# MOCOA COPPER-MOLYBDENUM PROJECT, COLOMBIA

## NI 43-101 Technical Report


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# TABLE OF CONTENTS

## LIST OF FIGURES

# LIST OF TABLES

# 1 EXECUTIVE SUMMARY

This technical report provides a mineral resource estimate for Libero Copper Corporation's Mocoa Copper-Molybdenum Project. The report was written by Michel Rowland Brepsant, FAusIMM, Robert Sim, P.Geo., and Bruce Davis, FAusIMM, all independent "qualified persons" (QPs) as defined by Canadian Securities Administrators *National Instrument 43-101 Standards of Disclosure for Mineral Projects* (NI 43-101) and as described in Section 28 (Date and Signature Pages) of this report.

This technical report was initially prepared in October 2016 based on the expected acquisition of the Mocoa Property by Libero Copper. Resource estimation was new work conducted by Libero Copper using data supplied by B2. The transaction did not occur in 2016 and the technical report was never filed. There has been no additional work of any kind completed on the Mocoa Property since the initial preparation of this report and, as a result, it remains current with an effective date of October 6, 2016.

### Property Description and Location

The Mocoa Copper-Molybdenum Project is located 465 km southwest of Bogota and 10 km north of the town of Mocoa, the capital of the Department of Putumayo. The centre of the property is at latitude 1°14′30″N and longitude 76°40′00″W. The UTM coordinates are 137,500N and 314,000E (geographic projection: WGS84, Zone 18N). The project comprises six contract claims totaling 11,391.09 ha.

The topography of the property is rugged with elevations that range from 1,100 masl to 1,850 masl. Access to the property is via dirt roads and footpaths from the town of Mocoa.

The area has a tropical climate with temperatures that range from 9°C to 29°C. The average annual rainfall is 4,600 mm. The deposit area is covered by densely vegetated rain forests.

### Ownership

On May 7, 2018, Libero Copper Corporation (Libero Copper) acquired a 100% interest in the Mocoa Project from B2Gold Corp. (B2Gold) by acquiring all of the shares of Mocoa Ventures Ltd. (Mocoa Ventures). Mocoa Ventures is a wholly owned subsidiary of B2Gold, which holds the Mocoa Project. The purchase price for the project consisted of 10,400,000 shares of Libero Copper and a retained 2% net smelter return (NSR) royalty. Libero Copper has retained a right of first refusal in the event that B2Gold wishes to sell the royalty. As a result of this transaction, Mocoa Ventures, including its Colombian branch, became a wholly owned subsidiary of Libero Copper. The Mocoa property is also subject to a retained 1% NSR return royalty held by its previous owner, AngloGold Ashanti Limited (AGA).

### History

The Mocoa deposit was discovered between 1973 and 1976 when the United Nations (UN) and the Instituto Nacional de Investigaciones Geológico Mineras of Colombia

(INGEOMINAS), now the El Servicio Geológico Colombiano (SGC), conducted a regional stream geochemical survey. Between 1978 and 1983, this Joint Venture carried out an exploration program that consisted of geological mapping, surface sampling, ground geophysics (IP, magnetics), 31 diamond drill holes totaling 18,321 m, and preliminary metallurgical testwork (von Guttenberg, 2008). In 1984, a preliminary feasibility report was published; it included an historical estimate of mineral resources: 306 million tonnes with a grade of 0.37% Cu and 0.061% Mo using 0.25% and 0.025% cut-off grades for copper and molybdenum, respectively (UN-INGEOMINAS, 1984).

Note: This historical estimate was prepared prior to the implementation of NI 43-101 and are not compliant with currently standards. There is no information regarding the assumptions, parameters, methods or classification of the historic resource and it has not been verified by the authors of this report and, as a result, it is not being treated as a current estimate of mineral resources.

In 2004, AGA acquired the property. From 2005 to 2006, Antofagasta Minerals S.A. (Antofagasta) explored the property. In 2008, B2Gold acquired the concessions and drilled nine holes (5,122.9 m). In 2012, B2Gold drilled three additional holes (1,768.2 m). In October 2016, Libero Copper commissioned an updated mineral resource estimation using data supplied by B2.

## Geology and Mineralization

The Mocoa deposit is situated in the Eastern Cordillera of Colombia, a 30 km wide tectonic belt underlain by volcano-sedimentary, sedimentary and intrusive rocks that range in age from Triassic-Jurassic to Quaternary, and by remnants of Paleozoic metasediments and metamorphic rocks of Precambrian age. This belt hosts several other porphyry-copper deposits, such as Mirador, San Carlos, and Panantza, located in southeastern Ecuador (von Guttenberg, 2008).

The geology of the Mocoa deposit has been described by Sillitoe et al. (1984). Copper-molybdenum mineralization is associated with a dacite porphyry intrusion of Middle Jurassic age emplaced into andesitic and dacitic volcanics. The Mocoa porphyry system exhibits a classical zonal pattern of hydrothermal alteration and mineralization, with a deeper central core of potassic alteration overlain by sericitization and surrounded by propylitization. Mineralization consists of disseminated chalcopyrite, molybdenite and local bornite associated with multiphase veins, stockworks and hydrothermal breccias. Patchy surface oxidation extends to a depth of 150 m and overlaps a 70 m to 220 m thick barren quartz-sericite-pyrite lithocap that overlies primary copper-molybdenum mineralization. The deposit contains no significant supergene copper mineralization.

Drilling has indicated that the deposit is roughly cylindrical, with a 600 m diameter and thicknesses that range from 250 m to 350 m. High-grade copper-molybdenum mineralization continues to depths in excess of 1,000 m.

## Sample Database and Validation

A review of the sample collection and analysis practices used during the various drilling campaigns indicates that this work was conducted using generally accepted industry procedures.

Portions of the data have been validated using several methods, including visual observations and comparisons with the assay results, and direct comparisons with assay certificates. Only the sampling programs conducted by B2Gold (in 2008 and 2012) were monitored using a QA/QC program that is typically accepted in the industry. Similarities between data of all drilling campaigns (location, style, and tenor) suggest that there is no reason to question the results from the earlier drill programs. It is the QPs' opinion that the database is sufficiently accurate and precise to generate a mineral resource estimate.

## Metallurgy

Four drill core composites, representing different rock and ore types, and a bulk composite of all these samples were processed at Dawson Metallurgical Laboratories in Murray, Utah (UN-INGEOMINAS, 1984; von Guttenberg, 2008). Standard grinding and flotation tests were completed. A bulk copper-molybdenum flotation concentrate was processed to produce copper and molybdenum concentrates. The copper concentrate has a grade of 24.2% Cu with a recovery of 85.9% and the molybdenum concentrate has a grade of 55.14% Mo with a recovery of 82.7%. Both concentrates are clean with no deleterious elements.

## Mineral Resource Estimate

The mineral resource estimate was generated from drill hole sample assay results for copper and molybdenum, and qualitative geological (core logging) information. All available drilling data were loaded into MineSight® and the initial, variable-length sample data were composited to 1.5 m intervals. Statistical analysis shows that lithology, alteration, oxidation, and the presence of stockwork zones do not control the distribution of mineralization at Mocoa. As a result, a probability shell approach, based on a threshold grade of 0.1% Cu, was used to provide a domain that segregates mineralized from unmineralized rocks. The resulting shell represents areas where there is a >50% probability that the grade will be greater than 0.1% Cu. Because the drilling remains “open” to mineralization in three directions, the limits of the probability shell are not bound by sample data, but, instead, by a distance of 250 m from a drill hole. Using the logging information, a surface representing the base of visible oxidation was interpreted and used to segregate resources by oxide type.

Grade estimates have been made using ordinary kriging into a model with a nominal block size of 10×10×5 m (L×W×H). Potentially anomalous outlier grades have been identified and their influence on the grade models are controlled during interpolation through the use of top-cutting and outlier limitations resulting in a 1% reduction in contained copper and a 1.5% reduction in contained molybdenum. An average density of 2.7 t/m$^3$ was used to calculate resource tonnage.

The results of the modeling process have been validated using a series of visual and statistical methods, the results of which indicate that the resource model is an appropriate estimation of global resources based on the underlying database.

The resources have been classified by their proximity to sample locations and are reported, as required by NI 43-101, according to the *CIM Definition Standards for Mineral Resources and Mineral Reserves*. Based on the current distribution of drilling, resources in the Inferred category occur within a maximum distance of 200 m from a drill hole.

A resource-limiting pit shell has been generated using recoverable copper-equivalent (CuEqR) grades calculated using the following formula:

$$CuEqR = (Cu\% \times 0.90) + (Mo\% \times 3.33 \times 0.75)$$

**Assumptions:**

- Metal prices: US$3.00/lb Cu; US$10.00/lb Mo.
- Metallurgical recoveries: copper 90%; molybdenum 75%.
- Pit slope: 45 degrees.
- Operating costs:
    - Mining: open pit US$2.50/t.
    - Processing: US$10.00/t.
    - G&A: US$2.00/t.

Due to the polymetallic nature of the deposit, mineral resources were presented on a copper-equivalent (CuEq) basis (CuEq = Cu% + (Mo% × 3.33)). Assuming a price of $3.00/lb Cu and the projected operating costs listed here, the base case cut-off grade of the mineral resource is estimated to be 0.25% CuEq. There are no adjustments to account for dilution or recovery in the estimate of mineral resources.

Table 1.1 summarizes the mineral resource estimate at a series of cut-off limits for comparison purposes.

**Table 1.1: Sensitivity of Inferred Mineral Resource at Mocoa**

| Cut-off (CuEq%) | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| 0.15 | 721 | 0.42 | 0.31 | 0.035 | 6.68 | 4.85 | 549.9 |
| 0.2 | 683 | 0.43 | 0.32 | 0.035 | 6.54 | 4.77 | 530.2 |
| **0.25 (base case)** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |
| 0.3 | 553 | 0.48 | 0.35 | 0.039 | 5.81 | 4.24 | 470.4 |
| 0.35 | 433 | 0.52 | 0.38 | 0.042 | 4.96 | 3.62 | 404.6 |
| 0.4 | 330 | 0.57 | 0.41 | 0.047 | 4.12 | 2.99 | 341.8 |
| 0.45 | 259 | 0.61 | 0.44 | 0.051 | 3.47 | 2.50 | 293.2 |
| 0.5 | 201 | 0.65 | 0.46 | 0.056 | 2.87 | 2.04 | 247.9 |
| 0.55 | 148 | 0.69 | 0.49 | 0.061 | 2.26 | 1.60 | 199.6 |
| 0.6 | 106 | 0.74 | 0.52 | 0.067 | 1.73 | 1.21 | 155.8 |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo% × 3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

A Regional Forest Reserve boundary intersects the western part of the deposit. Table 1.2 shows the separation of mineral resources along this boundary.

**Table 1.2: Estimate of Inferred Mineral Resources Inside and Outside the Forest Reserve**

| Location | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| Inside Forest Reserve | 159 | 0.43 | 0.33 | 0.031 | 1.52 | 1.16 | 107.8 |
| Outside Forest Reserve | 477 | 0.46 | 0.33 | 0.038 | 4.78 | 3.44 | 402.7 |
| **Total** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo%×3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

Table 1.3 shows the estimate of mineral resources separated above and below the interpreted surface representing the base of visible oxidation.

**Table 1.3: Estimate of Inferred Mineral Resources by Oxide Type**

| Location | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| Oxide and Transition | 139 | 0.41 | 0.32 | 0.026 | 1.25 | 0.99 | 78.3 |
| Sulphide | 497 | 0.46 | 0.33 | 0.040 | 5.06 | 3.61 | 432.7 |
| **Total** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo%×3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

Other than the location of the Forest Reserve and the portion of the resource that is partially oxidized, there are no other known factors related to environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource.

### Conclusions

Based on the evaluation of the data available from the Mocoa property, the authors of this technical report have drawn the following conclusions:

- At the execution date of this Technical Report, Libero Copper holds a 100% interest in the Mocoa property (subject to a total 3% NSR royalty).
- The Mocoa deposit forms a relatively continuous zone of copper and molybdenum mineralization over an area measuring approximately 1.2 km east-west by 1.4 km north-south and extending to depths of more than 1 km below surface.
- The Mocoa copper-molybdenum mineralization remains open to the north, west and east.
- Drilling to date has outlined an Inferred resource (at a 0.25% CuEq cut-off) of 636 Mtonnes at 0.33% Cu and 0.036% Mo which contains 4.60 billion pounds of copper and 510.5 million pounds of molybdenum.
- Preliminary metallurgical work indicates that the copper-molybdenum mineralization can be recovered using conventional methods.
- Challenges facing continued exploration and evaluation of the Mocoa deposit include its remote location, lack of road infrastructure, steep topography and high annual rainfall.

## Recommendations

Further work is warranted to assess the size and grade of the Mocoa copper-molybdenum deposit. Specific recommendations are separated into two phases. The proposed work in Phase 2 is conditional on the successful completion of the Phase 1 program.

**Phase 1:**

- Conduct an additional soil and rock chip sampling survey to assess untested exploration targets. The estimated budget is US$75,000.

**Phase 2:**

- Conduct a 2,000 metre drill program to test additional surface anomalies. The estimated budget is US$500,000.

## Cautionary Note Regarding Forward-looking Information and Statements

Information and statements contained in this technical report that are not historical facts are “forward-looking information” or “forward-looking statements” within the meaning of Canadian securities legislation and the *U.S. Private Securities Litigation Reform Act of 1995* (hereinafter collectively referred to as “forward-looking statements”) that involve risks and uncertainties. Examples of forward-looking statements in this technical report include information and statements with respect to: Libero’s plans and expectations for the Mocoa Project, estimates of mineral resources, plans to continue the exploration drill program, and possible related discoveries or extensions of new mineralization or increases or upgrades to reported mineral resources estimates; the metallurgical testing program in connection with the Mocoa Project and plans to conduct further comprehensive engineering, and metallurgical studies; and budgets for recommended work programs.

In certain cases, forward-looking statements can be identified by the use of words such as "plans", "budget", "estimates", or "believes", or variations of such words and phrases or state that certain actions, events or results "may", "would", or "occur". These forward-looking statements are based, in part, on assumptions and factors that may change, thus causing actual results or achievements to differ materially from those expressed or implied by the forward-looking statements. Such factors and assumptions include, but are not limited to, assumptions concerning copper, base metal and precious metal prices; cut-off grades; accuracy of mineral resource estimates and resource modeling; reliability of sampling and assay data; representativeness of mineralization; accuracy of metallurgical testwork and timely receipt of regulatory approvals.

Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of Libero Copper to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Such risks and other factors include, among others, risks inherent in mineral resource estimation, fluctuation in the price of copper, base and precious metals; expropriation risks; currency fluctuations; requirements for additional capital; government regulation of mining operations; environmental, safety and regulatory risks; unanticipated reclamation expenses; title disputes or claims; limitations on insurance coverage; changes in project parameters as plans continue to be refined; failure of plant, equipment or processes to operate as anticipated; accidents, labour disputes and other risks of the mining industry; competition inherent in the mining exploration industry; delays in obtaining governmental approvals or financing or in the completion of exploration, development or construction activities, as well as those factors discussed in the sections entitled “Risks and Uncertainties” in Libero’s MD&A in its annual report. Although Libero Copper and the authors of this technical report have attempted to identify important factors that could affect Libero Copper and may cause actual actions, events or results to differ, perhaps materially, from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended.

There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers should not place undue reliance on forward-looking statements. The forward-looking statements in this technical report are based on beliefs, expectations and opinions as of the effective date of this Technical Report (October 6, 2016). Libero Copper and the authors of this technical report do not undertake any obligation to update any forward-looking information and statements included herein, except in accordance with applicable securities laws.

# 2 INTRODUCTION

In September 2016, Libero Copper Corporation (Libero Copper) commissioned Michel Rowland Brepsant, FAusIMM, to provide an updated review of exploration completed on the Mocoa Copper-Molybdenum Project, and Robert Sim, P.Geo., of SIM Geological, and Bruce Davis, FAusIMM, of BDRC, to provide a mineral resource estimate for the Mocoa deposit. Brepsant, Sim, and Davis are all independent "qualified persons" (QPs), within the meaning of *National Instrument 43-101 Standards of Disclosure for Mineral Projects* (NI 43-101). They are responsible for the preparation of this technical report on the Mocoa Project (the Technical Report) which has been prepared in accordance with NI 43-101 and Form 43-101F1.

This technical report was initially prepared in October 2016 based on the expected acquisition of the Mocoa Property by Libero Copper. The transaction did not occur in 2016 and the technical report was never filed. There has been no additional work of any kind completed on the Mocoa Property since the initial preparation of this report and, as a result, it remains current with an effective date of October 6, 2016.

Michel Rowland Brepsant visited the site from October 4 to 5, 2016. He inspected drill core from numerous holes in Medellín from October 7 to 8, 2016.

The QPs are responsible for the information provided in the following sections within this Technical Report:

- Michel Rowland Brepsant, FAusIMM, is responsible for the information provided in Sections 1–10, 13, 20, 23, 24, 27 and portions of Sections 25 and 26.
- Robert Sim, P.Geo., is responsible for the information provided in Section 14 and portions of Sections 1, 25 and 26.
- Bruce Davis, FAusIMM, is responsible for the information provided in Sections 11 and 12 and portions of Sections 1, 14, 25 and 26.

In preparing this Technical Report, the authors relied on geological reports, maps and miscellaneous technical papers listed in Section 27 (References) of this Technical Report. This report is based on information known to the QPs as of October 6, 2016. There has been no additional work completed on the property since this date.

All measurement units used in this report are metric, and currency is expressed in US dollars unless stated otherwise. The currency used in Colombia is the Colombian peso. The exchange rate in October 2016 was approximately US$1 = 2,936 pesos.

## 2.1 Abbreviations and Acronyms

Abbreviations and acronyms used throughout this report are shown in Table 2.1.

**Table 2.1: Abbreviations and Acronyms**

| | |
|---|---|
| above mean sea level | amsl |
| atomic-absorption spectrophotometry | AAS |
| AngloGold Ashanti Limited | AGA |
| Antofagasta Minerals S.A. | Antofagasta |
| B2Gold Corp. | B2Gold |
| Bondar-Clegg & Company Ltd. | Bondar-Clegg |
| copper | Cu |
| digital elevation model | DEM |
| Empresa Colombiana de Minas | ECOMINAS |
| Environmental Impact Assessment | EIA |
| Global Positioning System | GPS |
| gram | g |
| hectare | ha |
| ICP Emission Spectrometry | ICP-ES |
| ICP Mass Spectrometry | ICP-MS |
| Inductively Coupled Plasma | ICP |
| Instituto Nacional de Investigaciones Geologico–Mineras of Colombia | INGEOMINAS |
| International Standards Organization | ISO |
| Laboratory Information Management System | LIMS |
| Libero Copper Corporation | Libero Copper |
| Management Discussion and Analysis | MD&A |
| molybdenum | Mo |
| National Instrument 43-101 | NI 43-101 |
| net smelter return | NSR |
| lead | Pb |
| portable document format | PDF |
| quality assurance/quality control | QA/QC |
| minimum effective daily Colombian legal salary | SMDLV |
| United Nations | UN |
| zinc | Zn |

# 3 RELIANCE ON OTHER EXPERTS

This Technical Report was prepared by Michel Rowland Brepsant, FAusIMM, Robert Sim, P.Geo., and Bruce Davis, FAusIMM. They are qualified persons for the purposes of NI 43-101 and fulfill the requirements of an "independent qualified person". The information, conclusions, and recommendations contained herein are based on:

- The qualified person's field observations.
- Data, reports and other information supplied by Libero Copper and other third parties.

