grid (referred to as the SAMIN, interpreted to be based on the Mauritanian National Grid). McGay states that the new coordinates for the old drillholes "were computed to fit the 'Sections', so that they were evenly distributed from the new Eastings". He notes that "this method ensured that they were uniformly distributed about the new Easting cross-sections."

No downhole survey information is recorded for the pre-1990 drillholes, and they are all assumed to be vertical, with the exception of C26 and C27 drilled at -70° on the Oriental hill. Given that the geology and grade data obtained from these holes correlates well with the more recent surveyed drilling results this appears to be a reasonable assumption. It is, however, quite likely that the pre-1990 drillholes will have deviated slightly from the vertical before the end of the hole, resulting in uncertainty associated with the location of these sample intervals. The 2006 confirmatory drilling programme confirms that slight downhole deviations do occur; however, the effects are relatively small (Figures 11.5 and 11.6). As a result the effect of assuming the pre-1990 drillholes to be vertical is considered to be small.

11.4.2 GGI drillholes

Strickland (1999) provides the following information concerning surveying during the GGI evaluation drilling:

- All drillhole collar locations were surveyed on "local mine grid", for 3D coordinates and orientation (as applicable).
- All drillhole collar elevations were surveyed for "local mine grid" Reduced Levels (Mean Sea Level plus 1000m).

- No downhole surveys were undertaken and all but two of the GGI holes were vertical. The two exceptions were RCGM97 (-70°) on Occidental and RCGM100 (-50°) on Oriental.
- Surface topography control was based on mine survey DTM.

11.4.3 Underground workings

Mine workings dating from 1954 to 1956 are shown on several of the plans and sections from the 1970s that were seen during the Snowden 2005 site visit. Old adits were reported to have been encountered during evaluation drilling in 1994/95 and an old shaft remains at the eastern edge of the current pit. Strickland (1999) stated that the extent of these workings was not considered to present a dangerous situation for future mining. Snowden considers it important for MCM to consider capturing the available underground information in digital form and to represent it on mine plans. This will allow for any necessary precautions to be taken when working close to old mine workings and for this information to be used during mine planning exercises.

11.4.4 Surface topography

MCM is using a DTM of the surface topography which was inherited from the previous operators. The exact date of this surface is unknown; however, MCM reports that it has resurveyed the local grid and fixed a bench mark on an old station near the mine shaft. This appeared to fit the topography around the pit fairly accurately, being within ±0.5 m in elevation.

One area of potential discrepancy exists at the Oriental deposit where the topography and the drillhole collar locations do not match. As Oriental is currently not the focus of MCM's mining activity this should not pose a serious problem. Snowden has recommended to MCM that Oriental be resurveyed in order to correct this problem. This will be necessary for future geological modelling and exploration planning in this area.

All mine survey data is reported in the mine grid and all modelling work undertaken by Snowden for this study used this coordinate system.

12 Sampling method and approach

12.1 Pre-1990 evaluation work

Details of the pre-1990s sampling methods are no longer available. GGI reports indicate that most of this early sampling work was based on cored diamond drilling; however, only a limited amount of core from some of the holes drilled in the mid 1970s remains.

12.2 GGI evaluation work (1990s)

12.2.1 Sampling methods

The evaluation drilling undertaken by GGI included both face sampling RC and cored diamond drilling (Table 11.1). Strickland (1999) gives details of the separate sampling procedures that were applied for the two different types of drilling, as follows:

- RC drilling: cuttings were collected via a cyclone in one metre intervals and retained on site in large ultra-violet (UV) resistant plastic bags. The samples were systematically weighed. Recorded sample weights are generally in the range 25 kg to 50 kg, and are reported to average 35 kg. Dry samples were reduced through a 1:4 riffle splitter to obtain a 2 kg sample, whereas wet samples were pipe split from the original collection plastic bags. Duplicate 2 kg samples were prepared for every interval and stored in calico bags for archive reference purposes. From each metre interval a small representative sample was washed, collected in archival chip boxes and described lithologically. All samples within the mineralised unit, and for 10 m into the metabasite above and below, were sampled on 1 m intervals. Samples from other sections in the hangingwall were composited at the rig site into 4 m intervals to reduce analytical costs.
- NQ cored diamond drillholes: The diamond core was also sampled in 1 m intervals. Recovered core was sawn in half with one half pulverized for assay and the other half retained on site.

12.2.2 Sample recoveries

Although the weights of RC samples have been recorded no analysis has been done to see if there are significant variations or spatial trends in the amount of material recovered. It is noted that in excess of 30% of samples collected were wet due to abundant groundwater. Moisture details were also recorded but do not appear to have been analysed separately.

Core recovery from diamond drilling is reported to have been good. The character of the retained split core supports this conclusion; however, no detailed records of core recovery have been seen, so it has not been possible to assess the range of variation in core recovery that was obtained.

12.2.3 Other measurements

GGI reported that magnetic susceptibility was recorded on a 1 m basis and that this allowed accurate definition of the contacts of the magnetite-bearing carbonate unit.

Density measurements were also carried out on the split core samples as discussed in Section 17.3.11.

12.2.4 Database capture

Sampling data and lithological information were recorded on geological data sheets for later entry into an onsite database. Most of these data appear to be available in the form of a series of spreadsheet files.

12.3 FQML verification drilling (2004)

The FQML verification drilling carried out in 2004 was done using a 6 inch face sampling hammer. Samples were collected at 1 m intervals, with the entire sample being collected from the cyclone in polyweave bags. The sample was then riffle split to collect approximately 2 kg into calico bags to be sent to the laboratory for preparation and analysis.

12.4 MCM resource drilling (2006)

The MCM resource drilling carried out during 2006 was undertaken using a diamond drill rig producing HQ size core. The core was geologically logged (including recording the core recovery) and magnetic susceptibility readings were recorded, prior to the core being cut in half with a diamond core saw. The core was orientated and the top half was collected for laboratory submission. Where possible samples were taken on 1 m intervals with allowances made for geological boundaries. Density measurements were taken on half core samples for each sample interval.

Samples collected on site were placed in calico bags that were sealed with numbered plastic cable ties. A numbered sample ticket was placed inside the bag, and the sample number was also written on the exterior of the bag. Bagged samples were shipped in sealed shipping crates. No on site sample preparation was undertaken. Snowden has no reason to suspect that any fraudulent tampering of the samples has occurred.

Core recovery was generally $<90\%$ total core recovery (TCR) or better. Core viewed by Snowden in July 2007 confirmed the good core recoveries. In addition Snowden reviewed the photographs of the borehole core from the and again good core recoveries were noted.

13 Sample preparation, analyses and security

13.1 Pre-1990 evaluation work

Details of the pre-1990s' sampling preparation and analytical procedures are no longer available.

13.2 GGI evaluation work (1990s)

13.2.1 Sample preparation

The total 2 kg sample was pulverised to 90% passing 75 microns in the Akjoujt preparation laboratory using a Labtechnics Mill, Model LM2-P, which uses a puck rather than discs for pulverising the samples. This is reported to have proved more effective for pulverising the dense mineralised carbonate unit with its high magnetite content (KSLE, 1997). Approximately 150 g to 200 g of the pulverised material was submitted to the laboratory for analysis.

13.2.2 Analyses

Analyses have been carried out at three laboratories, as follows:

SGS Australia Pty Ltd[9] – thought to have been used for the bulk of the evaluation drilling

- gold: 30 g fire assay with AAS analysis
- copper, lead, silver, nickel and cobalt: mixed acid digest with AAS analysis
- arsenic, sulphur: pressed powder XRF analysis.

Genalysis Laboratory Services Pty Ltd[10] - thought to have been used for the later grade control drilling done in 1997

- gold: initially by aqua regia AAS, later changed to 30 g fire assay with AAS analysis
- copper: aqua regia digest, AAS analysis
- cobalt, arsenic, zinc, nickel, silver: on every fifth sample using aqua regia digest and AAS analysis
- sulphur: on selected samples using the LECO technique.

Lakefield Research – duplicate analyses for comparison with the SGS results which were done for quality assurance purposes. Results for copper, gold, cobalt and arsenic are reported.

13.2.3 Security

No details are recorded of measures that were in place to prevent tampering with samples. However, Snowden has no reason to suspect that any fraudulent tampering with the resource database samples has occurred.

[9] MCM understands that SGS was used for the bulk of the evaluation drilling but Snowden has not confirmed this assumption.
[10] MCM understands that Genalysis was used for the 1997 grade control drilling but Snowden has not confirmed this assumption.

13.3 FQML verification drilling (2004)

Samples from the FQML verification drilling were sent to Abilab Afrique De L'Ouest SARL (Abilab) at Bamako in Mali. This laboratory is understood to be an independent but non-ISO certified laboratory.

The 2 kg samples dispatched from site are believed to have been pulverised to minus 100 μm. The following analyses were performed on these samples:

- Copper – based on approximately 200 g sample of material digested in aqua regia and analysed using AAS;
- Gold – based on a 50 g fire assay with AAS finish.

13.4 MCM resource drilling (2006)

Samples from the 2006 MCM resource drilling programme were initially shipped to OMAC Laboratories Ltd in Ireland. However, due to the identification of small quantities of 'fibrous' minerals in the ore, OMAC withdrew their services on the grounds of health and safety.

The samples were then shipped to SGS Lakefield in Canada and Genalysis in Australia. The bulk of the analyses were undertaken by SGS Lakefield who undertook to process and assay the samples using a laboratory facility aimed at reducing any health risks posed by the samples.

At SGS, the entire half core was crushed to less than 12.5 mm and then roll crushed to less than 1.7 mm. At this stage 1 kg was split off for gold assay and 100 g for copper and arsenic determination.

The 100 g base metal sample was pulverized to minus 75 μm, and assayed for copper and arsenic by AAS.

The 1 kg gold sub-sample was pulverized to minus 75 μm, and screened on a 106 μm sieve. Two 30 g fire assay charges were taken from the undersize fraction.

The choice of a 1 kg Screen Fire Assay (SFA) was based on the reported presence of coarse gold in some samples. A heterogeneity test undertaken by Snowden in May 2006 was inconclusive with regards to coarse gold, but did indicate that up to 45% of gold (mean 9%) in a sample could report to the +106 μm fraction, thus indicating locally high levels of potentially coarse gold.

14 Data verification

14.1 QAQC for pre-1990 evaluation sampling

No record of the QAQC procedures used in the pre-1990 sampling remains.

None of the original assay or geological logging sheets from this period is available. There is also no record of how the digital database of information from this period was derived.

14.2 QAQC for 1990s' evaluation sampling by GGI

14.2.1 Procedures used

Details of the QAQC procedures used are given by Strickland (1999). These included the following:

'Field duplicate' splits – it is reported that every 15th sample was re-submitted as a duplicate (7% frequency) during the 1994/95 evaluation campaign for a total of 471 duplicates. It is unclear as to whether this refers to a proper field duplicate (i.e. the second 1 kg sample) or to a second pulp taken from the pulverised sample.

Laboratory repeats, as follows:

- SGS – every 24th sample repeated routinely
- Genalysis – every 25th sample repeated routinely

Inter-laboratory checks – comparative results for a suite of 58 chip samples from nine different RC holes, selected to represent a wide range of metal values, were sent to Lakefield in order to compare with the original assays by SGS as reported in the 1997 feasibility study (KSLE, 1997).

Laboratory standards - the use of laboratory standards is mentioned by Strickland, however, there is no record of the results obtained for these analyses.

There is no record of the inclusion of standards and blanks in the batches of samples dispatched from site.

14.2.2 Results obtained

'Field' duplicates

Regression analysis by GGI of the paired results from the 471 'field duplicates' are reported to have given the following values for the Pearson correlation coefficient, copper 0.99, gold 0.76 and cobalt 0.96. Regression plots are reported to have shown 'loose proximity' to the 45° (equality) line.

The correlations obtained for copper and cobalt appear to be very good, however that for gold is quite poor and confirms the high sampling variability associated with the gold analyses that was also indicated by the results of Snowden's verification sampling.

Inter-laboratory checks

The results of statistical analysis of the analytical results for copper, gold, arsenic and cobalt from the inter-laboratory checks are presented in the 1997 feasibility study report (KSLE, 1997), as summarised below:

- the mean and standard deviation of assays for each metal are very similar for both laboratories
- nine pairs of results are considered to be statistical outliers
- differences in assay values are normally distributed when the nine outliers are excluded
- overall accuracy is good (i.e. there is no evident bias)
- precision (maximum error at 90% confidence) is poor when the outliers are included in the analysis.

The high proportion of outliers encountered in this study is of concern since it suggests that sampling handling or database entry errors have affected 4% of the samples taken. In addition it appears that the samples were not selected at random which could introduce sampling biases into the data collected.

The original results from this study were re-examined by Snowden. Statistical comparisons of the pairs of copper and gold values are presented in Table 14.1. Scatterplots of the paired results for copper and gold are presented in Figures 14.1 and 14.2 respectively.

Table 14.1 Statistical comparison of Lakefield and SGS interlaboratory check results for copper and gold (based on data presented in KSLE, 1997)

	All pairs				**Excluding statistical outliers**			
	No.	**SGS**	**Lake-field**	**Rel. Diff.**	**No.**	**SGS**	**Lake-field**	**Rel. Diff.**
Copper (%)								
All pairs	58	1.30	1.39	7%	55	1.27	1.35	7%
Pair average >=1%	24	2.55	2.75	8%	23	2.51	2.66	6%
Pair average <1%	34	0.41	0.43	5%	32	0.38	0.41	10%
Gold (g/t)								
All pairs	58	2.77	2.76	0%	55	2.51	2.55	2%
Pair average >=1g/t	24	5.13	5.11	0%	21	4.85	4.95	2%
Pair average <1g/t	34	0.42	0.41	-1%	34	0.42	0.41	-1%

Figure 14.1 Interlaboratory checks for Copper: Lakefield vs SGS (data from KSLE, 1997)

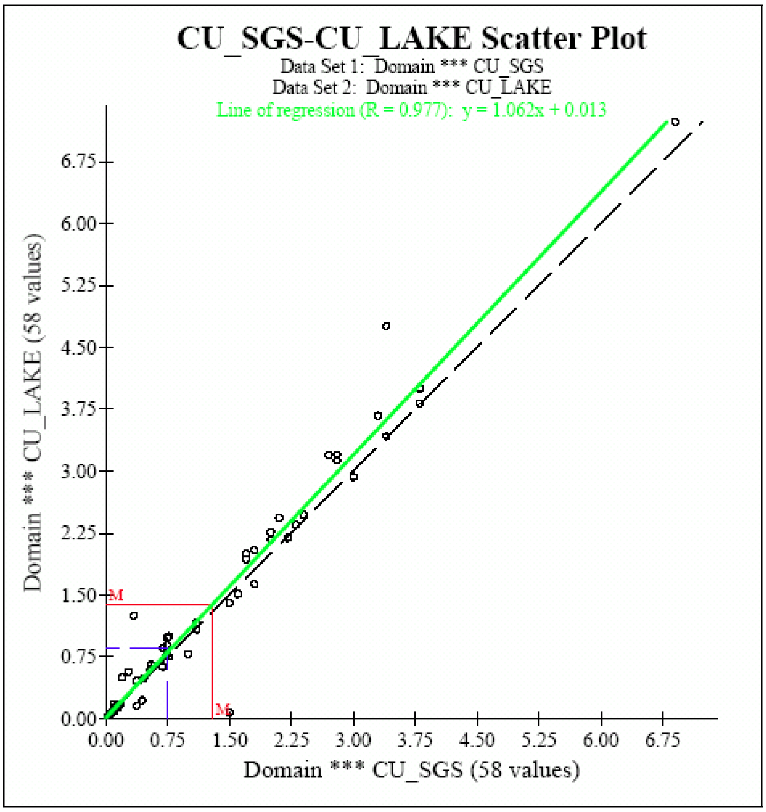
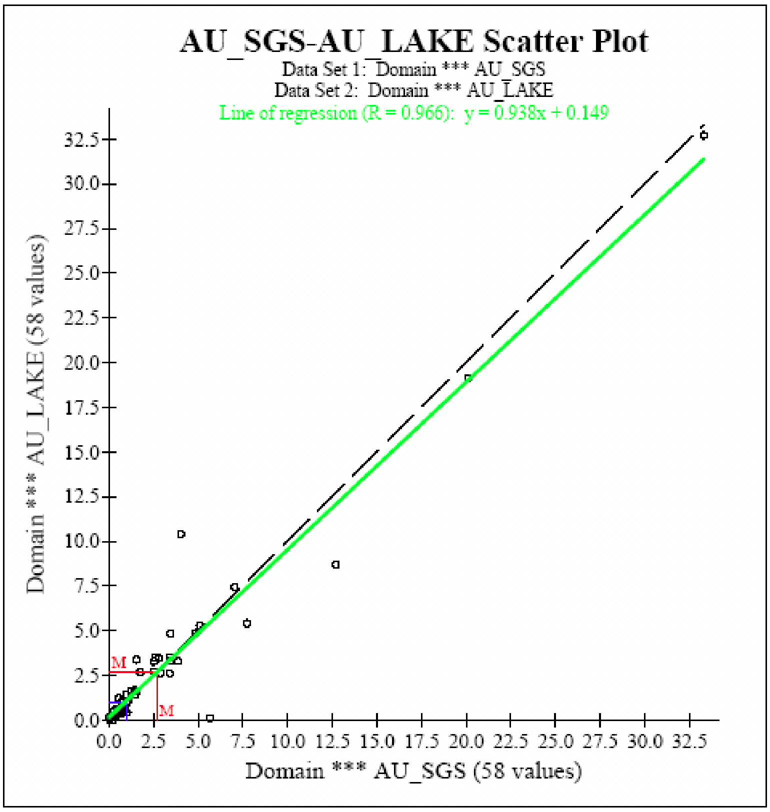


Figure 14.2 Interlaboratory checks for Gold: Lakefield vs SGS (data from KSLE, 1997)



From these studies Snowden makes the following conclusions:

- There are three obvious outliers in the case of both copper and gold, representing about 5% of the comparisons in each case. These are likely to be related to sample handling or database entry errors and represent a larger proportion of the samples than would be expected for such a study.
- The results for copper, presented in Figure 14.1, show a consistent bias towards higher values in the analyses from Lakefield. The slope of the linear regression line indicates a relative difference of around 6%. The average difference in the mean copper grade for the two sets of samples is also around 7% higher for the Lakefield results, both with and without the outliers included as well as above a cut-off of 1% Cu, as indicated in Table 14.1.
- The results for gold, presented in Figure 14.2, suggest a tendency for gold to be lower in the Lakefield results; however the linear regression is strongly influenced by a few high values and is considered to be slightly misleading. Comparison of the mean gold grades for the two sets of results, as presented in Table 14.1, shows that they are within ± 2% both with and without outliers, and also both above and below 1 g/t Au.

14.3 QAQC for 2004 verification sampling by FQML

14.3.1 Procedures used

FQML's 2004 drilling campaign included the following quality assurance procedures:

- Repeat analyses for 1 in every 20 samples.
- Inclusion of blanks – one in each of 37 batches of samples.
- Inclusion of standards – two standards (GBM 996-5 and MP-1a) were included in each of the 37 batches of samples, and in addition single analyses for two other standards (GEO-1 and GEO-2) were obtained.

It is understood that all of these QA procedures were performed by the laboratory (Abilab) rather than FQML.

No field duplicates were taken during this sampling programme.

14.3.2 Results obtained

Results for the standards analyses and control plots have been examined. These indicate that for both sets of standards analyses the reported results were significantly lower than the nominal standard grades, as follows:

- Standard GBM 996-5, reported to be 160 ppm Cu, average assay obtained was 140 ppm Cu.
- Standard MP-1a, reported to be 1.44% Cu, average assay obtained was 1.37% Cu.

These results indicate that the laboratory results may have been under reporting the copper grades, however, it appears that no action was taken to address this issue at the time. This apparent bias is similar to that noted in the results obtained from Snowden's verification sampling (see Section 14.6.3).

14.4 QAQC for 2006 resource drilling by MCM

14.4.1 Procedures used

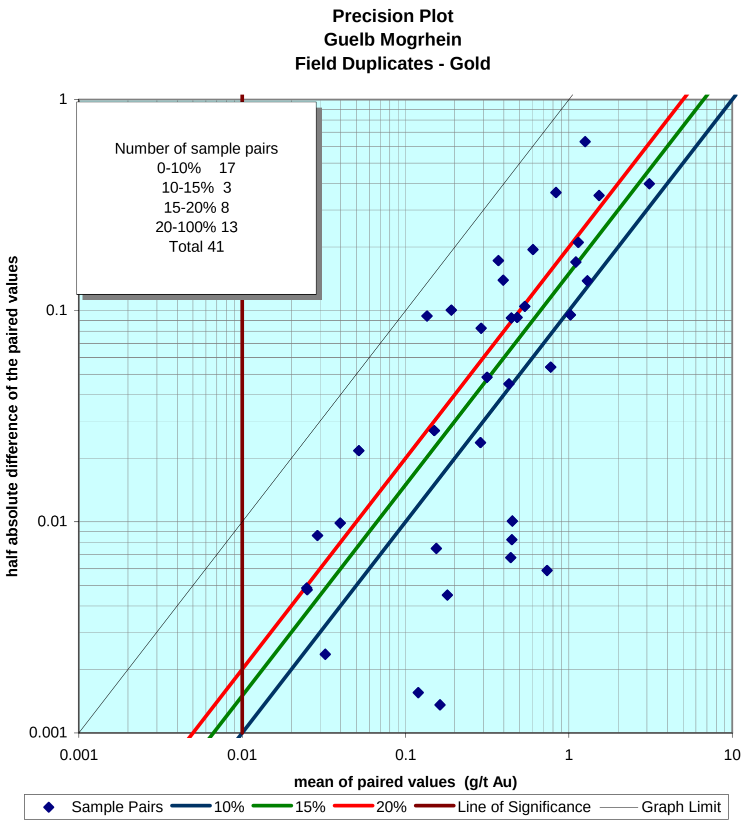
FQML took duplicate samples, as opposing core halves, and submitted these for identical sample preparation and assaying. These were submitted at a rate of 2 in 100 samples, which Snowden considers to be low.

14.4.2 Results obtained

Duplicate field samples were taken as opposing halves of drill core and submitted to SGS Lakefield as separate sample batches. The results for gold and copper are presented in Figures 3.3 and 3.4.

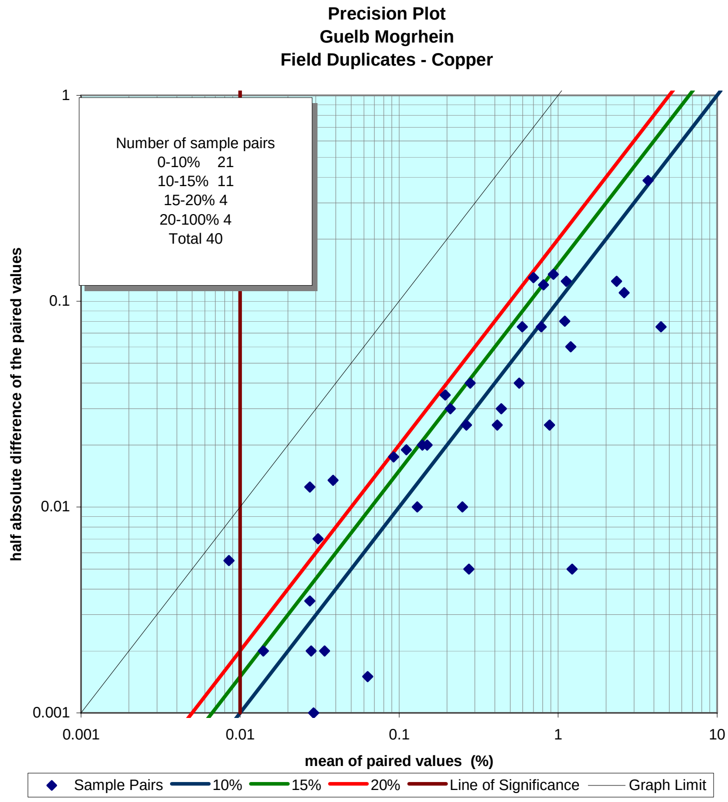
For gold, a total of 41 duplicate samples were taken. Of these, some 42% showed a precision of ±10% or better and 32% a precision of greater than ±20% (Figure 14.3). These are reasonably high values, and indicate that level of heterogeneity exists between the two samples. This may be related to the presence of coarse gold particles and/or clusters of gold particles.

Figure 14.3 Precision plot for gold field duplicates



For copper, a total of 41 duplicate samples were taken. Of these, some 52% showed a precision of ±10% or better and 10% a precision of greater than ±20% (Figure 14.4). These figures are still quite high, but indicate far less heterogeneity than that for gold.

Figure 14.4 Precision plot for copper field duplicates



Laboratory pulp duplicates were not *per se* taken for gold as a result of the use of the screen fire assay (SFA) process. However, a duplicate fire assay was taken for each of the undersize sample fractions. Figure 14.5 shows a precision plot of a population of 1,627 SFA undersize fire assay duplicates.

Of these, some 81% showed a precision of ±10% or better and 4% a precision of greater than ±20% (Figure 14.5). This indicates a relatively low level of heterogeneity in the pulps, which is to be expected given that any coarse gold particles have been removed by screening.

Laboratory pulp duplicates taken for copper totalled 64 pairs. Figure 14.6 indicates a good correlation between pairs, with 95% showing better than ±10% precision.