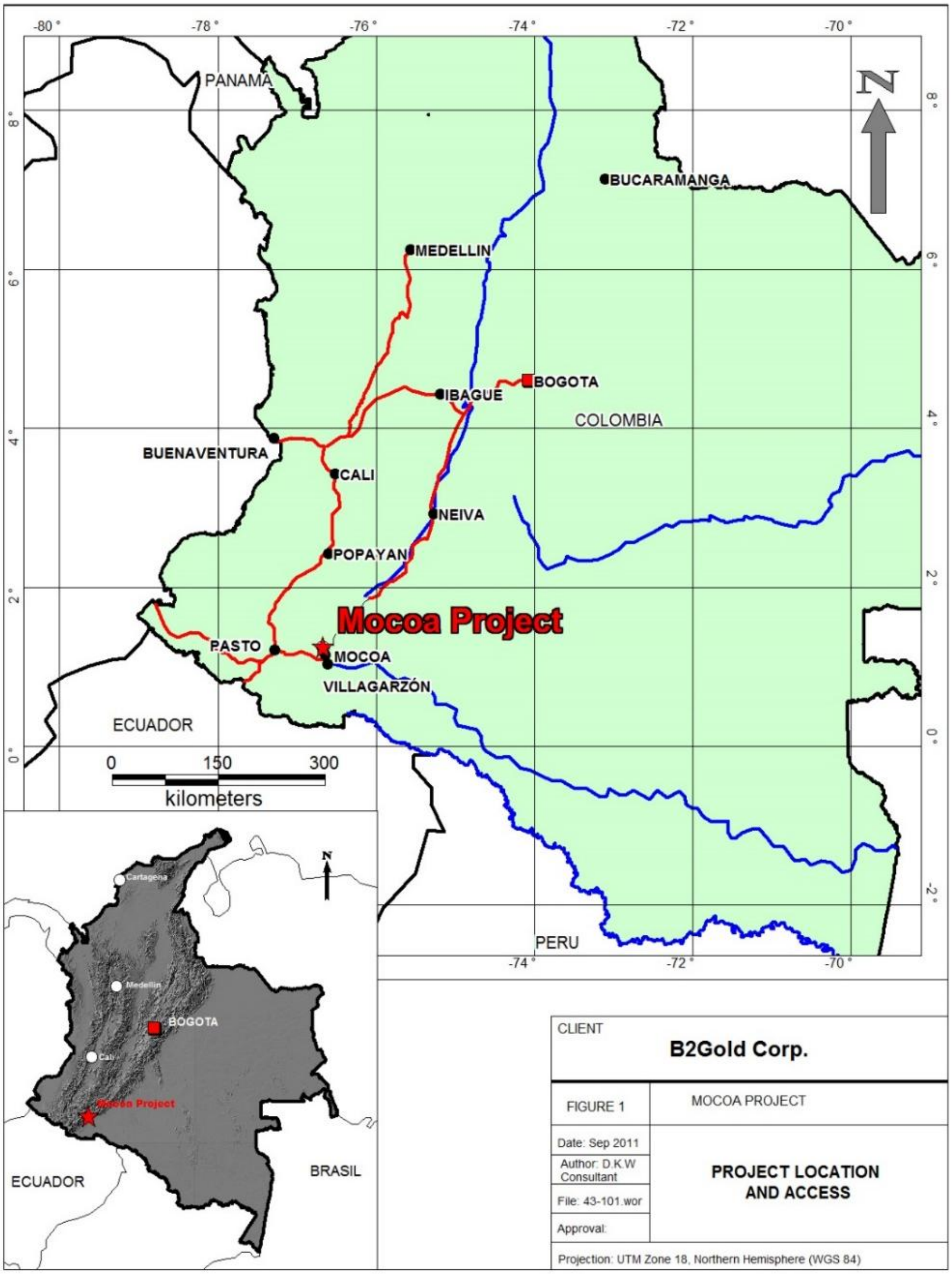
For the purpose of this report, the authors have relied on the ownership data (mineral, surface and access rights) and information provided by Libero Copper, and they believe that such data and information are essentially complete and correct to the best of their knowledge, and that no information has been intentionally withheld that would affect the conclusions made herein. The authors have not researched the property title or mineral rights for the Mocoa Project and express no legal opinion as to the ownership status of the property.

# 4 PROPERTY DESCRIPTION AND LOCATION

## 4.1 Location

The Mocoa property is located in southwestern Colombia, 465 km southwest of Bogota and 10 km north of the town of Mocoa (Figure 4-1). The centre of the property is at latitude 1°14'30"N, longitude 76°40'00"W. UTM coordinates are 137,500N, 314,000E (geographic projection: WGS84, Zone 18N).

**Figure 4-1: Location Map
Mocoa Project**




Source: B2Gold, 2011.

## 4.2 Land Tenure

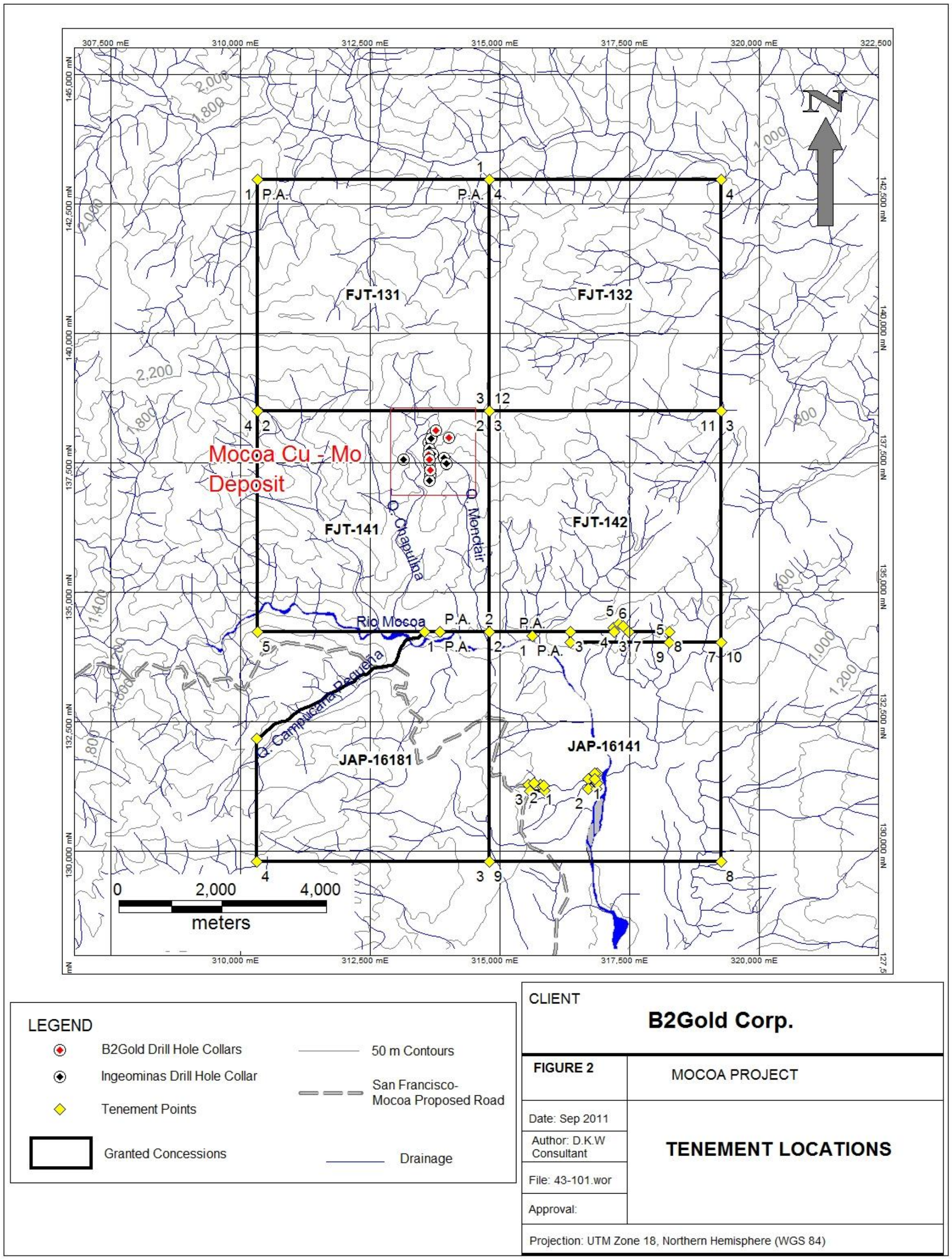
The Mocoa property comprises six concession contracts totaling 11,391.09 ha (Table 4.1, Figure 4-2). AGA retains a 1% net smelter return (NSR) royalty on these concessions but holds no back-in rights. Concession JAP-16181 is not yet registered, and AGA cannot transfer it to Mocoa Ventures until the title is registered. Libero Copper acquired a 100% interest in the Mocoa Project from B2Gold Corp. (B2Gold) by acquiring all of the shares of Mocoa Ventures Ltd. (Mocoa Ventures). Mocoa Ventures is a wholly owned subsidiary of B2Gold, which holds the Mocoa Project. The purchase price for the Project consisted of 10,400,000 shares of Libero Copper and a retained 2% net smelter return royalty. There are no further obligations that must be met to retain the property. The company has no surface rights in the area. There are no other impediments that may affect the ability to perform work on the property.

All mineral claim payments have been made, and the claims are in good standing. There are no other encumbrances that could affect access and title, other than those mentioned in the preceeding paragraph. There are no significant risks affecting the normal course of business and exploration efforts at the project.

**Table 4.1: Mining Concessions**
**Mocoa Property**

| Concession Number | Area (ha) | Date Granted (mm/dd/yyyy) | Expiry Date (mm/dd/yyyy) | Registered Owner |
|---|---|---|---|---|
| FJT 131 | 1,998.09 | 5/24/2007 | 5/23/2037 | Mocoa Ventures Ltd. |
| FJT 132 | 1,998.09 | 6/22/2007 | 6/21/2037 | Mocoa Ventures Ltd. |
| FJT 141 | 1,908.69 | 12/18/2006 | 12/17/2036 | Mocoa Ventures Ltd. |
| FJT 142 | 1,925.78 | 6/21/2007 | 6/20/2037 | Mocoa Ventures Ltd. |
| JAP-16141 | 1,919.69 | 1/25/2008 | 1/24/2038 | Mocoa Ventures Ltd. |
| JAP-16181 | 1,640.75 | not yet registered | n/a | AngloGold Ashanti Colombia S.A. |
| **Total** | **11,391.09** | | | |

**Figure 4-2: Claim Map
Mocoa Property**




Source: B2Gold (2011).

## 4.3 Environmental Regulations and Permitting

Mining and exploration activities in Colombia are governed by the revised 2001 Mining Code (Código de Minas) (Law 685/01) of August 2001. Concession contracts under the Mining Code are granted for 30 years, including a three-year period for exploration from the moment the concession contract is registered before the National Mining Registry, which can be extended for four additional two-year periods for a total term of 11 years, followed by a three-year construction and assembly period, which can be extended for one year. The remaining portion of the term is allocated to the exploitation phase. All extension periods have been approved at the Mocoa Project.

The concession contracts are subject to annual surface fees. For the five concession contracts that are registered, the annual fee is equivalent to a minimum effective daily Colombian legal salary (SMDLV) per hectare per year, which, currently, is approximately US$9.00 per hectare per year. The annual surface fee will be calculated differently as it will be registered under a different law (Law 1753 of 2015). Therefore, (i) for years 1 to 5, the annual fee will be equivalent to 0.75 SMDLV per hectare per year, (ii) for years 5 to 8, the annual fees will be increased to 1.25 SMDLV per hectare per year, and (iii) for years 8 and onwards, the annual fees will be 2.00 SMDLV per hectare per year. For the six concession contracts covering the Mocoa deposit, current annual fees amount to approximately US$90,000. Once in production, state royalties on copper and molybdenum are 5% of the metal value at the plant site (as per Article 16 of Law 141 in 1994) which are independent of national, departmental and municipal taxes.

Under the Mining Code, liability insurance is required to cover any environmental or mining accidents (mining-environmental policy). This insurance is issued by local companies on an annual basis and cover up to 5% of the estimated annual exploration investments as reported to the Colombian mining authorities. No production has occurred at the Mocoa property, and the authors are not aware of any known environmental liabilities that could affect the Mocoa property.

The Mining Code specifies that environmental impact assessment (EIA) study permits are not required during prospecting and exploration but permits and/or environmental authorizations are required for the use of natural resources (e.g., water concessions, water discharge permits, forestry permits) during exploration.

At the effective date of this Technical Report (October 6, 2016), water permits were obtained and were in effect during the 2008 and 2012 B2Gold drill programs. New permits and authorizations will need to be obtained for the next drilling campaign.

EIA studies are required once a mine plan is submitted.

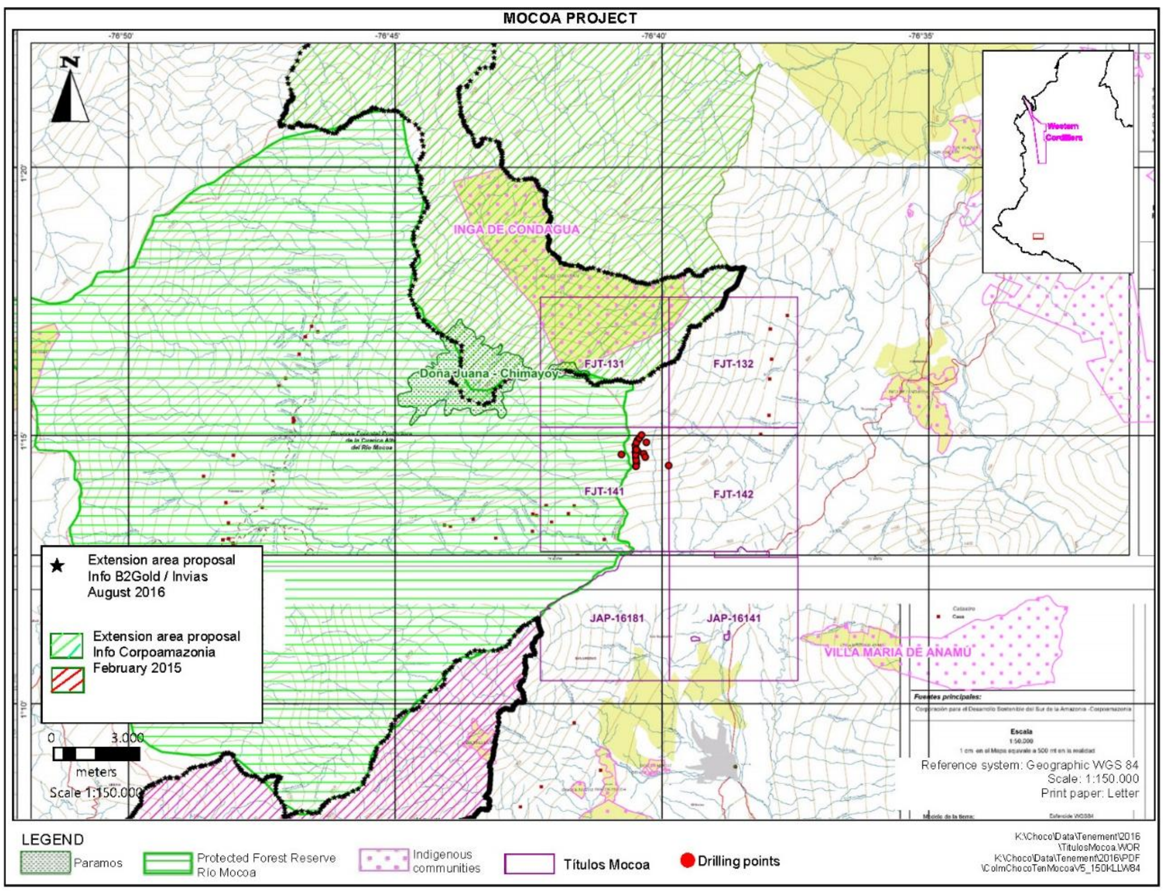
By Executive decision 224 of 1984, the “Cuenca Alta del Rio Mocoa” Protective Forest Reserve was created. This Protective Forest Reserve currently overlaps with a portion of the mining titles (FJT-141 and FJT-131) that comprise the Project. It covers an area of

30,917.22 ha (Figure 4-3) and is located in the western sector of the Mocoa property, west of the Mocoa deposit and Chapulina Creek, encompassing the upper catchment basin of the Mocoa River.

The Inga de Condagua Indigenous Reservation (Resguardo Indigena Inga de Condagua) was created in 1993 and its area was extended in 2006. Currently, part of this extension is located within the area of titles FJT-131 and FJT-132 (Figure 4-3).

As indicated in the 2008 Technical Report, most of the drill collars are on a north-south ridge that, as far as Libero Copper is aware, is located on government land property. These collars are east of the Protective Forest Reserve. (Figure 4-3).

**Figure 4-3: Forest Reserves and Indigenous Reservations
Mocoa Project**




Source: B2Gold (2016).

At the effective date of this Technical Report (October 6, 2016), water permits were obtained and were in effect during the 2008 and 2012 B2Gold drill programs. New permits and authorizations will be required for the next drilling campaign.

Baseline environmental studies and community discussions will commence before the next drill program. There are no known environmental liabilities.

There are no know other significant factors and risks that may affect title, access, or the ability to perform work on the project.

# 5 ACCESSIBILITY, CLIMATE, INFRASTRUCTURE AND PHYSIOGRAPHY

## 5.1 Accessibility

The Mocoa Project is located 10 km north of the town of Mocoa, an agricultural centre that is the provincial capital of the Department of Putumayo, Colombia. The town can be reached by mostly paved roads from the towns of Villagarzón (30 km), Pasto (150 km) and Puerto Asís (95 km); all are served by regularly scheduled commercial flights from Bogota. Puerto Asís is connected by navigable rivers to the Atlantic Ocean.

The Mocoa Project site is accessible by 6 km of dirt road between the town of Mocoa and the Montclar Bridge which crosses the Mocoa River. A 4 km footpath and mule trail wind up the ridge line to the project area. The project is also accessible by helicopter.

## 5.2 Climate

The Mocoa Project is situated near the eastern edge of the Andean Cordillera and forms part of the headwaters of the Amazon basin. The climate is tropical with annual temperatures varying from 9°C to 29°C. The average annual rainfall for the town of Mocoa is approximately 4,650 mm with the rainy season lasting from April to July. Due to the higher elevation of the project, the actual average temperatures and levels of precipitation may vary.

## 5.3 Local Resources and Infrastructure

The closest population centre to the project area is the town of Mocoa (population approximately 36,000). It is the regional cattle and agricultural centre and the seat of the government for the Department of Putumayo.

CorpoAmazonia, the regional environmental corporation, has offices in Mocoa. It grants most of the environmental permits required to conduct exploration activities in Colombia. The town of Mocoa offers accommodations and some of the basic supplies for exploration and mining, including a potential workforce for less specialized positions.

Mocoa is connected to the national power grid. The ocean port best suited to ship supplies and concentrate is Buenaventura on the Pacific Ocean, approximately 650 km north-northwest of the project area by road (Figure 4-1). Water for the project could be supplied from the nearby Mocoa River (UN-INGEOMINAS, 1984).

## 5.4 Physiography

The Mocoa property is situated in steep terrain with elevations that range from 1,100 masl to 1,850 masl. The surface projection of the Mocoa deposit occurs along a linear north-south-trending ridge, which rises about 300 m above canyons on both sides. Slope angles on the ridges are steep and range from 30° to 50°. The Mocoa Project area is primarily covered by low, dense rain forest. At lower elevations, the land has been cleared for agricultural use.

# 6 HISTORY

Previous exploration, prior ownership, and changes in ownership at the Mocoa Project are summarized in Table 6.1 and discussed in greater detail in Sillitoe et al. (1984) and von Guttenberg (2008).

Results of the drill programs are provided in Section 10 (Drilling) of this Technical Report. No production has occurred at the Mocoa Project.

**Table 6.1: Exploration History
Mocoa Project**

| Year | Company | Description |
|---|---|---|
| 1973–1976 | UN-INGEOMINAS | Regional stream sediment survey located a Cu-Mo-Zn-Pb stream anomaly over an 8 $km^2$ area. Soil and rock chip sampling defined 2 Cu-Mo-Zn anomalies. |
| 1978 | UN-INGEOMINAS | A drill hole discovered 175 m of high-grade Cu-Mo mineralization, including 1.54% Cu, 0.23% Mo over 90 m. |
| 1978–1983 | UN-INGEOMINAS | 31 drill holes, 18,321 m and IP/magnetic surveys outlined the mineralized zone. |
| 1984 | UN-INGEOMINAS | Preliminary Feasibility Study – historical mineral resource estimate of 306 Mtonnes @ 0.37% Cu, 0.061% Mo. Note: this is a historic estimate that does not meet the requirements of NI 43-101. There is no information regarding assumptions, parameters, methods or classification and the estimate has not been verified by the author and, as a result, it is not being treated as a current estimate of mineral resources. |
| post 1985 | UN-INGEOMINAS | Project eventually abandoned due to economic and political reasons. |
| 1990–2000 | Minera Andes Inc. | Acquired a 4,800-ha exploration license over the Mocoa deposit but did little work and terminated the license in 2000 due to adverse conditions in Colombia. |
| 2004 | AngloGold Ashanti | Acquired concessions over the Mocoa deposit. |
| 2005–2006 | AngloGold Ashanti / Antofagasta | Reconnaissance exploration in the Mocoa area. |
| 2007 | AngloGold Ashanti / Antofagasta | Joint Venture terminated, but AGA retained the concessions. |
| 2008 | AngloGold Ashanti / B2Gold | B2Gold acquired a 100% interest in the property subject to a 1% NSR royalty retained by AngloGold Ashanti. Drilled 9 holes, 5,122.9 m. |
| 2012 | B2Gold | Drilled another 3 holes, 1,768.2 m. |

Aside from the initial UN-INGEOMINAS regional program all work has been conducted within the current mineral property boundaries.