Figure 14.5 Precision plot for gold pulps from screen fire assay undersize fraction (-106 micron fraction)

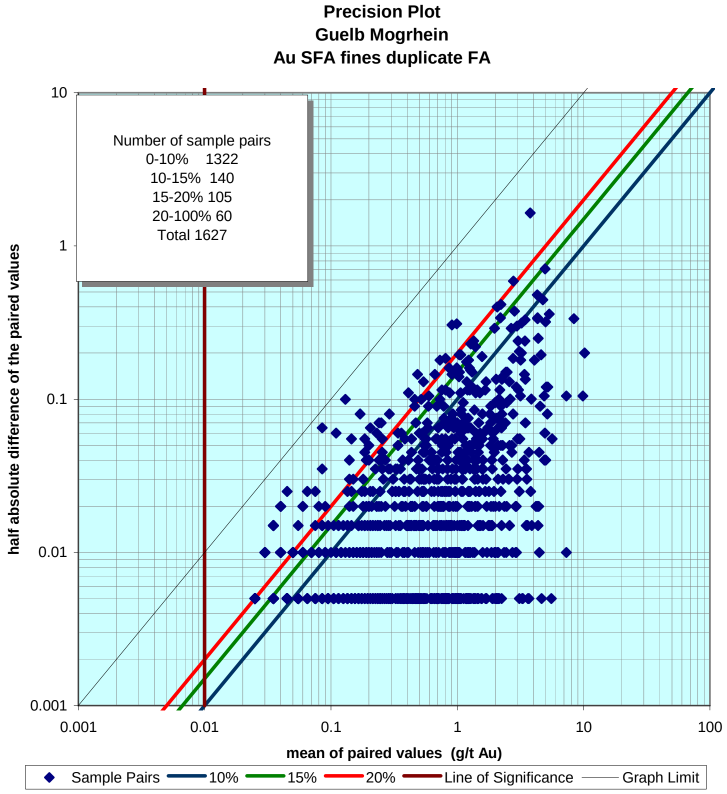
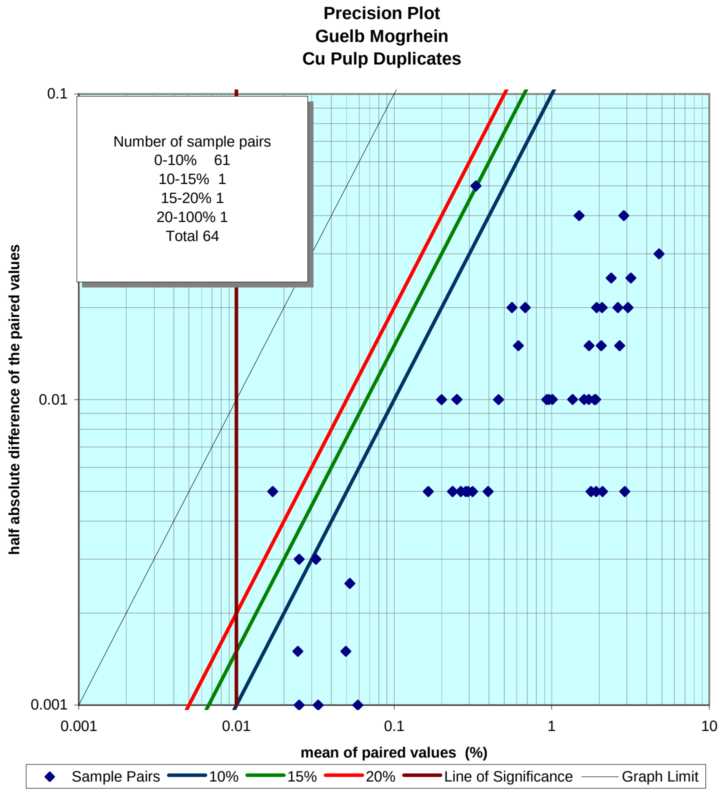


Figure 14.6 Precision plot for copper pulps



Gold shows a high level of variability (heterogeneity) between field duplicates. Such variability is often related to the presence of coarse gold within the ore. Core logging at Guelb Moghrein generally does not indicate visible gold particles and metallurgical testing gives a low gravity recoverable gold value (GRG <10%).

In 2006, MCM undertook a 'Gy 50 Piece Heterogeneity Test' on GM ore under the supervision of Snowden. This indicated a very low heterogeneity based on three tests at particle sizes of 7 cm (250 g), 9.5 cm (500 g) and 11.5 cm (1,000 g). These gave Sampling Constant (K) values of 15 g/cm$^{1.5}$, 65 g/cm$^{1.5}$ and 115 g/cm$^{1.5}$ respectively. These were all low values indicating a low heterogeneity and little coarse gold. K values of 1,000 g/cm$^{1.5}$ or above generally indicate the presence of coarse gold in samples (Dominy, 2004). When coarse gold is suspected, it may be present in localized domains and is easy for standard heterogeneity tests to yield low values. This inefficiency in the heterogeneity test has been observed in a number of practical examples (Dominy & Petersen, 2005; Dominy, 2007).

The 2007 assay programme for gold utilized the SFA process. Any gold particles above 106 microns in size were effectively screened out of the ore to leave a theoretically homogeneous pulp. Figure 14.5 essentially indicates this. The SFA data shows that 16% of samples contained 10% or more of the gold inventory captured on the screen. The mean coarse gold value was 6%, within a range of values between 0.15% and 97%. Given that the samples have been pulverized prior to screening, this represents a minimum value for coarse gold.

Since there is conflicting evidence for the presence of coarse gold at Guelb Moghrein, Snowden suspects that quantities of 'fine' coarse gold exist around the 75 micron to 200 micron size range. In addition, these are likely to cluster and result in a pseudo-nugget effect on the drill core/sample scale (Dominy & Platten, 2007).

14.4.3 QAQC procedures at SGS Lakefield

As part of their routine QAQC procedures, SGS assayed standard reference materials ("SRM") for all Guelb Moghrein elements reported (e.g. Cu, Au and As). An Excel spreadsheet was supplied directly to Snowden by SGS for analysis. A range of SRM grades were used covering 0.64% to 10% As; 0.067% to 44.04% Cu and 0.037 g/t to 15.05 g/t Au. The percentage difference was determined for each standard result giving the following maximum and minimum ranges:

- As: -8% to +4%
- Cu: -6% to +7%
- Au: -6% to +4%

The coefficient of variation for each set of standard results was generally less than 2%, indicating a low variability between the expected reference material grade and that achieved by assay.

Snowden considers these results to be acceptable and within allowable limits. The assay dataset generated by SGS for Guelb Moghrein is considered by Snowden to be of a sufficiently high quality to be useable in a mineral resource estimate.

14.5 Reverse circulation and diamond drilling comparison

GGI drilled four diamond drill holes close to the locations of existing RC holes for comparative purposes. Average grades from the pairs of holes are summarised in Table 14.2.

Table 14.2 Summary statistics for four twinned diamond cored and RC holes drilled by GGI

Diamond drillholes (DDGM*)				RC drillholes (RCGM*)			Relative diff. (RC/DDH)	
Holes	**Length (m)**	**Cu (%)**	**Au (g/t)**	**Length (m)**	**Cu (%)**	**Au (g/t)**	**Cu**	**Au**
All twinned drilling								
DDGM1 RCGM31	20	3.73	2.02	20	3.82	2.61	102%	129%
DDGM2 RCGM59	16	2.05	2.59	16	2.26	2.77	110%	107%
DDGM3 RCGM21	22	1.69	3.27	22	1.70	5.90	101%	180%
DDGM4 RCGM41	20	2.18	6.91	20	2.35	5.26	108%	76%
Total	**78**	**2.41**	**3.74**	**78**	**2.53**	**4.25**	**105%**	**114%**
Sulphide zones only								
DDGM1 RCGM31	7	3.51	2.25	5	3.62	7.18	103%	319%
DDGM2 RCGM59	6	2.28	2.15	0				
DDGM3 RCGM21	5	1.02	0.53	5	0.80	0.93	78%	176%
DDGM4 RCGM41	7	1.04	3.27	6	0.93	3.49	89%	107%
Total	**19**	**1.95**	**2.17**	**16**	**1.73**	**3.84**	**89%**	**177%**

Note: Total for sulphide zone excludes DDGM2 for which there is no matching sulphide interval in RCGM59

These results indicate that the two sets of results are in generally broad agreement. Downhole profiles and scatterplots of the pairs of results also show correspondence in the grade trends but with frequent 'spikes' in individual samples. As might be expected from the results of duplicate sampling, copper results show a generally closer match than those for gold. The mean copper grade is 5% higher in the RC samples compared to the diamond core samples, whereas the mean gold grade is 14% higher. Differences between the samples logged as sulphide mineralisation are much greater. These should, however, be treated with caution as they are based on much fewer samples. Comparison of the geological logs for the two sets of holes shows some difference in recording the extent and boundaries of the mixed zone.

14.6 Data verification by Snowden

14.6.1 Drillhole collar locations

During the 2005 site visit a geo-referenced high resolution satellite image was used to verify the collar locations of several holes in the field. Details of the satellite image used are as follows:

- Quickbird Data, 0.6 m resolution
- Date – unknown - a composite of at least two different scenes
- Bands 321 as RGB
- Datum WGS84, Projection UTM 28 North
- Supplied by Geoimage, Perth.

Snowden found that the approximate collar locations of many of the older diamond drillholes were identifiable from well preserved remains of concreted drainage channels and sumps and were sometimes marked by metal casing (Figure 14.7). The GGI RC holes located in the field were marked by white plastic casing (approximately 20 cm diameter) and the more recent FQML holes by black plastic casing (also approximately 20 cm diameter). Four of the GGI diamond drillholes, which had provided material for metallurgical testing, were also marked by metal casing.

Figure 14.7 Presumed collar location of drillhole I53 (centre foreground) showing remains of concreted drainage channel and sump (in front of bushes)

Within the existing pit, the following holes were verified by reference to the abandoned shovel which was clearly visible on the satellite image:

- FQM001
- RCGM72
- RCGM58

- DCGM5 to DCGM8 (four metallurgical sampling holes surrounding RCGM72).

To the south and east of the existing pit the collar locations of the following drillholes were identified:

- Diamond drillholes south of the pit – C12, C14, C17, I53, K53
- Exploration drillhole south of the pit - 97MAG01
- Diamond drillholes east of the pit – C16, C21, C22, C24, C26, C29
- RC drillholes east of pit – RCGM89, RCGM90, RCGM99.

A drillhole identification plate was only seen at a single hole (C14) so it was not possible to verify whether the drillhole numbers stored in the database correspond with the same locations in the field. However, given the grid-based numbering system used for the older holes (a combination of a letter for the X direction and a number for the Y direction) it is highly unlikely that these holes would have been mixed up during transfer to the digital database.

In addition to the above, at least two diamond drillhole sites were identified on the drillhole location map that did not correspond with any of the holes stored in the existing drillhole database. Possible matches to these were indicated as planned holes on a drillhole location plan (dated 1973) seen in the mine offices. It is not clear whether holes were actually drilled on these sites and turned out not to be mineralised or whether the sites were prepared but the holes were never drilled.

14.6.2 Database validation

Initial review of the assay database indicated that although most sample intervals had a copper assay, analytical coverage of gold was only partially complete and for other metals was only available for a limited number of samples. In addition it was noted that in many of the older holes there were repeated sequences of identical values for gold suggesting that the assays were originally derived from longer intervals (composite samples) than the copper assays.

In order to assess the extent to which gold assays were absent from some of the sample intervals from the older drilling campaigns a statistical review of the assay database was carried out. An initial study was based on the assay data file obtained by Snowden on 22nd November 2005.

Each assay was first assigned a code identifying the drilling campaign to which it belonged, as determined from the hole numbers used (see Section 11.1 and Table 11.1 for more details). After an initial inspection it was found that there were several long intervals with no assays in the database and these were excluded prior to calculation of statistical summaries. The data were filtered to exclude all intervals >=4.0 m and unanalysed intervals >2 m length.

The presence of copper and gold analyses was then flagged using a formula to check for values greater than the minimum value stored (>0 ppm copper and >0.001 g/t gold). Statistics for the average sample length and percentage of records with copper and gold assays were then calculated. The results obtained, as presented in Tables 14.3 and 14.4, highlight the fact that the early drilling campaigns did not use a standard 1 m sample interval. The earliest drilling campaign has an average sample interval length of 1.49 m. A search of the assay data file revealed that it contains 1,557 intervals with a length of 2.0 m which represents around 12% of the assay data used in the 1997 resource estimate.

All drilling campaigns have copper assays for >95% of the intervals in the assay database (Table 14.3); however, complete gold results are only available for the post-1980 drilling campaigns. For the earliest drilling campaign gold analyses are recorded for 90% of the sample intervals, but for the next two campaigns (mid 1970s?) they are only available for 33% and 38% of the sample intervals. Overall gold assay results are missing for about 15% of the sample intervals used in the 1997 resource estimate. It is assumed that these missing values represent samples which were analysed for copper but not for gold, although there is no documentation to support this. A visual inspection of the relevant records indicates that the missing gold values are not confined to unmineralised zones, and the relevant records have an average grade of 0.7% copper.

A further problem with gold results stored in the assay database file is highlighted by the example presented in Table 14.5. This shows that whereas copper results for consecutive samples are nearly all different, some gold values show repeated duplication of values down the hole. Whilst some of these values could be related to results from unmineralised intervals, in the example shown here many of the values are from mineralised material with grades of >1 g/t gold and are considered to represent results obtained from analyses of composite samples >2 m in length.

Table 14.3 Statistical summary of copper analyses in the drillhole assay database

Ref.*1	Type (hole numbers) *1	All records		Records with copper analyses (> 0 ppm)				Mineralised records (>0.1% Cu)		
		Total	Average length (m)	Number	% of total	Identical to previous record: Number	Identical to previous record: % of copper analyses	Total number	Identical to previous record: Number	Identical to previous record: %
1	DD (A3, B2, J2, etc)	2,958	1.49	2,908	98%	79	3%	2,618	47	2%
2	DD (13_2, 13_3, 36, 37)	625	1.21	607	97%	9	1%	558	3	1%
3	DD (C11 to C30)	1,536	1.03	1,486	97%	124	8%	915	23	3%
4	RCD + DD tails(RCGM*)	7,162	1.00	7,012	98%	1,347	19%	4,338	104	2%
5	DD - met. samples (DDGM*)	78	1.00	78	100%	2	3%	78	2	3%
Total used for 1997 resource estimate		12,376	1.13	12,108	98%	1,563	13%	8,510	179	2%
6	RCD grade control (GC*)	6,619	1.00	6,616	100%	93	1%	5,482	91	2%
7	RCD - FQM001, FQM002, FQM017	325	1.00	325	100%	4	1%	175	0	0%
8	RCD -expl. Holes (97*)	1,030	1.00	1,019	99%	27	3%	29	1	3%
9	RCD - expl. Holes (FQML*)	2,383	1.00	2,377	100%	72	3%	8	0	0%

*1 Refer to Section 11.1 and Table 11.1 for further details; DD = diamond drilling, RCD = reverse circulation drilling

Excluding all intervals >= 4.0 m, and unanalysed intervals > 2.0 m

Table 14.4 Statistical summary of gold analyses in the drillhole assay database

Ref.[*1]	Type (hole numbers) [*1]	All records		Records with gold analyses (>=0.001 ppm)				Mineralised records (>0.01 g/t Au)		
		Total	Average length (m)	Number	% of total	Identical to previous record		Total	Identical to previous record	
						Number	% of gold analyses		Number	%
1	diamond drilling (A3, B2, J2, etc)	2,958	1.49	2,655	90%	1,645	62%	1,444	664	46%
2	diamond drilling (13_2, 13_3, 36, 37)	625	1.21	204	33%	117	57%	132	67	51%
3	diamond drilling (C11 to C30)	1,536	1.03	584	38%	46	8%	584	46	8%
4	RC + diamond tails (RCGM*)	7,162	1.00	7,010	98%	1,462	21%	5,612	316	6%
5	DD - metallurgical samples (DDGM*)	78	1.00	78	100%	1	1%	78	1	1%
Total used for 1997 resource estimate		12,376	1.13	10,531	85%	3,271	31%	7,850	1,094	14%
6	RC grade control (GC*)	6,619	1.00	6,616	100%	364	6%	6,058	106	2%
7	RC - FQM001, FQM002, FQM017	325	1.00	325	100%	14	4%	258	1	0%
8	RC -expl. Holes (97*)	1,030	1.00	1,019	99%	383	38%	273	39	14%
9	RC - expl. Holes (FQML*)	2,383	1.00	2,382	100%	229	10%	922	29	3%

*1 Refer to Section 11.1 and Table 11.1 for further details; DD = diamond drilling, RCD = reverse circulation drilling

Excluding all intervals >= 4.0 m, and unanalysed intervals > 2.0 m

Table 14.5 Extract from assay database illustrating problem of repeated gold assay results

BHID	FROM	TO	LENGTH	Cu	Au
B0	143	145	2.00	0.27	0.005
B0	145	147	2.00	0.08	0.005
B0	147	149	2.00	0.20	0.005
B0	149	149.9	0.90	0.45	0.005
B0	149.9	150.65	0.75	2.99	0.4
B1	67.3	69	1.70	0.65	1.0
B1	69	71	2.00	0.45	1.0
B1	71	73	2.00	0.84	0.6
B1	73	75	2.00	0.24	0.6
B1	75	77	2.00	0.59	1.4
B1	77	79	2.00	1.43	1.4
B1	79	81	2.00	1.87	1.2
B1	81	83	2.00	1.42	1.2
B1	83	85	2.00	0.36	0.005
B1	85	87	2.00	0.10	0.005
B1	87	89	2.00	0.14	0.6
B1	89	91	2.00	0.24	0.6
B1	91	93	2.00	0.24	0.005
B1	93	95	2.00	0.31	0.005

In order to assess the magnitude of this problem, a code was assigned to each sample based on whether or not its value was identical with the previous sample, and the number of affected records was then counted. This was repeated for all records with copper and gold analyses and also for what were considered to be mineralised intervals - in order to eliminate sequences of samples from unmineralised intervals with values at or below the detection limit. The results of this analysis are presented in Tables 14.3 and 14.4.

The results for copper indicate that identical values are at a maximum of 19% for the main GGI drilling campaign (RCGM holes). However when only mineralised samples with >0.1% copper are considered then none of the drilling campaigns have more than 3% repeated sample values. For gold the number of identical values from the main GGI evaluation drilling campaign is similar to that for copper (21%), however for the earlier campaigns it is significantly higher, affecting 62% and 57% of records from the two earliest campaigns. When only mineralised records are considered (>0.01 g/t gold) then values of 46% and 51% are obtained which is more likely to reflect the true proportion of such duplication. As these percentages are based on only counting one record in every duplicated pair, it is concluded that over 90% of the gold values from the two earliest drilling campaigns are based on composited samples. For instance, most of the gold values in Table 14.5 appear to be based on composites of 4 m length. Overall this appears to affect between 25% and 30% of the sample records used in the 1997 resource estimate.

14.6.3 Verification sampling by Snowden in 2005

During the Snowden site visit in November 2005, a total of 46 verification samples totalling around 55 kg were taken from retained core, RC chip and pulp samples. These were transported by Snowden and analysed at OMAC Laboratories in Ireland for copper, acid soluble copper, gold and cobalt. The results obtained indicated the following:

- Copper results showed a good correlation (coefficient of 0.98) with the original results, confirming the position and general magnitude of mineralisation as indicated by the original sampling.
- Copper results showed an overall bias towards higher values (+10% to +15% relatively) in the repeat samples.
- Gold results showed a relatively low correlation coefficient (0.75) indicating poorer sampling and analytical reproducibility.
- The repeat gold results showed a lower overall average grade than the original samples, reflecting the failure to confirm two high grade values in the original samples (39.6 g/t and 16.3 g/t).
- Results for twelve screen fire assays for gold reported >10% coarse (>100 μm) gold in half the samples, reaching a maximum of 62% for the highest grade sample. This indicates that coarse gold may be present in significant amounts and that the sampling and analytical procedures used previously may not be optimal for accurate prediction of the true gold content of the mineralisation.
- Cobalt results showed a good correlation (coefficient of 0.93) with the original values confirming the position and general magnitude of mineralisation as indicated by the original sampling.
- Cobalt results showed a slight overall bias towards lower values in the repeat pulp samples.

14.7 Data verification by Snowden in 2007

14.7.1 Drill collars

During its site visit in July 2007, Snowden verified what drill hole collars it could from the 2006 drilling programme given that the majority were located within the confines of a working open pit. Three of the planned holes were not drilled because of accessibility problems. Snowden had no issues with the drilling programme.

14.7.2 Database validation

Snowden obtained all assay certificates for the 2006 drilling programme directly from SGS Lakefield. Some 40% of entries for copper and gold where randomly checked against the database used for resource estimation. No errors were found.

14.7.3 Verification sampling

During its site visit in July 2007, Snowden collected fifteen random pulp reject samples from Guelb Moghrein's grade control programme. These were transported back to the UK by Snowden and submitted to OMAC Laboratories in Ireland for copper and gold assay. Copper was determined by acid digestion and ICP-AES analysis (OMAC method 'ICPORE') and gold was determined via a 30 g fire assay (OMAC method 'Au4'). The results of the assays are given in Table 14.6.

Table 14.6 Repeat pulp assays from Snowden/OMAC and Guelb Moghrein

Snowden/OMAC Assays			Original Guelb Moghrein	
Snowden SANO	**Cu %**	**Au g/t**	**Cu %**	**Au g/t**
S005	3.38	1.65	3.16	1.83
S006	2.45	1.70	1.91	0.19
S007	2.72	1.73	2.69	1.80
S008	0.27	0.19	0.31	0.49
S009	0.35	0.19	0.30	0.41
S010	0.79	0.90	0.60	0.86
S011	1.16	0.58	0.97	0.41
S012	1.88	4.85	1.82	2.85
S013	1.17	3.55	0.88	NR
S014	2.93	2.24	2.50	1.88
S015	2.95	2.12	2.23	NR
S016	0.43	0.20	0.76	NR
S017	4.22	5.04	0.69	0.74
S018	0.80	0.85	0.36	NR
S019	0.99	1.57	0.52	NR
Mean	1.77	1.91	1.32	1.15
COV	71%	91%	74%	77%
Ratios of OMAC to GM assay means	Cu: 1.77/1.32 = 1.34		Au: 1.91/1.15 = 1.66	

It is immediately seen that the mean grades of the OMAC assays for both copper and gold are higher than that of the original Guelb Moghrein assays. Figures 14.8 and 14.9 show QQ plots for both copper and gold. These clearly show the strong positive bias with respect to the OMAC assays.