# 7 GEOLOGICAL SETTING

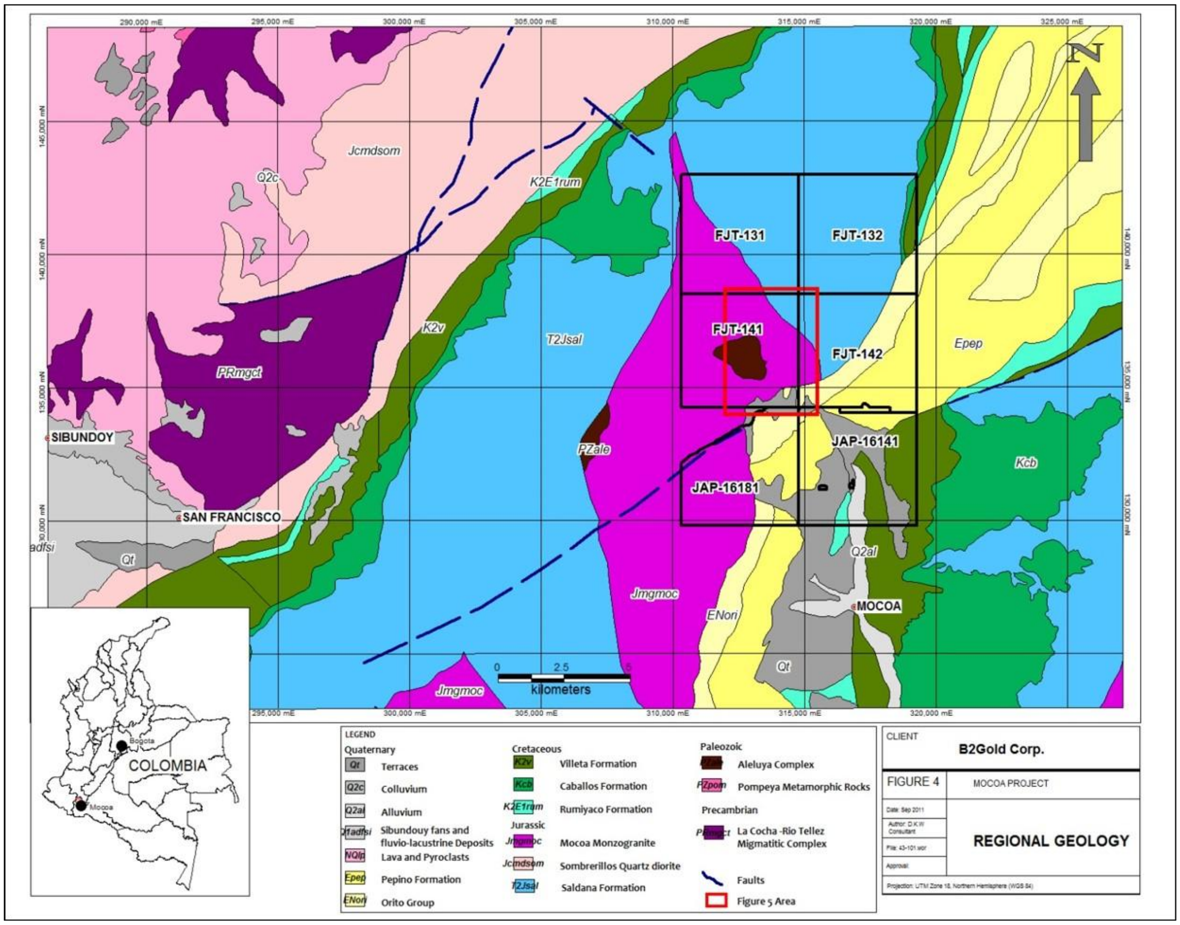
## 7.1 Regional Geology

The Mocoa deposit is located in the Eastern Cordillera of Colombia, a 30 km wide tectonic belt underlain by volcano-sedimentary, sedimentary and intrusive rocks that range in age from Triassic-Jurassic to Quaternary, and by remnants of Paleozoic metasediments and metamorphic rocks of Precambrian age. This belt hosts several other porphyry-copper deposits, such as Mirador, San Carlos, and Panantza, located in southeastern Ecuador (von Guttenberg, 2008).

Northeast-southwest-trending regional fault zones control the exposure of Paleozoic to Tertiary age volcanic-sedimentary sequences (Figure 7-1). The northern part of the Mocoa property is underlain by the northeasterly trending Saldana Formation which is composed of subaerial volcanics and volcaniclastics. This unit and adjacent older sediments are intruded by the late Triassic (198 to 210 Ma [Sillitoe et al., 1984]) Mocoa batholith. The batholith is a composite body with distinct granodioritic and adamellitic facies and has a contact metamorphic aureole of marbles, skarns and hornfelsed siltstones. Both the batholith and Saldana Formation are in fault contact to the south and southeast with Tertiary-age continental red beds.

The Saldana Formation hosts the Mocoa copper-molybdenum deposit, which is associated with dacite porphyry stocks and dikes of Early to Middle Jurassic age (166 to 183 Ma; Sillitoe et al., 1984)

**Figure 7-1: Regional Geology
Mocoa Project**




Source: B2Gold, 2011; INGEOMINAS, 2003.

## 7.2 Local Geology

### 7.2.1 Lithology

A more detailed picture of the geology in the vicinity of the Mocoa deposit is shown in Figure 7-2 (Sillitoe et al., 1984). Early Triassic marine sediments (shown in light blue) are overlain by andesites and dacites of the Saldana Formation. These are intruded by the composite Mocoa batholith which is exposed in the southwest part of the map area.

Several small intrusive bodies are associated with the Mocoa mineralization:

- Pre-mineral porphyritic andesitic, latitic and dacitic irregularly shaped stocks and dikes occur southwest and south of the main deposit area.
- A syn-mineral, partly unroofed dacite porphyry stock hosts the mineralization. The mineralized dacite porphyry is hosted by shallow-dipping and completely bleached volcanic rocks of the Saldana Formation.
- Post-mineral dacite porphyry stocks occur within and peripheral to the mineralized zone.

Hydrothermal breccias form a north-northwest-trending series of pipes that are 75 m to 250 m in diameter. The pipes occur in the roof zone and along the western edge of the mineralized dacite porphyry. Some of the hydrothermal breccias host high-grade copper-molybdenum mineralization.

### 7.2.2 Structure

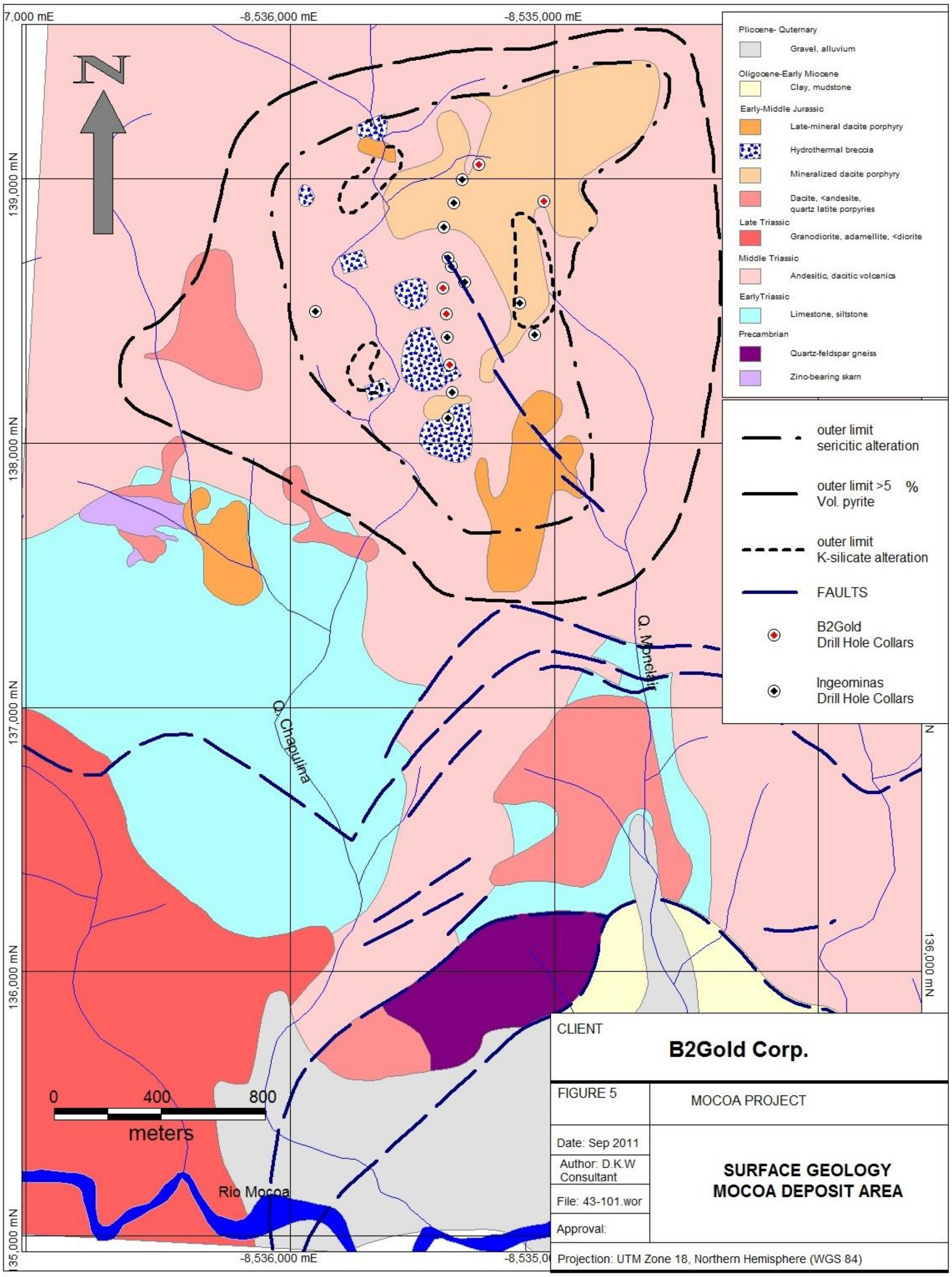
A complex fault zone is located between the Mocoa deposit and the Mocoa River. This structural corridor trends east-northeast. The northern structure appears to dip to the south at 40° to 70° south and is interpreted to be a normal fault. The southern structure is inferred to dip steeply northward and is a reverse fault. This major fault zone is correlated with other major high-angle reverse faults of late Cenozoic age, which bound the Eastern Cordillera. It is a relatively recent, and possibly continuing, fault displacement which has given rise to the rapid drainage incision and consequent steep relief in the Mocoa Project area and the apparent tilting of the volcanic stratigraphy.

Within the alteration zone, a northwest-striking fault zone has been observed at surface and in drill core. This structure is roughly coincident with the hydrothermal breccia pipes.

### 7.2.3 Alteration

A circular halo of pyritic mineralization (>5% pyrite) with a diameter of 2 km is associated with the Mocoa mineralization (Figure 7-2). A zone of pervasive sericite and three smaller zones of potassic alteration occur within this pyrite zone.

**Figure 7-2: Local Geology
Mocoa Project**




Source: B2Gold, 2011.

## 7.3 Geology of the Mocoa Copper-Molybdenum Deposit

The geology of the Mocoa deposit is based largely on the interpretation of drill hole lithology logs. A plan map of the deposit is shown in Figure 7-3, and vertical cross sections are shown in Figures 7-4, 7-5 and 7-6. Detailed descriptions of the lithology, alteration and mineralization are found in reports by Sillitoe et al. (1984) and von Guttenberg (2008) and are summarized here.

The Mocoa copper-molybdenum porphyry system is associated with a partially unroofed stock of dacite porphyry. The northern part is an oval-shaped stock with dimensions of 1,200 m by 400 m and the southern part is dike-like (600 m by 200 m). Many smaller dacite porphyry dikes, which have been seen on the surface and in drill holes, are apophyses of the main intrusion. Mineralization occurs within the dacite porphyry and adjacent volcanic rocks. The Mocoa porphyry system, including its host stock, appears to have been tilted to the northeast, resulting in its elongation in that direction and a 65° southwest dip of the K-silicate-sericite alteration boundary.

### 7.3.1 Hypogene Alteration and Mineralization

The hydrothermal alteration and mineralization pattern conforms to the classical zonal pattern expected in the upper parts of a porphyry system: sericitization surrounded by propylitization and underlain in its deeper parts by K-silicate alteration. The widespread overprinting of alteration-mineralization types, and the multiplicity of veinlet generations within each of the alteration-mineralization zones have contributed to both the high grade and the geological complexity of the Mocoa porphyry system. The large number of mineralization stages is emphasized by the high density of stockwork fracturing, which locally exceeds 400 fractures per linear metre in andesitic wall rocks immediately adjoining the stock.

A zone of pervasive sericite-pyrite alteration forms a barren lithocap to the Mocoa porphyry system. This zone is up to 150 m thick and is underlain by a steep-sided cylindrical body of K-silicate alteration.

Late-stage sericitization of variable intensity persists as patches to the deepest levels drilled (1,000 m below surface). Pervasive sericitic overprinting locally resulted in at least partial removal of chalcopyrite and molybdenite, and the addition of 4% to 6% pyrite. In the northern part of the deposit, it is estimated that 80% of the mineralization is associated with sericitic alteration within the dacite porphyry stock.

K-silicate alteration is characterized by pink K-feldspar (mainly orthoclase), pale green chlorite, lavender-coloured anhydrite, transparent to milky quartz, locally abundant white calcite and traces of epidote. The K-silicate zone includes a well-mineralized, K-feldspar-chlorite facies and a deep, centrally located K-feldspar-phlogopite-actinolite-magnetite facies, which coincides with low-grade copper and molybdenum values. Remnants of an early facies of K-silicate alteration were recognized at depths greater than 400 m in the central parts of the deposit.

The propylitic halo is characterized by chlorite, epidote, calcite, prehnite, and pyrite, occurring as patches, veinlets, and disseminations. The main inner part of the halo carries at least 1% pyrite, but minimal copper or molybdenum. The outer limit of the propylitic halo is difficult to determine given the limited exposure but appears to contain enhanced zinc and lead values.

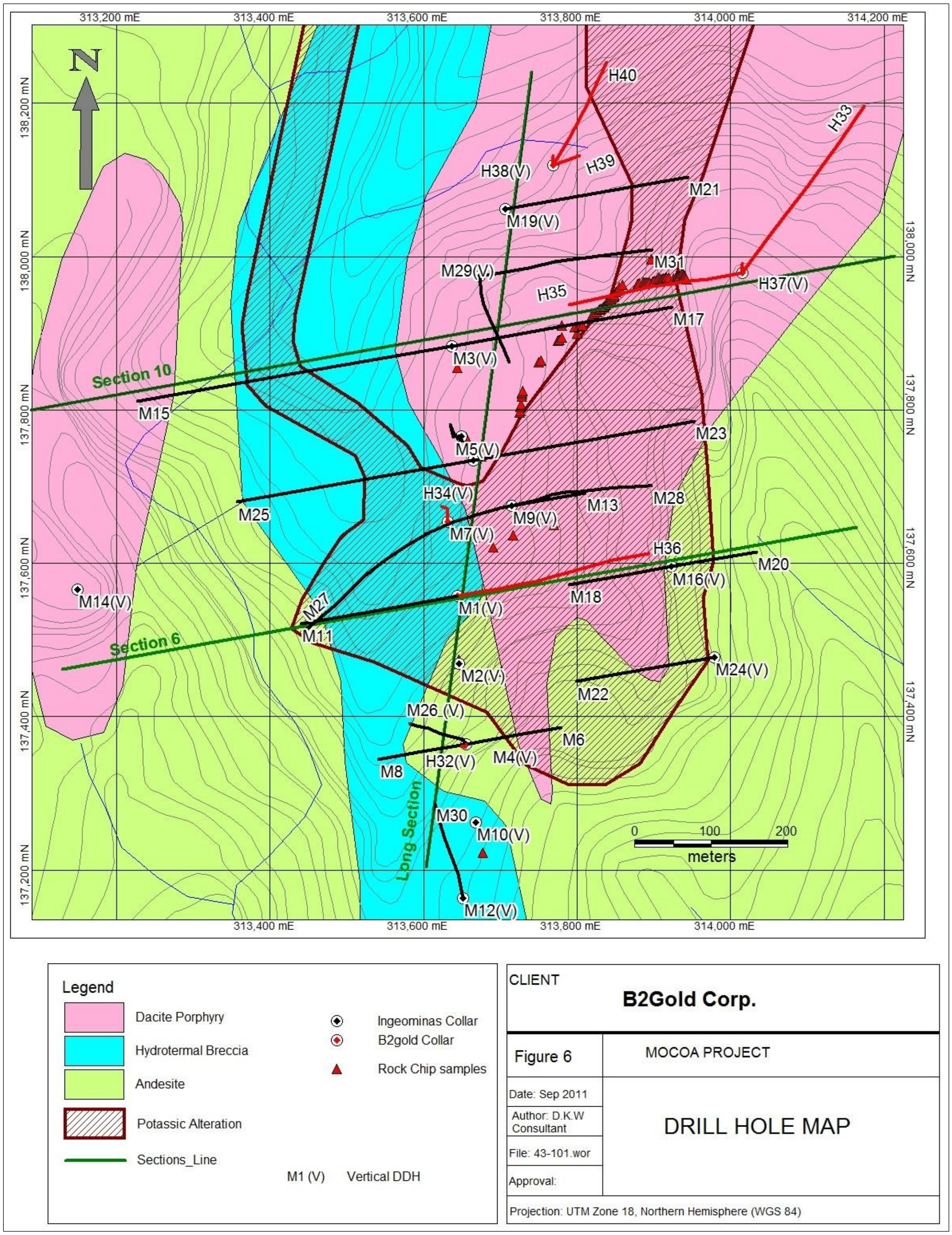
Chalcopyrite, molybdenite, pyrite and minor bornite occur as disseminations and in quartz vein stockworks. Total sulphide content is usually less than 3%. Higher grade copper-molybdenum mineralization is hosted by several hydrothermal breccias, which are concentrated in both K-silicate and sericitic alteration along the concealed southern roof and southwestern flank of the stock.

### 7.3.2 Supergene Alteration and Mineralization

A thick zone of partial leaching is present along the ridge in the central part of the deposit, but it is absent beneath the canyon floors. The leach cap ranges from 200 m to 260 m thick in the northern part of the deposit to about 130 m in the southern, eastern and western parts of the deposit. It is characterized by the development of jarosite and minor hematite after sulphides (primarily pyrite). Isolated zones within the leach cap are unoxidized and contain fresh pyrite.

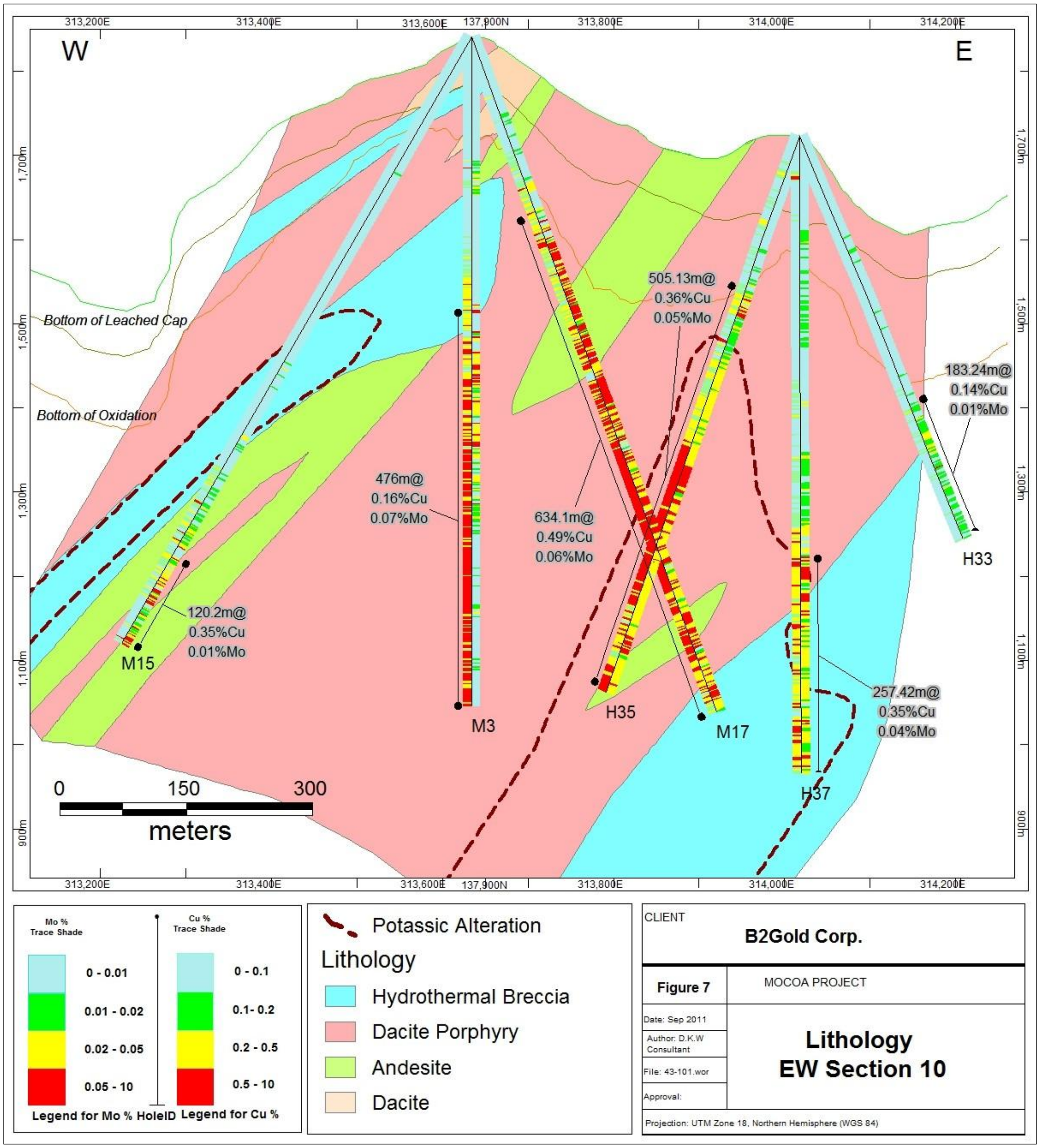
An irregular zone of incipient supergene copper enrichment is most common in a 10 m to 100 m thick zone within and/or immediately beneath the lowermost part of the leach cap. It consists of surficial replacement of pyrite and lesser chalcopyrite by sooty chalcocite and, at greater depths, by films of covellite. Rapid erosion during the late Cenozoic precluded generation of a significant zone of supergene chalcocite enrichment. The high precipitation caused nearly complete removal of abundant hypogene anhydrite and supergene gypsum to depths of at least 900 m.

**Figure 7-3: Geological and Drill Hole Plan
Mocoa Deposit**




Source: B2Gold, 2011.

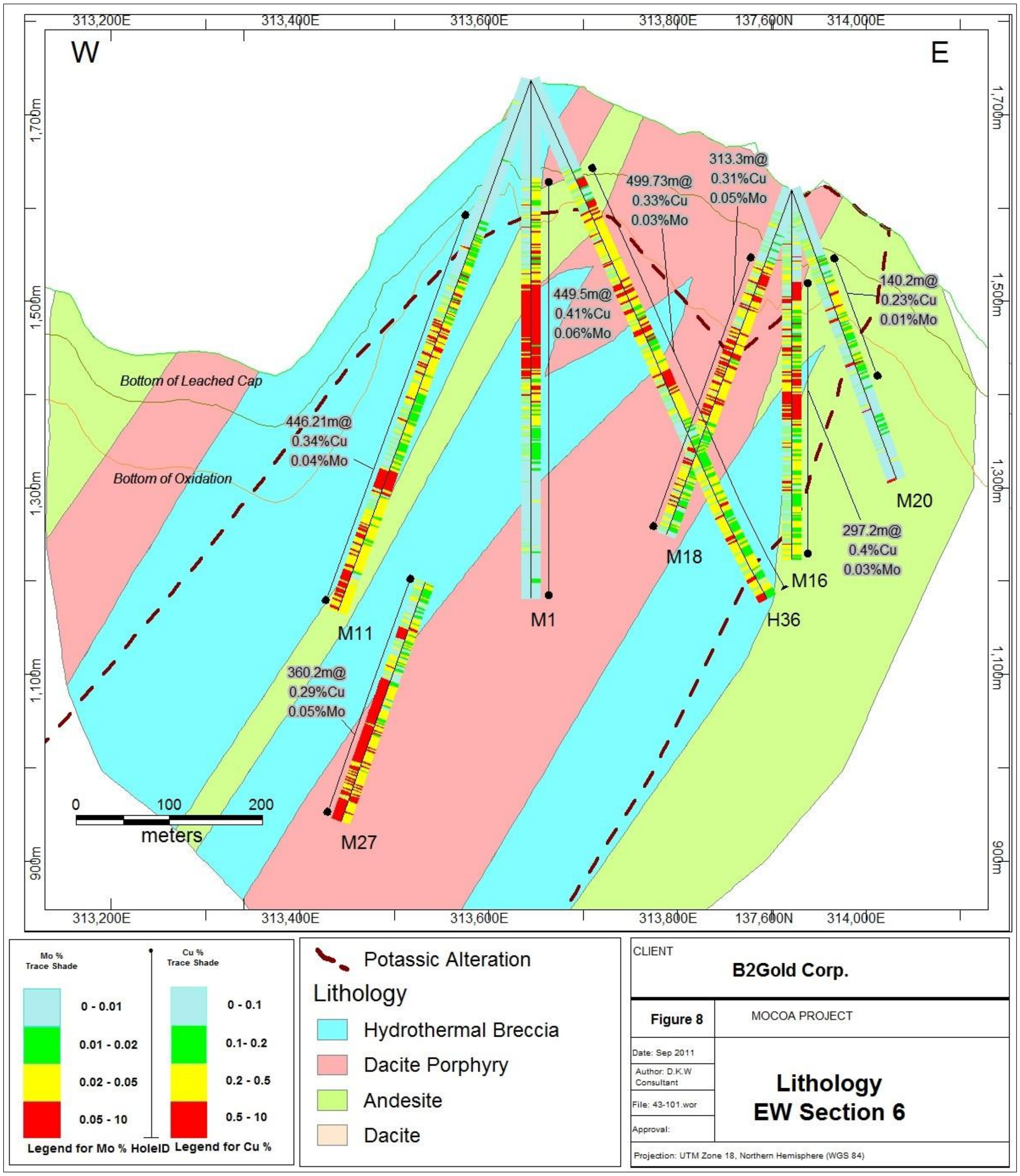
**Figure 7-4: East-West Cross Section 10**
**Mocoa Deposit**




Note: Assays are over core lengths and may not represent the true thicknesses. Additional infill drilling will be required to confirm the orientation of the mineralized zones.

Source: B2Gold 2011.

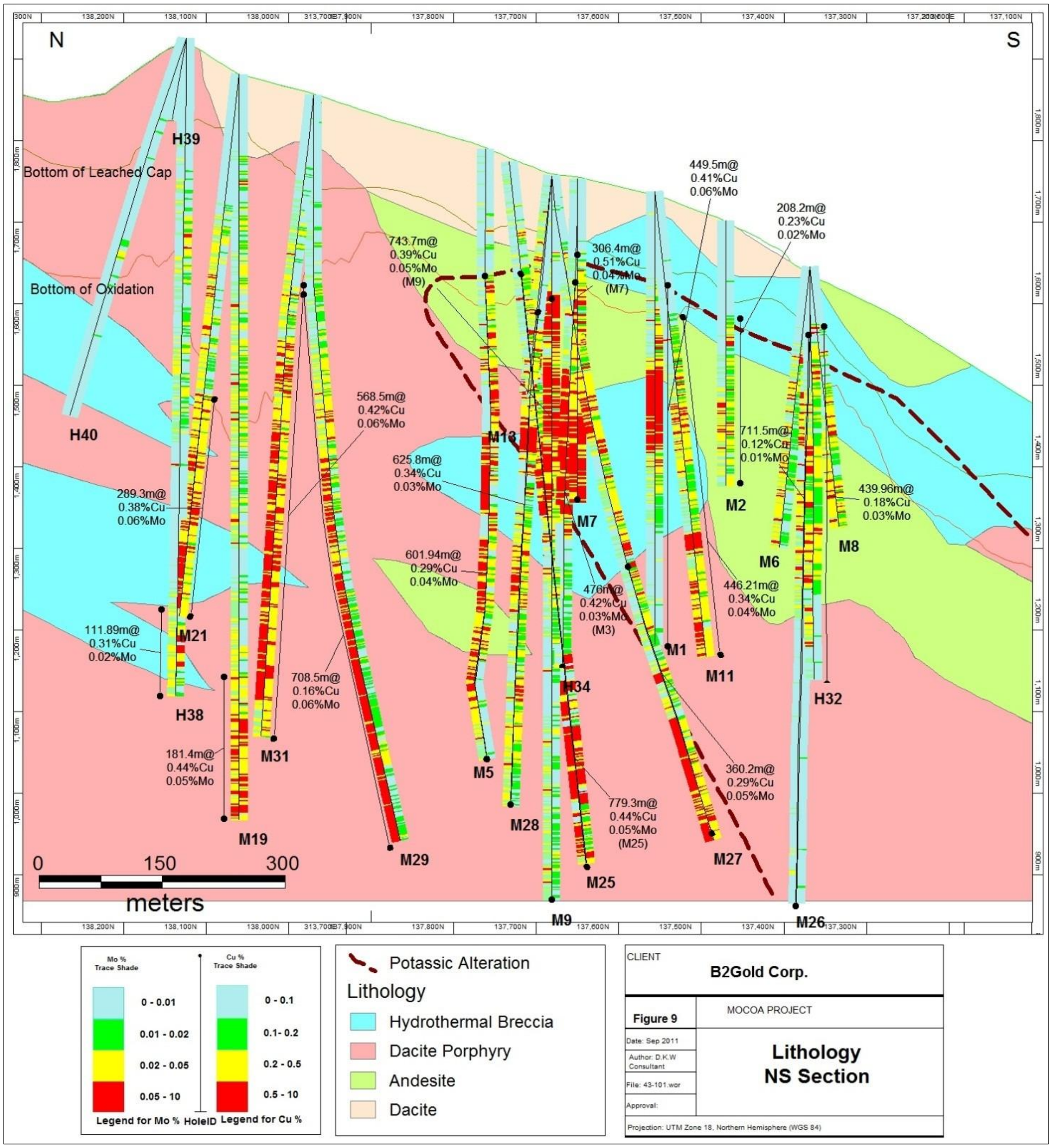
**Figure 7-5: East-West Cross Section 6
Mocoa Deposit**




Note: Assays are over core lengths and may not represent the true thicknesses. Additional infill drilling will be required to confirm the orientation of the mineralized zones.

Source: B2Gold, 2011.

**Figure 7-6: North-South Cross Section
Mocoa Deposit**




Note: Assays are over core lengths and may not represent the true thicknesses. Additional infill drilling will be required to confirm the orientation of the mineralized zones.

Source: B2Gold, 2011.

# 8 DEPOSIT TYPES

Mineralization at Mocoa is similar to a typical Andean porphyry copper-molybdenum deposit (Lowell and Guilbert, 1970; Panteleyev, 1995). Common features of a porphyry deposit include the following:

- Large zones (>10 $km^2$) of hydrothermally altered rocks that commonly grade from a central potassic core to peripheral phyllic-, argillic-, and propylitic-altered zones.

- Generally low-grade mineralization consisting of disseminated, fracture, veinlet, and quartz stockwork-controlled sulphide mineralization. Deposit boundaries are determined by economic factors that outline the mineralized zones.

- Mineralization commonly zoned with a chalcopyrite-bornite-molybdenite core and peripheral chalcopyrite-pyrite and pyrite. Enrichment of primary copper mineralization by late-stage hypogene, high-sulphidation events can sometimes occur.

- Important geological controls on porphyry mineralization that include igneous contacts, cupolas, and the uppermost, bifurcating parts of stocks and dike swarms. Intrusive and hydrothermal breccias and zones of intensely developed fracturing, due to coincident or intersecting multiple mineralized fracture sets that commonly coincide with the highest metal concentrations.

- Modification by surface oxidation in weathered environments (e.g., Escondida). Low-pH meteoric waters generated by the oxidation of iron sulphides leach copper from hypogene copper sulphides, and oxidized copper minerals, such as malachite, chrysocolla, and brochantite and re-deposit copper as secondary chalcocite and covellite immediately below the water table in flat tabular zones of supergene enrichment. The process results in a copper-poor leach cap lying above a relatively thin but high-grade zone of supergene enrichment that caps a thicker zone of moderate-grade, primary hypogene mineralization.

Exploration work is planned that is consistent with this deposit type.

# 9 EXPLORATION

The UN-INGEOMINAS Joint Venture carried out stream, soil and rock geochemical surveys. IP and magnetic surveys were also completed over the Mocoa deposit. This work is described in greater detail in von Guttenberg (2008). A copper-molybdenum-zinc soil and rock chip anomaly is associated with the surface expression of the Mocoa deposit. An IP chargeability high and a magnetic low correlate with the zone of sericite-pyrite alteration. The Joint Venture carried out a 31-hole drill program (18,321 m) which is described in Section 10 (Drilling).

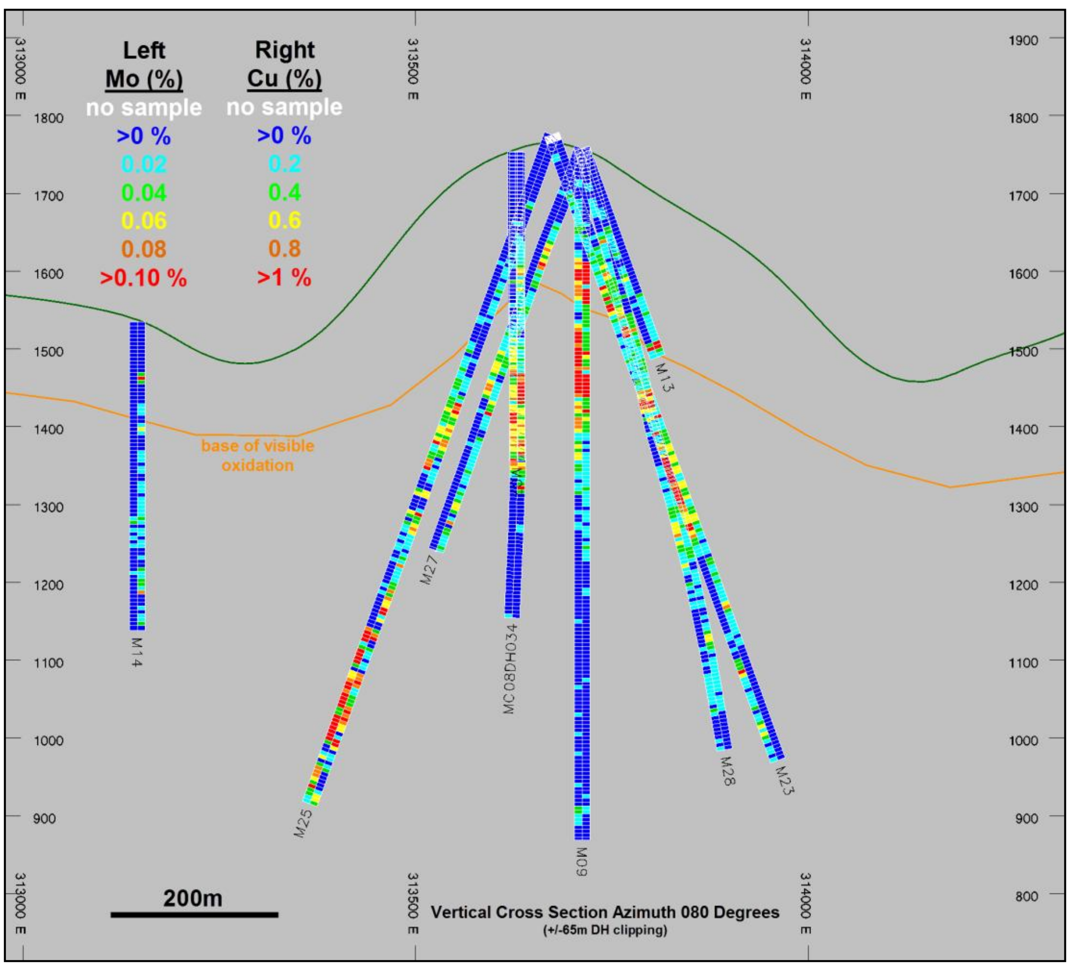
The issuer has not conducted any fieldwork on this property, aside from the field visit by the QP.

# 10 DRILLING

Two groups have drilled the Mocoa porphyry copper-molybdenum deposit: the UN-INGEOMINAS Joint Venture between 1978 and 1983, and B2Gold in 2008 and 2012. Drilling results from both operators has been used in the estimate of mineral resources contained in this report. Drill hole locations are plotted in Figure 7-3 and collar locations, azimuths, dips and hole depths are shown in Table 10.1. The two programs are described in section 10.1 and 10.2.

The deposit is overlain by steep topography in many areas and access for drilling is somewhat limited. The majority of drilling to date has been conducted from the top of a ridge that runs in a north-south direction over the centre of the deposit. A series of drill stations have been established along the ridge at roughly 100m intervals and drill holes are oriented vertically or steeply "fanned-out" in west and east directions. An example of drilling through the centre of the deposit is shown in Figure 10-1.

**Figure 10-1: Vertical Cross Section Showing Drilling in Centre of Mocoa Deposit**




Source: SIM Geological, 2016.

**Table 10.1: Drill Collar Locations**
**Mocoa Project (1978–2012)**

| Hole | E_WGS84 | N_WGS84 | Elevation | Azimuth | Dip | Length (m) | Year | Company |
|---|---|---|---|---|---|---|---|---|
| M01 | 313646 | 137557 | 1737 | 0 | -90 | 555.3 | 1978 | UN-INGEOMINAS |
| M02 | 313649 | 137470 | 1703 | 0 | -90 | 325.7 | 1979 | UN-INGEOMINAS |
| M03 | 313634 | 137884 | 1842 | 0 | -90 | 794.5 | 1979 | UN-INGEOMINAS |
| M04 | 313656 | 137364 | 1645 | 0 | -90 | 306.2 | 1979 | UN-INGEOMINAS |
| M05 | 313648 | 137767 | 1790 | 0 | -90 | 751.3 | 1979 | UN-INGEOMINAS |
| M06 | 313656 | 137364 | 1645 | 80 | -70 | 366.3 | 1979 | UN-INGEOMINAS |
| M07 | 313632 | 137654 | 1753 | 0 | -90 | 396.3 | 1979 | UN-INGEOMINAS |
| M08 | 313656 | 137364 | 1645 | 260 | -70 | 339.5 | 1979 | UN-INGEOMINAS |
| M09 | 313714 | 137674 | 1757 | 0 | -90 | 888.5 | 1979 | UN-INGEOMINAS |
| M10 | 313666 | 137263 | 1596 | 0 | -90 | 396.6 | 1979 | UN-INGEOMINAS |
| M11 | 313644 | 137557 | 1737 | 260 | -70 | 606.2 | 1979 | UN-INGEOMINAS |
| M12 | 313648 | 137165 | 1550 | 0 | -90 | 281.7 | 1979 | UN-INGEOMINAS |
| M13 | 313714 | 137674 | 1757 | 80 | -70 | 285.22 | 1980 | UN-INGEOMINAS |
| M14 | 313149 | 137566 | 1535 | 0 | -90 | 396.7 | 1980 | UN-INGEOMINAS |
| M15 | 313634 | 137884 | 1842 | 260 | -60 | 831.9 | 1980 | UN-INGEOMINAS |
| M16 | 313917 | 137598 | 1624 | 0 | -90 | 396.2 | 1980 | UN-INGEOMINAS |
| M17 | 313634 | 137884 | 1842 | 80 | -70 | 853.5 | 1980 | UN-INGEOMINAS |
| M18 | 313922 | 137596 | 1620 | 260 | -70 | 394.1 | 1980 | UN-INGEOMINAS |
| M19 | 313701 | 138064 | 1882 | 0 | -90 | 914.4 | 1980 | UN-INGEOMINAS |
| M20 | 313922 | 137596 | 1620 | 80 | -70 | 330.5 | 1980 | UN-INGEOMINAS |
| M21 | 313701 | 138064 | 1882 | 80 | -70 | 706.8 | 1981 | UN-INGEOMINAS |
| M22 | 313976 | 137478 | 1591 | 260 | -60 | 366.1 | 1981 | UN-INGEOMINAS |
| M23 | 313663 | 137735 | 1775 | 80 | -70 | 855.4 | 1981 | UN-INGEOMINAS |
| M24 | 313979 | 137478 | 1588 | 0 | -90 | 243.48 | 1981 | UN-INGEOMINAS |
| M25 | 313663 | 137735 | 1775 | 260 | -70 | 914.9 | 1981 | UN-INGEOMINAS |
| M26 | 313656 | 137364 | 1645 | 0 | -90 | 784.63 | 1982 | UN-INGEOMINAS |
| M27 | 313714 | 137674 | 1757 | 260 | -70 | 875.3 | 1982 | UN-INGEOMINAS |
| M28 | 313714 | 137674 | 1757 | 80 | -75 | 794.92 | 1982 | UN-INGEOMINAS |
| M29 | 313671 | 137974 | 1858 | 0 | -90 | 926.41 | 1982 | UN-INGEOMINAS |
| M30 | 313651 | 137164 | 1549 | 350 | -80 | 609.32 | 1983 | UN-INGEOMINAS |
| M31 | 313671 | 137974 | 1858 | 80 | -70 | 819.94 | 1983 | UN-INGEOMINAS |
| H32 | 313653 | 137365 | 1646 | 0 | -90 | 505.96 | 2008 | B2Gold |
| H33 | 314017 | 137981 | 1724 | 35 | -60 | 549.24 | 2008 | B2Gold |
| H34 | 313630 | 137654 | 1754 | 0 | -90 | 600 | 2008 | B2Gold |
| H35 | 314015 | 137979 | 1723 | 260 | -70 | 699.13 | 2008 | B2Gold |
| H36 | 313642 | 137558 | 1737 | 80 | -65 | 611.73 | 2008 | B2Gold |

| Hole | E_WGS84 | N_WGS84 | Elevation | Azimuth | Dip | Length (m) | Year | Company |
|---|---|---|---|---|---|---|---|---|
| H37 | 314015 | 137979 | 1723 | 0 | -90 | 757.42 | 2008 | B2Gold |
| H39 | 313768 | 138123 | 1906 | 0 | -90 | 805.89 | 2008 | B2Gold |
| H39 | 313768 | 138123 | 1906 | 70 | -70 | 106.67 | 2008 | B2Gold |
| H40 | 313768 | 138124 | 1906 | 30 | -70 | 486.65 | 2008 | B2Gold |
| H41 | 313852 | 138238 | 1923 | 80 | -70 | 416.9 | 2012 | B2Gold |
| H41A | 313852 | 138236 | 1923 | 80 | -70 | 1003.5 | 2012 | B2Gold |
| H42 | 314793 | 137193 | 1555 | 360 | -65 | 347.8 | 2012 | B2Gold |

## 10.1 UN-INGEOMINAS (1978–1983)

The UN-INGEOMINAS Joint Venture drilled 31 holes (18,321 m) on the Mocoa Project between November 1978 and August 1983 using Boyles BBS-15, BBS-37 and Longyear LY-38 drills. Bell 204 and 205 helicopters were used for drill support and moves. Core sizes ranged from NQ at the start of the holes to BQ and AQ at depth (von Guttenberg, 2008).

A Tropari was used to provide down-hole deviation data for the last seven holes, but there are no records for down-hole deviations for the other holes.

Drill core from this program is stored at the national core storage facility in Bucaramanga. It is contained in wooden boxes that exhibit various degrees of deterioration. Crusher reject samples from the drill core sampling program are stored at the INGEOMINAS warehouse in Bogota.

Selected intersections from the UN-INGEOMINAS drilling are shown in Table 10.2.