Figure 14.8 QQ plot comparing Cu pulp repeats (Snowden/OMAC versus original Guelb Moghrein)

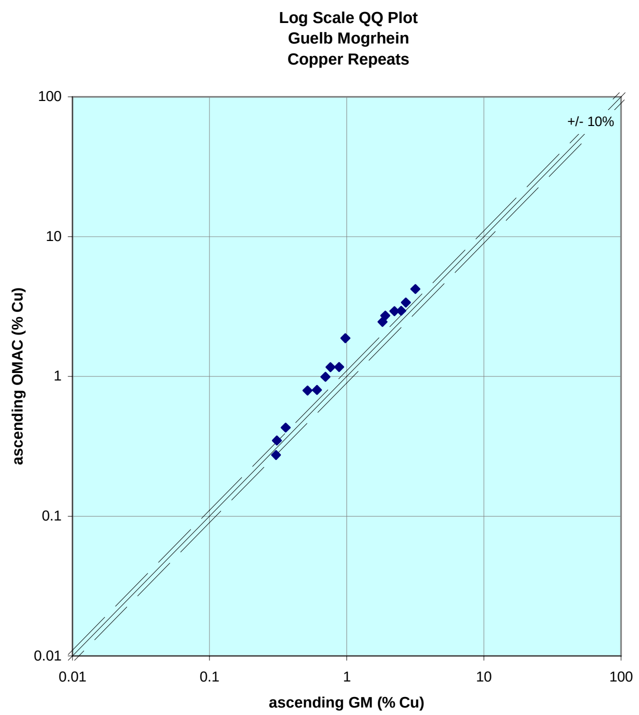
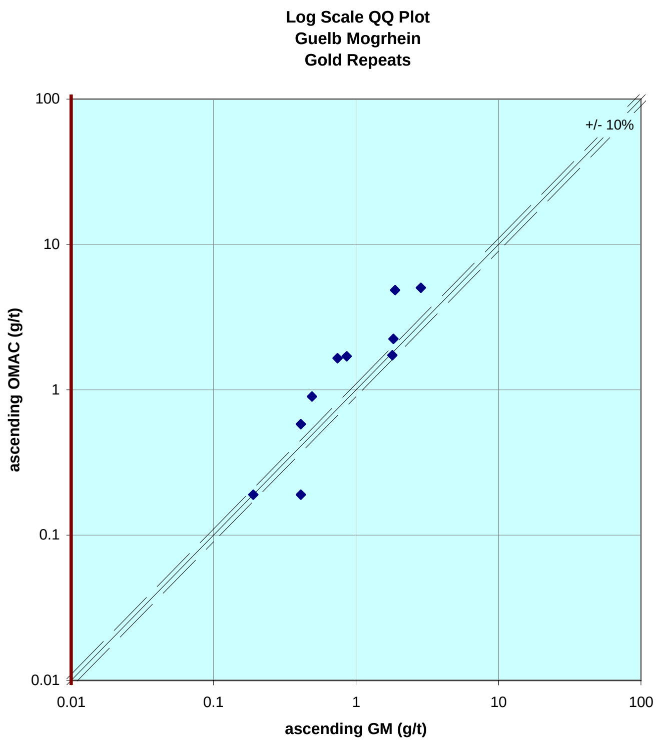


Figure 14.9 QQ plot comparing Au pulp repeats (Snowden/OMAC versus original Guelb Moghrein)



14.8 Conclusions

After consideration of the documentation presented for review, analysis of the existing evaluation database, and results of verification sampling undertaken during Snowden's 2005 and 2007 site visits, Snowden arrived at the following conclusions:

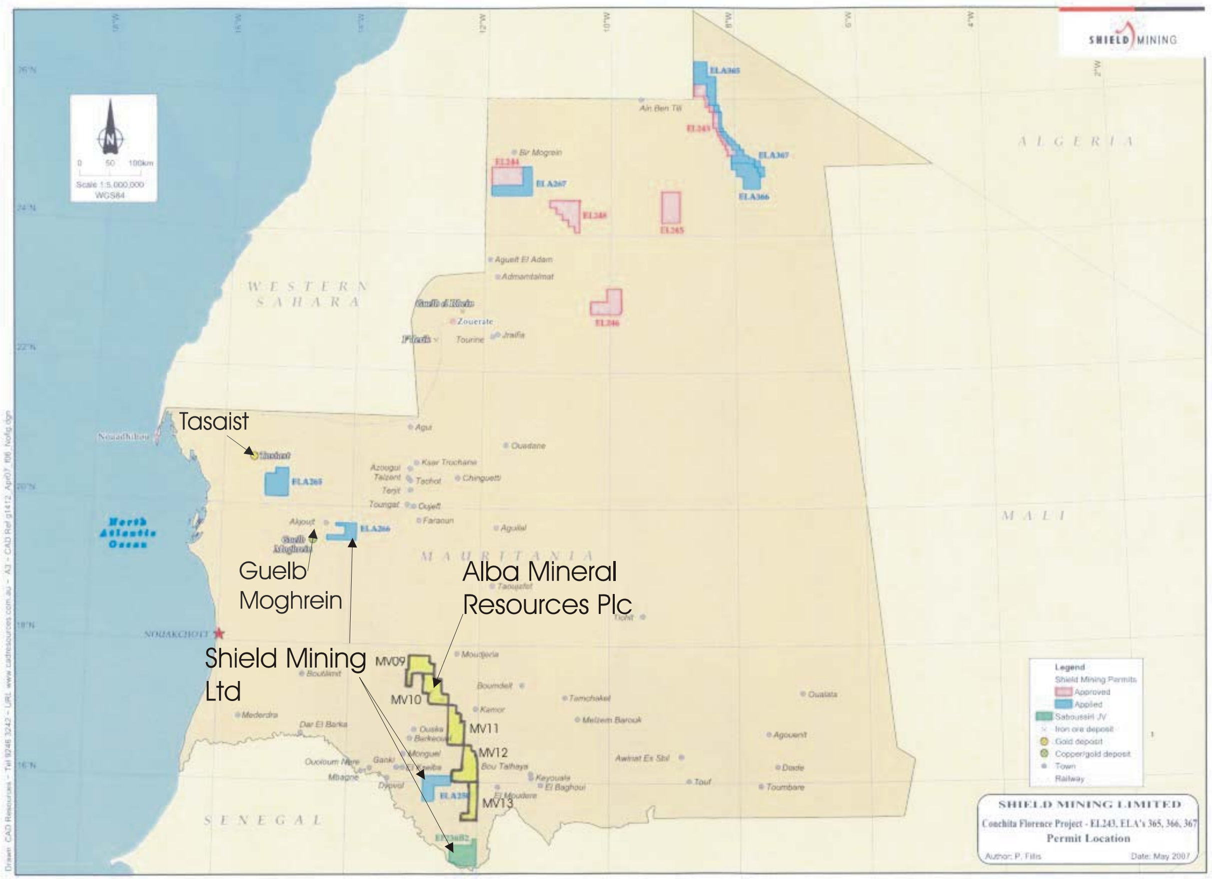
- The sampling work done by General Gold International S.A. (GGI) appears to have been done to acceptable standards and there is adequate retained sample material to verify the work that GGI performed.
- There is uncertainty associated with the older pre-1990s diamond drilling, since little evidence remains to allow an audit trail back to the source of the original data.
- Despite the uncertainties related to the older drilling data it was possible to verify collar locations for many of the older holes in the field, giving a reasonable degree of assurance that they were drilled as indicated.
- Guelb Moghrein ore potentially carries a 'pseudo-coarse gold' problem due to the presence of clustered 'fine' coarse-gold particles. The issue does not present a major problem unlike coarse gold in many mesothermal vein systems; however, it does result in some variability in gold assays.
- Based on a small sample set, there is a positive bias between the OMAC and Guelb Moghrein duplicate pulp assays. In effect it is likely that the on-site laboratory is understating both gold grade and copper grades by between 20% and 40%, thus providing some potential upside.
- Snowden considers it acceptable to use the existing assay database as the basis for resource evaluation, provided some caution is taken to exclude the anomalous values that were encountered during data validation. In order to account for the uncertainties associated with the pre-1990s' data, resource classification should include a criterion related to the proportion of pre-1990s' data used during estimation.

15 Adjacent properties

The mining concession held by MCM covers the entire extent of the known mineralisation at Guelb Moghrein (Figure 4.5). The surrounding area contains numerous copper gold occurrences, none of which had been shown to be economic. The closest mining operation of note is the Tasiast Gold Mine operated by RedBack Mining Inc., approximately 150 km to the northwest of Guelb Moghrein. Geologically, the Tasiast gold deposits are associated with banded iron formations (BIF) and quartz veins within the Archaean terrains of Northern Mauritania (Howe, 2007). As a result they are not comparable geologically to Guelb Moghrein.

As noted in Sections 4 and 10, MCM controls large exploration concessions around the Guelb Moghrein deposit and active exploration has commenced with the intention of locating further copper-gold mineralisation. Interest in exploration along the Mauritanide belt has increased during 2006 and 2007. Shield Mining Ltd and Alba Mineral Resources PLC have both applied for exploration concessions on the Mauritanide belt. One of Shield Mining's applications (ELA 266) is located in close proximity to Akjoujt and MCM's concessions (Figure 15.1).

Figure 15.1 Location of the Tasiast gold mine, and prospecting licence applications in the Mauritanides by Shield Mining and Alba Mineral Resources May 2007[11].. (Modified after Shield Mining and Alba Mineral Resources)



[11] Information obtained from http://www.shieldmining.com/index.php and http://www.albamineralresources.com/text/news/press.html

16 Mineral processing and metallurgical testing

16.1 General

The Guelb Moghrein plant was commissioned in October 2006 as a crushing and copper floatation circuit. The gold carbon in leach (CIL) circuit is scheduled to be commissioned in March 2008, once a regrind circuit has been installed. A summary of the previous mineral processing and metallurgical recovery data that is relevant to the current project was reviewed by Snowden in 2005 and was included in the Project Engineering Report prepared for FQML in 2004 (MDM, 2004). During the July 2007 site visit the current operational process was discussed and the brief discussion below covers the Guelb Moghrein mineral processing circuit.

16.2 Metallurgical Tests

Results from three sets of studies were used to assist the development of the flowsheet for the current project, namely:

- Charter Consolidated Services Limited (Charter), 1973: included laboratory and pilot tests carried out on both core and bulk samples of ore.
- KSLE, 1996-1997: included laboratory and pilot tests on both core and bulk samples of ore.
- IML, 2004: included a programme of comminution and flotation testing carried out in Perth.

Results of the mineralogical studies carried out as part of these tests are summarised in Section 9. The metallurgical studies included comminution, flotation, gravity concentration, leaching and solid/liquid separation testing.

16.3 Process Plant Design

Based on the results of previous metallurgical testing, MDM produced a proposed concentrator design based on established technology. The proposed process flowsheet consists of:

- crushing and ore stockpiling
- grinding
- flotation and gravity concentration
- cyanide leaching
- concentrate dewatering
- tailings discharge
- reagent mixing, storage and distribution
- water and power supply
- other services.

Some of the key design parameters used for production planning and cost estimation are summarised below:

- a plant capacity of 2.0 Mtpa was selected
- mill availability of 91.3%, equating to a mill feed rate of 250 t/h
- average feed grades of 1.82% Cu and 1.43 g/t Au
- maximum design feed grades of 2.17% Cu and 2.19 g/t Au
- minimum concentrate grade of 25% Cu
- 85% copper recovery at an average feed grade of 1.82% Cu
- 60% recovery of gold by flotation
- an additional 15% of gold to be recovered by leaching of cleaner scavenger tailings and gravity concentrate obtained from the flotation tailings.

Details of the plant design, production forecasts, and cost estimates are given in the Project Engineering Report referred to above (MDM, 2004).

16.3.1 Operational variations

Discussions with MCM staff during July 2007 highlighted certain operational variations to the parameters detailed above which are summarised below;

- The average feed grade for Au is >2.00 g/t and is approximately on a 1:1 ratio with the Cu grade.
- The optimal Cu concentrate grade is 25% however in practice this figure is in a range between 23% – 25%.
- Cu recovery is averaging 83%.
- Au recovery from floatation is 40%.
- Testwork has shown the gravity recoveries of gold to be very poor.
- MCM testwork has shown that 35% of the gold can be recovered in the CIL circuit, from the cleaner scavenger tails and bulk scavenger float concentrate. The latter requires regrinding to between a 30 μm and 40 μm grain size. The design of the plant has been modified to incorporate this change and installation of the regrind mill and ancillary equipment is scheduled for completion by March 2008.

16.4 Plant description

16.4.1 General

A description of the Guelb Moghrein plant is given below. This is based directly on details supplied by MCM.

16.4.2 Crushing circuit

The crushing circuit comprises the existing single stage Allis-Chalmers 42-65 gyratory crusher in open circuit. Plant feed will be direct tipped into the crusher dump pocket by 55 t Komatsu 4657 haul trucks or reclaimed from the ROM stockpile with a Caterpillar 988 loader. Design throughput is 913 t/hr at a feed size of minus 1200 mm with a nominal product size of 130 mm. Crushed ore discharges onto an apron feeder and to the primary ore conveyor feeding the coarse ore stockpile. Live capacity of the stockpile is 7,000 t; total capacity is 21,000 t, which will allow an extended crusher shutdown of approximately three days with the use of a dozer on the stockpile. Ore is reclaimed from the stockpile via two vibrating feeders to the conveyor, feeding a single 350 t capacity mill bin. Emphasis has been placed in the plant design on the control of dust as there is up to 4% fibrous amphibole mineral (FAM) present in the ore. Control will be achieved by dust suppression sprays on the dump pocket, enclosed coarse ore stockpile and conveyors, and heavy duty dust extraction systems.

16.4.3 Grinding circuit

The grinding circuit is made up of two parallel semi-autogenous grinding (SAG) mills, one operating in open circuit and the second operating in closed circuit with a cluster of 500 mm hydrocyclones. Feed for the two mills is drawn from the common feed bin at a combined feed rate of 250 t/h at a nominal size of minus 130 mm. The product of the grinding circuit, cyclone overflow, has a design P80 of 75 μm. SAG Mill No.1 is a 7.47 m diameter by 1.43 m EGL Aerofall mill converted to wet grinding. SAG Mill No.2 is a 4.85 m diameter by 12.2 m EGL low aspect mill from South Africa. Steel and rubber liners are used on both mills with grate discharge. Motor sizes for the two mills are 1500 kW and 4000 kW respectively.

16.4.4 Copper flotation circuit

The flotation circuit comprises rougher flotation followed by three stages of cleaning in conjunction with a regrind mill to liberate composite particles. The basic reagent suite is sodium ethyl xanthate collector, Dowfroth 50 frother, and lime addition to pH 11 in the cleaners to depress arsenopyrite from the concentrate. The rougher bank is a series of six Outokumpu 50 m^3 tank cells with a total residence time of 30 minutes. First stage cleaning is in a bank of three 10 m^3 tank cells, with an additional four 10 m^3 cells for cleaner scavenger flotation. Residence times are 10 minutes and 20 minutes respectively. Second and third stage cleaning is in four and two 3 m^3 U-shaped cells with residence times of 20 minutes each. The cleaner scavenger concentrate reports to the regrind circuit comprising a 2.90 m diameter by 4.44 m EGL Allis-Chalmers ball mill operating in closed circuit with a cluster of 165 mm cyclones. The motor size of 540 kW will allow a design throughput of 83 t/h at a P80 of 30 μm. Circuit monitoring and optimisation is assisted by an Outokumpu Courier 5 On-Stream-Analyser.

16.4.5 Gold gravity circuit

Initial process design included a gravity circuit consisting of a Falcon SB 5200 Centrifugal Concentrator installed on the flotation tails stream to recover free gold in the ore. Subsequent gravity circuit trials on the operating plant and additional testwork have shown that the recoveries of free gold from the gravity circuit are limited and as a result this will not be installed.

16.4.6 Copper concentrate handling

The final flotation concentrate is thickened to 65% solids and stored in the filter feed tank which has a storage capacity of 24 hours production. The concentrate is filtered by a Larox Ceramec CC60 filter to produce a cake of approximately 9.5% moisture. The transportable moisture limit of the concentrate is 10.5%. Storage capacity in the concentrate shed is six days, with additional outside storage areas adjacent to the plant. Wheel loaders are used to load concentrate sacks into 20 foot lined sea containers. Depending on the client these are loaded with between 21 t and 26 t of concentrate. Sampling and weighing is carried out on site and containers are sealed by customs prior to dispatch.

Maersk has been contracted to transport full containers by road to the Port of Nouakchott for shipment to smelter customers and return empty containers to site for loading.

16.4.7 Copper concentrate specifications

Concentrate specifications have been determined by locked cycle flotation testwork carried out by Independent Metallurgical Laboratories in Perth (IML, 2004). Copper concentrate grades of 23% to 25% are being achieved and credits are received for gold in concentrate. Arsenic is the chief penalty element and the average concentrate grade of 1,900 ppm is well below the penalty level of 2,500 ppm. Snowden understands that concentrate is currently sold to smelters in Namibia, China and India.

16.4.8 Gold leach circuit

The CIL plant consists of a leach circuit, a pressure Zadra strip circuit and gold room. As a result of the gravity circuit trials and testwork noted above, MCM will modify the plant circuit to include a regrind mill to treat the bulk scavenger float concentrate. The bulk scavenger float concentrate will be reduced in size to between 30 μm and 40 μm. MCM anticipates that the regrind mill will be installed by March 2008, at which point the CIL circuit will be commissioned.

Cleaner scavenger floatation tails and the reground bulk scavenger float concentrate will report to the CIL feed thickener. Thickener underflow at 70% solids will be pumped via a trash screen to five agitated leach tanks in series. Total tank volume is 1792 m^3 which gives 30 hour residence time. The pH of the circuit will be maintained in excess of 10.5 and cyanide will be added to the first tank and subsequent tanks as required. Carbon will be moved counter current to the flow of pulp from Tank 5 to Tank 1 before reporting to the loaded carbon screen which separates carbon from pulp. Loaded carbon from the screen is transferred to the acid wash tank for acid washing with hydrochloric acid. The carbon is then transferred to the 1 t capacity elution column where hot caustic solution, over a period of 8 hours, is used to remove the gold from the carbon. Eluate from the strip column will pass through the electrowinning cell where gold will be deposited onto mild steel wool cathodes. Cathodes will be calcined then smelted to dore bullion in an LPG fired barring furnace. Dore bullion will be exported to Europe for refining. Barren carbon from the elution column will be regenerated in the vertical regeneration kiln before being returned to Tank 5 of the leach circuit.

16.4.9 Tailings disposal

There are two separate tailings dams, one for the flotation tailings and the second for tails from the CIL plant. Flotation tailings are thickened and pumped to the main tailings storage facility (TSF) adjacent to the plant site (Figure 4.3). Deposition is via a series of drop bars spaced at intervals of 11 m on the dam wall. There is provision to reclaim process water from the pool via a pontoon mounted submersible pump.

Initial CIL plant tailings were deposited in the former evaporation pond / leach tailings dam on the site (Figure 4.3). Subsequent investigations found this facility to be unsuitable and a new TSF is under construction to handle the CIL tailings. This is expected to be completed in time for the recommissioning of the CIL plant in March 2008. The CIL tails are thickened to 70% solids before being pumped to the dam.

17 Mineral resource estimates

17.1 Summary

The Mineral Resource estimate for the Occidental deposit at Guelb Moghrein is summarised in the following Tables (Tables 17.1 and 17.2). Two Mineral Resource estimates are provided; firstly using a copper cut-off grade of 0.75%, and secondly using a copper cut-off of 1%, which reflects the current mining cut-off grade and is comparable to the cut-off grades used in previous resource estimates. In the latter case gold resources have been included for gold ore above a cut-off of 1 g/t, where the copper grade falls below the 1% Cu cut-off. This material is currently mined and stockpiled separately for future processing by MCM.

Table 17.1 Guelb Moghrein in situ Copper Mineral Resources at a cut-off grade of 0.75% Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 0.75 % Cu cut-off		
		Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	12.38	1.59	1.38
	Indicated	20.64	1.44	0.93
	Total	**33.02**	**1.49**	**1.10**
	Inferred	2.43	1.36	0.72
Oxide	Measured	0.36	2.87	2.41
	Indicated	0.01	2.46	1.81
	Total	**0.37**	**2.85**	**2.39**
	Inferred	0.02	3.09	1.98

Table 17.2 Guelb Moghrein in situ Copper and Gold Mineral Resources at a cut-off grade of 1 % Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 1 % Cu cut-off			Additional Gold resources at 1 g/t Au cut-off		
		Tonnes (Mt)	Cu %	Au g/t	Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	10.03	1.76	1.51	1.02	0.79	1.30
	Indicated	15.15	1.64	1.08	0.91	0.77	1.32
	Total	**25.18**	**1.69**	**1.25**	**1.92**	**0.78**	**1.31**
	Inferred	1.75	1.54	0.84	0.24	0.44	1.25
Oxide	Measured	0.35	2.91	2.43	0.013	0.48	2.04
	Indicated	0.01	2.46	1.81	0.002	-	2.04
	Total	**0.37**	**2.89**	**2.40**	**0.015**	**0.41**	**2.04**
	Inferred	0.02	3.09	1.98	0.007	-	2.25

17.2 Disclosure

Mineral Resources reported in Section 17 were prepared by Mr. C. J Bargmann, Principal Consultant, and Dr. S C Dominy, Principal Consultant, both of whom are full time employees of Snowden. Both are Qualified Persons as defined in NI 43-101 and are independent of both FQML and MCM.

In addition Snowden operates an internal review process, and this document was reviewed by Mr I Glacken, Group General Manager Resources for Snowden.

Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

17.2.1 Known issues that materially affect Mineral Resources and Mineral Reserves

Snowden is unaware of any significant issues that may materially affect the Mineral Resource in a detrimental sense. These conclusions are based on the following:

MCM is currently in production and has demonstrated the economic viability of the Occidental deposit.

There are no infrastructure issues and MCM has demonstrated that the copper concentrates can be successfully exported from Mauritania.

The 2006 confirmatory drilling programme has provided increased confidence in the reliability of the older generations of drilling data.

The presence of arsenic and FAM in the ore material are potential operational issues; however, MCM is aware of these issues, and measures are in place to mitigate the effects on production and upon the health and safety of personnel.

The reliability and range of assays available from the MCM mine laboratory is also a problem operationally. At present the mine laboratory produces conservative results. Mine management is aware of the problem and is taking steps to rectify the situation. No assays from the mine laboratory were used in the resource estimate detailed in this Technical Report.

17.3 Assumptions, methods and parameters – Snowden resource estimates.

The basis of the Mineral Resource estimate for the Occidental deposit at Guelb Moghrein is discussed in this section.

The estimate was prepared in the following steps;

- data validation (sampling, database validation, drillhole locations, QAQC sample analysis)
- geological interpretation and 3d modelling
- compositing of assay intervals
- data analysis for copper, gold and arsenic
- variogram analysis

- determination of top cuts
- generation of block models
- grade interpolation of copper, gold and arsenic
- validation of copper and gold grade estimates
- classification of copper and gold estimates with respect to CIM (2005) guidelines
- resource tabulation and reporting.

17.3.1 Drilling database

All drilling data was available in the Guelb Moghrein mine co-ordinate system. This grid system was used for all of the Datamine modelling, and in the generation of the block model.

The pre 2006 drillhole database

The pre 2006 drillhole database was supplied as a series of Excel spreadsheets. The main files used are summarised below:

- Drillhole header information file, containing information on collar coordinates (in both UTM and mine coordinate system), drillhole orientation and total depth. No downhole surveys are available.
- Assay file, including assays for copper, gold, cobalt and several other elements.
- Geology intervals file, containing codes for mineralisation types to match the revised geological interpretation done on site.

Additional files from the archive inherited from the GGI evaluation period were also available for checking. These included information on detailed geological logging of some of the 1990s drillholes, density measurements, duplicate sampling results, etc. Once again these were mostly available as Excel spreadsheets.

Details on the verification of the pre-2006 drilling database can be found in Section 14.6 for this report.

The 2006 confirmatory drillhole database

The 2006 confirmatory drillhole database was supplied to Snowden by MCM as a single Excel spreadsheet. This included all collar, survey and assay information. The database was received by Snowden during the 2007 site visit, which allowed time for the data to be checked and any issues resolved on site. Snowden verified the position of the remaining collars during the 2007 site visit and believes that these are correctly represented in the database. Final assay results were emailed directly to Snowden from SGS Lakefield and Genalysis in early September 2007 for inclusion in the final dataset. Snowden created separate collar, survey and assay files for importation of the dataset into Datamine for geological modelling.

MCM grade control database

During the 2007 site visit the MCM grade control database was obtained for possible use in the evaluation process. The dataset contained numerous unsampled drillholes and was edited by Snowden to produce a database containing only sampled drillholes. Because of the large size of the database and location of the drilling within the active mining areas of the Guelb Moghrein pit, Snowden accepted the accuracy of the collar positions and assay results. All of the MCM grade control drillholes were assayed through the Guelb Moghrein site laboratory which has been shown to be unreliable, and as a result the data was not used in the resource estimation. However, the general grade trends within the grade control database proved useful in validation the final block model and as a control in geological modelling.

17.3.2 Geological interpretation and modelling

The geological model of the Occidental zone used in this resource estimate is based on original wireframe models prepared on site by FQML personnel. Models were generated in Surpac software and imported into Datamine software in order to create a revised geological model.

Wireframe models of the following geological boundaries were used in generating the geological block model on which the current resource estimate is based:

- Original topographic surface – a digital terrain model (DTM) of the pre MCM mining surface topography[12]. This DTM includes the base of the prexisting oxide open pit and the surrounding infrastructure.
- Current topographic surface – during the 2007 site visit Snowden obtained the current mine survey DTM. This was the surface at the end of July 2007 (week 29). Snowden combined this surface with the original topographic DTM to produce a DTM of the current topography.
- FMC boundary – a solid wireframe defining the boundary of the mineralised FMC unit. This wireframe was revised by Snowden based on the results of the 2006 drilling programme.
- Base of oxidation – a DTM surface used on site as the base of weathering. This was extended to cover the whole area and revised based on oxide intersections from the 2006 drilling programme.

Geological interpretation

Snowden revised the geological interpretation of the FMC unit in order to incorporate the 2006 drilling results and address concerns that the existing wireframe did not honour the fault boundaries marked by the D3 faulting. An important aspect of the geological remodelling was to define the positions of these D3 age boundary faults. These faults were reinterpreted and wireframes created which accounted for the new drilling data and the observed position of the western boundary fault within the open pit. Once the fault positions had been defined the FMC wireframe was extended to the new fault positions. This resulted in an increase in the volume of the wireframe to the east and west.

Figures 17.1 and 17.2 respectively show the original and revised geological interpretations of the FMC/mineralisation in relation to the revised boundary fault interpretation.

[12] The original source of this DTM has not been identified; however, Snowden considers that it provides a realistic representation of the current topographic surface.

Figure 17.1 Original geological interpretation of the Occidental FMC body with the revised boundary faults as reference

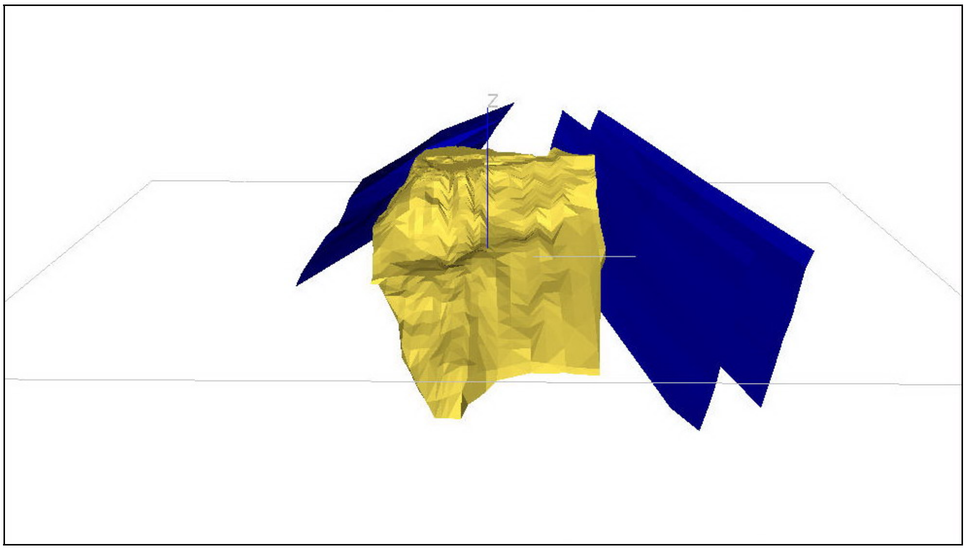
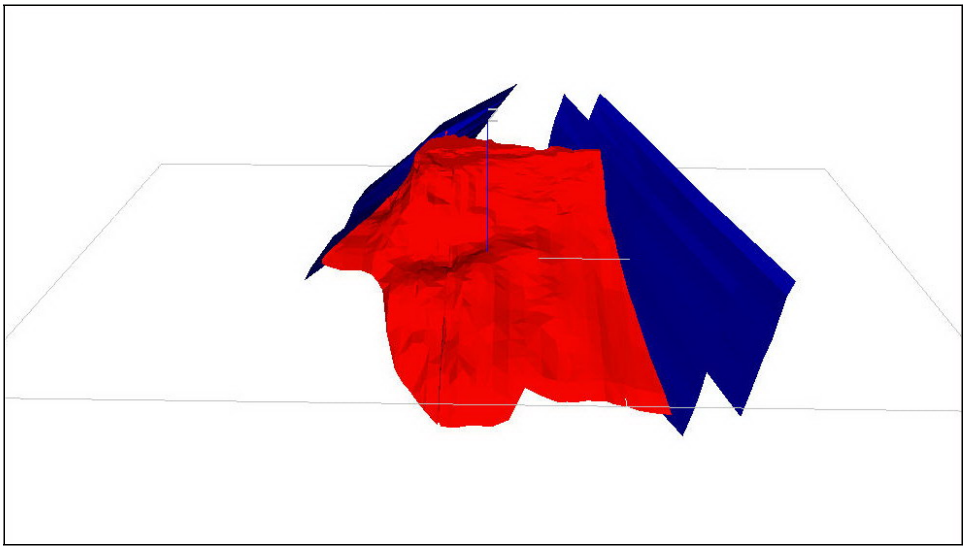


Figure 17.2 Revised geological interpretation of the Occidental FMC body and boundary faults as reference

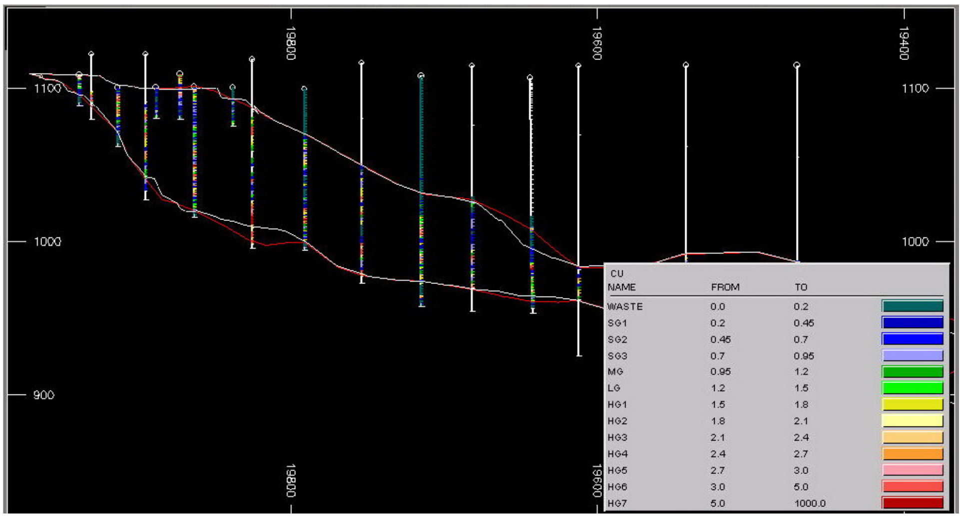


The MCM base of weathering surface was revised on the basis of the oxidation information from the 2006 drilling, and was extended to cover the whole area of interest.

Mineralisation interpretation

Based on the observations of the drill core from the 2006 drilling programme it was apparent that the mineralisation is not exclusive to the FMC lithology. As a result the FMC wireframe was adjusted to include mineralisation in both the hangingwall and footwall, where either the FMC boundary had been misinterpreted or the recent drilling confirmed the presence of mineralisation in the metabasalts. This resulted in an increase in the vertical extent of the mineralisation on several sections and resulted in better definition of the apparently distinct pods within the FMC unit. Figure 17.3 compares the revised FMC / mineralisation wireframe (in red) with the original (in white).

Figure 17.3 Section 7210E showing the revised FMC / Mineralisation wireframe contacts based on 2006 drilling results.



Evaluation wireframe and data

Prior to analysis the drillhole database was coded according to drilling generation (Drillgen variable) and those belonging to the main evaluation drilling campaigns (Drillgen codes 1, 2, 3, 4, 7, 11, and 12) were extracted as the evaluation dataset. Table 17.3 details the drilling generation codes applied to the database.

Table 17.3 Guelb Moghrein drillhole database drilling phase codings

Drillgen	Dates	Company	Type of work
1	Pre-1968	MICUMA	Diamond drilling
1	1968 -1973	SOMIMA	Diamond drilling
2	Mid-1970s ?	SOMIMA ?	Diamond drilling ?
2	Mid-1970s ?	SOMIMA ?	Diamond drilling ?
3	Mid-1970s ?	SOMIMA ?	Diamond drilling
4	1994-1995	GGI	RC drilling
4	1994-1995	GGI	Diamond drilling – evaluation
5	1994-1995	GGI	Diamond drilling - metallurgical and geotechnical
6	1997	GGI	RC drilling - grade control
7	2004	FQML	RC drilling – validation
8	1997	GGI	RC drilling – exploration
9	2004	FQML	RC drilling – exploration
10	2005 - 2006	MCM	RC drilling – grade control
11	2006	MCM	Diamond drilling SGS assay
12	2006	MCM	Diamond drilling Genalysis assay

In addition a code for old and new drilling was also inserted (Drillind – 0 for pre-1990, 1 for post-1990 drilling).

The finalised FMC wireframe – now representing a combination of a geological and a mineralisation domain – was clipped to honour the contacts with the eastern and western boundary faults. The top contact was clipped to the original pre MCM topographic surface. The resulting wireframe now honoured the geological interpretation of the mineralised FMC body. This was split using the revised oxide wireframe to produce separate oxide and sulphide wireframes, from which the individual drillhole intersections were obtained as separate Datamine files. By adding an additional data column and code to these two files codes for oxide and sulphide were applied to the drillhole data within the FMC wireframe (Sulphide = 1, Oxide = 2). The sulphide and oxide borehole data files were recombined to produce the final evaluation dataset.

In January 2008 the FMC / mineralisation wireframe was further subdivided in order to distinguish two distinct mineralised zones. Mineralised metabasalt and areas of mixed FMC / metabasalt are present and have density implications which are discussed in Section 17.3.11. The mixed FMC / metabasalt unit has only been identified as part of the logging of the 2006 drilling programme and is not present in the database for the older drilling phases. Snowden have recommended to MCM that they reinterpret the core and borehole logs from the older drilling phases in order to identify this mixed lithology in order to provide better definition of the geology. This should be conducted prior to any future resource modelling.

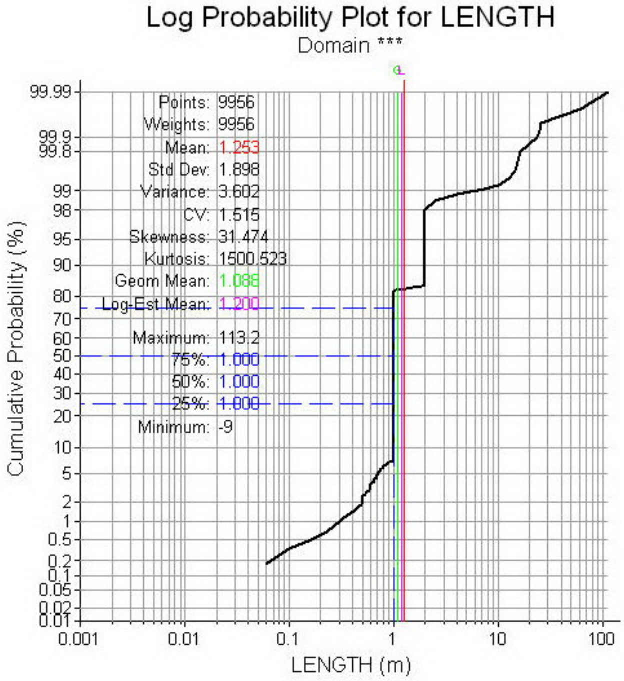
17.3.3 Statistical analyses of assay samples

Initial statistical analysis of the data was carried out using Snowden's Supervisor software. In normal circumstances oxide and sulphide domains would be treated separately; however, in the case of Guelb Moghrein the bulk of the oxide orebody has already been exploited. Prior to MCM commencing mining oxide represented 3.87% of the revised FMC/mineralisation wireframe volume, and by the end of July 2007 this volume had reduced to 0.68%. Practically all of the remaining oxide has already been extracted by MCM, making the modelling of the remaining oxide a separate unwarranted exercise. Summary statistics were calculated and histograms and probability plots were plotted and examined. Subsequently, the raw data was composited into regular intervals and statistical analysis for the two economic elements of interest, copper and gold, was repeated.

Statistics based on the original sample intervals - Sample length

A log probability plot of sample lengths for the revised mineralised FMC is shown in Figure 17.4. The bulk of the assay sampling has been undertaken at 1 m or 2 m intervals. Large sample intervals are associated with unsampled boreholes. One early phase drillhole (G7) was found to have the same copper value assigned to the whole borehole length and was removed as being unreliable.

Figure 17.4 Log probability plot for recorded sample length in the evaluation assay database



Statistics based on the original sample intervals - Analytical values

Summary statistics for copper, gold and arsenic from the grade control and exploration drilling are presented in Table 17.4 and Table 17.5. Datamine was used to create subset drillhole files for grade control and exploration intersections within the revised FMC wireframe from which the following statistics are derived. Copper and gold mean grades for the grade control (both MCM and GGI) and exploration drilling are very similar with the exception of the exploration gold mean value, which is lower than the grade control data. The oxide values for copper and gold are slightly higher in the oxide zone. Arsenic values also show a higher oxide value over sulphide and a large range in mean values between grade control and exploration samples.

The close comparison between the grade control and exploration results is encouraging, and suggests that the grade control data may be suitable for use in the resource estimation process. However, the grade control data is specifically unreliable on two counts. Firstly, the drilling is focussed on the currently active high grade portion of the open pit whilst the exploration results encompass the whole FMC body including low grade or unmineralised areas; as such, the grade control results should be higher than the exploration results. Secondly, as discussed in Section 14.7, the MCM mine laboratory underestimates copper and gold, and this is expected to be reflected in the grade control results. The inclusion of the denser spaced grade control results would affect the resource estimate and as a result only the exploration results were used for the estimation of the Mineral Resources.

As the FMC mineralised wireframe represents a combination of a geological and mineralisation zone it will include areas of low grade or unmineralised FMC. This material is clearly marked by distinct low grade peaks in the grade histograms for copper, gold and arsenic. By applying a low-grade cut-off to the assay data, statistics more closely representing the mineralisation can be generated. Analysis of the grade distribution shows distinct low-grade peaks at 0.001% for copper, 0.001 g/t, 0.005 g/t and 0.01 g/t for gold and 0.001 g/t, 0.5 g/t and 1.0 g/t for arsenic (Figures 17.5 to 17.7). These figures are likely to represent assay detection limits for the various drilling phases and this material represents unmineralised or poorly mineralised FMC within the FMC wireframe. Tables 17.6 and 17.7 provide summary statistics for copper, gold and arsenic using a low-grade cut-off of 0.001%, 0.0105 g/t and 1.05 g/t respectively in order to provide an unweighted estimate of the grade of the main mineralisation.

With the exception of the grade control gold grade for the sulphide zone the exploration results are higher for copper and gold. Arsenic assays are comparable.

Figure 17.5 Grade distribution histogram plot for copper within the FMC/mineralisation wireframe for uncomposited exploration and grade control drillholes

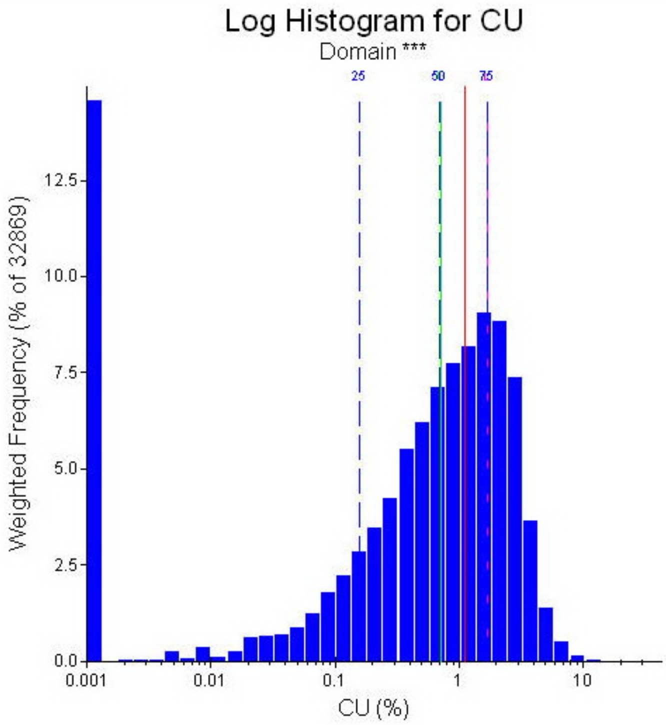


Figure 17.6 Grade distribution histogram plot for gold within the FMC/mineralisation wireframe for uncomposited exploration and grade control drillholes

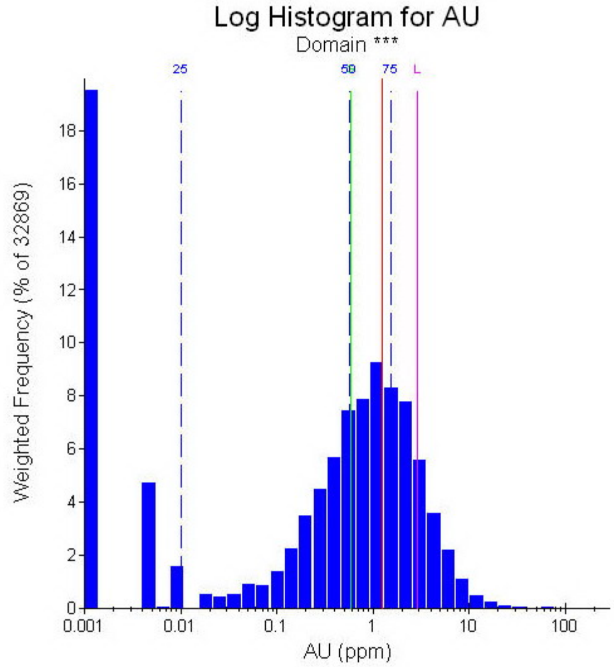


Figure 17.7 Grade distribution histogram plot for arsenic within the FMC/mineralisation wireframe for uncomposited exploration and grade control drillholes

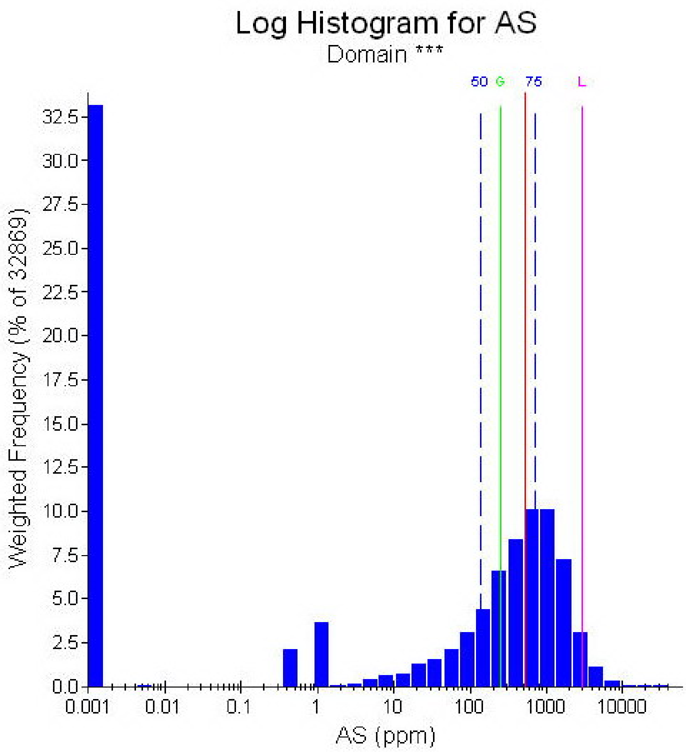


Table 17.4 Statistical summary of grade control assay results for copper, gold and arsenic from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	5,115	24,211	5,115	24,211	5,115	24,211
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	20.50	19.56	297.50	220.00	19,600	202,200
Mean	1.27	1.08	1.32	1.33	608.7	582.5
Standard deviation	1.62	1.21	4.32	2.63	1,207.3	957.9
CV	1.27	1.12	3.28	1.98	1.98	1.64
Variance	2.62	1.46	18.65	6.93	1,457,540	917,560
Skewness	2.82	1.98	48.67	29.20	4.59	4.90

Table 17.5 Statistical summary of exploration assay results for copper, gold and arsenic from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	1,208	8,658	1,208	8,658	1,208	8,658
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	13.00	33.64	64.40	39.60	20,000	41,000
Mean	1.27	1.18	1.36	0.95	837.5	386.2
Standard deviation	1.67	1.43	3.40	1.79	1396	1078
CV	1.31	1.21	2.50	1.88	1.67	2.79
Variance	2.77	2.03	11.56	3.20	1,948,840	1,161,750
Skewness	1.92	3.85	9.11	6.58	4.80	12.59

Table 17.6 Statistical summary of filtered grade control assay results for copper (>0.001%), gold (>0.0105 g/t) and arsenic (>1.05 g/t) from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	4,714	20,516	4,106	18,698	1,900	15,225
Minimum	0.004	0.002	0.02	0.02	2.50	2.00
Maximum	20.5	19.56	297.5	220.0	19,600	202,200
Mean	1.46	1.29	1.87	1.75	1,382.7	888.9
Standard deviation	1.66	1.21	5.05	2.9	1,497.0	1,062.1
CV	1.13	0.94	2.70	1.65	1.08	1.19
Variance	2.74	1.47	25.51	8.39	2,240,920	1,128,140
Skewness	2.77	1.95	43.00	28.47	1.95	4.69

Table 17.7 Statistical summary of filtered exploration assay results for copper(>0.001%), gold (>0.0105 g/t) and arsenic (>1.05 g/t), from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	1,146	8,450	916	6,840	923	5,309
Minimum	0.01	0.002	0.02	0.012	3.00	2.00
Maximum	13	33.64	64.4	39.6	20,000	41,000
Mean	1.71	1.31	2.17	1.37	1,336.4	789.7
Standard deviation	1.73	1.44	4.09	2.01	1,563.2	1,434.3
CV	1.01	1.11	1.88	1.47	1.17	1.82
Variance	2.98	2.09	16.71	4.03	2,443,680	2,060,000
Skewness	1.68	3.89	7.80	6.10	4.56	10.08

17.3.4 Downhole compositing

Based on the sample length distribution discussed above, a 2 m downhole composite interval for the evaluation was selected. Only the exploration drillholes were used, and all sample intervals within the revised FMC wireframe were composited.

Downhole composites were generated in Datamine using the following parameters:

- composite length = 2.0 m
- minimum composite length = 1.5 m
- minimum gap = 0.001 m forcing composites to be split at every gap
- start at beginning of hole (START = 0)
- optimal compositing was not used (MODE = 0). This produced a more consistent set of 2.0 m composite intervals.

17.3.5 Statistics of the 2 m downhole composites

Statistical summaries for the 2 m composites are presented in Table 17.8 and 17.9. The summary statistics confirm the trends seen in the raw data and in the filtered high grade dataset. From the results it is again apparent that the oxide zone exhibits higher grades than the sulphide zone.

Table 17.8 Statistical summary of 2 m composited exploration assay results for copper, gold and arsenic from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	649	5,436	649	5,436	649	5436
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	9.1	18.31	36.31	27.95	11,430	27,500
Mean	1.27	1.16	1.31	0.93	838.4	369.7
Standard deviation	1.52	1.28	2.61	1.49	1,242.2	894.2
CV	1.20	1.10	2.00	1.60	1.48	2.42
Variance	2.32	1.63	6.84	2.21	1,543,140	799,508
Skewness	1.58	2.52	6.28	4.56	3.14	9.24

Table 17.9 Statistical summary of 2 m composited, filtered exploration assay results for copper(>0.001%), gold (>0.0105 g/t) and arsenic (>1.05 g/t), from the FMC oxide and sulphide zones

	Cu % (Ox)	Cu % (Sulp)	Au g/t (Ox)	Au g/t (Sulp)	As g/t (Ox)	As g/t (Sulp)
Samples	492	4,971	417	3,933	407	2,640
Minimum	0.010	0.002	0.014	0.018	15.50	1.80
Maximum	9.1	18.31	36.31	27.95	1,1430	27,500
Mean	1.67	1.27	2.04	1.28	1,336.8	760.7
Standard deviation	1.54	1.28	3.03	1.61	1,339.8	1,161.0
CV	0.92	1.01	1.49	1.26	1.00	1.53
Variance	2.38	1.65	9.16	2.6	1,794,920	1,347,880
Skewness	1.38	2.54	5.62	4.34	2.98	7.68

17.3.6 Top-cut analysis

A top-cut analysis for copper, gold and arsenic from the 2 m downhole composite data was carried out using a rank analysis approach. The combined dataset (oxide and sulphide) was copied into a spreadsheet and sorted in order of grade with a column then being added to indicate the percentage increase in grade between each interval and the following one. Top-cut values were then chosen where this percentage increased suddenly near the tail of the distribution, and a top-cut value was selected at that point. The results obtained are summarised in Table 17.10.

Table 17.10 Summary of results of top-cut analysis for copper, gold and arsenic

	Top-cut (no. of values affected)	Mean grade		Coefficient of variation	
		Original	With top cut	Original	With top cut
Cu (%)	8.9 (5)	1.299	1.295	1.010	0.984
Au (g/t)	15.25 (7)	1.133	1.124	1.524	1.430
As (g/t)	7575 (10)	834.6	818.5	1.244	1.250

It is apparent from the top cut analysis that the overall effects are minor, affecting a small number of samples and resulting in a slight decrease in the average grade. As a result it was decided not to use a top-cut in the resource estimation as it is unlikely to result in an overestimation of the grades.

17.3.7 Variogram analysis

General

Variographic studies were carried out using Snowden's Supervisor program. Modelling was undertaken using both the grade control and exploration datasets. As discussed earlier the oxide and sulphide were not treated separately due to the limited amount of oxide remaining in the Guelb Moghrein open pit. Although the grade control data would not be used in the estimation process it provided a useful control during the variography. As a result of the close spaced nature of the grade control drilling, strong directional trends were apparent, which were utilised in the analysis of the exploration dataset. Geological controls and trends observed from grade control plans were also taken into account.

Variogram models were fitted initially to the downhole variograms in order to get a good estimate of the nugget variance, and this was then applied to the directional variograms.

Copper semi-variograms

The horizontal continuity plot based on normal-scores semivariance shows a strong anisotropy with the direction of maximum continuity corresponding to an azimuth of 085° in the grade control data and 105° degrees from the exploration data (with respect to mine grid) (Figure 17.8 and 17.9). This agrees well with the interpreted trends of the footwall and hangingwall FMC contacts in the current pit area.

Figure 17.8 Horizontal continuity plot (normal scores semi-variance) for copper, based on 2 m composite grade control data

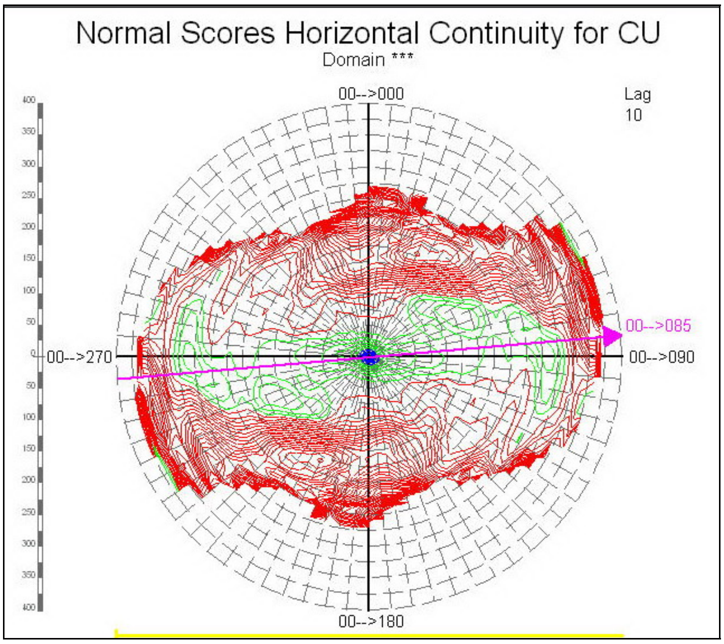
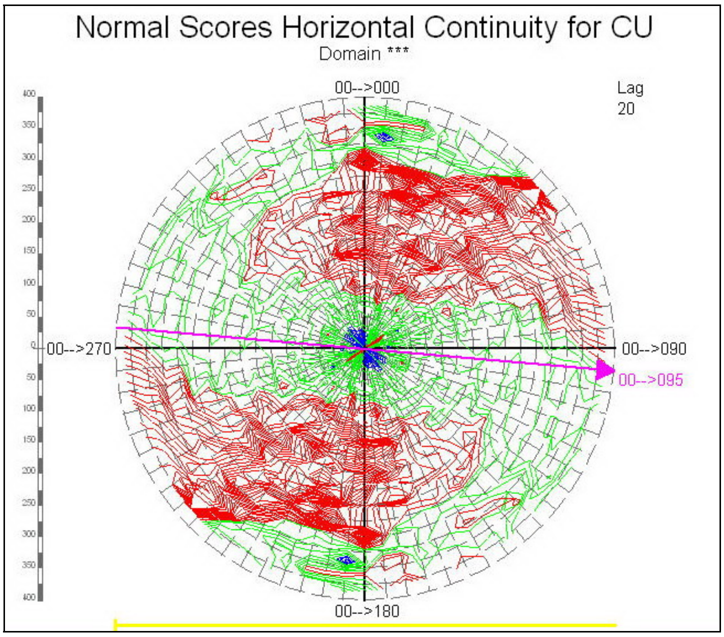


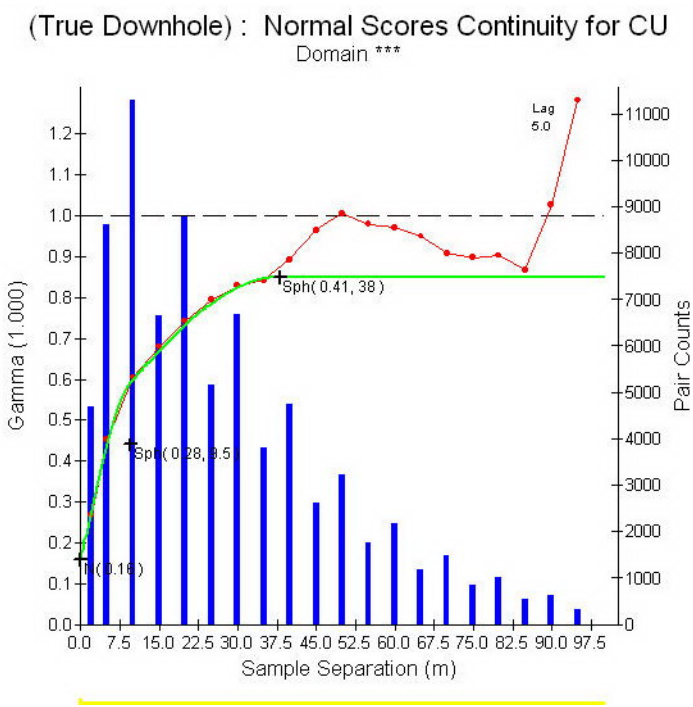
Figure 17.9 Horizontal continuity plot (normal scores semi-variance) for copper, based on 2 m composite exploration data



Similar continuity plots for the vertical dip-direction plane also indicate the presence of anisotropy, with the maximum direction of continuity corresponding with a dip of 25° to an azimuth of 195° (with respect to the mine grid). This also agrees well with the general orientation of the FMC unit on transverse cross sections.