**Table 10.2: Selective Intersections
UN-INGEOMINAS (1978–1983)**

| Hole | From (m) | To (m) | Interval (m) | Cu (%) | Mo (%) |
|---|---|---|---|---|---|
| M1 | 105.70 | 555.20 | 449.50 | 0.41 | 0.06 |
| including | 141.10 | 411.40 | 270.30 | 0.62 | 0.09 |
| including | 214.50 | 309.30 | 94.80 | 1.23 | 0.22 |
| M3 | 318.50 | 794.50 | 476.00 | 0.16 | 0.07 |
| M5 | 149.30 | 751.24 | 601.94 | 0.29 | 0.04 |
| M7 | 89.90 | 396.30 | 306.40 | 0.51 | 0.04 |
| including | 291.00 | 396.30 | 105.30 | 0.87 | 0.07 |
| M9 | 144.70 | 888.40 | 743.70 | 0.39 | 0.05 |
| including | 144.70 | 621.80 | 477.10 | 0.56 | 0.06 |
| including | 144.70 | 362.70 | 218.00 | 0.95 | 0.11 |
| M11 | 160.00 | 606.21 | 446.21 | 0.34 | 0.04 |
| including | 445.00 | 472.40 | 27.40 | 1.38 | 0.14 |
| M17 | 219.40 | 853.50 | 634.10 | 0.49 | 0.06 |
| M23 | 140.20 | 855.40 | 715.20 | 0.34 | 0.05 |
| including | 384.00 | 544.00 | 160.00 | 0.53 | 0.10 |
| M25 | 135.60 | 914.90 | 779.30 | 0.44 | 0.05 |
| including | 330.70 | 460.20 | 129.50 | 0.56 | 0.056 |
| M26 | 73.10 | 784.60 | 711.50 | 0.12 | 0.015 |
| including | 96.00 | 402.30 | 306.30 | 0.22 | 0.029 |
| M31 | 150.80 | 819.90 | 669.10 | 0.37 | 0.06 |
| including | 493.70 | 774.20 | 280.50 | 0.49 | 0.085 |

Note: Assays are over core lengths and may not represent the true thicknesses. Additional infill drilling will be required to confirm the orientation of the mineralized zones.

## 10.2 B2Gold (2008, 2012)

In 2008, B2Gold's drill program was conducted by Kluane Colombia; it used KD600 and KD1000 man-portable drill rigs. In 2012, B2Gold used AK Drilling; it used a Hydracore 4000 man-portable drill rig. Pack animals were used to service and move the drill for both B2Gold's drill programs. The drill core was transported down the hill by mule and then trucked to B2Gold's office in Mocoa where it was logged and sampled. Down-hole surveys were conducted at 50 m intervals using a REFLEX MAXIBOR II instrument.

Core from the 2008 and 2012 drill programs is stored at a facility in Medellín.

Two of the 2008 drill holes, H32 and H34, twinned existing holes, M26 and M7, respectively. Holes H39 and H41 were lost, and hole H40 did not reach the target depth. Hole H42 was drilled 800 m east of the Mocoa deposit.

Significant intersections from the B2Gold drilling are shown in Table 10.3.

**Table 10.3: Drill Results
B2Gold (2008, 2012)**

| Hole | From (m) | To (m) | Interval (m) | Cu (%) | Mo (%) |
|---|---|---|---|---|---|
| H32 | 66.00 | 505.96 | 439.96 | 0.182 | 0.029 |
| (Including) | 96.00 | 402.00 | 306.00 | 0.229 | 0.032 |
| H33 | 366.00 | 549.24 | 183.24 | 0.137 | 0.006 |
| H34 | 124.00 | 600.00 | 476.00 | 0.422 | 0.034 |
| including | 124.00 | 442.00 | 318.00 | 0.578 | 0.047 |
| H35 | 194.00 | 699.13 | 505.13 | 0.355 | 0.053 |
| including | 414.00 | 699.13 | 285.13 | 0.426 | 0.072 |
| H36 | 112.00 | 611.73 | 499.73 | 0.323 | 0.031 |
| H37 | 500.00 | 757.42 | 257.42 | 0.349 | 0.038 |
| H38 | 694.00 | 805.89 | 111.89 | 0.305 | 0.022 |
| H39 | No significant values; lost hole | | | | |
| H40 | No significant values; target depth not reached | | | | |
| H41 | No significant values; lost hole | | | | |
| H41A | 616.00 | 1003.50 | 387.50 | 0.48 | 0.015 |
| including | 731.00 | 1003.50 | 272.50 | 0.58 | 0.017 |
| H42 | No significant values | | | | |

Note: Assays are over core lengths and may not represent true thicknesses. Additional infill drilling will be required to confirm the orientation of the mineralized zones.

In the authors' opinion, the core handling, logging, sampling and core storage protocols in place on the Mocoa Project meet or exceed common industry standards, and the authors are not aware of any drilling, sampling or recovery factors that could materially impact the accuracy and reliability of the results.

# 11 SAMPLING PREPARATION, ANALYSES AND SECURITY

## 11.1 UN-INGEOMINAS Joint Venture (1978–1983)

### 11.1.1 Core Handling and Storage

The UN-INGEOMINAS procedures for handling drill core during the 1978–1983 Mocoa drill programs involved detailed logging of the geological and mineralogical characteristics of the drill core, and the selection of 1.5 m sample intervals. The selected samples were split longitudinally with a core splitter, and one half of the drill core was sent to the INGEOMINAS laboratory, which has no relation to the issuer, for chemical analysis. The remaining half-core was returned to the wooden core boxes and transported to the INGEOMINAS regional office in Cali. This drill core is now being stored inside the national core storage facility in Bucaramanga (Litoteca Nacional de Colombia), where the wooden core boxes exhibit varying degrees of deterioration. Drill core recovered from severely damaged boxes are stored in plastic bags with identification markings. The crusher reject samples from Mocoa drill core are stored at the INGEOMINAS laboratory-warehouse facility in Bogota.

### 11.1.2 Sample Preparation and Analytical Procedures

Between 1978 and 1983, a total of 11,857 drill core samples collected from the Mocoa Project were prepared and assayed at the INGEOMINAS laboratory in Bogota, Colombia, which has no relation to the issuer,. The samples were crushed and pulverized to 80 mesh and dissolved in nitric acid using an aluminum additive to enhance the detection of molybdenum. Atomic-absorption spectrophotometry (AAS) was used to assay for copper, molybdenum, lead, zinc and silver. A small selection of samples was also tested for gold. Of the elements tested, copper and molybdenum produced the only values of interest.

Duplicates of approximately 23% of the drill core samples were sent to the former Bondar-Clegg & Company Ltd. (Bondar-Clegg) in Ottawa, Ontario, Canada, , which has no relation to the issuer, for check analysis. The preparation and analysis of samples at Bondar-Clegg were similar to those at the INGEOMINAS laboratory. Samples were crushed and pulverized to 150 mesh, digestion was by acid decomposition, and assay measurements for copper and molybdenum were conducted with an AAS.

Assay results from both laboratories are appended to the 1984 INGEOMINAS Preliminary Feasibility Study (Anexo 2 Analisis Quimicos de Los Nucleos de Perforacion; Anexo 2A Analisis de Comprobacion). The copper and molybdenum assay results are accompanied by the drill hole identification, and the assay intervals are expressed in metres. There are no original assay certificates for the 1978–1983 diamond drilling available for review.

### 11.1.3 Quality Assurance/Quality Control (QA/QC)

The nature and extent of the quality assurance and quality control procedures used by UN-INGEOMINAS for the collection and processing of drill core samples from 1978 through 1983 are not extensively documented. It was reported that check assays were performed on a selection of samples to ensure accuracy of the chemical determinations, but there was no reported use of certified standards or blanks. Because the sample collection, preparation and analysis were conducted internally, it was presumed that the drill core material was secured by UN-INGEOMINAS personnel throughout the process.

## 11.2 B2Gold (2008)

### 11.2.1 Core Handling and Storage

During the 2008 B2Gold drill programs, initial drill core review and logging was performed at the Mocoa Project site. Subsequently, the drill core was transported from the drill area down the hill by mule where core was transferred to a truck and transported to the town of Mocoa about 6 km away. Detailed geological and geotechnical drill core logging, as well as sampling and cutting, were performed at B2Gold's Mocoa office, which was a secured house in the town of Mocoa.

The 2008 Mocoa drill core was systematically sampled every 2 m, or less, when it was preferable to sample specific intervals (e.g., veins). The sampling information, including the insertion of standards, blanks and duplicates, was recorded by the B2Gold geologist on duty.

A diamond core saw was used to cut the drill core along its length, and one half of the core was sampled at the intervals assigned by the geologist. The half-core was selected in an unbiased manner and collected in bags which were then sealed and shipped by secure transport directly to the laboratories in Bogota. The remaining half-core was returned to the core box as a permanent record, and is now being stored, along with the Mocoa coarse rejects, at a facility in Medellín.

### 11.2.2 Sample Preparation and Analytical Procedures

#### *11.2.2.1 ALS Chemex Preparation Laboratory, Bogota*

The ALS Chemex Bogota sample preparation laboratory, where 1,361 Mocoa drill core and quality control samples were submitted, is a joint venture between AGA and ALS Chemex, which has no relation to the issuer. At the time of sample preparation in 2008, this laboratory did not operate the ALS Chemex Laboratory Information Management System (LIMS), which tracks the progress of samples through the laboratory.

Wet samples were placed on stainless steel pans and dried in an oven with a digitally controlled, gas-fired burner at 110°C. The drill core samples were crushed with a TM Terminator and reduced to 1 kg by quartering with a riffle splitter. As per ALS Chemex protocol, at least 70% of the sample was crushed to -2 mm. In October 2008, during a laboratory audit by Smee and Associates Consulting Ltd., it was noted that the pulverizer was not being used by the laboratory in Bogota, and the 1 kg samples of crushed material were, instead, being shipped to the ALS Chemex laboratory in Lima for both pulverization and analysis. A ring mill was used in the Lima laboratory for those samples requiring pulverization to reduce the particle size to 75 μm with at least 85% of the pulverized material passing 200 mesh.

Internal laboratory quality control measures included the insertion of two sandstone cleaning blanks at the beginning of the work order, one every 30 samples, and one at the end of the work order. ALS Chemex also used certified standards and pulp duplicates.

#### *11.2.2.2 ALS Chemex Laboratory, Lima*

The Mocoa samples prepared at the ALS Chemex laboratory in Bogota were immediately entered into the ALS LIMS system upon arrival at the laboratory in Lima, Peru. Samples were analyzed for multi-elements by four-acid digestion and a combination of inductively coupled plasma (ICP) mass spectrometry and ICP emission spectrometry. Over-limits of ICP were re-analyzed by AAS.

The ALS Chemex laboratory in Lima, which has no relation to the issuer is certified by the International Standards Organization (ISO) for quality assurance (ISO 9001) and general requirements for the competence of testing and calibration laboratories (ISO/IEC 17025).

#### *11.2.2.3 Acme Analytical Laboratories (AcmeLabs) Preparation Facility, Bogota*

In 2008, B2Gold also submitted 1,605 drill core and quality control samples to the AcmeLabs preparation laboratory in Bogota, which has no relation to the issuer. The decision to use two separate laboratories was based on timing issues for receiving sample analyses. The AcmeLabs LIMS system was not in place at the time these samples were prepared; therefore, all data were captured manually into a digital format.

Samples at the AcmeLabs preparation laboratory were placed on aluminum pans lined with heavy brown paper then placed on drying trolleys which were inserted into a gas-fired, heated cabinet to be dried at 60°C. The primary crusher, which reduced the particle size to 5 mm using a TM Terminator crushing system, was followed by a second stage of crushing by a Boyd crusher that reduced at least 70% of the material to a 2 mm particle size. A 500 g split was taken from the crushed samples using a stainless-steel riffle splitter, followed by pulverization with a LM-2 pulverizer. The pulverized material was divided into two fractions: 380 g of fine rejects, and 120 g for analysis in Vancouver, British Columbia, Canada.

At the start of each work order and after every 10 samples, the laboratory cleaned both the crusher and pulverizer using quartz rock. Preparation duplicates were taken every 30 to 40 samples, and crusher- and pulp-size checks were conducted at the same frequency. Certified standards, as well as pulp duplicates, were also used to control quality.

#### *11.2.2.4 Acme Analytical Laboratories, Vancouver*

The samples prepared at the AcmeLabs laboratory in Bogota were shipped to Vancouver, British Columbia, which has no relation to the issuer, and analyzed for copper, molybdenum and multi-elements using AcmeLabs' analysis code Group 7TX. AcmeLabs analyzed 41 elements using a four-acid digestion and a combination of ICP mass spectrometry (ICP-MS) and ICP emission spectrometry (ICP-ES). B2Gold also requested the additional analysis of rhenium, which was performed by aqua regia digestion and ICP-MS.

AcmeLabs in Vancouver, British Columbia is registered with the quality management system ISO 9001.

### 11.2.3 Quality Assurance/Quality Control (QA/QC)

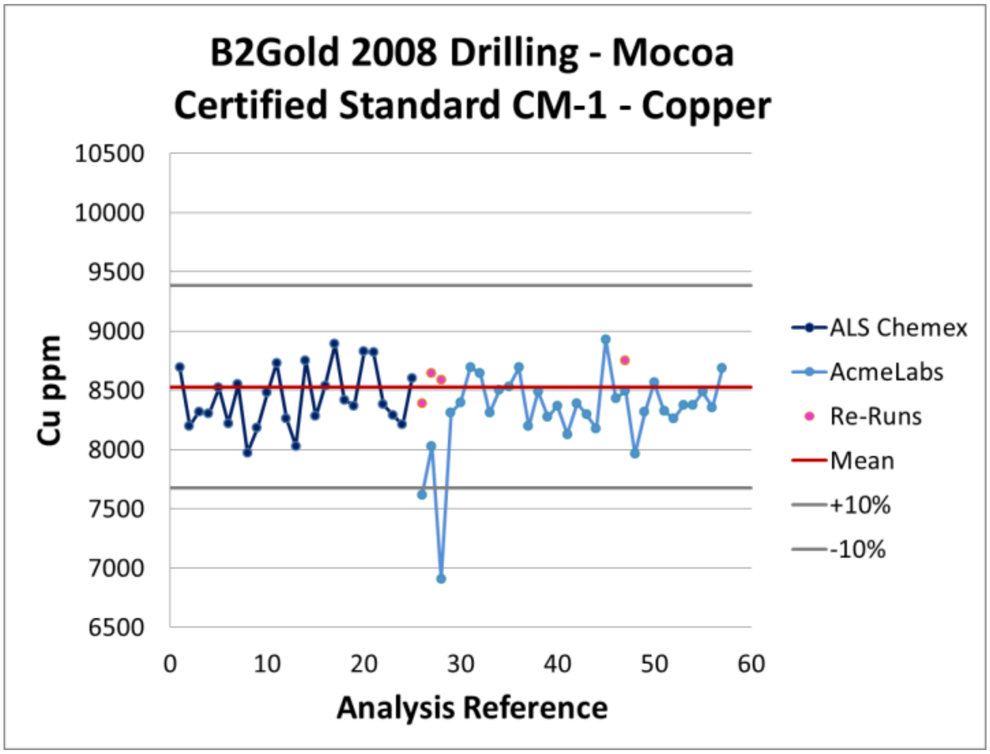
B2Gold's QA/QC protocol consists of two samples of blank material inserted at the beginning of each batch, a blank and a standard inserted every 25 samples, and both a field and preparation duplicate taken every 30 to 40 samples. These quality control samples were selected and inserted in the sample stream as part of the sampling process prior to submission at the laboratory. At ALS Chemex, 75 of the 84 samples in a batch were submitted by the client and the remaining samples were internal laboratory quality control samples. At AcmeLabs, 78 of the 84 samples in a batch were submitted by the client.

#### *11.2.3.1 Standard Reference Material*

Two certified standards prepared by CDN Resource Laboratories, which has no relation to the issuer, were used by B2Gold during the 2008 Mocoa drill program. The certified, accepted values for these reference materials were 8,530 ppm Cu and 10,130 ppm Cu, and 760 ppm Mo and 290 ppm Mo, respectively. B2Gold selected maximum acceptance limits of 10% of the recommended values.

B2Gold protocol required one certified standard to be inserted into the sample stream every 25 samples for a total of 118 standards submitted to ALS Chemex and AcmeLabs. B2Gold tracked the accuracy and precision of each laboratory batch and recorded the laboratory batch quality control in a "Table of Failures", which summarized the type of failure, the reason for failure, the action taken, and the assessment of any re-analysis. An example control chart showing the analytical results for one certified standard is shown in Figure 11-1.

**Figure 11-1: Certified Standard CM-1
2008 Tracking Performance – Copper**




Source: B2Gold, 2008.

Upon review of the assay results from both laboratories, copper values were determined to be acceptable for all but one of the batches. Only the first work order sent to AcmeLabs in Vancouver returned standards that failed the maximum limits for copper, requiring re-analysis due to errors in instrument calibration.

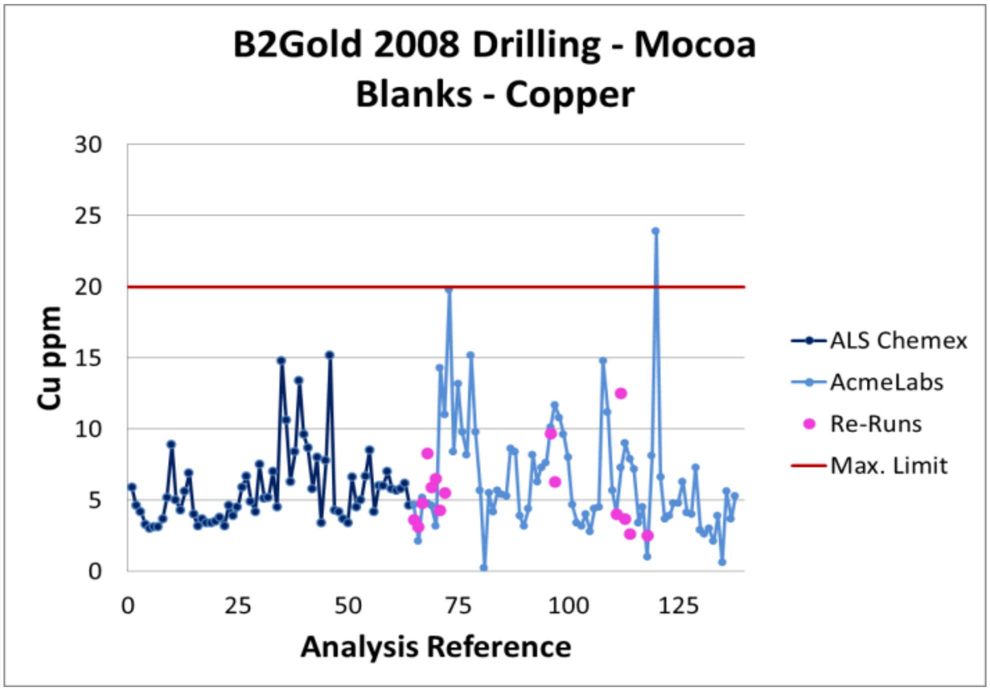
The standard reference material analyzed at ALS Chemex returned no standard limit failures for molybdenum; however, two of the work orders submitted to AcmeLabs required re-analysis. These batch failures were primarily due to a bias at the laboratory, which was indicated by two or more standards falling outside the ±2 standard deviation limits.

#### *11.2.3.2 Blank Material*

Blank material used to monitor contamination and sample mix-ups in the laboratory was obtained from a sandstone quarry located a few miles north of Bogota. Two blank samples were inserted into the sample stream at the beginning of each sample batch, as well as one blank sample every 25 samples. The 138 blank samples submitted to the laboratories were prepared and analyzed in the same manner as the submitted drill core samples.

Based on a maximum limit of 20 ppm for copper and 10 ppm for molybdenum, which are approximately five times the normal background values for the blanks, the results indicated that contamination levels were low. An example is shown in Figure 11-2.

**Figure 11-2: Blank Performance – Copper**
**2008 B2Gold Drilling**




Source: B2Gold, 2008.

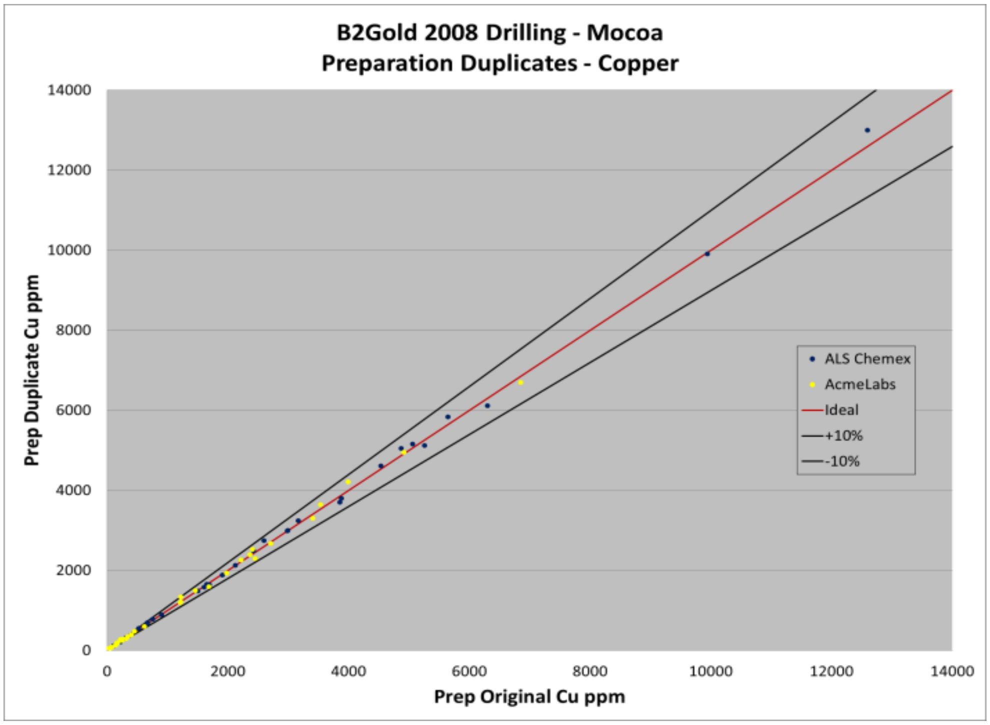
#### *11.2.3.3 Duplicate Samples*

Field duplicates of one-quarter core were sampled every 40 samples for a total of 65 field duplicate samples submitted to the laboratories. Preparation duplicates obtained from a split of the samples after crushing at the laboratories were also taken every 30 to 40 samples for a total of 65 preparation duplicates. ALS Chemex reported results for 34 pulp duplicates, and AcmeLabs provided results for 43 pulp duplicates.