The downhole variogram, as shown in Figure 17.10, gave a good indication of the nugget variance to assist in determining models for the other directions.

Figure 17.10 Downhole semi-variogram and corresponding variogram model (normal scores semi-variance) for copper - based on 2 m exploration composites



Initial models for copper were based on two nested spherical structures. The variogram models selected for use in copper grade estimation are summarised in Table 17.11.

Table 17.11 Normal scores variogram models for Copper

Direction	Nugget C0	Structure 1		Structure 2	
		Sill C1	Range A1	Sill C2	Range A2
-02->100			47		116.5
25->011	0.16	0.38	29.5	0.31	139.5
65->185			13.5		36.5

Gold semi-variograms

The horizontal continuity plot based on normal-scores semivariance shows a strong anisotropy with the direction of maximum continuity corresponding to an azimuth of 100° in the grade control data and 115° degrees from the exploration data (with respect to mine grid) (Figure 17.11 and 17.12).

Figure 17.11 Horizontal continuity plot (normal scores semi-variance) for gold, based on 2 m composite grade control data

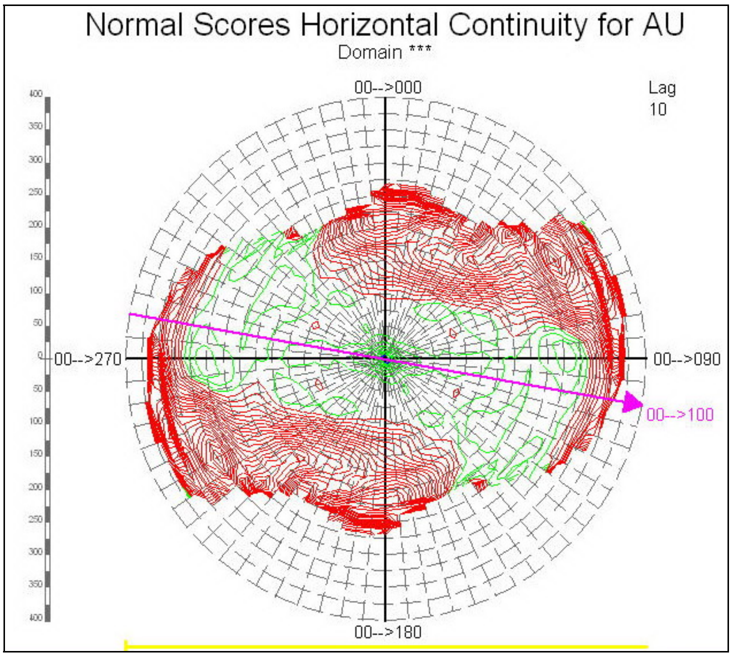
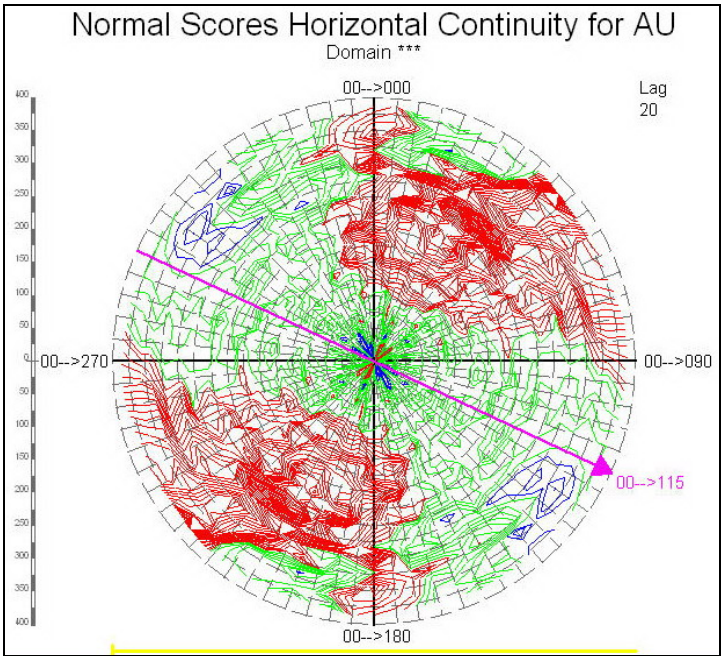
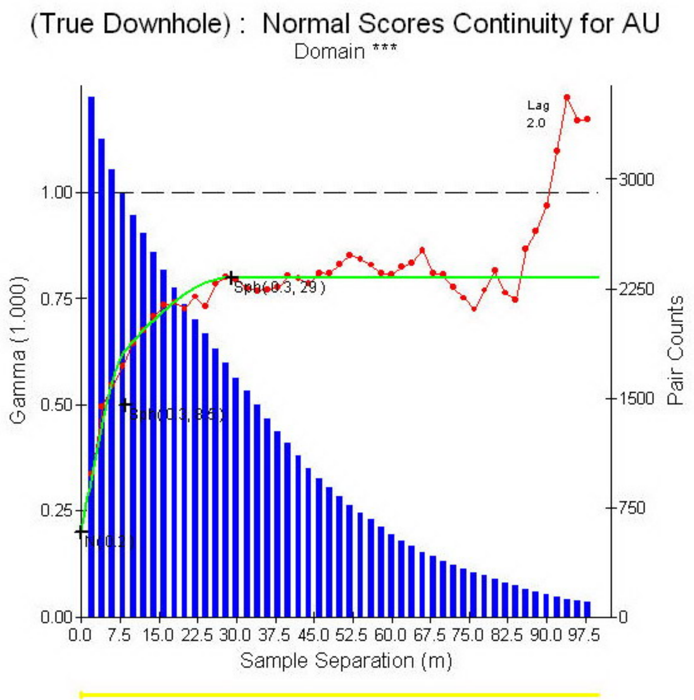


Figure 17.12 Horizontal continuity plot (normal scores semi-variance) for gold, based on 2 m composite exploration data



Similar continuity plots for the vertical dip-direction plane also indicate the presence of anisotropy, with the maximum direction of continuity corresponding with a dip of 25° to an azimuth of 205° (with respect to the mine grid). The downhole variogram, as shown in Figure 17.10, gave a good indication of the nugget variance to assist in determining models for the other directions.

Figure 17.13 Downhole semi-variogram and corresponding variogram model (normal scores semi-variance) for gold - based on 2 m exploration composites



The variogram models selected for gold are summarised in Table 17.12.

Table 17.12 Normal score variogram models for Gold

Direction	Nugget C0	Structure 1		Structure 2	
		Sill C1	Range A1	Sill C2	Range A2
-06->129			71		133
24->041	0.2	0.3	45	0.3	82
65-->205			10		24

Arsenic semi-variograms

The horizontal continuity plot based on normal-scores semivariance for the grade control data shows a complex structure with two directions of continuity corresponding to an azimuth of 105° and 150°. In the exploration data a complex pattern emerges, with strong trends in 035° and 130° to 150° orientations (with respect to mine grid) (Figure 17.14 and 17.15).

Figure 17.14 Horizontal continuity plot (normal scores semi-variance) for arsenic, based on 2 m composite grade control data

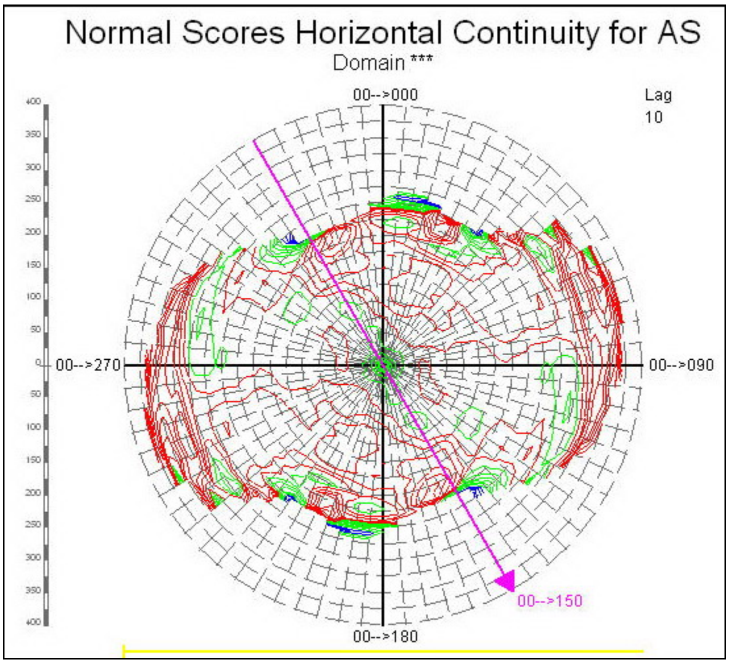
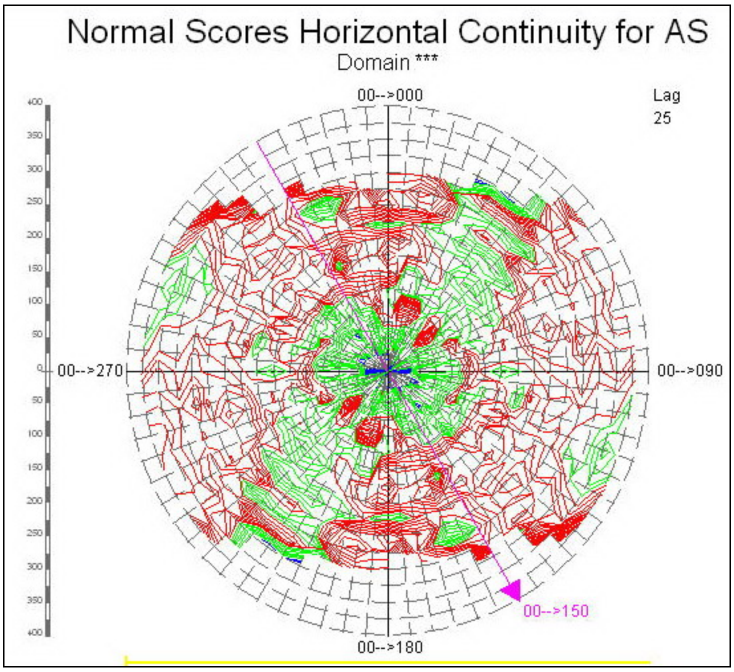
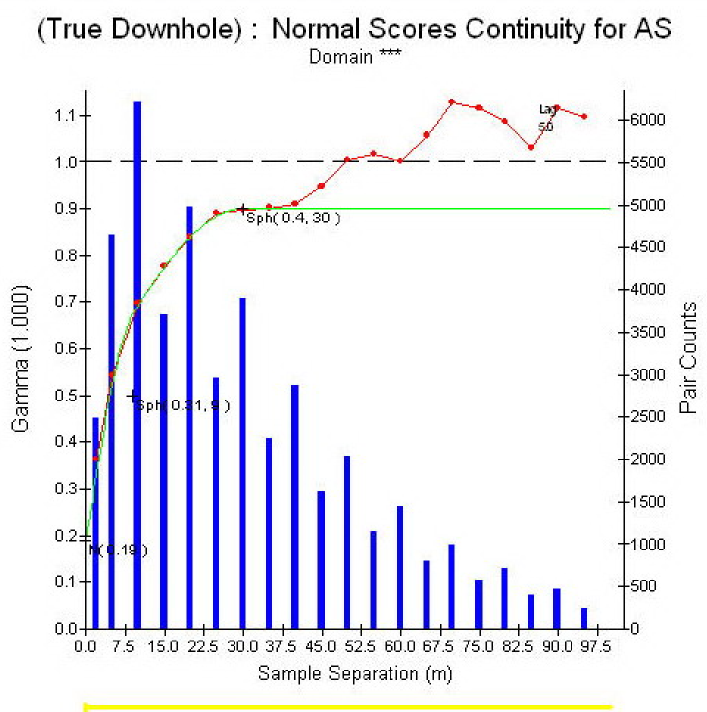


Figure 17.15 Horizontal continuity plot (normal scores semi-variance) for arsenic, based on 2 m composite exploration data



Similar continuity plots for the vertical dip-direction plane also indicate the presence of anisotropy, with the maximum direction of continuity corresponding with a dip of 10° to an azimuth of 240° (with respect to the mine grid). The downhole variogram, as shown in Figure 17.10, gave a good indication of the nugget variance to assist in determining models for the other directions.

Figure 17.16 Downhole semi-variogram and corresponding variogram model (normal scores semi-variance) for arsenic - based on 2 m exploration composites



The variogram models selected for arsenic are summarised in Table 17.12.

Table 17.13 Normal scores variogram models for Arsenic

Direction	Nugget C0	Structure 1		Structure 2	
		Sill C1	Range A1	Sill C2	Range A2
04->125	0.19	0.35	58.5	0.36	135
09->035			47.5		83.5
80-->240			8.5		31

17.3.8 Kriging neighbourhood analysis

Overview

Kriging neighbourhood analysis was carried out during 2006 in order to assist in the selection of an appropriate block size and kriging parameters for use in generating the resource block model. The main objective of this type of analysis is to minimise conditional bias during grade estimation by optimising parameters such as search neighbourhood, the number of informing samples, block size and discretisation. Conditional bias in a resource estimate is undesirable because it indicates the presence of over-smoothed block grades within a model, which reduces the accuracy of the local block grade estimates and may lead to incorrect estimation of tonnage and grade (Figure 17.17).

The amount of conditional bias present for a given set of estimation parameters is judged using:

- The predicted regression slope between true and estimated grades. This should be close to one in order to ensure that the estimated grades have a close correlation with the true grades (see Figure 17.17).
- The kriging efficiency parameter, which is based on the ratio between the kriging variance and the block variance. When these two values are similar (i.e. the kriging variance is low to zero), kriging efficiency approaches 100%, and this indicates that the estimated grades are likely to be an accurate reflection of the true grades (see Figure 17.18).

These two statistics provide an indication of how well the selected set of kriging parameters, together with the configuration of available data with respect to the block(s) analysed, can predict local block grades.

Figure 17.17 Effect of conditional bias on estimated block grades and its relationship with the regression slope parameter

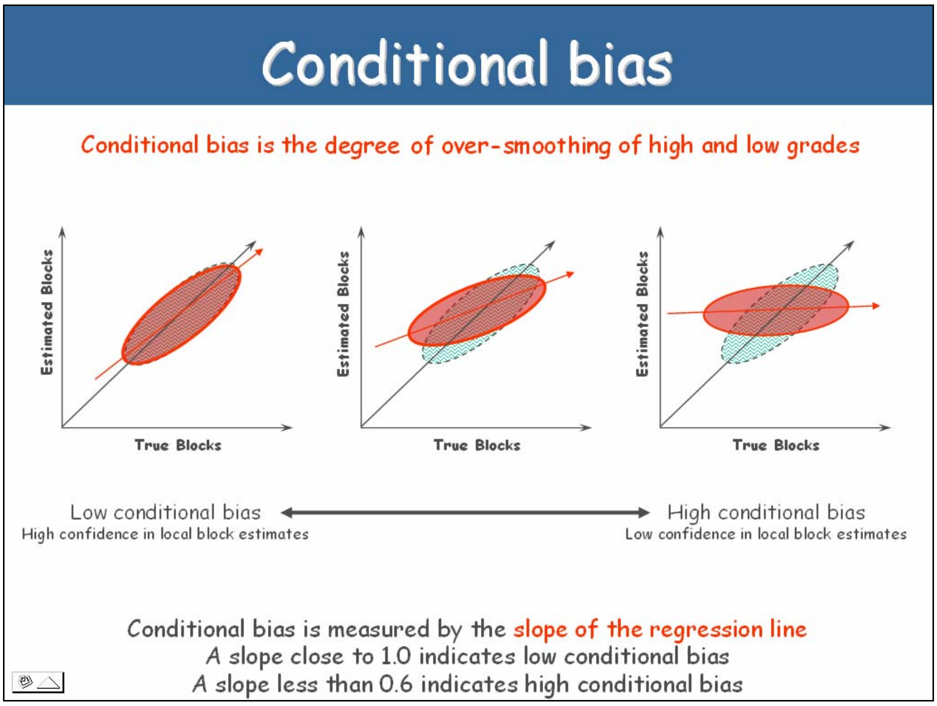
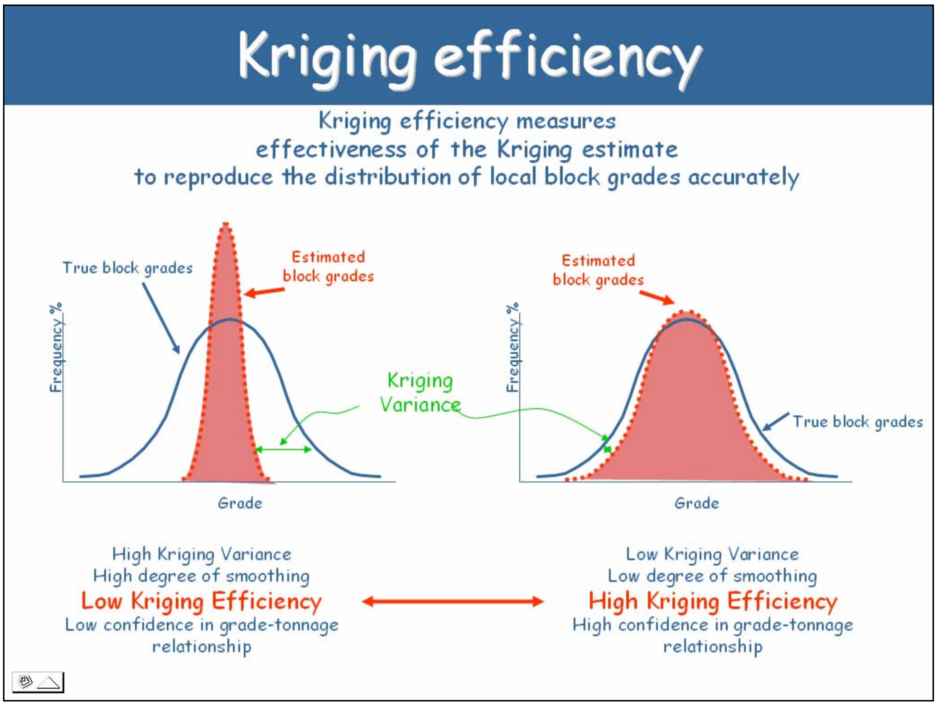


Figure 17.18 Relationship between kriging efficiency and accuracy of local block estimation



Methodology and results

Kriging neighbourhood analysis was carried out using an in-house Snowden program called blkvar7. Block sizes ranging from 5 m by 5 m up to 50 m by 50 m were tested in three locations for a range of different estimation parameters. The results obtained using the parameters selected for copper grade estimation are summarised in Table 17.14.

Table 17.14 Summary of the results obtained for the three block centroids used during kriging neighbourhood analysis using the estimation parameters selected for copper grade estimation. (K.E. = Kriging efficiency)

Level of information	X	Y	Z	Slope	K.E. (%)	Description
High	7140	19785	1025	0.981	83.1	Well informed – located in centre of 35 m by 35 m grid
Med	7140	19645	980	0.986	83.7	On boundary between 35 m by 35 m and 70 m by 70 m grid
Low	7140	19540	930	0.941	80.7	Poorly informed - at outer edge of 70 m by 70 m grid

A preliminary analysis was carried out using the variogram models and search parameters (150 m by 150 m by 15 m ellipsoid) selected for use in estimation of copper block grades. The results of this analysis were used to confirm the selection of a 20 m N by 20 m E by 3 m RL block size as appropriate.

After validation of the results obtained in initial estimation runs it was considered advisable to introduce a two-pass estimation strategy with reduced dimensions for the first-pass search ellipsoid (90 m by 90 m by 15 m) in order to reduce the proportion of negative kriging weights reported during estimation of the entire model. The results presented below are based on a subsequent analysis with parameters which match those used during the estimation. Results obtained from the earlier analysis were similar for the medium and well informed blocks, and only marginally different for the poorly informed block.

The output obtained in the course of this analysis was plotted on a series of graphs in order to assist in the interpretation and validation of the results. Figure 17.19 shows a north-south section and horizontal plan displaying the location of the sample locations and block centre for the moderately informed block. Figure 17.20 and Figure 17.21 show the corresponding variation in regression slope and kriging efficiency, respectively, for the range of block sizes analysed.

Figure 17.19 Kriging neighbourhood analysis – N-S section (left) and plan (right) showing location of test block centroid (moderately informed) and samples used

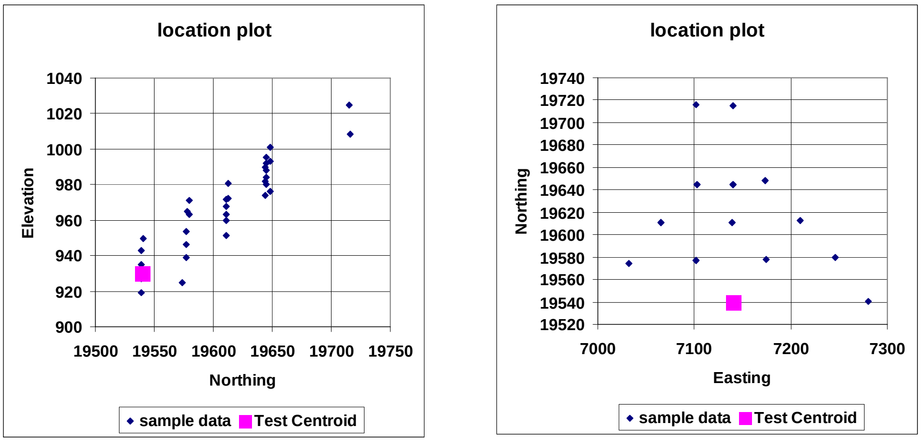


Figure 17.20 Kriging neighbourhood analysis - impact of block size on regression slope for moderately informed block

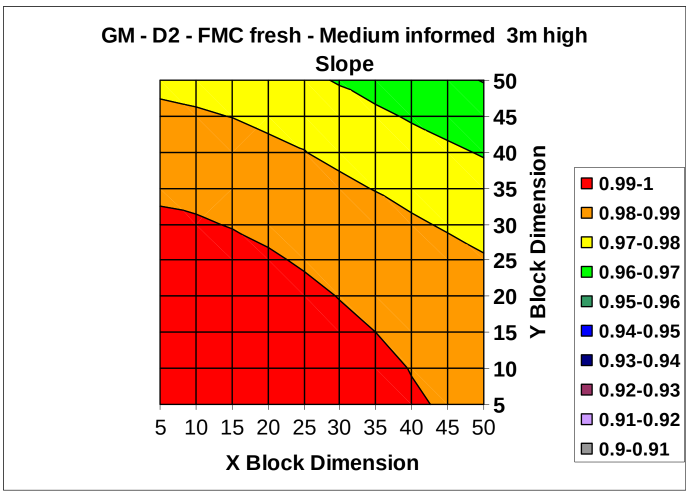
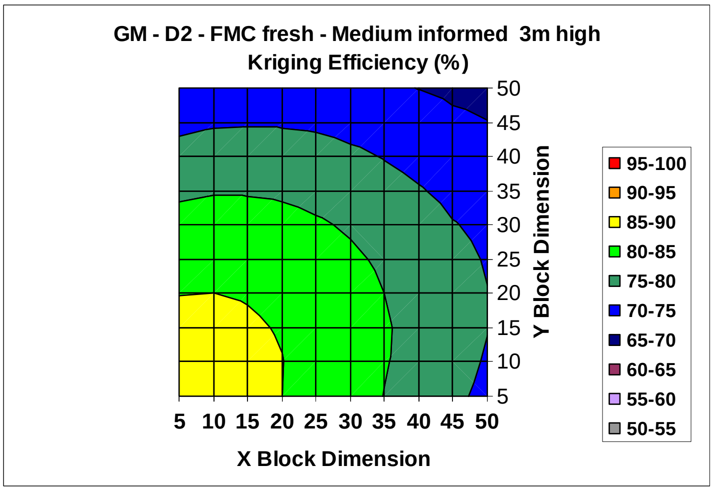


Figure 17.21 Kriging neighbourhood analysis - impact of block size on kriging efficiency for moderately informed block



The results presented in Figures 17.19 to 17.21 suggest that a block size of 15 m by 15 m by 3 m might be considered the optimum size. However, a block size of 20 m by 20 m by 3 m was chosen after consideration of all the results in order to facilitate comparisons with the previous resource model, since the differences in regression slope and kriging efficiency for the two different sizes were not great.

17.3.9 Block modelling

A block model with a larger extent than that used in the 1997 feasibility study was created in order to ensure that the Oriental zone and the entire hill north of the existing pit were included in the model. A block size of 20 m by 20 m by 3 m was selected after considering the results of kriging neighbourhood analysis, as discussed above.

The parameters used to define the block model are presented in Table 17.15.

Table 17.15 Block model definition parameters

Parameter	X	Y	Z
Block size	20 m	20 m	3 m
Model origin	6,500	18,800	700
Number of blocks	75	75	180
Model limit	8,000	20,300	1,240

The geological block model used as the basis for resource estimation was created using the wireframe and DTM models described in Section 17.3.2. Sub-blocking was used along the wireframe boundary and the oxide/sulphide boundary so as to enable greater precision in the calculation of volumes and tonnages of different geological domains. A maximum of 4 subdivisions along each axis of the model was allowed such that the minimum sub-block size of 5 m by 5 m by 0.75 m was obtained.

A block model containing the geological variable which had been assigned to the drillhole samples and composites was created in Datamine in the following steps:

- create a prototype (empty) block model below the original pre MCM topography.
- fill the prototype model inside the FMC wireframe solid and below the oxidation DTM surface with code ZONE = 2. This will represent the sulphide FMC mineralisation.
- fill the prototype model inside the FMC wireframe and above the oxidation DTM surface with code ZONE = 3. This will represent the remaining oxide FMC mineralisation.
- fill the prototype model inside the FMC wireframe and within the mixed FMC / metabasalt zone with code ZONE = 4. This will represent the remaining sulphide mineralisation with the mixed lithology.
- fill the prototype model inside the FMC wireframe and within the metabasalt zone with code ZONE = 5. This will represent the remaining sulphide mineralisation within the metabasalt lithology.

The code ZONE = 1 is unused and available for identification of waste.

17.3.10 Grade interpolation

As part of the process of selecting the final estimation parameters a series of trial grade estimation runs were performed. During initial validation of the results some problems were noted due to the occurrence of a limited number of samples with identical locations. The samples causing the latter problem were discovered to be some of those belonging to the metallurgical holes drilled by GGI, and consequently an edited drillhole file was created from which these had been excluded, and was used in subsequent estimation runs. Copper, gold and arsenic were estimated using ordinary kriging and separate variogram parameters. Arsenic was modelled for use in mine planning purposes and is not quoted as part of this resource estimate.

As noted previously the revised mineralisation wireframe represents the combination of a geological and mineralisation model for the Occidental zone. A strict mineralization wireframe, based on a low grade cut-off for gold and copper, would better represent the morphology of the sulphide and oxide mineralization itself. The current wireframe allows for the estimation of the mineralization within the geological bounds of the controlling FMC unit and allows comparisons with historical estimates. A key element in the estimation is the representation of the low grade and unmineralised areas within the FMC body. In order to achieve this, the decision was made to run the estimation with an uncut dataset allowing for soft boundaries to be modelled.

Analysis of the results obtained at the different stages of testing resulted in the final selection of a three pass search strategy for the grade estimation for copper, gold and arsenic block grades within the revised FMC / mineralisation wireframe boundaries. In addition a block discretisation of 4 by 4 by 1 was used. These are detailed in Tables 17.16, 17.17 and 17.18, whilst Table 17.19 details the sample selection strategy.

Table 17.16 Dimensions and orientation of principal axes of the variogram anisotropy and search ellipsoids used for copper grade estimation

Axis	Major	Semi-major	Minor
Orientation	-02° to 100°	25° to 011°	65° to 185°
Anisotropy ellipsoid dimensions			
Ranges - structure 1	47	29.5	13.5
Ranges - structure 2	116.5	139.5	36.5
Search ellipsoid dimensions			
Search pass 1	45	45	15
Search pass 2	90	90	30
Search pass 3	150	150	50

Notes:

1. Datamine ZXZ rotation angles used: -175, 25, -175
2. Ranges and ellipsoid dimensions are given in metres
3. Dips and azimuths are in degrees; azimuth given with reference to the mine grid north

Table 17.17 Dimensions and orientation of principal axes of the variogram anisotropy and search ellipsoids used for gold grade estimation

Axis	Major	Semi-major	Minor
Orientation	-06° to 129°	24° to 041°	65° to 205°
Anisotropy ellipsoid dimensions			
Ranges - structure 1	71	45	10
Ranges - structure 2	133	82	24
Search ellipsoid dimensions			
Search pass 1	45	45	15
Search pass 2	90	90	30
Search pass 3	150	150	50

Notes:

1. Datamine ZXZ rotation angles used: -155, 25, -165
2. Ranges and ellipsoid dimensions are given in metres
3. Dips and azimuths are in degrees; azimuth given with reference to the mine grid north

Table 17.18 Dimensions and orientation of principal axes of the variogram anisotropy and search ellipsoids used for arsenic grade estimation

Axis	Major	Semi-major	Minor
Orientation	04^{o} to 125^{o}	09^{o} to 035^{o}	80^{o} to 240^{o}
Anisotropy ellipsoid dimensions			
Ranges - structure 1	58.5	47.5	8.5
Ranges - structure 2	135	83.5	31
Search ellipsoid dimensions			
Search pass 1	45	45	15
Search pass 2	90	90	30
Search pass 3	150	150	50

Notes:

1. Datamine ZXZ rotation angles used: -175, 25, -175
2. Ranges and ellipsoid dimensions are given in metres
3. Dips and azimuths are in degrees; azimuth given with reference to the mine grid north

Table 17.19 Parameters used to define controls on sample selection for the different search passes used during copper, gold and arsenic estimation

Search pass	Total number of samples		Number of octants	Samples per octant	
	Min.	Max.		Min.	Max.
1	4	32	4	1	8
2	4	32	4	1	8
3	2	32	4	1	8

Drilling age indicator

The drilling age indicator variable (Drillind) was estimated in Datamine using nearest neighbour averaging of the samples obtained after applying the sample selection criteria for both copper and gold. The value of this indicator (binary) variable is 0 for samples from pre-1990 drillholes and 1 for samples from newer drillholes, such that the estimate obtained indicates the proportion of new drilling selected. In order to provide distinct resource classifications for copper and gold the Drillind variable was calculated using the respective elemental variography. These variography parameters and the sample selection strategy are detailed in Tables 17.20, 17.21 and 17.22.

Table 17.20 Dimensions and orientation of principal axes of the variogram anisotropy and search ellipsoids used for Drillind estimation for copper

Axis	Major	Semi-major	Minor
Orientation	-02° to 100°	25° to 011°	65° to 185°
Anisotropy ellipsoid dimensions			
Ranges - structure 1	47	29.5	13.5
Ranges - structure 2	116.5	139.5	36.5
Search ellipsoid dimensions			
Search pass 1	150	150	50

Notes:

1. Datamine ZXZ rotation angles used: -175, 25, -175
2. Ranges and ellipsoid dimensions are given in metres
3. Dips and azimuths are in degrees; azimuth given with reference to the mine grid north

Table 17.21 Dimensions and orientation of principal axes of the variogram anisotropy and search ellipsoids used for Drillind estimation for gold

Axis	Major	Semi-major	Minor
Orientation	-06° to 129°	24° to 041°	65° to 205°
Anisotropy ellipsoid dimensions			
Ranges - structure 1	71	45	10
Ranges - structure 2	133	82	24
Search ellipsoid dimensions			
Search pass 1	150	150	50

Notes:

1. Datamine ZXZ rotation angles used: -155, 25, -165
2. Ranges and ellipsoid dimensions are given in metres
3. Dips and azimuths are in degrees; azimuth given with reference to the mine grid north

Table 17.22 Parameters used to define controls on sample selection for the different search passes used during copper and gold grade Drillind estimation

Search pass	Total number of samples		Number of octants	Samples per octant	
	Min.	Max.		Min.	Max.
1	2	32	2	1	8

17.3.11 In situ density determination

Available data

The KSLE feasibility study and other documents (Strickland, 1995) provide a summary of the density measurement data that were available in 1997. These include the following:

- November 1969 – M. Jacques carried out a study of core samples from the oxide zone.
- Pre-1973 – an internal SOMIMA study was carried out by P. McGrane based on reconciliation of survey, mine and plant production measurements.
- November 1973 – J. Evans made a study of representative samples from the oxide zone (1140 and 1130 benches), sulphide zone and unmineralised hangingwall rocks.
- May 1978 – a study of 100 mixed waste core samples was reported by Seltrust Engineering Limited (SEL).
- April 1995 – C. Strickland reported on a detailed study of whole core samples (HQ diameter with each sample >1 kg in weight) from the oxide and transition zones.
- 1994-1995 drilling campaign – density measurements were performed on the split NQ core from the 18 diamond 'tails' drilled by GGI.
- September 1998 – W.S. Peters carried out tests on the physical properties of six NQ core samples from the Occidental deposit to assist in planning of future geophysical surveys. The measurements made included determination of dry bulk density, apparent porosity and apparent density.

The results obtained from previous studies are summarised in Table 17.23. The results given for the 1994-1995 half NQ core measurements are based on calculations done by Snowden during 2006 as part of the data validation process.

Table 17.23 Summary of the results of previous studies of bulk density measurements from the Guelb Moghrein deposit (1969-1997)

Source (Date)	Number of samples (Type)	Domain	Results
Jacques (1969)	20 (core)	Oxide zone	3.12 t/m^3
McGrane (pre-1973)	Production data	Oxide zone (1140 and 1130 levels)	2.73 t/m^3
Evans (1973)	90 (pit samples ? cut into 5 cm by 3 cm by 2 cm blocks)	Oxide zone (1140 and 1130 levels)	2.86 t/m^3
Evans (1973)	50 (core samples?)	Sulphide zone	3.78 t/m^3
Evans (1973)	10 (pit samples?)	Hangingwall schist (1140 and 1130 levels)	2.33 t/m^3
SEL (1978)	100 (core samples)	Waste	3.01 t/m^3(all); 2.94 t/m^3(excluding 7 high values);
Strickland (1995)	40 (whole HQ core, >1 kg each)	Oxide zone	3.38 t/m^3(wet); 3.36 t/m^3(dry); 0.71% moisture loss
Strickland (1995)	40 (whole HQ core, >1 kg each)	Transition zone	3.52 t/m^3(wet); 3.50 t/m^3(dry); 0.57% moisture loss
GGI (1994-1995)	702 (half NQ core)	FMC - Sulphide zone	3.79 t/m^3
1994-1995	217 (half NQ core)	Schist and Metabasite (fresh)	3.06 t/m^3
Peters (1998)	6 (15 cm to 20 cm long pieces of half and full NQ core)	Selection of mineralised samples	3.95 t/m^3 (average 0.4% apparent porosity on smaller samples)

Evaluation of GGI density measurements

As part of Snowden's 2006 evaluation the half NQ core measurements from the 1994-1995 GGI evaluation programme were scanned into digital form, captured into a spreadsheet, and combined with grade data from the assay database in order to allow investigations of possible correlations between copper and/or sulphur grade and density.

Scatterplots of density against log copper and log sulphur content are presented in Figure 17.22 and Figure 17.23 respectively. These scatterplots indicate clearly that there is no correlation between density and these elements. Field observations suggest that density variations are more likely to be directly related to magnetite content.

Figure 17.22 Scatterplot of density against log copper for 1994-1995 half NQ core measurements

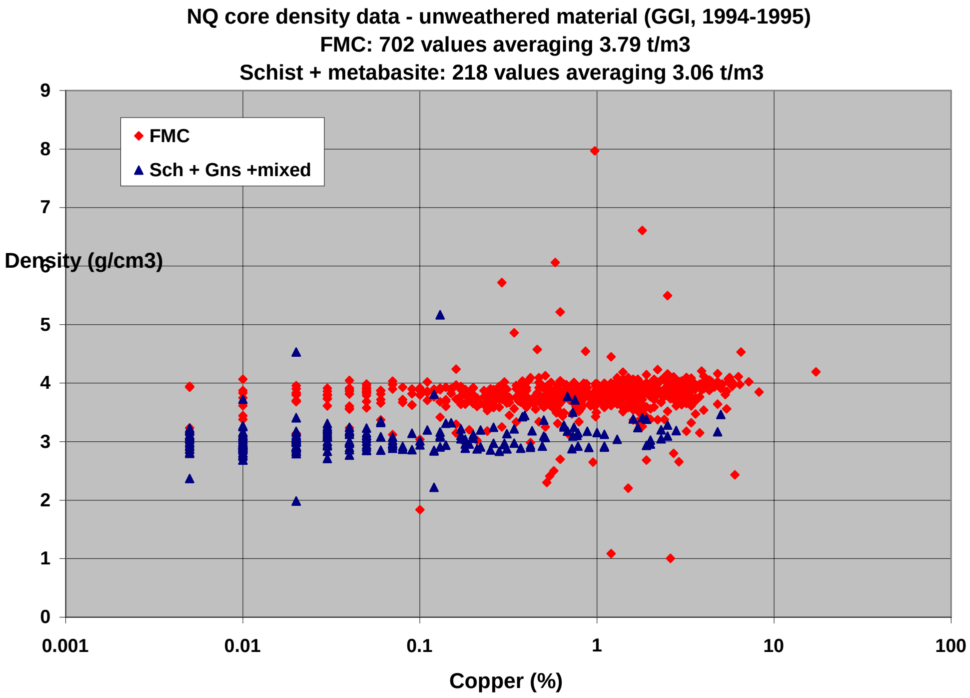
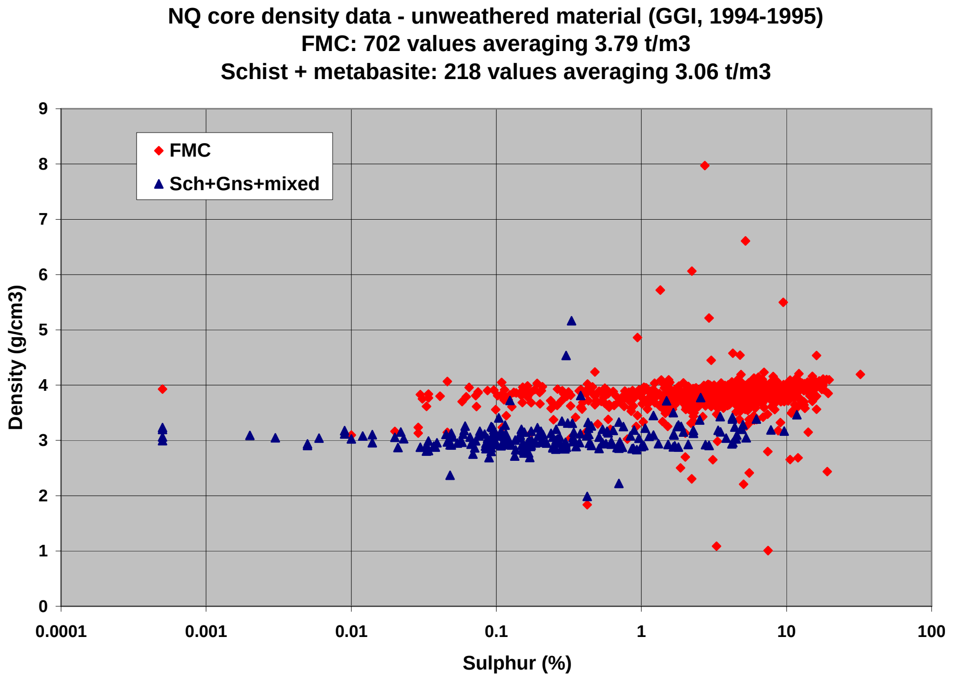


Figure 17.23 Scatterplot of density against log sulphur for 1994-1995 half NQ core measurements



A statistical summary of these data is presented in Table 17.24. The results presented in Figure 17.22 and Figure 17.23 indicates that there are a significant number of outliers that may reflect errors in the density measurement procedures. Comparison of the average and median values given in Table 17.24 indicates that these outliers have not distorted the average statistics.

Table 17.24 Statistical summary of density measurements from half NQ core (GGI, 1994-1995)

Lithology	Number	Average	Median	Minimum	Maximum
FMC	695	3.80	3.8	1.0	8.0
FMC/Sch	7	3.16	3.1	3.1	3.3
Gns	164	3.08	3.0	2.0	5.2
Gns/FMC	16	3.09	3.1	3.0	3.2
Sch	37	2.97	2.9	2.4	3.7
Total FMC	**702**	**3.79**	**3.8**	**1.0**	**8.0**
Total non-FMC	**217**	**3.06**	**3.0**	**2.0**	**5.2**
TOTAL	**919**				

Density measurements from the 2006 MCM drilling programme

Density measurements were routinely collected during the logging and sampling of the core from the 2006 MCM drilling programme. Where possible density measurements were obtained from each half core sample destined for assay. This data was split according to lithology in order to establish average densities. The results are illustrated in Figures 17.24, 17.25 and 17.26.

Figure 17.24 Scatterplot of FMC density against copper grade from 2006 MCM drilling programme

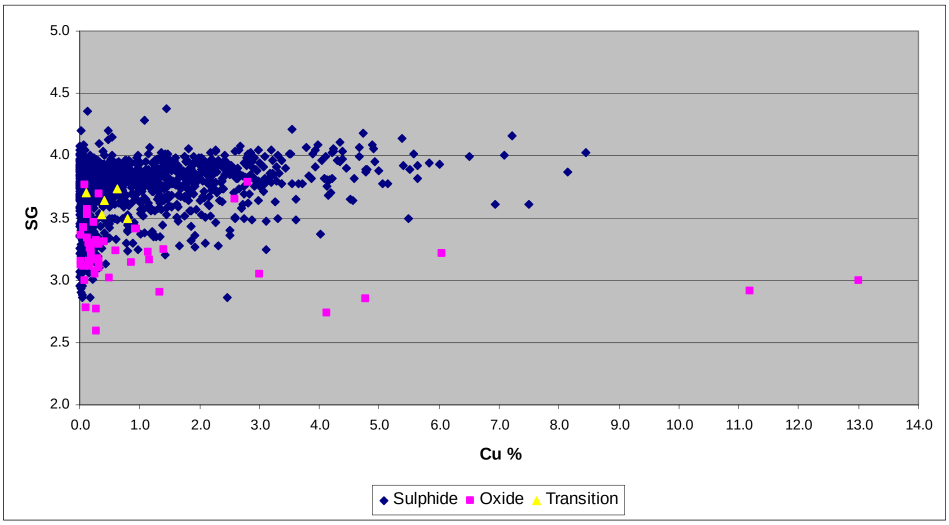


Figure 17.25 Scatterplot of mixed FMC / metabasalt (GNS) density against copper grade from 2006 MCM drilling programme

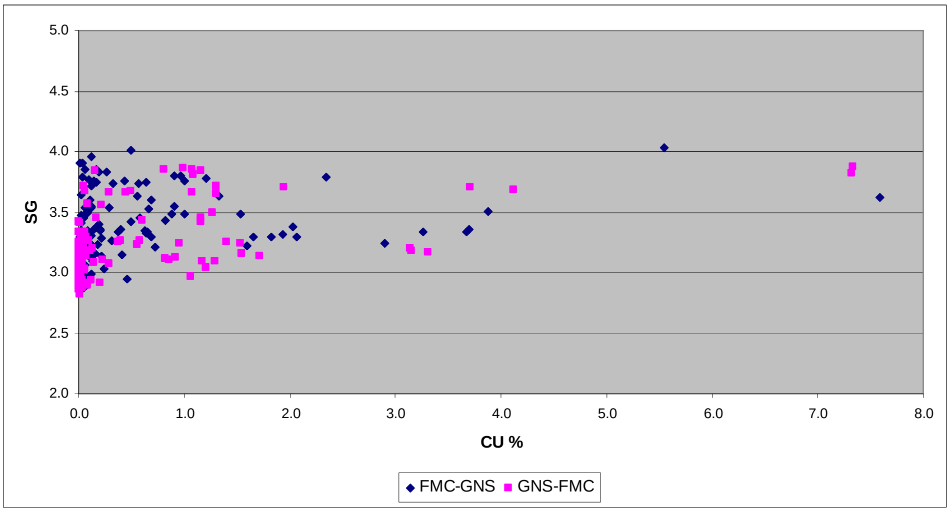


Figure 17.26 Scatterplot of metabasalt density against copper grade from 2006 MCM drilling programme

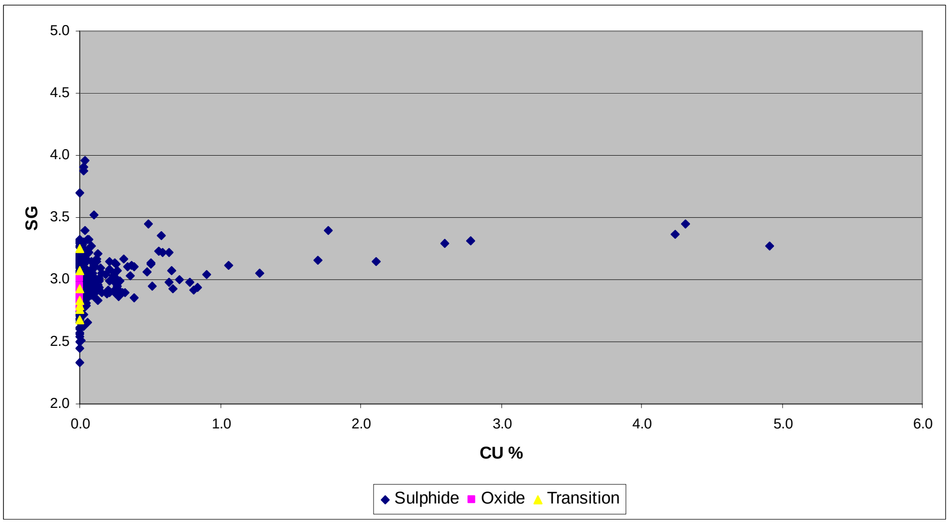


Table 17.25 summarises the results. It is apparent that there is a marked density contrast between the FMC in the sulphide and oxide domains marked by average densities of 3.76 and 3.20 respectively. In contrast there is a small variation in the metabasalt country rocks (logged as GNS) between the sulphide and oxide domains of 2.95 and 2.89 respectively. The mixed lithology units (logged as FMC/GNS and GNS/FMC) showed similar densities of 3.30 and 3.22 respectively. These density measurements are consistent with these described above.

Table 17.25 Summary of density measurements from 2006 MCM drilling programme

Lithology		Number of samples	Average	Median	Minimum	Maximum
FMC	Sulphide	1,273	3.76	3.80	2.86	4.38
	Transition	5	3.62	3.64	3.49	3.73
	Oxide	50	3.20	3.19	2.56	3.79
Metabasalt (GNS)	Sulphide	777	2.95	2.94	2.33	3.96
	Transition	7	2.90	2.83	2.68	3.07
	Oxide	6	2.89	2.90	2.77	3.01
Mixed FMC/GNS	Sulphide	169	3.30	3.24	2.87	4.03
Mixed GNS/FMC	Sulphide	112	3.22	3.17	2.82	3.87

Concluding comments

Density values used in, or recommended for, previous resource estimation studies are summarised below:

- 1973 – 3.12 t/m^3 for the oxide zone
- SEL (1978) – 3.70 t/m^3 for ore and 3.00 t/m^3 for waste
- Strickland (1995) – 2.86 t/m^3 for oxide zone and 3.78 t/m^3 for sulphide zone (based on the 1973 data)
- Snowden (2006 and 1995) and KSL (1997) – as reported by Strickland (1999):
  - 3.2 t/m^3 for oxide mineralisation
  - 3.4 t/m^3 for transition mineralisation
  - 3.7 t/m^3 for sulphide mineralisation
  - 3.0 t/m^3 for metabasalt lithologies.

The identification and inclusion of the mixed FMC / metabasalt unit within the mineralisation wireframe necessitated a revision of the density values used in the current resource estimation. Based on the range of density values documented at Guelb Moghrein the following density values were used for the resource estimation. Where reasonable the rock densities were maintained at the established values, particularly those in daily use by MCM. The FMC density was kept at 3.70 despite measurements suggesting the density is higher. As the extent of the mixed FMC/metabasalt material is likely to be underestimated within the FMC body, the lower density was considered appropriate for the estimation.

Block densities were assigned to the block model on the basis of the value of the zone coding (ZONE) detailed in Section 17.3.9.

FMC – sulphide – 3.70 (ZONE =2)

FMC – oxide – 3.20 (ZONE = 3)

FMC/metabasalt - sulphide – 3.25 (ZONE = 4)

Metabasalt (waste) – sulphide – 3.00 (ZONE = 1)

Metabasalt (mineralised) – sulphide – 3.00 (ZONE = 5)

Metabasalt (waste) – oxide – 2.90

17.3.12 Block model validation

Objectives

The results obtained were validated using the following approaches:

- Visual comparison of colour coded estimated block grades with downhole histograms of the composite drillhole sample grades from which they are derived.
- Visual comparison of colour coded estimated block grades with downhole histograms of the composite grade control sample grades.
- Comparison of global statistics for the main domains in the block model with those for the composites from which they are derived.
- Plots of average block grades against average sample grades on a level-by-level and section-by-section basis.

Visual comparisons – Exploration drillholes

Drillhole and block grade data were displayed on cross-sections using the same colour coded intervals. No significant discrepancies were noted between the two and the block grades appear to accurately reflect the patterns seen in the original drilling results.