The field duplicate results obtained for copper were predominantly within ±20% of the field original sample values, indicating a high degree of reproducibility. The preparation and pulp duplicate values for copper were predominantly within ±10% and ±5% of the corresponding sample values, respectively; this indicates that adequate precision levels were attained by maintaining proper sample handling procedures during the crushing and pulverizing stages of preparation (Figure 11-3).

The molybdenum duplicate sample results showed greater variation than copper. One possible explanation for this behaviour is that molybdenum occurs in veinlets associated with structures, allowing for a greater “nugget” effect. In comparison, copper is generally disseminated throughout the rock, which results in a more homogeneous distribution of the sampled mineral.

**Figure 11-3: Preparation Duplicates – Copper
2008 B2Gold Drilling**




Source: B2Gold 2008.

## 11.3 B2Gold (2012)

### 11.3.1 Core Handling and Storage

The same procedures were used in the 2008 and 2012 B2Gold drill programs.

A diamond core saw was used to cut the drill core along its length, and one half of the core was sampled at the intervals assigned by the geologist. The selected half-core (unbiased) was collected in bags which were then sealed and shipped by secure transport directly to the laboratories in Medellín. The samples were reviewed and inventoried upon arrival at the lab, and the laboratory reported any discrepancies to B2Gold.The remaining half-core was returned to the core box as a permanent record and is now being stored at a facility in Medellín.

Magnetic susceptibility measurements were determined for 549 samples.

### 11.3.2 Sample Preparation and Analytical Procedures

#### *11.3.2.1 Acme Analytical Laboratories Preparation Facility, Medellín*

In 2012, B2Gold submitted 624 drill core and quality control samples to the AcmeLabs preparation laboratory in Medellín.

AcmeLabs uses a sophisticated LIMS (Laboratory Information Management System) to track the flow of every sample through each stage of sample handling and analysis.

Samples at the AcmeLabs preparation laboratory were placed on aluminum pans lined with heavy brown paper then placed on drying trolleys which were inserted in a gas-fired heated cabinet to be dried at 60°C. The crushing, which reduced the particle size to 80% passing 2 mm using a TM Terminator crushing system, was followed by a second stage where a 1,000 g split was taken from the crushed samples using a stainless-steel riffle splitter, followed by pulverization to 85% passing 75 µm with an LM-2 pulverizer. The pulverized material was divided into two fractions: 850 g of fine rejects and 150 g for analysis in Vancouver, British Columbia, Canada.

At the start of each work order and after every 10 samples, the laboratory cleaned both the crusher and pulverizer using quartz rock. Preparation duplicates were taken every 40 samples, and crusher- and pulp-size checks were conducted at the same frequency. Certified standards, as well as pulp duplicates, were also used to control quality.

#### *11.3.2.2 Acme Analytical Laboratories, Vancouver*

The samples prepared at the AcmeLabs laboratory in Medellín were shipped to Vancouver, and analyzed for copper, molybdenum and multi-elements using AcmeLabs analysis code Group 7TX. AcmeLabs analyzed 41 elements using a four-acid digestion and a combination of ICP-MS and ICP-ES.

Oven batch size was 40 samples; 33 were client submitted. AcmeLabs included two standards, one analytical blank, one pulp duplicate, one reject duplicate and two preparation blanks for internal quality control.

AcmeLabs in Vancouver is registered with the quality management system ISO 9001.

### 11.3.3 Quality Assurance/Quality Control (QA/QC)

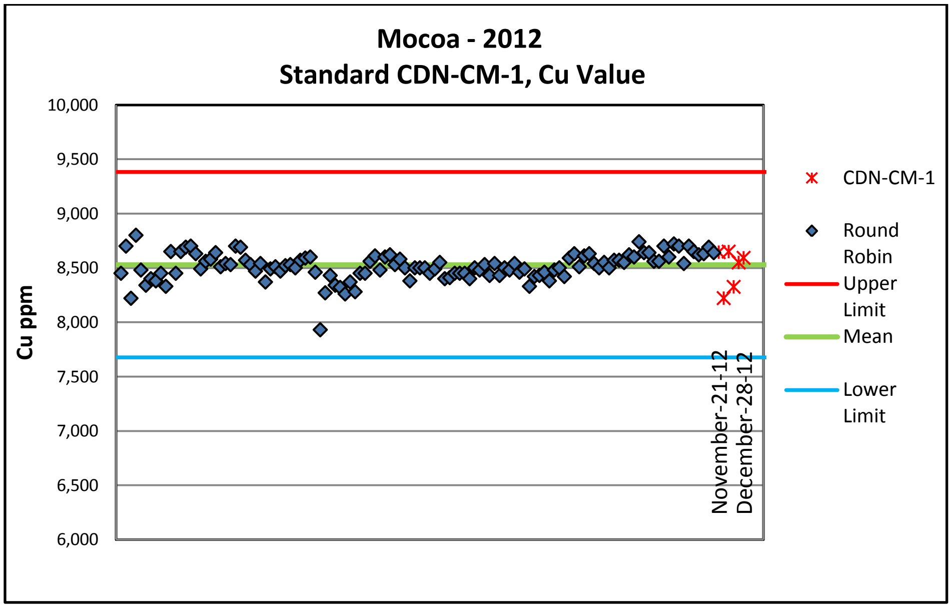
B2Gold's QA/QC protocol is designed to suit the specific lab batch size. At AcmeLabs, 33 of the 40 samples in a batch were submitted by the client, and the remaining samples were internal laboratory quality control samples. B2Gold's insertions included: one sample of blank material inserted at the beginning of each batch, a standard inserted every 33 samples, and both a field and a preparation duplicate taken every 35 samples. These quality control samples were selected and inserted into the sample stream as part of the sampling process prior to submission at the laboratory.

#### *11.3.3.1 Standard Reference Material*

Three certified standards prepared by CDN Resource Laboratories were used by B2Gold during the 2012 Mocoa drill program. The certified, accepted values for these reference materials were 8,530 ppm Cu, 10,130 ppm Cu, and 3,160 ppm Cu, and 760 ppm Mo, 290 ppm Mo, and 300 ppm Mo, respectively. B2Gold selected maximum acceptance limits of ±10% of the recommended values for copper.

B2Gold protocol required one certified standard to be inserted into the sample stream every 33 samples for a total of 18 standards submitted to AcmeLabs. B2Gold tracked the accuracy and precision of each laboratory batch and recorded the laboratory batch quality control in a “Table of Failures”, which summarized the type of failure, the reason for failure, the action taken, and the assessment of any re-analysis. An example control chart is shown in Figure 11-4.

**Figure 11-4: Certified Standard CM-1**
**2012 Tracking Performance – Copper**




Source: B2Gold, 2012.

AcmeLabs processed 18 standards: one standard within one work order failed either accuracy or precision tests based on molybdenum value (6% failure rate). The failed batch was re-analyzed and QA/QC-cleared results for the re-analysis were updated in the master Mocoa database. The batch failure was due to a bias at the laboratory.

Upon review of the assay result from the laboratory, copper values were determined to be acceptable for all batches.

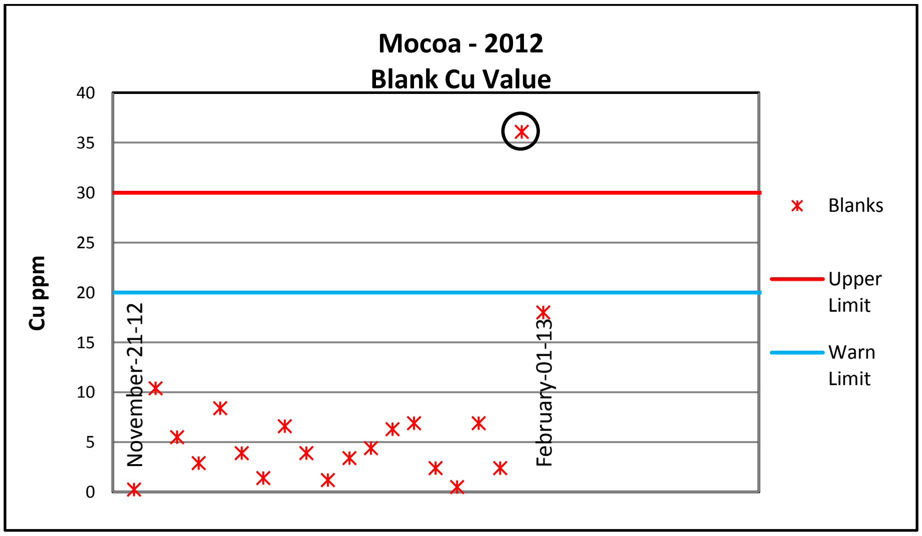
#### *11.3.3.2 Blank Material*

Coarse blank material used to monitor contamination and sample mix-ups in the laboratory was obtained from a quartz quarry located a few miles from Medellín. A blank sample was inserted into the batch every 25 samples. The 19 blank samples submitted to the laboratory were prepared and analyzed in the same manner as the submitted drill core samples.

Based on a maximum limit of 6 ppm for copper and 2 ppm for molybdenum, which are approximately three times the normal background values for the blanks, the results indicated that contamination levels were low. An example is shown in Figure 11-5.

AcmeLabs processed 19 blanks: only one in one work order failed either accuracy or precision tests based on the copper value (5% failure rate). The failed batch was re-analyzed and QA/QC-cleared results for the re-analysis were updated in the master Mocoa database. However, values elevated above the normal background value indicate that additional cleaning of the crushing and pulverizing equipment is required.

**Figure 11-5: Blank Performance – Copper**
**2012 B2Gold Drilling**




Source: B2Gold, 2012.

#### *11.3.3.3 Duplicate Samples*

Field duplicates of one-quarter core were sampled every 33 samples for a total of 20 field duplicate samples submitted to the laboratories. Preparation duplicates obtained from a split of the samples after crushing at the laboratory were also taken every 33 samples for a total of 18 preparation duplicates. AcmeLabs reported results for 38 pulp duplicates.

The field duplicate results obtained for copper were predominantly within ±22% of the field original sample values, indicating a reasonable degree of reproducibility. The preparation and lab duplicate values for copper were predominantly within ±13% and ±2% of the corresponding sample values, respectively; this indicates that adequate precision levels were attained by maintaining proper sample handling procedures during the crushing and pulverizing stages of preparation.

The molybdenum results for duplicate samples showed relatively low reproducibility for field duplicates, but preparation and fine duplicates had acceptable reproducibility.

## 11.4 Assessment of Sample Preparation, Security and Analytical Procedures

In October 2008, at the request of B2Gold, Smee and Associates Consulting Ltd. audited three of the four laboratories used by B2Gold for sample preparation and analysis, as well as an assessment of B2Gold's QA/QC protocols. The report accompanying the laboratory audit stated that B2Gold's quality control program met or exceeded the NI 43-101 requirements.

The authors conclude that procedures followed by B2Gold during its 2008 and 2012 Mocoa drill programs met or exceeded the industry standards for collection, handling and transportation of drill core samples. B2Gold used industry-recognized laboratories that used best practice sample preparation and analytical methods, as well as acceptable internal quality control practices.

# 12 DATA VERIFICATION

## 12.1 1978–1983 Drill Database

### 12.1.1 Compiling Older Data Files

Drill data for the 1978 to 1983 drill programs was initially provided to B2Gold by AGA in a series of comma-separated-value (CSV) and Datamine® files. Data included collar locations, down-hole surveys, lithology, alteration, and assays for molybdenum and copper. B2Gold conducted a comprehensive validation program on the database, including a comparison of all digital data received from AGA with all available hard copy data from the UN-INGEOMINAS drill program.

Comparing the digital data against the UN-INGEOMINAS drill logs and assay data presented in the 1984 UN-INGEOMINAS Report provided an acceptable level of confidence in the accuracy of the database. Blocks of assay data were missing in both preliminary feasibility reports. However, by combining the data from the two reports, an almost complete dataset for the 31 drill holes was achieved, including 11,702 assay results for 11,857 intervals, which represents 98.7% of all sample intervals.

### 12.1.2 Check Analysis

The UN-INGEOMINAS Joint Venture reported results for check analysis by Bondar-Clegg for approximately 23% of the drill core samples. In general, the 2,734 Bondar-Clegg check assays correlate well with the original INGEOMINAS assays, with a slight bias towards higher values from Bondar-Clegg.

In 2008, B2Gold obtained splits of 121 coarse reject samples pertaining to 21 drill holes of the 1978–1983 UN-INGEOMINAS drill campaign. ALS Chemex performed check analysis on these samples, and the results correlate well with the original UN-INGEOMINAS assays. Additional check assays further confirmed the reproducibility of the original assay results, as well as an absence of bias between the testing laboratories.

In early 2013, one batch of 59 umpire pulp samples were shipped to SGS Labs in Medellín, Colombia for multi-acid digestion and combined ICP-ES and ICP-MS analysis. Check assay results were available for the 59 samples, representing 9.46% of the 624 samples analyzed between November 2012 and December 2012.

The initial check assay batch failed QA/QC. Results of the subsequent, failed rerun batch compared well with the original results, and the original results were accepted.

### 12.1.3 Drill Hole Collar Survey

In 2008, B2Gold contracted a surveyor, Juan Carlos Borbon Caceres, to reconstruct the topography covering the main ridge where the 1978–1983 Mocoa drill holes were located. These historical drill holes were surveyed, excluding hole M14 which could not be located.

For drill hole M14, B2Gold has retained the original documented coordinates transformed into WGS84, Zone 18N.

## 12.2 2008–2012 B2Gold Database

### 12.2.1 General Database Verification

The master Mocoa drill database was compiled and vetted by B2Gold staff and was stored in MS Access® format. The 2008 and 2012 drill data were entered into the database from the original paper logs, and any errors or missing information noticed during the initial checks were immediately corrected.

The UN-INGEOMINAS drill information was also incorporated into the database using the format established for B2Gold drilling. This format meant that some of the lithology and alteration codes were manipulated to increase their functionality with the application software.

Scans of the original drill logs and geotechnical logs from the 2008 and 2012 drilling confirm the validity of the geological data presented in the master Mocoa drill database. Digital replicates of the drill logs from both the INGEOMINAS and B2Gold phases of drilling are also available in portable document format (PDF).

Digital photographs were taken of all 2008 and 2012 Mocoa drill core, both wet and dry. The photographs were reviewed to ensure photo quality, completeness, and correct hole information before the core was cut.

### 12.2.2 Check Analysis

Assay certificates from AcmeLabs, ALS Chemex and SGS Labs are available for review in PDF. Approximately 10% of the samples analyzed at ALS Chemex were sent to AcmeLabs for check analysis, and vice versa. A total of 271 pulps, nine standards and eight blanks were rechecked in the 2008 drill program, and 59 pulps were rechecked in the 2012 drill program.

The check-analysis copper results correlate well between the two laboratories. The check-analysis molybdenum results indicate that AcmeLabs' results were generally lower than ALS Chemex.

### 12.2.3 Drill Hole Validation (Twin Holes)

In 2008, B2Gold drilled two twins of historical holes, two infill holes and five expansion holes. These drill holes provided a good validation of the lithology and assay values reported in the 1978–1983 UN-INGEOMINAS drill programs.

A comparison of the twin holes shows general agreement in the copper and molybdenum values. Differences are attributed to sample preparation and assay technique differences between the programs.

## 12.3 Recent Database Validation

Following the completion of the mineral resource model, the copper and molybdenum grades, from a series of seven randomly selected drill holes in the sample database, were manually compared to the values listed in certified assay certificates provided by the lab. Note that assay certificates are only available for the holes drilled by B2Gold in 2008 and 2012, and there are no certificates from the earlier drilling completed by UN-INGEOMINAS between 1978 and 1983. Although these seven holes represent about 16% of the total database, comparisons could only be performed on recent drill holes. There were no errors identified.

## 12.4 Verification Conclusions

Visual and statistical comparisons show that the drilling results achieved between 1979 and 1983 compare well with the more recent (and validated) drilling results from 2008 and 2012. The authors conclude that the drill program results are consistent and of sufficient quality and reliability to support the estimation of Inferred resources.

# 13 MINERAL PROCESSING AND METALLURGICAL TESTING

Metallurgical testwork was conducted by the UN-INGEOMINAS Joint Venture in 1981 (UN-INGEOMINAS, 1984), and the results of this work were summarized by von Guttenberg (2008). Four drill core composites, representing different rock and ore types, and a bulk composite of all these samples were processed at Dawson Metallurgical Laboratories in Murray, Utah. Standard grinding and flotation tests were completed. A bulk copper-molybdenum flotation concentrate was processed to produce copper and molybdenum concentrate. The copper concentrate is 24.2% Cu with a recovery of 85.9%, and the molybdenum concentrate is 55.14% Mo with a recovery of 82.7%. Both concentrates are clean with no deleterious elements. Further metallurgical testing was recommended to improve recoveries for some of the different ore types.

# 14 MINERAL RESOURCES

## 14.1 Introduction

This section describes the approach taken to generate an estimate of mineral resources for the Mocoa copper-molybdenum deposit located in the Department of Putumayo in southwestern Colombia, 10 km north of the regional capital of Mocoa. The resource estimate is based on a database provided by B2Gold Corp. (B2Gold) and files dated June 20, 2014. These files contain all of the current drilling information available for the Mocoa Project.

This mineral resource estimate was prepared under the direction of Robert Sim, P.Geo, SIM Geological Inc., with the assistance of Bruce Davis, FAusIMM, BD Resource Consulting, Inc. Based on education, work experience relevant to this style of mineralization and deposit type, and membership in a recognized professional organization, both Sim and Davis are independent Qualified Persons (QPs) within the requirements of National Instrument 43-101 (NI 43-101) for the purpose of the mineral resource estimate contained in this report.

The mineral resource has been estimated in conformity with generally accepted guidelines outlined in CIM *Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines* (November, 2003) and is reported in accordance with the Canadian Securities Administrators' (CSA) National Instrument 43-101 (NI 43-101). Mineral resources are not mineral reserves, and they do not have demonstrated economic viability.

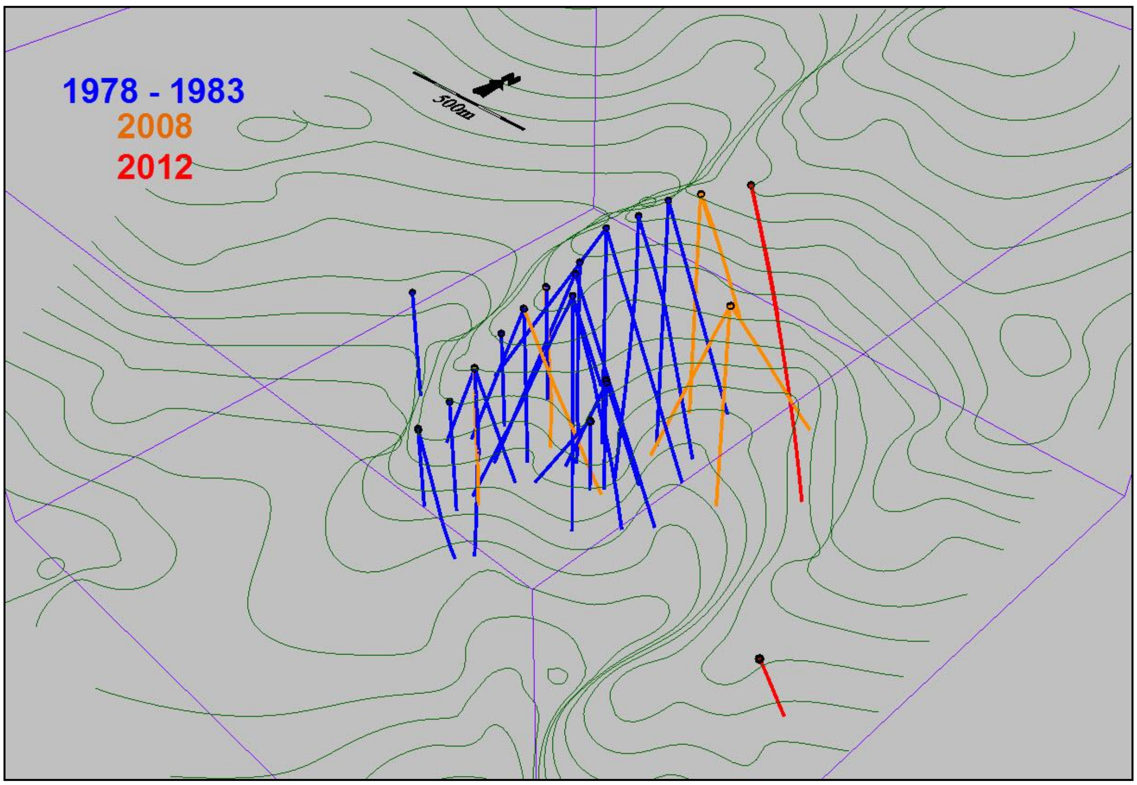
Estimations are made from 3D block models based on geostatistical applications using commercial mine planning software (MineSight® v11.50). The project limits are based on the UTM coordinate system (WGS84). The nominal block size in the model is 10×10×5 m. Sample data are derived from a series of diamond drill holes collared from setups on surface.

The resource estimate has been generated from drill hole sample assay results and the interpretation of a grade probability shell domain which relates to the spatial distribution of copper and molybdenum in the deposit. Interpolation characteristics were defined based on the geology, drill hole spacing, and geostatistical analysis of the data. The resources were classified according to their proximity to sample data locations and were reported, as required by NI 43-101, according to the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May, 2014).

## 14.2 Available Data

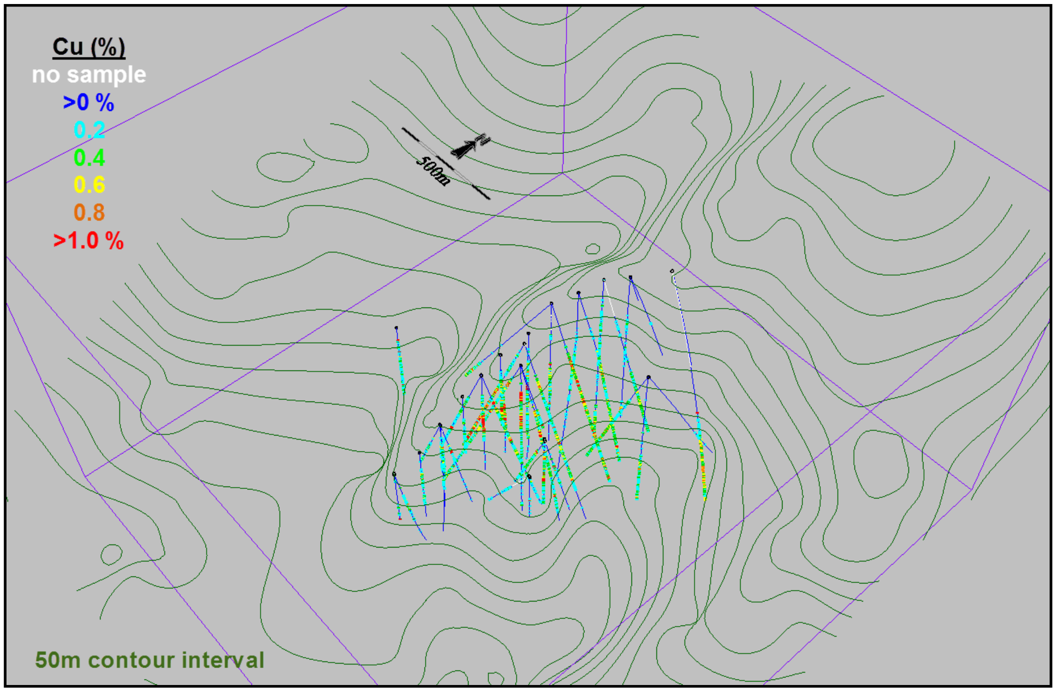
A data room has been set up for this project. It contains numerous miscellaneous reports, including a 2008 Technical Report by Strathcona Mineral Services Ltd. (no resource estimate included). For this study, Sim and Davis used the sampling data collected from 43 drill holes. The data represents 25,199 m of drilling on the property. Thirty-one of these holes were drilled between 1978 and 1983, nine holes were drilled in 2008, and the remaining three holes were drilled in 2012. One of the 2012 holes, located on the northeastern end of the deposit, was abandoned and restarted. Visual comparisons of the two vintages of drilling indicate that there is no apparent bias in the results. Results include two sets of twinned holes that returned very similar copper and molybdenum grades. The distribution of drilling by year is shown in Figure 14-1. The distributions of copper and molybdenum grades in drilling are shown in Figures 14-2 and 14-3.

**Figure 14-1: Isometric View of Drilling by Year**



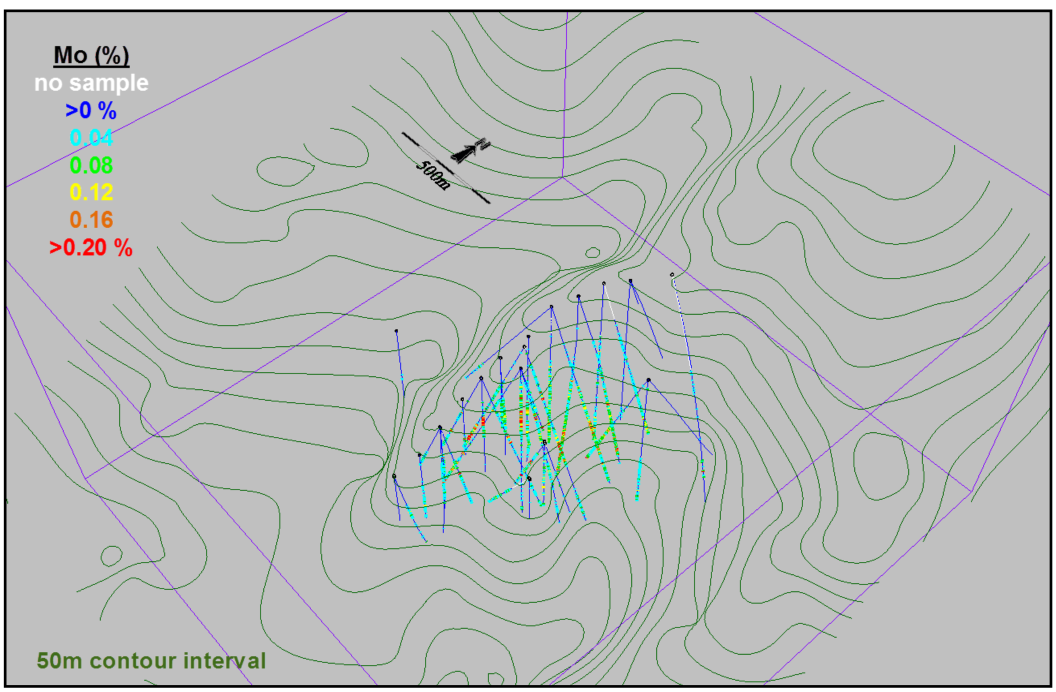

Source: Sim Geological, 2016.

**Figure 14-2: Isometric View Looking Northwest of Copper Grades in Drilling**




Source: Sim Geological, 2016.

**Figure 14-3: Isometric View Looking Northwest of Molybdenum Grades in Drilling**




Source: Sim Geological, 2016.

A 3D surface topography was not provided in the data room, so, as an alternative, a topographic surface was generated using the drill hole collar points and a series of 3D point locations obtained from proximal rock, soil and stream sediment samples. This 3D surface was sliced at 50 m increments to show the contour lines in Figures 14-1, 14-2 and 14-3. A series of aerial photos provided in the data room (taken from a helicopter) show the extreme nature of the property's topography, and this 3D surface appears to appropriately reflect this surface.

The surface topography is extremely rugged in this highly eroded environment, and it appears there are relatively few flat areas to place a drill rig. Drill holes are collared from surface with the majority of setups located along a narrow ridge above the deposit. Generally, holes are spaced on 100 m sections oriented at an azimuth of 80°. Each setup typically hosts three drill holes: one vertical, one at -70° to the east (Az 080°) and one to the west (Az 260°). This results in a distribution of holes that are roughly spaced at 150 m to 200 m intervals.

The current drilling covers an area measuring roughly 1.4 km north-south by 1.2 km east-west to depths up to 1,000 m below surface. Based on current results, mineralization remains open to the west, east and north.

Samples collected from drill holes completed in 2008 and 2012 were analyzed using a multi-element (40 elements) package. Samples collected from drilling conducted in the 1980s were only analyzed for copper and molybdenum content. Copper and molybdenum grades were extracted from the main database for use in this resource estimate. Note that the original copper and molybdenum assay data were provided in parts per million (ppm), and these have been converted to percentage units (% = ppm/10,000). Some drilled intervals have not been sampled and analyzed for copper and molybdenum. These are relatively rare and appear to represent abandoned drill holes. No modifications were made to the database to account for these unsampled intervals.

There is a total of 14,831 individual samples in the assay database that were used to generate this mineral resource estimate. Individual sample intervals range from 0.32 m to 10 m long, with an average of 1.62 m long (58% of the sample intervals are exactly 1.5 m long, 19% are 1.6 m long and 20% of samples are 2 m long). A basic statistical summary of the assay sample database is shown in Table 14.1.

Geological information derived from core logging shows the lithology type, alteration assemblage, presence of stockworks, and intensity of oxidation. These data were formatted and imported into MineSight®.

**Table 14.1: Statistical Summary of Sample Assay Data**

| Element | Number of Samples | Total Length (m) | Min | Max | Mean[1] | Standard Deviation | Coefficient of Variation |
|---|---|---|---|---|---|---|---|
| Copper (%) | 14,831 | 24,027 | 0 | 8.49 | 0.22 | 0.297 | 1.35 |
| Molybdenum (%) | 14,817 | 24,005 | 0 | 1.300 | 0.028 | 0.046 | 1.65 |

[1] Statistics are weighted by sample length.

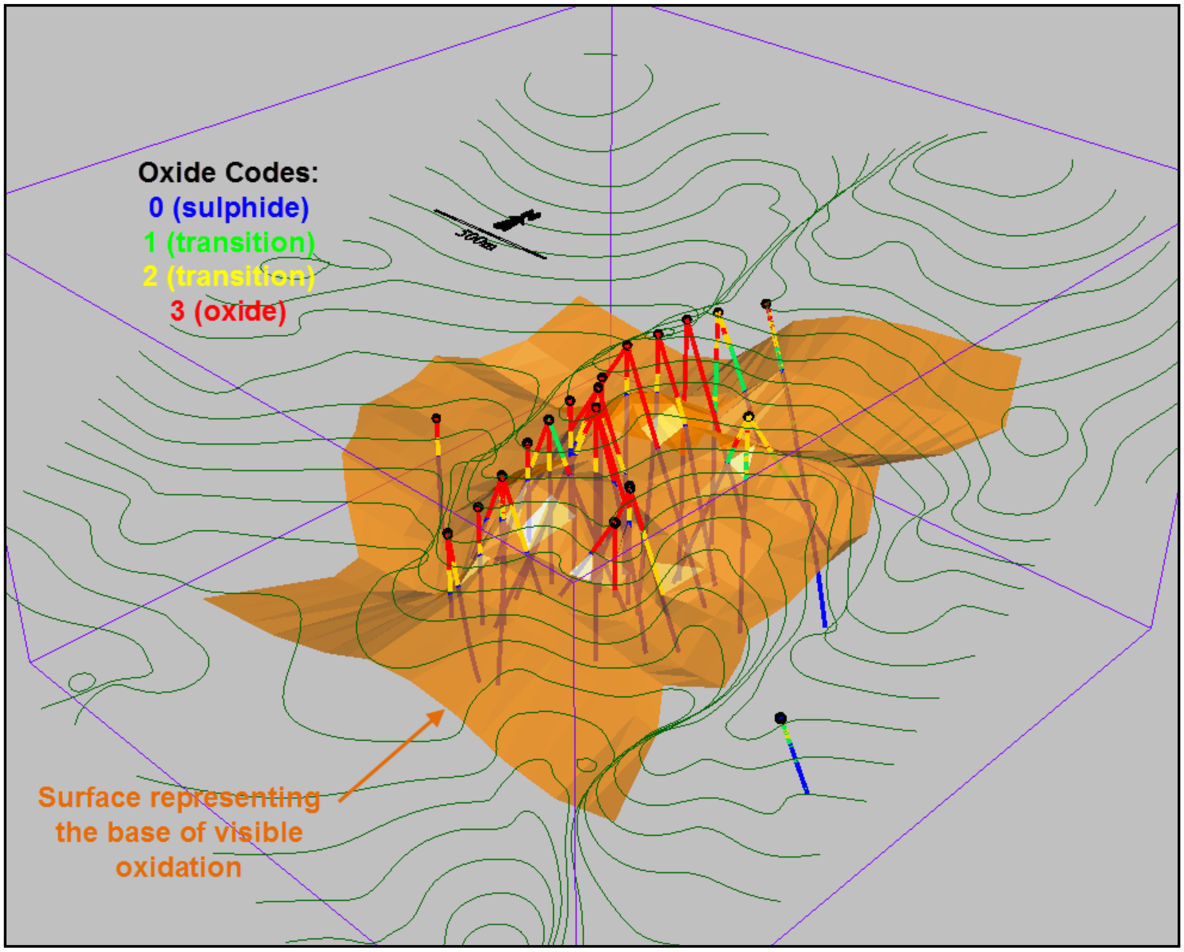
Drill core recoveries are only available for holes drilled in 2008 and 2012, and they average 95% recovery. There is no apparent correlation between recovery and sample grade.

## 14.3 Geologic Model, Domains and Coding

Mocoa is interpreted to be a porphyry-type deposit with copper and molybdenum mineralization resulting from the intrusion of dacite porphyritic rocks into an intermediate to mafic volcanic host. There are no interpreted wireframe domains representing the distribution of lithology, alteration or other geologic features. This information is derived for analysis directly from the information recorded during drill core logging.

A surface representing the base of visible oxidation (Figure 14-4) has been interpreted using the oxide code data. Above this surface, rocks exhibit oxide and transitional (partial oxidation) features. Below the surface, there is no evidence of oxidation (primary sulphides).

**Figure 14-4: Isometric View of Surface representing the Base of Visible Oxidation**

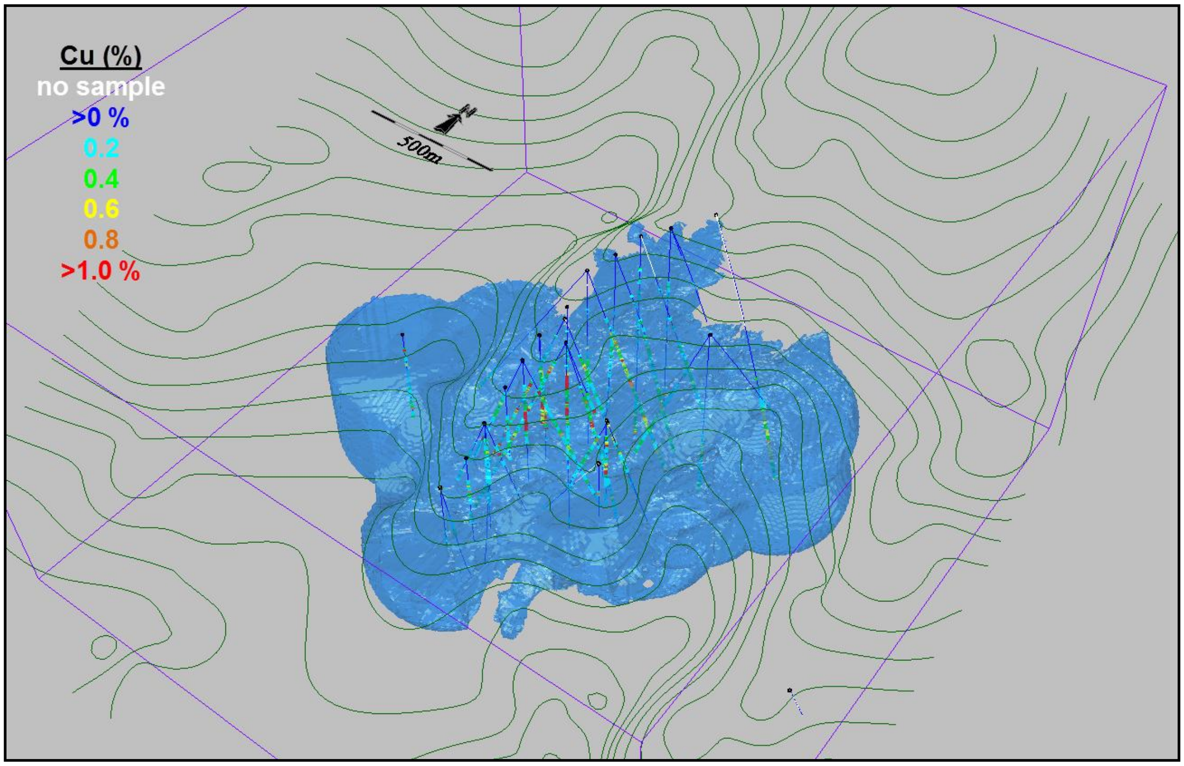



Source: Sim Geological, 2016.

In the absence of a geologic model, a probability shell approach was used in an attempt to produce a domain that segregates mineralized from unmineralized rocks. The shell is based on the distribution of copper because it is the main contributor to the economic value of the deposit. Note that molybdenum tends to occur in the same general areas as copper. A grade threshold of 0.1% Cu has been selected to build this domain. Indicator values were assigned to composited drill hole samples based on the copper grade; an indicator value of "0" was assigned to sample intervals <0.1% Cu, and an indicator value of "1" was assigned to sample intervals >0.1% Cu.

A variogram is produced using these indicator variables, and probability estimates are made into model blocks using ordinary kriging. A probability shell was produced that encompasses areas where there is a >50% chance that the grade will exceed 0.1% Cu. The shape and extent of the probability shell domain is shown in Figure 14-5. Note that the limits of the deposit have not been found with the current drilling, and mineralization remains “open” to the west, east, and northeast and at depth. The probability shell has been limited to a maximum distance of 250 m from a drill hole in these areas.

**Figure 14-5: Isometric View of 0.1% Cu Probability Shell Domain**




Source: Sim Geological, 2016.

## 14.4 Compositing

Compositing of drill hole samples is carried out to standardize the database for further statistical evaluation. This step eliminates any effects related to the sample length that may exist in the data.

To retain the original characteristics of the underlying data, a composite length is selected which reasonably reflects the average original sample length. The generation of longer composites results in some degree of smoothing which could mask certain features of the data. Sample intervals are relatively consistent in the database: over the whole database, samples average 1.6 m long with the majority of samples measuring exactly 1.5 m long. As a result, a standard composite length of 1.5 m has been applied to the sample data.

Drill hole composites are length-weighted and have been generated *down-the-hole*; this means that composites begin at the top of each hole and are generated at 1.5 m intervals down the length of the hole. Several holes were randomly selected, and the composited values were checked for accuracy. No errors were found.

## 14.5 Exploratory Data Analysis

Exploratory data analysis (EDA) involves the statistical summarization of the database to better understand the characteristics of the data that may control grade. One of the main purposes of this exercise is to determine if there is any evidence of spatial distinctions in grade which may require the separation and isolation of domains during interpolation. The application of separate domains prevents unwanted mixing of data during grade interpolation so that the resulting grade model will better reflect the unique properties of the deposit. However, applying domain boundaries in areas where the data are not statistically unique may impose a bias in the distribution of grades in the model.

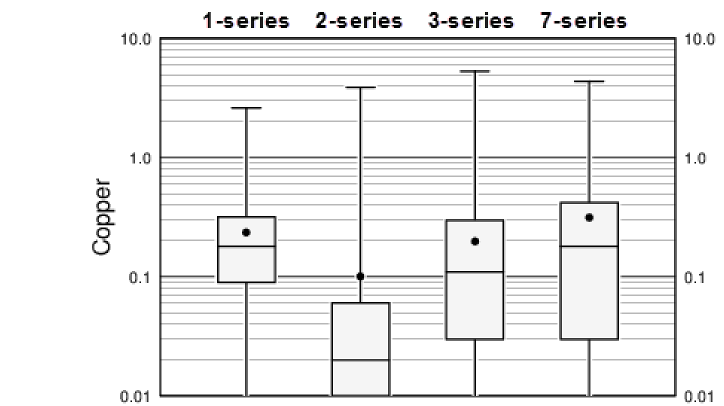
A domain boundary, which segregates the data during interpolation, is typically applied if the average grade in one domain is significantly different from that of another domain. A boundary may also be applied where there is evidence that a significant change in the grade distribution exists across a geologic contact.

### 14.5.1 Basic Statistics by Domain

Basic statistics for the distributions of each element were generated by lithology, alteration, stockwork and the intensity of oxidation.

The distributions of copper and molybdenum in the four main lithologic units are shown in boxplots in Figures 14-6 and 14-7. There is no supporting information explaining the various lithology codes in the geology database (lithology codes are typically defined as 1, 1a, 1b, 2, 2a, 2b, etc.). The majority of these are 1-, 2-, 3- and 7-series designations. Grades are lower in the 2-series rocks, which appear to represent the oxidized rocks close to surface. This is not really a lithologic type but rather a degree of oxidation that overprints the original stratigraphy. The copper and molybdenum grades are similar across the other remaining lithologic types indicating that grade is not dependent on rock type.