Figure 17.27, and 17.28 show examples from a representative cross section for copper and gold respectively. The estimation process can be seen to be accurately representing the grade distribution within the borehole intersections within the FMC/mineralisation wireframe. The use of separate elemental variographic characteristics in the grade estimation process is reflected in the differing grade distributions apparent for each element

Figure 17.27 Transverse section 7210E: comparison of estimated block copper grades with exploration drillhole composite grades used during estimation

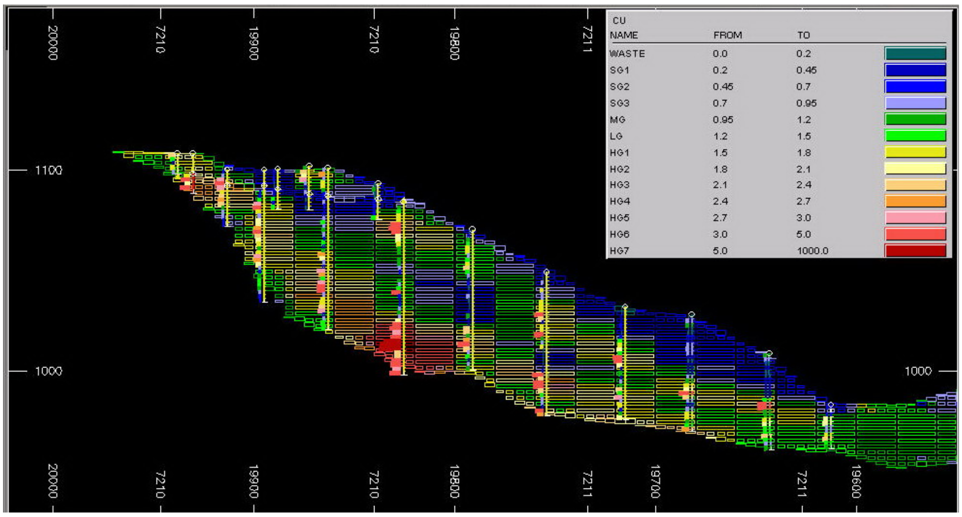
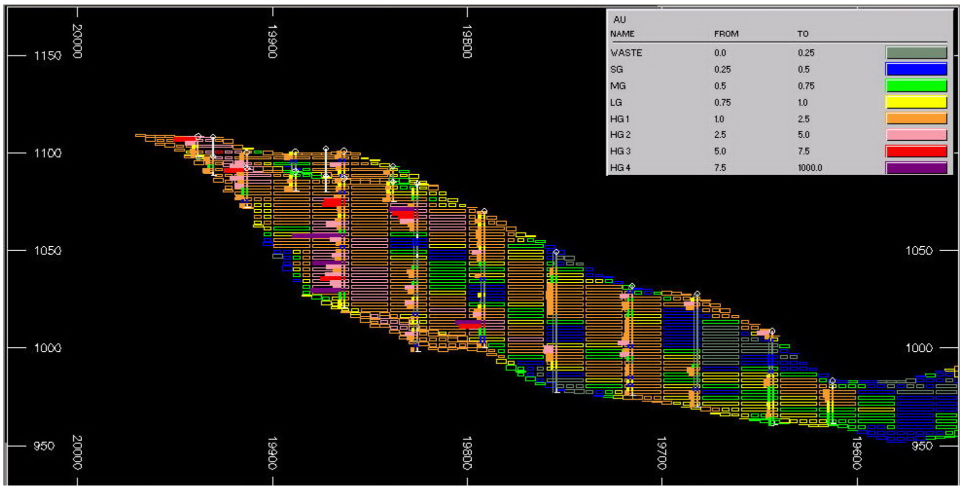


Figure 17.28 Transverse section 7210E: comparison of estimated block gold grades with exploration drillhole composite grades used during estimation



Visual comparisons – grade control drillholes

A second visual test was undertaken using the grade control drilling data. Although the accuracy of the assaying on these drillholes has been identified as problematic, the overall grade trends are likely to be representative. Grade control drillholes and block grade data were displayed on cross-sections and horizontal planar sections using the same colour coded intervals. The objective of this exercise was to ensure that the grade estimation process had replicated the overall grade trends observed in the grade control drilling. A very good correlation was observed and in particular the block modelling had replicated the pronounced grade break between high and low grade areas on the south western edge of the open pit. The two prominent grade trends northwest to southeast and parallel to the basal contact (east to west) are accurately represented in the estimated block grades.

Figure 17.27 and 17.30 show examples from a representative plan views for copper and gold respectively.

Figure 17.29 Horizontal plan view 1080m: comparison of estimated block copper grades with grade control drillhole composite grades

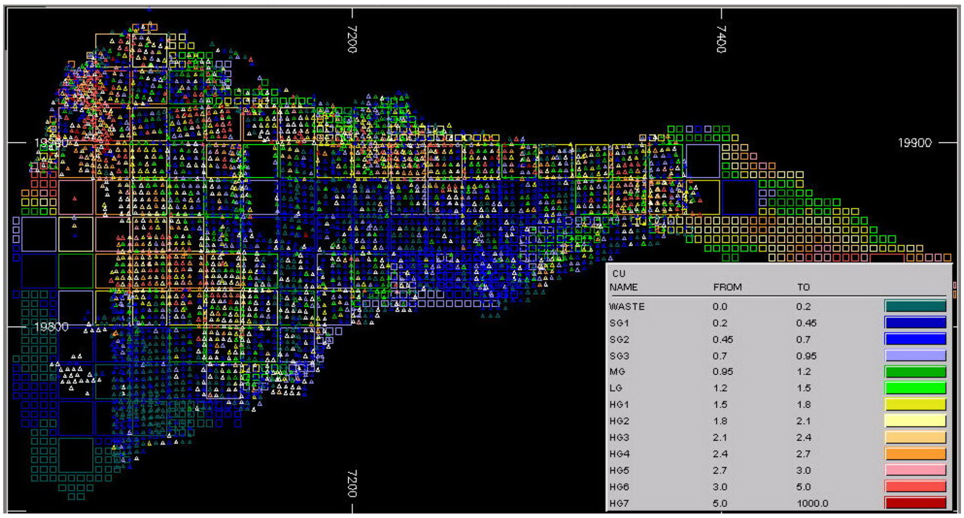
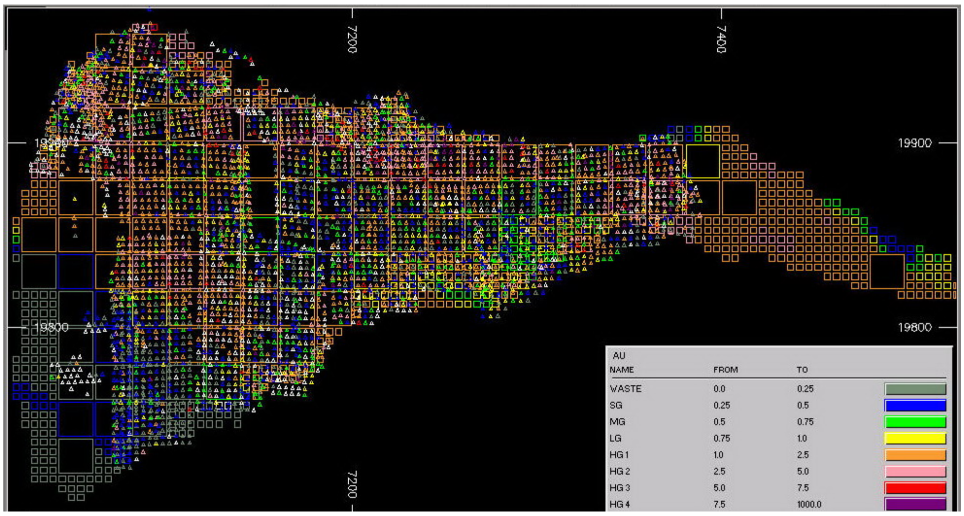


Figure 17.30 Horizontal plan view 1080m: comparison of estimated block gold grades with grade control drillhole composite grades



Global grade comparisons

Mean domain grades for copper, gold and arsenic from the Occidental zone, were calculated and compared to blocks classified as Measured and Indicated Resources. The overall comparison was based on the filtered drillhole composite means with the very low grade assays removed (see section 17.3.3). The results obtained are presented in Table 17.26.

Table 17.26 Comparison of mean domain grades for 2 m drillhole composites with block estimates

	Grade control	Exploration	Block grades (Measured and Indicated)			
	Mean grade	Mean grade	No Cu cut-off	>0.25 %Cu	>0.75 %Cu	>1.00 %Cu
			Copper (%)			
Oxide	1.48	1.67	1.70	1.77	2.04	2.21
Sulphide	1.3	1.27	1.14	1.22	1.51	1.71
			Gold (g/t)			
Oxide	1.81	2.04	2.00	2.10	2.36	2.50
Sulphide	1.74	1.28	0.88	0.93	1.16	1.31

These results show a very close match between the mean exploration composites for copper at a zero and 0.25% Cu cut-off. For gold there is a close correlation in the oxide zone at a zero and 0.25% Cu cut-off and an apparent underestimation in the block model for the sulphide zone. In the light of the potential nugget effect issues with gold highlighted in Section 14.4, this is not considered a serious flaw with the block model and a conservative estimate for gold has been produced. As a result Snowden believe the mean block grades – particularly for the copper – honour the exploration composite grades.

The grades for copper at cut-offs of 0.75 % Cu and 1.00% Cu are included to illustrate the effects of the application of an economic paylimit on the copper and gold grades.

The grade control figures are included for comparison and show a wider variation based on the data being derived from a localised high grade portion of the deposit and as a result of the grade underestimation in the MCM laboratory.

Grade trend plots

Plots of average copper and gold block grades against average exploration and grade control sample grades were prepared on a level-by-level and section-by-section basis as presented in Figure 17.31 to 17.36. The north - south and east - west sections are spaced at 30 m intervals whilst the horizontal; sections are spaced at 6 m intervals. These results indicate the smoothing effect of the kriging process with less 'spiky' curves for the block grade trends.

Higher grades are noted in the upper levels, closer to the oxidation layer, particularly for gold (Figure 17.35 and 17.36) and on the eastern side of the Occidental deposit (Figure 17.33 and 17.34). The relationship between the modelled grades and the mean grade control data is as expected erratic. In the north - south orientation it is noticeable that there is a lower mean block grade for both copper and gold compared to both the exploration and grade control drilling (Figure 17.31 and 17.32). This is related to the large number of low grade and unestimated blocks present on the southern edge of the block model, in relation to the spread of the drilling data. This area of modelled low grade material is associated with a small number of boreholes, giving a bias towards the block model in terms on low grade samples in the north south sectional validation run. An example of this effect is illustrated in Figure 17.37.

Figure 17.31 Copper mean grade comparison for block model with 2 m exploration and grade control drillhole composites- north south sections relative to mine grid

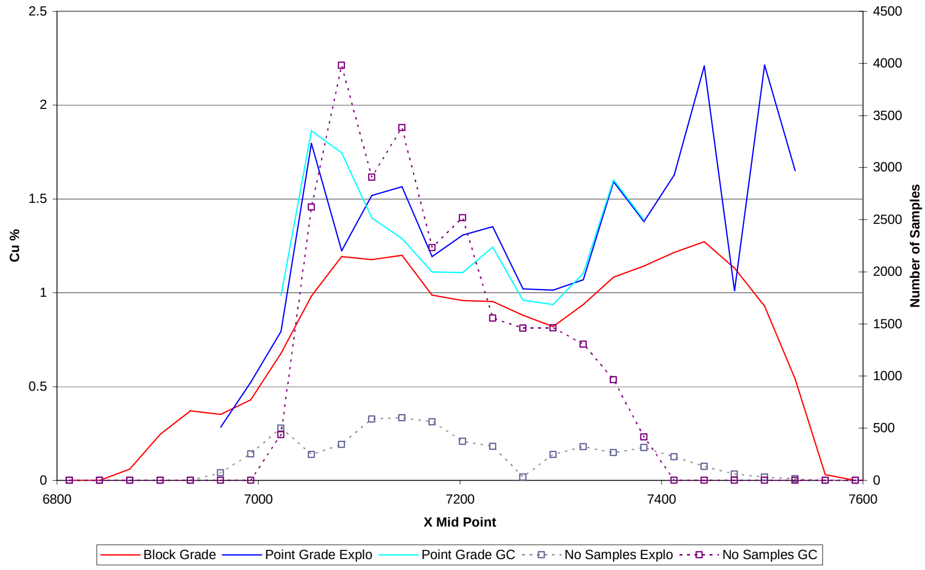


Figure 17.32 Gold mean grade comparison for block model with 2 m exploration and grade control drillhole composites- north south sections relative to mine grid

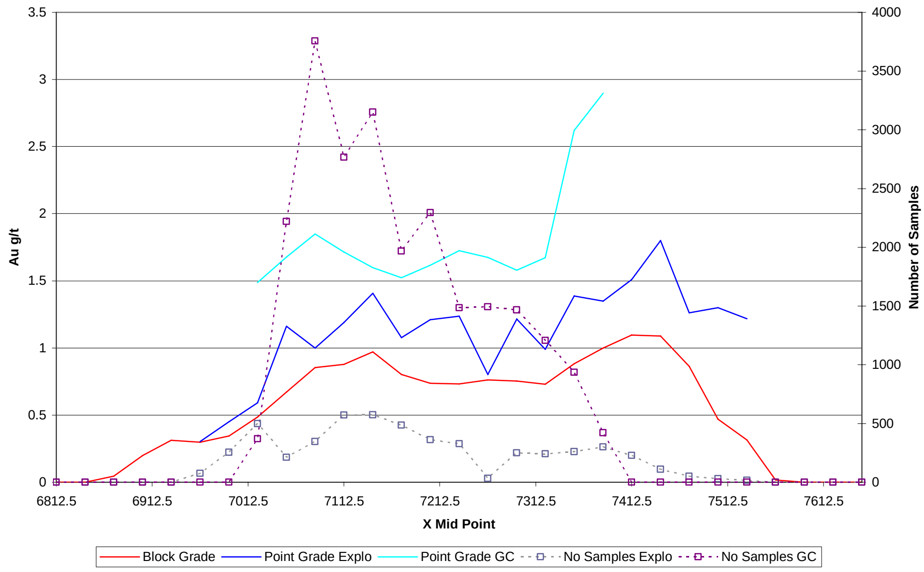


Figure 17.33 Copper mean grade comparison for block model with 2 m exploration and grade control drillhole composites- east west sections relative to mine grid

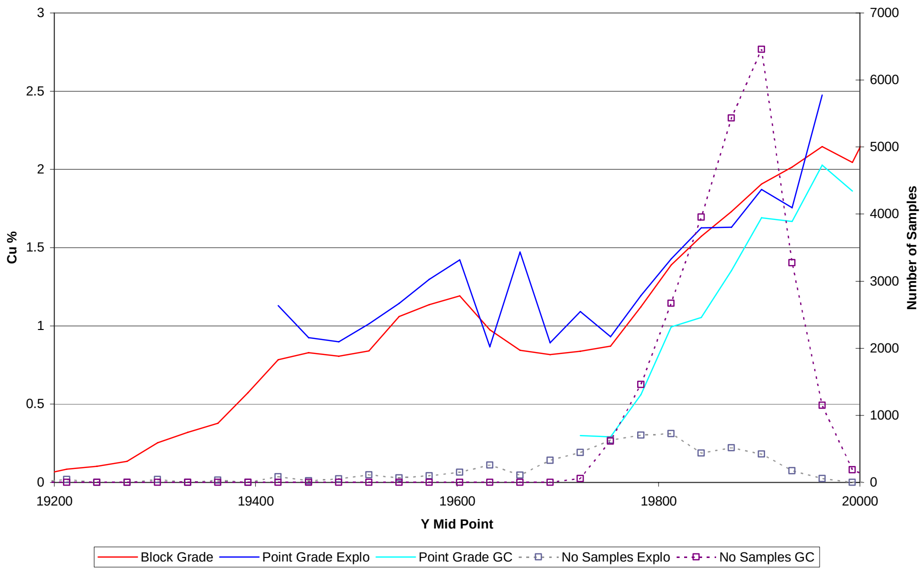


Figure 17.34 Gold mean grade comparison for block model with 2 m exploration and grade control drillhole composites- east west sections relative to mine grid

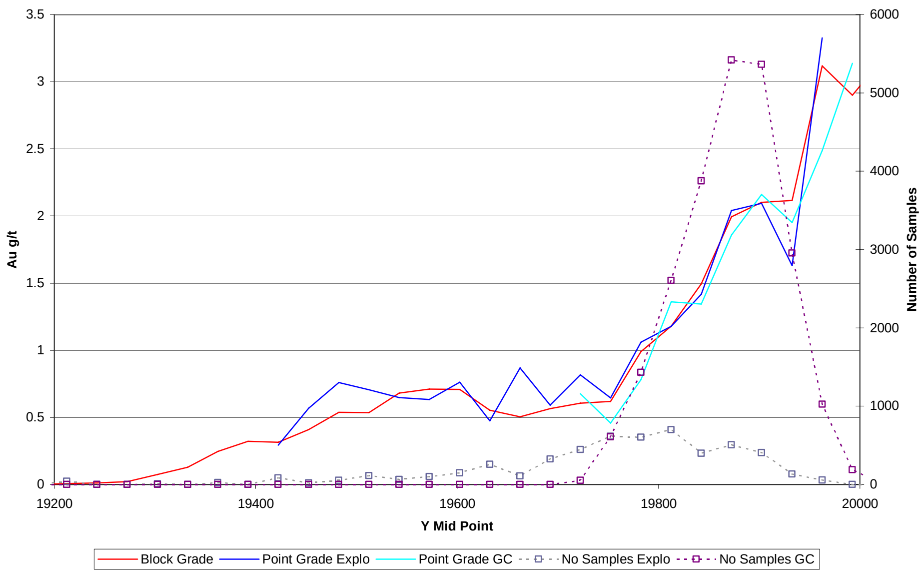


Figure 17.35 Copper mean grade comparison for block model with 2 m exploration and grade control drillhole composites- horizontal sections

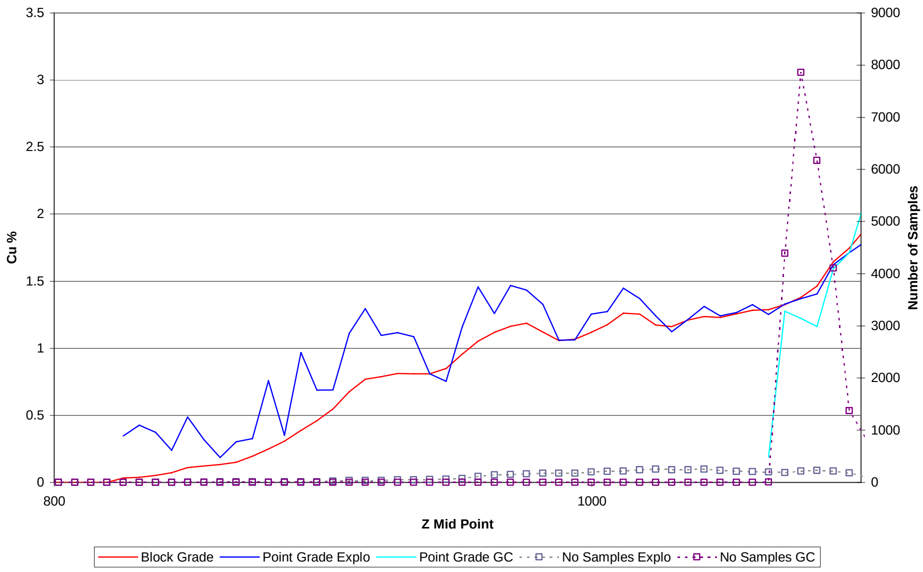


Figure 17.36 Gold mean grade comparison for block model with 2 m exploration and grade control drillhole composites- horizontal sections

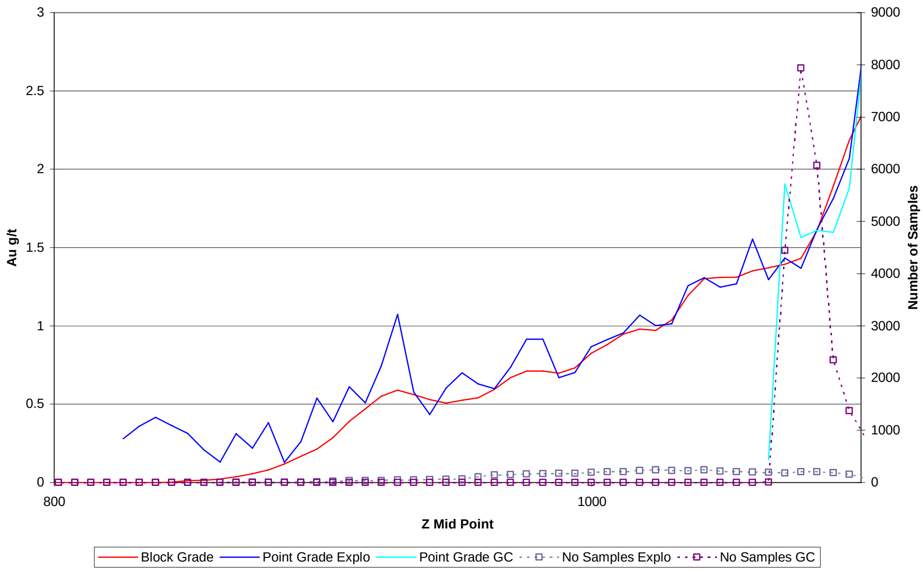
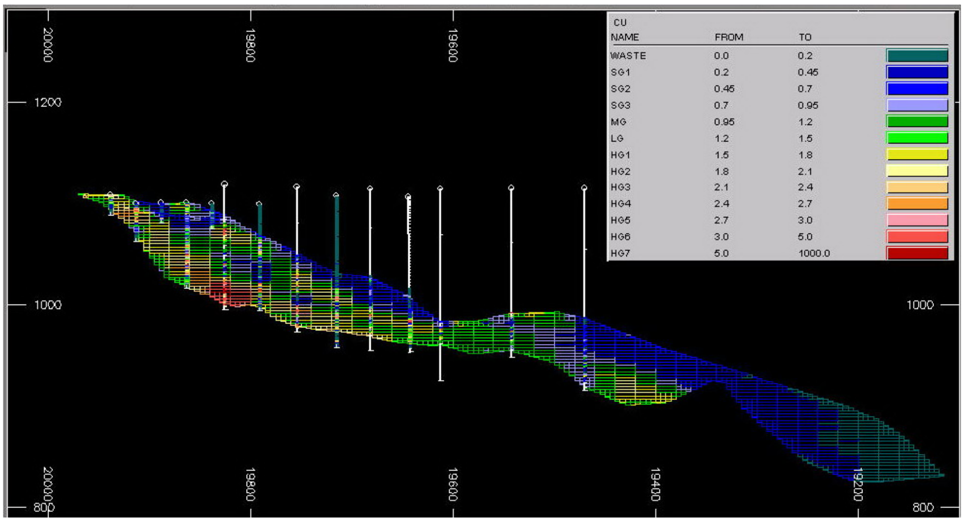


Figure 17.37 Transverse section 7210E: Illustrating the distribution of unestimated and low grade blocks block on the southern deeper extremities of the block model



17.3.13 Mineral Resource classification

Definitions

The Resource Statement presented below has been prepared and reported in accordance with NI 43-101 requirements using the classifications adopted by Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Council in December 2005 (CIM, 2005). The CIM definitions are provided below for reference purposes:

- Mineral Resource - A Mineral Resource is a concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilised organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for 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.
- Inferred Mineral Resource - An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.
- Indicated Mineral Resource - An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and

drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

- Measured Mineral Resource - A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate 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 that are spaced closely enough to confirm both geological and grade continuity.

Classification

The criteria used for classifying resources in the current update are summarised in Table 17.27. An identical classification run was undertaken for gold using the drillind values derived from the gold variography.

Table 17.27 Criteria used for the 2007 copper resource classification for Guelb Moghrein

Resource category	Criteria	Comment
Measured	Copper grade estimated in the first or second pass search using a drilling indicator of 1. Drilling indicator based on copper variography	Copper estimated using ordinary kriging, Search ellipse 45 m x 45 m x 15 m or 90 m x 90 m x 30 m, with octant control (min 4, max 32 samples, 4 octants, min 1 per octant, max 8 per octant)
Indicated	Copper grade estimated in first or second pass search using a drilling indicator of 0, grades derived only from old drilling data. Drilling indicator based on copper variography	Copper estimated with ordinary kriging. Search ellipse 45 m x 45 m x 15 m or 90 m x 90 m x 30 m with octant control (min 4, max 32 samples, 4 octants, min 1 per octant, max 8 per octant)
Inferred	Copper grade estimated in third pass search using a drilling indicator of 1 or 0. Drilling indicator based on copper variography	Copper estimated with ordinary kriging, Search ellipse 150 m x 150 m x 50 m with octant control min 2, max 32 samples, 4 octants, min 1 per octant, max 8 per octant)

17.3.14 Mineral Resource reporting

Revised resource totals for the Occidental deposit at Guelb Moghrein are detailed below. Both the initial (pre MCM mining) and the remaining resources at end July 2007 are provided. It is stressed that these are global in situ Mineral Resources (i.e. not representing stockpiled material, or in pit Mineral Reserves) to which no economic criteria have been applied. As MCM have demonstrated that the Guelb Moghrein Occidental deposit can be successfully exploited, Snowden consider that these Mineral Resources have a reasonable prospect of economic extraction.

FQML and MCM are currently running a pit optimisation exercise. Snowden understands that FQML will release a statement on the in pit Mineral Resources and Mineral Reserves as a separate Technical Report once the current exercise is complete. This separate report will also include a statement on the Guelb Moghrein stockpile reserves.

The selection of 1.00% Cu and 0.75% Cu cut-off grades used in quoting the Mineral Resources detailed below were based on discussions with MCM staff and takes cognisance of both the cut-off grades currently in use at Guelb Moghrein and previous resource estimates. MCM is currently reviewing the mining cut-off grades. MCM's current mining cut-off grade strategy is summarised in Table 17.28. This is based on a copper equivalent (CuEq) grade control system which was put in place as mining commenced in 2006. This system has since been abandoned and the CuEq value was replaced with a straight copper grade in grade control estimation.

The Mineral Resources quoted below excludes stockpiled ore tonnages and this material represents

Table 17.28 MCM mining cut-off grades in use in July 2007 at Guelb Moghrein.

	Copper %	Gold g/t
High grade	>1.50	
Low grade	1.2 – 1.50	If Cu <1 % and Au >1 g/t
Marginal grade	0.95 – 1.25	
Sub grade	0.20 – 0.95	
Waste	<0.20	

Resources at a copper cut-off grade of 1% Cu

Mineral Resources are quoted for two scenarios, pre MCM's commencements of mining and the remaining resources at the end of July 2007. These are summarized in Tables 17.29 and 17.30 respectively. MCM's current grade control strategy identifies gold rich ore with low copper grades as potentially economic and this is stockpiled separately. The gold cut-off grade in this scenario is 1 g/t Au and the resources below include this additional material.

Table 17.29 Guelb Moghrein Mineral Resource estimate 2007. In situ copper and gold Mineral Resources at a cut-off grade of 1 % Cu (prior to MCM mining commencement)

Ore Type	Classification	Copper resources at 1 % Cu cut-off			Additional gold resources at 1 g/t Au cut-off		
		Tonnes (Mt)	**Cu %**	**Au g/t**	**Tonnes (Mt)**	**Cu %**	**Au g/t**
Sulphide	Measured	11.08	1.79	1.59	1.32	0.76	1.35
	Indicated	15.72	1.65	1.11	1.05	0.77	1.35
	Total	**26.79**	**1.71**	**1.31**	**2.37**	**0.77**	**1.35**
	Inferred	1.75	1.54	0.84	0.24	0.44	1.25
Oxide	Measured	1.53	2.26	2.60	0.24	0.76	1.68
	Indicated	0.23	1.94	1.86	0.05	0.71	1.92
	Total	**1.75**	**2.21**	**2.50**	**0.29**	**0.75**	**1.71**
	Inferred	0.03	2.92	2.07	0.01	-	2.27

Table 17.30 Guelb Moghrein Mineral Resource estimate 2007. in situ copper and gold Mineral Resources at a cut- off grade of 1 % Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 1 % Cu cut-off			Additional Gold resources at 1 g/t Au cut-off		
		Tonnes (Mt)	**Cu %**	**Au g/t**	**Tonnes (Mt)**	**Cu %**	**Au g/t**
Sulphide	Measured	10.03	1.76	1.51	1.02	0.79	1.30
	Indicated	15.15	1.64	1.08	0.91	0.77	1.32
	Total	**25.18**	**1.69**	**1.25**	**1.92**	**0.78**	**1.31**
	Inferred	1.75	1.54	0.84	0.24	0.44	1.25
Oxide	Measured	0.35	2.91	2.43	0.013	0.48	2.04
	Indicated	0.01	2.46	1.81	0.002	-	2.04
	Total	**0.37**	**2.89**	**2.40**	**0.015**	**0.41**	**2.04**
	Inferred	0.02	3.09	1.98	0.007	-	2.25

Resources at a copper cut-off grade of 0.75 %Cu

Based on the improved commodity prices it is anticipated that the mining cut-off grade at Guelb Moghrein will be reduced from the current level of 0.95% Cu. As a result copper resources have also quoted using a cut-off grade of 0.75 % Cu. The pre MCM mining resources and remaining resources at the end of July 2007 are summarized in Tables 17.31 and 17.32 below.

Table 17.31 Guelb Moghrein Mineral Resource estimate 2007. In situ Copper Mineral Resources at a cut-off grade of 0.75% Cu (prior to MCM mining commencement)

Ore Type	Classification	Copper resources at 0.75 % Cu cut-off		
		Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	13.58	1.63	1.46
	Indicated	21.30	1.44	0.96
	Total	**34.88**	**1.51**	**1.16**
	Inferred	2.43	1.36	0.72
Oxide	Measured	1.74	2.08	2.46
	Indicated	0.28	1.73	1.75
	Total	**2.03**	**2.04**	**2.36**
	Inferred	0.03	2.91	2.07

Table 17.32 Guelb Moghrein Mineral Resource estimate 2007. In situ Copper Mineral Resources at a cut-off grade of 0.75% Cu (effective end July 2007)

Ore Type	Classification	Copper resources at 0.75 % Cu cut-off		
		Tonnes (Mt)	Cu %	Au g/t
Sulphide	Measured	12.38	1.59	1.38
	Indicated	20.64	1.44	0.93
	Total	**33.02**	**1.49**	**1.10**
	Inferred	2.43	1.36	0.72
Oxide	Measured	0.36	2.87	2.41
	Indicated	0.01	2.46	1.81
	Total	**0.37**	**2.85**	**2.39**
	Inferred	0.02	3.09	1.98

17.3.15 Grade-tonnage curves

Grade tonnage curves for the remaining resources at Guelb Moghrein are presented in Figure 17.38 and Figure 17.39.

Figure 17.38 Grade tonnage curves for the remaining in situ sulphide Mineral Resources at Guelb Moghrein (effective end July 2007)

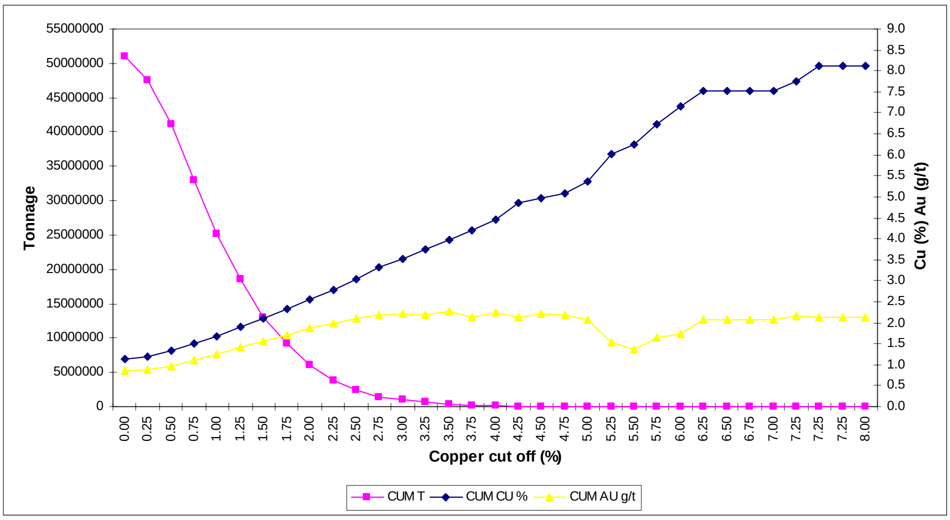
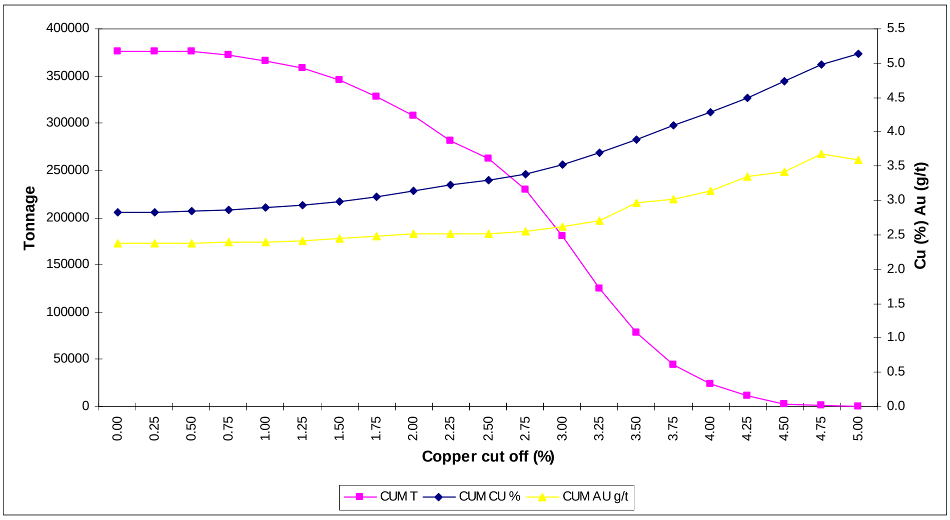


Figure 17.39 Grade tonnage curves for the remaining in situ oxide Mineral Resources at Guelb Moghrein (effective end July 2007)



17.3.16 Comparison with previous estimates

As a result of the new geological interpretations and estimation parameters, the current resource estimate will show differences to the previous estimates. The main differences in approach between the current and previous estimations are summarised below;

- The geological and mineralisation interpretations were revised to accommodate the boundary fault positions and mineralisation within the country rocks.

- The transition zone was not modelled separately for this study. Where identified it was combined with the sulphide zone during geological interpretation and resource estimation.
- The current estimation includes a mixed lithology of FMC and metabasalt within the FMC/mineralisation wireframe. This lithology has been assigned a density of 3.25 rather than 3.7 previously applied to the FMC.
- The Snowden 2006 resource estimate downgraded a large portion of the resource to Inferred Mineral Resources based on the amount of older drilling used to define the block grades. MCM's 2006 drilling programme has provided greater confidence in the drilling data and results in the increase in the Measured and Indicated Resources.
- In contrast to the Snowden 2006 resource estimate, where gold was co-kriged with copper, the current estimate treated copper and gold separately and used the elemental variographic characteristics in the estimation process. No low grade cut-off was applied to gold for the current estimate.

The current pre MCM mining Mineral Resources, at 1% Cu cut-off, are compared to the previous estimates in Table 17.33.

Table 17.33 Guelb Moghrein Occidental zone: Comparison of the 2007 resource estimate with previous resource estimates (at 1% Cu cut-off)

Resource category	Mineralisation type	Estimate (date)	Tonnage	Cu	Au
			Mt	%	g/t
Sulphide Mineral Resources					
Measured + Indicated	**Sulphide**	**Snowden (2007)**	**26.79**	**1.71**	**1.31**
Inferred	**Sulphide**	**Snowden (2007)**	**1.75**	**1.54**	**0.84**
Total Resource	**Sulphide**	**Snowden (2007)**	**28.55**	**1.70**	**1.28**
Measured + Indicated	Sulphide	Snowden (2006)	12.1	1.75	1.73
Inferred	Sulphide	Snowden (2006)	15.3	1.57	1.57
Total Resource	Sulphide	Snowden (2006)	27.3	1.65	1.64
Measured + Indicated	FMC Sulphide + Mineralised Schist	KSLE (1997)	22.3	1.87	1.35
Measured + Indicated	Sulphide	Snowden (1995)	24.4	1.73	1.25
Oxide Mineral Resources					
Measured + Indicated	**Sulphide**	**Snowden (2007)**	**1.75**	**2.21**	**2.50**
Inferred	**Sulphide**	**Snowden (2007)**	**0.03**	**2.92**	**2.07**
Total Resource	**Sulphide**	**Snowden (2007)**	**1.78**	**2.23**	**2.50**
Measured + Indicated	Oxide (incl. Transition)	Snowden (2006)	1.7	2.17	2.25
Measured + Indicated	Oxide + Transition	KSLE (1997)	1.3	2.07	2.35
Measured + Indicated	Oxide + Transition	Snowden (1995)	1.6	1.94	2.40

Some key differences that can be noted from Table 17.33 include the following:

- Overall sulphide resource tonnage is higher then the previous estimates and this reflects the revised geological and mineralization interpretation. The effects of the inclusion of mineralised mixed FMC/metabasalt and metabasalt material at lower densities is offset by the increase in FMC volume resulting from the new geological interpretation.
- The revised sulphide copper grade is consistent with the 2006 Snowden estimate and both show slight decrease in overall sulphide copper grade from the earlier estimates. This probably reflects the inclusion of some lower grade zones within the overall FMC wireframe and the lack of a grade zone type control as used in the 1997 estimate.
- The revised sulphide gold grade is lower than the 2006 Snowden estimate and in line with the 1997 and 1995 estimates. This reflects the exclusion of a significant number of sample values of 0.005 g/t Au from the assay database during gold grade estimation in 2006. In addition the use of co-kriging may have been significant in 2006.
- Oxide resources – the differences in tonnages and grades noted between the three sets of resource estimates are considered to reflect differences in geological interpretation and estimation parameters used. The use of co-kriging may have been significant in 2006 estimate and this approach was not used for the current estimate.

17.4 In pit Mineral Resource and Mineral Reserve Estimation

The new Mineral Resources detailed in this report will form the basis of MCM's future mine planning. A pit optimization exercise is being undertaken by FQML which will result in the definition of revised in-pit Mineral Resources and Mineral Reserves. Snowden understand that these results will be published as a separate Technical Report in due course. This separate report will also include a statement on the Guelb Moghrein stockpile reserves.

18 Other relevant data and information

Snowden is not aware of any other relevant information related to the resources that must be detailed in the Technical Report that would change the conclusions or interpretations.

19 Interpretation and conclusions

19.1 General

MCM and FQML have successfully bought Guelb Moghrein into production processing the sulphide ore at the Occidental deposit. Mining commenced in April 2006 and the mine is currently operating at a rate of 2 Mt ore/year. Commissioning of the copper floatation circuit commenced in July 2006 and commercial production began in October 2006. MCM are upgrading the gold floatation circuit and CIL plant which is scheduled to be operational in March 2008.

19.2 Geological interpretation

Guelb Moghrein is considered to fall into the IOCG category of mineral deposits although of an unusual type. In general IOCG deposits can be related to contemporaneous igneous activity; however, at Guelb Moghrein later tectonic activity has resulted in this link no longer being present.

The Occidental and Oriental deposits at Guelb Moghrein comprise two distinct elements, the structurally bound FMC host rock and the sulphide mineralisation. In gross terms the copper-gold mineralisation is spatially associated with the FMC body, but significant portions are unmineralised and mineralisation is present in the surrounding schistose meta volcanics. The Occidental deposit forms as a series of gently inclined lens like bodies bound on their top and bottom contacts by shear zones. The western and eastern boundaries are marked by later fault structures. Oxide mineralisation extends down to between 30 m to 40 m below the original ground surface. The oxide mineralisation at Occidental has predominantly been mined out by earlier mining ventures.

The sulphide mineralisation is predominantly chalcopyrite and pyrrhotite and the mineralisation varies between massive and disseminated styles over short distances.

19.3 Drilling data and geological modelling

Due to the uncertainties associated with the age, QAQC procedures and audit trails for the older drilling data from the pre-1990 period, Snowden recommended in early 2006 that a confirmatory drilling programme be undertaken. This drilling was undertaken between May and September 2006. The infill drilling has shown a generally good correlation with the older geological logging, with the exceptions of the older GGI RC drilling where uncertainties existed in the interpretation of the FMC/mineralisation boundary. The new core drilling also confirmed the continuation of the mineralisation into the footwall and hangingwall metavolcanics in certain areas. As a result the new drilling information has allowed for an improved geological model of the FMC/mineralisation to be created which incorporates revised hangingwall and footwall contacts as well as the boundary faults. In addition the reliance on sampling from the pre-1990s drilling campaigns has been reduced for resource estimation and classification purposes.

19.4 Data verification

Results of verification sampling by Snowden confirm the general patterns and magnitude of mineralisation encountered in the original samples. The sampling work undertaken by GGI appears to have been done to acceptable standards. There is uncertainty associated with the pre 1990 diamond drilling since little evidence remains to allow an audit trail to be established. The 2006 confirmatory drilling programme has reduced the level of uncertainty associated with the older drilling data.

Verification sampling results for gold show a wide scatter and it is difficult to detect a general bias due to the presence of several outliers in both original and repeats. These results confirm the poor reproducibility of the gold assays compared to the copper assays. The results of the screen fire assays for gold, completed on the 2006 confirmatory drill core, suggests that there may be a 'pseudo-coarse gold' problem at Guelb Moghrein. The screen fire assay results confirm that there is a small amount of true coarse gold present. The explanation for the poor repeatability of gold assays may possibly relate to the clustering of 'fine' gold particles.

A detailed review of the assay certificates from the 2006 drilling programmes was undertaken by Snowden and no errors were found.

Snowden was also able to confirm that the Guelb Moghrein mine laboratory is underestimating both copper and gold by between 20% and 40%. Whilst this does present an accuracy problem for grade control modelling, plant assays and concentrate sampling, it is not viewed by Snowden as a material to this resource estimate as no samples derived from the mine laboratory were used in the estimation process. At present the mine assay laboratory is producing conservative results and mine management is aware of the problem and is taking steps to rectify the situation.

Snowden considers that the enlarged evaluation database, incorporating the 2006 confirmatory drilling data, is suitable for use during resource estimation. In order to account for uncertainties associated with the pre 1990s data the resource classification includes a criterion related to the proportion of the pre 1990s data used in the estimation process.

19.5 Resource estimation

Snowden undertook geostatistical modelling of copper, gold and arsenic and based on these parameters grade estimation was carried out using the revised FMC/mineralisation wireframe interpretation. Copper and gold tonnages and grades are reported as Mineral Resources whilst arsenic was modelled for mine planning purposes only.

The overall magnitude of the new resource estimate shows an increase over the historical estimates (1997 and 1995) and is consistent with Snowden's earlier 2006 estimate. The sulphide resource tonnage is higher than the historical estimates and this reflects the revised geological and mineralisation interpretation. The copper grade is consistent with the Snowden 2006 estimate and both show a decrease from the historical estimates. This is believed to reflect the inclusion of some lower grade zones within the revised wireframe and the lack of grade zone type controls in the estimation.

The gold grade is in line with the historical estimates and is lower that the Snowden 2006 estimate. This reflects a change in the approach to the grade estimation from co-kriging to the kriging of the composited gold grades.

19.6 Pit optimisation and definition of in-pit Mineral Resources and Reserves

Snowden has not undertaken pit optimisation studies for Guelb Moghrein which would contribute to the estimation of Mineral Reserves. This work is being undertaken by FQML using the current Mineral Resource estimate. This will facilitate long term planning goals and allow for various expansion options to be evaluated. This process will result in the definition of in-pit Mineral Resources and Mineral Reserves and Snowden understands that these results will be published a separate Technical Report

20 Recommendations

Snowden has provided MCM with detailed recommendations for improving certain aspects of the Guelb Moghrein operation. These are summarised below.

20.1 Future drilling programmes – Occidental deposit

Recommendations have been provided by Snowden to MCM for a further drilling programme in the vicinity of the Guelb Moghrein open pit. This drilling is targeted at the south-eastern portion of the deposit in order to infill an area where the drilling density from the historical drilling coverage is poor. This drilling should be included in a future revision to the resource estimate for Guelb Moghrein.

Snowden has recommended to MCM that the QAQC protocols for the new core drilling, and all future exploration drilling and trench sampling, should be revised to include the inclusion of certified international copper and gold standards and blanks. It is essential that the insertion of certified international standards is routine practice and is best undertaken through a sample preparation facility on site (see below). Previously MCM has exported half core samples for both sample preparation and assay.

20.2 Sample Preparation Laboratory

MCM is planning to establish their own sample preparation facility and discussions have taken place with independent laboratory groups regarding the establishment of such a facility. Snowden endorses this proposal. The sample preparation laboratory should be located well away from the mine site to prevent the risk of contamination. The primary focus for this facility should be to provide dedicated exploration sample preparation facilities under the control of the Geology Department, although consideration should also be given to the preparation of grade control samples. This will allow the Geology Department to establish a QAQC system for both exploration and grade control of samples independently of the respective assay laboratory and provide better control over the sample audit trail.

20.3 Future exploration – Oriental deposit

The Oriental deposit also contains FMC with copper-gold mineralisation. The bulk of the current exploration drilling is located on the Oriental hill within the oxidised gossan zone. There is downdip potential for sulphide mineralisation. During validation of the drillhole database it was noted that the collar elevations for the Oriental drillholes did not match the topography and Snowden recommended to MCM that this be resolved by resurveying the borehole collars where possible. Once this is completed an initial geological wireframe model of the Oriental deposit can be constructed from which future exploration can be planned.

20.4 Future Resource Estimates

The current resource estimate is based on a combination wireframe comprising both the geological and mineralisation controls. Consideration should be given in future resource modelling exercises to generating specific grade shells for copper and gold (plus other minerals of interest). Software using Implicit Modelling techniques, such as Leapfrog, should be considered to generate the initial grade shells. The resultant grade shells would be independent of the FMC unit and should improve the geostatistical analysis and grade estimation processes.

Areas of mixed lithology were identified and logged by MCM's geologists during the 2006 drilling programme. This mixed unit is not identified in the borehole database for the older drilling phases. Snowden have recommended that MCM reinterpret the core and borehole logs from the older drilling phases in order to identify this mixed lithology. As there are density implications associated with this mixed lithology the re-logging should be undertaken prior to any future resource modelling.

The underground development dating from the 1950's should be digitised which will allow for this information to be incorporated into future mine planning.

20.5 Guelb Moghrein mine laboratory

The existing laboratory facility is far from suitable and Snowden has confirmed that problems exist with the sampling accuracy. The laboratory currently provides assays for copper gold and arsenic, and this should be increased to include cobalt, nickel and silver which may be significant in the copper concentrates.

MCM is aware of these problems and is actively seeking solutions. Discussions have taken place with independent laboratory groups regarding the establishment of a new laboratory facility to be run on a contract basis by an outside laboratory.

QAQC procedures are in place at the laboratory but need to be improved to meet international standards.

No sample data from the Guelb Moghrein laboratory was used in the resource estimate; however, it is essential that improvements be made to the laboratory to ensure the accuracy of grade control sampling and modelling and routine plant assays, as well as final concentrate assays.

20.6 Grade control procedures

MCM has generated a large grade control database which has the potential for use in mine reconciliation, ongoing resource and reserve prediction and block model validation. In addition to the problems associated with the Guelb Moghrein laboratory, Snowden has made recommendations to improve the grade control sample collection and computer based modelling.

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22 Date and signatures

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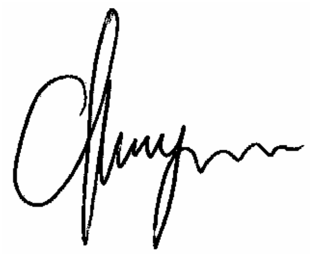
March 2008



Christopher John Bargmann 18th March 2008

Simon Charles Dominy 18th March 2008

23 Certificates

CERTIFICATE of QUALIFIED PERSON

(a) I, Mr Christopher John Bargmann FGS (CGeol), MAusIMM, Pr.Sci.Nat. of Snowden Mining Industry Consultants Ltd, Abbey House, Wellington Way, Weybridge, Surrey, United Kingdom, do hereby certify that:

(b) I am the co-author of the technical report titled Guelb Moghrein Resource Estimation, NI 43-101 Technical Report (the 'Technical Report') prepared for Mauritanian Copper Mines Ltd, a subsidiary of First Quantum Minerals Ltd.

(c) I graduated with the degree of Bachelor of Science (BSc Honours) in Geology from Leicester University, United Kingdom in 1983. In addition, I have obtained a Master of Science (MSc) degree in Mineral Resources from Cardiff University, University of Wales, Cardiff, United Kingdom in 2000.

I am a Chartered Geologist and Fellow of the Geological Society of London, and also a Member of the Australasian Institute of Mining and Metallurgy.

I have worked as a geologist for a total of 23 years since my graduation from university. I have experience of working with shear zone and structurally hosted gold deposits, Witwatersrand gold/uranium deposits and porphyry copper/gold deposits.

I have read the definition of "qualified person" set out in National Instrument 43-101 ("the Instrument") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of the Instrument. I have been involved in Exploration, Mining and Resource Evaluation consulting practices and mining companies for 21 years.

(d) I have made a current visit to the Guelb Moghrein mine site from 21st July 2007 to 4th August 2007.

(e) I am responsible for the preparation of the sections of the Technical Report as defined in Table 2.1.

(f) I am independent of the issuer as defined in section 1.4 of the Instrument.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form

(i) As of the date of this certificate, to the best of my knowledge, information and belief, the Technical report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Weybridge, United Kingdom this 18th day of March 2008

Christopher John Bargmann FGS (CGeol) MAusIMM, Pr.Sci.Nat

CERTIFICATE of QUALIFIED PERSON

(a) I, EurGeol Dr Simon Charles Dominy FGS (CGeol), FAusIMM (CP) of Snowden Mining Industry Consultants Ltd, Abbey House, Wellington Way, Weybridge, Surrey, United Kingdom, do hereby certify that:

(b) I am the co-author of the technical report titled Guelb Moghrein Resource Estimation, NI 43-101 Technical Report (the 'Technical Report') prepared for Mauritanian Copper Mines Ltd, a subsidiary of First Quantum Minerals Ltd.

(c) I graduated with a degree in Bachelor of Science (BSc Honours) in Geology from London City University, London, United Kingdom in 1987. In addition, I have obtained a Master of Science (MSc) degree in Mining Engineering from Camborne School of Mines, Cornwall, United Kingdom in 1989, and a Doctor of Philosophy (PhD) from Kingston University, London, United Kingdom in 1993.

I am a Chartered Geologist and Fellow of the Geological Society of London, and also a Fellow of the Australasian Institute of Mining and Metallurgy and a Chartered Professional (Geology).

I have worked as a geologist for a total of 20 years since my graduation from university. I have experience of working in resource geology (structural controls, etc), resource/reserve estimation (incl. geostatistics), grade control and reconciliation, mine planning and design, and mine management. My experience covers precious metal systems (e.g. Au, Ag, Cu-Au) and base metals (e.g. Sn-Cu, Sn-W, Cu-Au and Pb-Zn).

I have read the definition of "qualified person" set out in National Instrument 43-101 ("the Instrument") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of the Instrument. I have been involved in Mining and Resource Evaluation consulting practices, academic research and mining companies for 20 years, including resource estimation for at least 5 years

(d) I have not made a current visit to the Guelb Moghrein mine site.

(e) I am responsible for the preparation of the sections of the Technical Report as defined in Table 2.1.

(f) I am independent of the issuer as defined in section 1.4 of the Instrument.

(g) I have been involved with Guelb Moghrein through Snowden Mining Industry consultants Ltd since 2005.

(h) I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form

(i) As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Weybridge, United Kingdom this 18th day of March 2008

EurGeol Simon Charles Dominy FGS (CGeol) FAusIMM (CP)