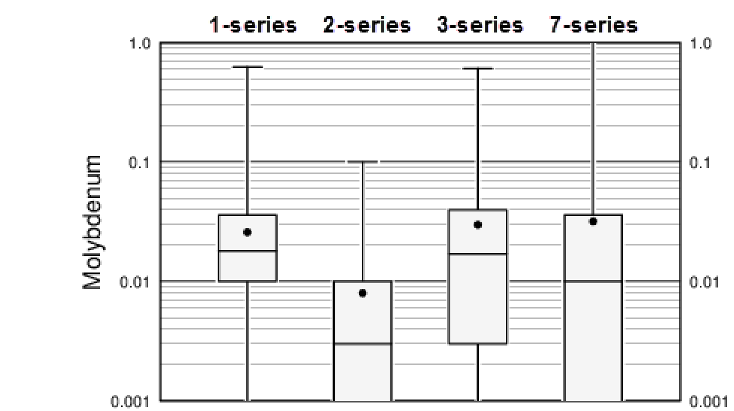
### Figure 14-6: Boxplot of Copper by Lithology Type




| | 1-series | 2-series | 3-series | 7-series |
|---|---|---|---|---|
| Number of data | 3692 | 1006 | 8395 | 2819 |
| Mean | 0.235 | 0.101 | 0.198 | 0.316 |
| Variance | 0.045 | 0.052 | 0.061 | 0.175 |
| Skewness | 2.572 | 7.065 | 4.669 | 2.717 |
| Coef of Variation | 0.897 | 2.264 | 1.243 | 1.323 |
| Maximum | 2.62 | 3.91 | 5.33 | 4.4 |
| Upper quartile | 0.32 | 0.06 | 0.3 | 0.42 |
| Median | 0.18 | 0.02 | 0.11 | 0.18 |
| Lower quartile | 0.09 | 0.01 | 0.03 | 0.03 |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 |

Source: Sim Geological, 2016.

### Figure 14-7: Boxplot of Molybdenum by Lithology Type

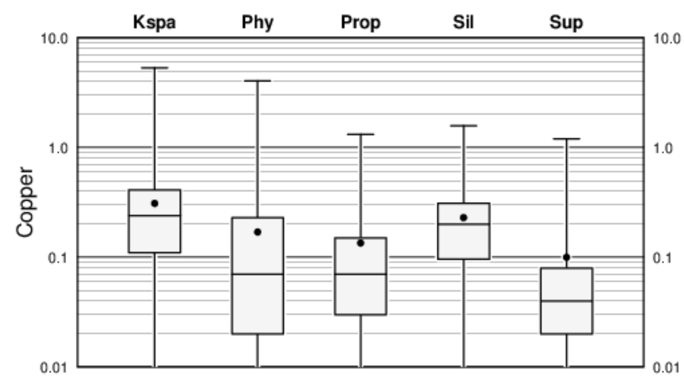



| | 1-series | 2-series | 3-series | 7-series |
|---|---|---|---|---|
| Number of data | 3692 | 1006 | 8395 | 2819 |
| Mean | 0.026 | 0.008 | 0.03 | 0.032 |
| Variance | 0.001 | 0.0 | 0.002 | 0.004 |
| Skewness | 5.095 | 2.889 | 3.192 | 7.599 |
| Coef of Variation | 1.207 | 1.469 | 1.336 | 2.07 |
| Maximum | 0.625 | 0.1 | 0.607 | 1.247 |
| Upper quartile | 0.036 | 0.01 | 0.04 | 0.036 |
| Median | 0.018 | 0.003 | 0.017 | 0.01 |
| Lower quartile | 0.01 | 0.0 | 0.003 | 0.0 |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 |

Source: Sim Geological, 2016.

The distributions of copper and molybdenum by alteration assemblage are shown in Figures 14-8 and 14-9. Copper is present in all alteration types, but slightly higher average copper grades occur in rocks containing potassium feldspar (Kspa) or silica (Sil) and lower copper grades occur in rocks designated as “Sup”. Note: the term “Sup” is not explained in the database. It may represent “supergene”, but the grade distribution does not show this assemblage to be enriched in copper. Molybdenum grades are lower in propylitic (Prop) rocks that tend to occur around the perimeter of the deposit. The distribution of alteration types is quite variable, and these results suggest that the grade is not dependent on these variables.

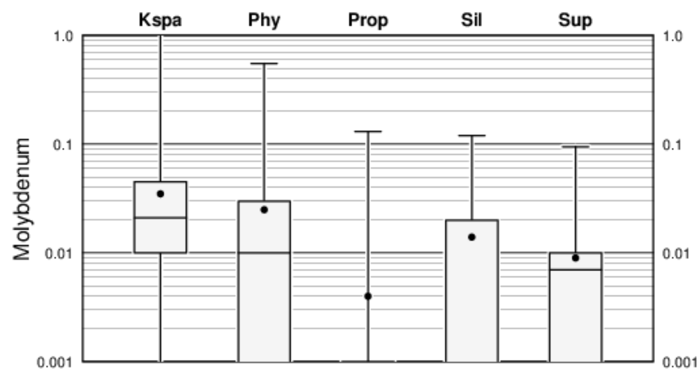
**Figure 14-8: Boxplot of Copper by Alteration Type**




| | Kspa | Phy | Prop | Sil | Sup | |
|---|---|---|---|---|---|---|
| Number of data | 5914 | 8621 | 372 | 477 | 393 | Number of data |
| Mean | 0.31 | 0.17 | 0.135 | 0.23 | 0.1 | Mean |
| Variance | 0.102 | 0.062 | 0.035 | 0.044 | 0.028 | Variance |
| Skewness | 3.999 | 4.101 | 3.284 | 2.344 | 3.389 | Skewness |
| Coef of Variation | 1.03 | 1.465 | 1.38 | 0.915 | 1.68 | Coef of Variation |
| Maximum | 5.33 | 4.05 | 1.32 | 1.58 | 1.2 | Maximum |
| Upper quartile | 0.41 | 0.23 | 0.15 | 0.31 | 0.08 | Upper quartile |
| Median | 0.24 | 0.07 | 0.07 | 0.2 | 0.04 | Median |
| Lower quartile | 0.11 | 0.02 | 0.03 | 0.096 | 0.02 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

**Figure 14-9: Boxplot of Molybdenum by Alteration Type**

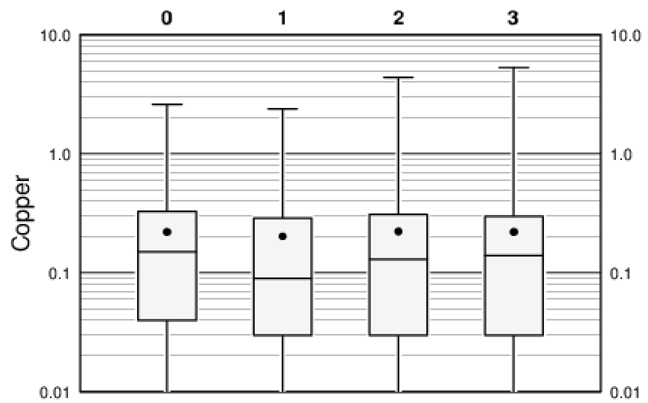



| | Kspa | Phy | Prop | Sil | Sup | |
|---|---|---|---|---|---|---|
| Number of data | 5914 | 8621 | 372 | 477 | 393 | Number of data |
| Mean | 0.035 | 0.025 | 0.004 | 0.014 | 0.009 | Mean |
| Variance | 0.003 | 0.002 | 0.0 | 0.001 | 0.0 | Variance |
| Skewness | 8.545 | 3.452 | 5.638 | 2.119 | 2.743 | Skewness |
| Coef of Variation | 1.457 | 1.56 | 3.016 | 1.785 | 1.41 | Coef of Variation |
| Maximum | 1.247 | 0.554 | 0.131 | 0.12 | 0.095 | Maximum |
| Upper quartile | 0.045 | 0.03 | 0.001 | 0.02 | 0.01 | Upper quartile |
| Median | 0.021 | 0.01 | 0.0 | 0.0 | 0.007 | Median |
| Lower quartile | 0.01 | 0.0 | 0.0 | 0.0 | 0.0 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

The distributions of copper and molybdenum by stockwork intensity are shown in Figures 14-10 and 14-11 Stockwork integer codes range from 0 to 3 and are assumed to represent the intensity of stockwork texture that is present in the rocks. The grades of copper and molybdenum are similar across all stockwork codes. Visual review shows a highly mixed and variable distribution of the four stockwork codes. It would be very difficult to interpret these codes into individual domains. The distribution of stockwork does not appear to control the distribution of mineralization at Mocoa.

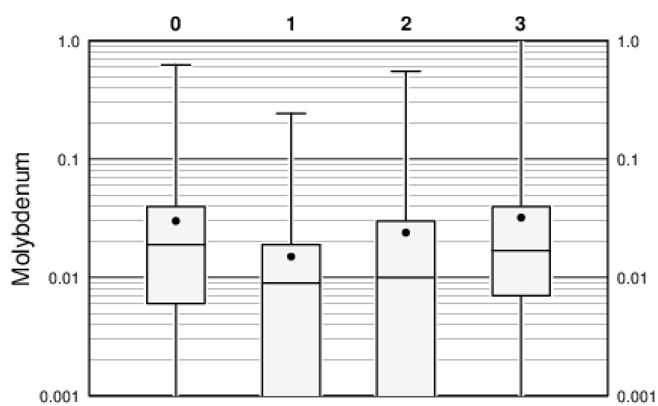
## Figure 14-10: Boxplot of Copper by Stockwork Code




| | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|
| Number of data | 4559 | 1071 | 4619 | 5823 | Number of data |
| Mean | 0.222 | 0.203 | 0.224 | 0.222 | Mean |
| Variance | 0.063 | 0.076 | 0.088 | 0.085 | Variance |
| Skewness | 3.006 | 2.671 | 4.006 | 4.555 | Skewness |
| Coef of Variation | 1.128 | 1.357 | 1.325 | 1.312 | Coef of Variation |
| Maximum | 2.62 | 2.39 | 4.4 | 5.33 | Maximum |
| Upper quartile | 0.33 | 0.29 | 0.31 | 0.3 | Upper quartile |
| Median | 0.15 | 0.09 | 0.13 | 0.14 | Median |
| Lower quartile | 0.04 | 0.03 | 0.03 | 0.03 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

## Figure 14-11: Boxplot of Molybdenum by Stockwork Code



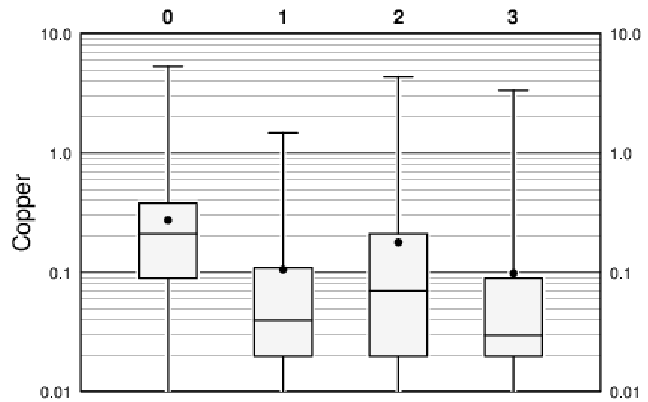

| | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|
| Number of data | 4559 | 1071 | 4619 | 5823 | Number of data |
| Mean | 0.03 | 0.015 | 0.024 | 0.032 | Mean |
| Variance | 0.002 | 0.001 | 0.001 | 0.003 | Variance |
| Skewness | 3.845 | 3.135 | 4.21 | 7.869 | Skewness |
| Coef of Variation | 1.331 | 1.648 | 1.516 | 1.625 | Coef of Variation |
| Maximum | 0.625 | 0.243 | 0.554 | 1.247 | Maximum |
| Upper quartile | 0.04 | 0.019 | 0.03 | 0.04 | Upper quartile |
| Median | 0.019 | 0.009 | 0.01 | 0.017 | Median |
| Lower quartile | 0.006 | 0.0 | 0.0 | 0.007 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

The distributions of copper and molybdenum by oxide code are shown in Figures 14-12 and 14-13. Oxide integer codes range from 0 to 3. The spatial distribution of these codes suggests that “0” represents a lack of oxidation (sulphide), “3” represents intense, near-surface oxidation, and codes 1 and 2 represent a transition between the two. Copper and molybdenum grades tend to be higher in the sulphide zone but similar through codes 1, 2 and 3. Visual review shows that there has been some near-surface leaching of metals, but there is no obvious supergene enrichment zone developed, and the oxide and transition zones, which are typically low-grade, also show local areas that are highly mineralized. The distribution of oxide codes is not distinct with respect to the distribution of copper and molybdenum in the deposit.

A plane representing the base of oxidation has been interpreted from this data (the plane represents the lower limit of oxide codes 1, 2 and 3). This surface is used to segregate the resources into “oxide” and “sulphide” types.

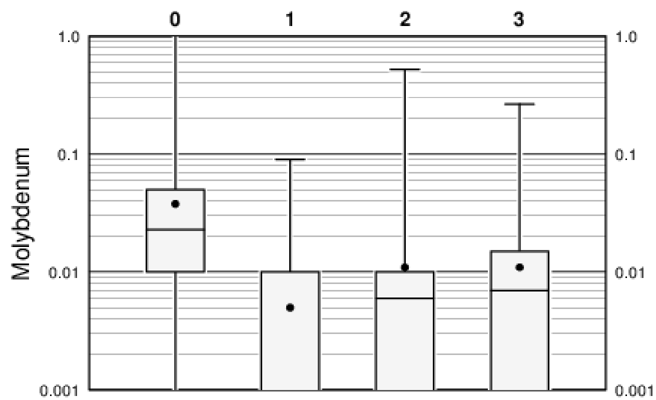
## Figure 14-12: Boxplot of Copper by Oxide Code




| | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|
| Number of data | 10438 | 605 | 1496 | 3531 | Number of data |
| Mean | 0.275 | 0.106 | 0.179 | 0.099 | Mean |
| Variance | 0.083 | 0.027 | 0.098 | 0.041 | Variance |
| Skewness | 3.628 | 3.522 | 5.574 | 6.336 | Skewness |
| Coef of Variation | 1.048 | 1.548 | 1.747 | 2.039 | Coef of Variation |
| Maximum | 5.33 | 1.48 | 4.4 | 3.36 | Maximum |
| Upper quartile | 0.38 | 0.11 | 0.21 | 0.09 | Upper quartile |
| Median | 0.21 | 0.04 | 0.07 | 0.03 | Median |
| Lower quartile | 0.09 | 0.02 | 0.02 | 0.02 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

## Figure 14-13: Boxplot of Molybdenum by Oxide Code

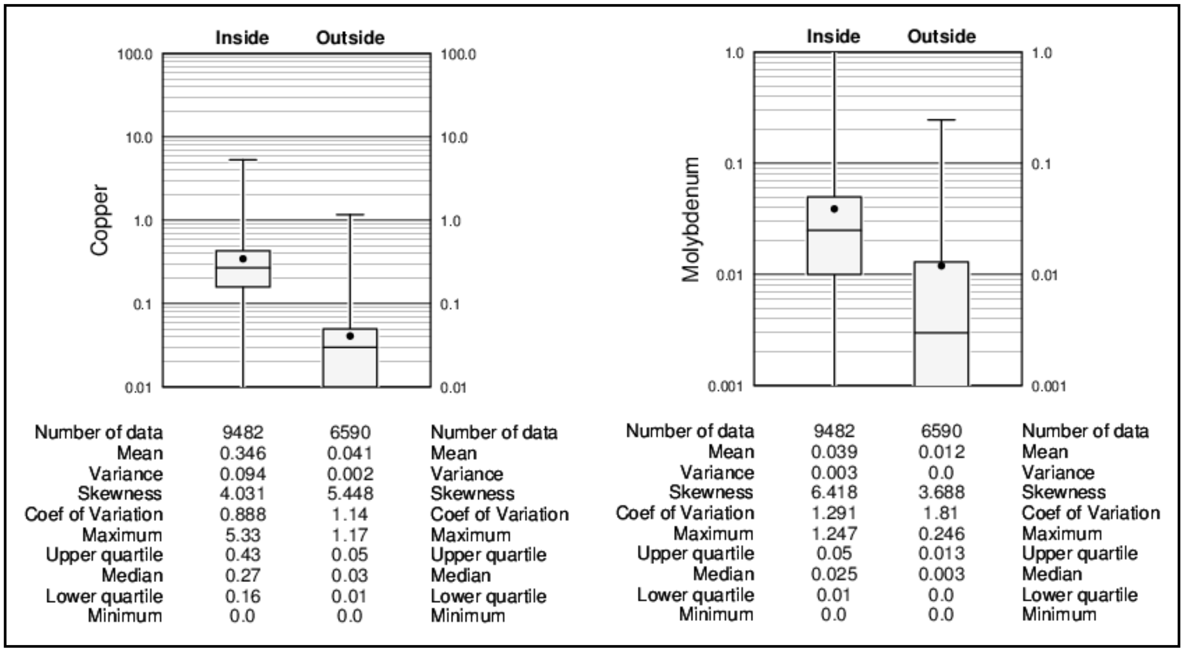



| | 0 | 1 | 2 | 3 | |
|---|---|---|---|---|---|
| Number of data | 10438 | 605 | 1496 | 3531 | Number of data |
| Mean | 0.038 | 0.005 | 0.011 | 0.011 | Mean |
| Variance | 0.002 | 0.0 | 0.001 | 0.0 | Variance |
| Skewness | 6.315 | 3.8 | 8.753 | 4.597 | Skewness |
| Coef of Variation | 1.316 | 1.597 | 2.28 | 1.638 | Coef of Variation |
| Maximum | 1.247 | 0.09 | 0.521 | 0.266 | Maximum |
| Upper quartile | 0.05 | 0.01 | 0.01 | 0.015 | Upper quartile |
| Median | 0.023 | 0.0 | 0.006 | 0.007 | Median |
| Lower quartile | 0.01 | 0.0 | 0.0 | 0.0 | Lower quartile |
| Minimum | 0.0 | 0.0 | 0.0 | 0.0 | Minimum |

Source: Sim Geological, 2016.

The distribution of copper and molybdenum inside vs. outside of the probability shell domain is shown in Figure 14-14. There is a distinct difference in the nature of these elements with respect to this domain suggesting that is should be used to estimate grade in the resource model.

**Figure 14-14: Boxplots of Copper and Molybdenum Inside vs. Outside of the Probability Shell Domain**



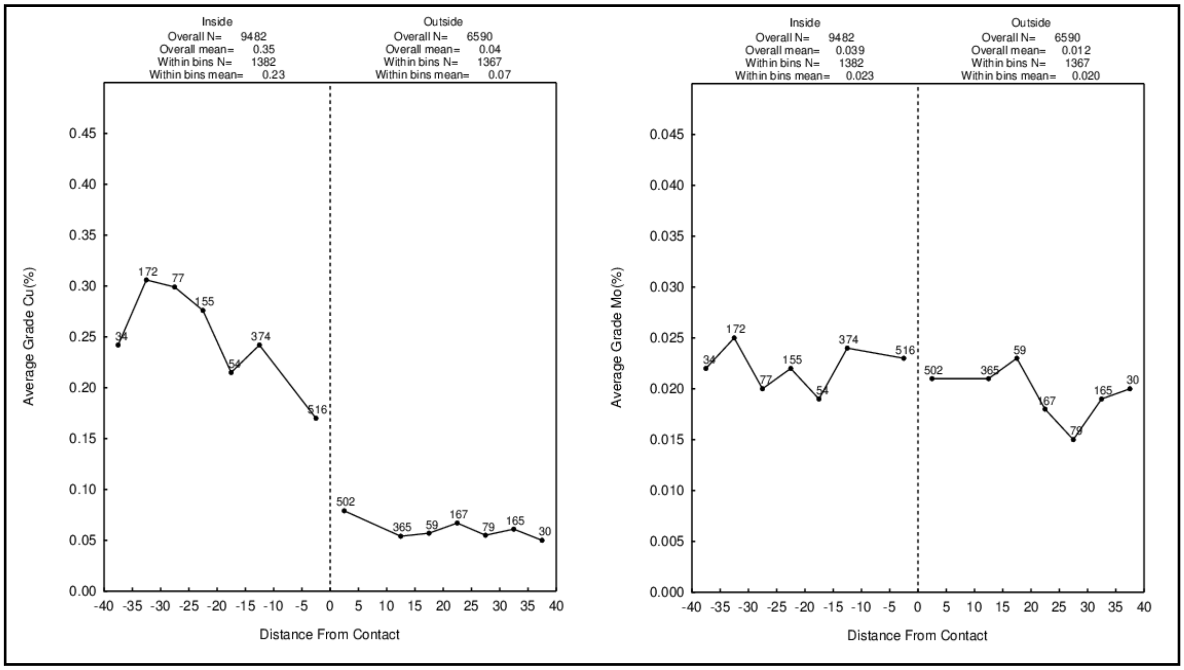

Source: Sim Geological, 2016.

### 14.5.2 Contact Profiles

Contact profiles evaluate the nature of grade trends between two domains: they graphically display the average grades at increasing distances from the contact boundary. Those contact profiles that show a marked difference in grade across a domain boundary indicate that the two datasets should be isolated during interpolation. Conversely, if a more gradual change in grade occurs across a contact, the introduction of a *hard* boundary (e.g., segregation during interpolation) may result in a much different trend in the grade model; in this case, the change in grade between domains in the model is often more abrupt than the trends seen in the raw data. Finally, a flat contact profile indicates no grade changes across the boundary; in this case, *hard* or *soft* domain boundaries will produce similar results in the model.

Contact profiles were generated to evaluate the change in copper and molybdenum grades across the boundary of the probability shell domain. The results are shown in Figure 14-15. The change in copper grade at this contact is very pronounced. Although the average molybdenum grade is three times higher inside the shell, there is little change in molybdenum grade evident at this contact.

**Figure 14-15: Contact Profiles of Copper and Molybdenum Inside vs. Outside of the Probability Shell Domain**




Source: Sim Geological, 2016.

### 14.5.3 Modeling Implications

The results of the EDA indicate that the distribution of copper and molybdenum are not distinctly related to the distributions of lithology, alteration or the intensity of stockwork alteration. Near-surface oxidation tends to correlate with a reduction in copper and, to a lesser extent, molybdenum grades, but there are instances where oxidized rocks also contain high grades. The shape and distribution of the copper probability shell correlates well with the unmineralized oxidized zones near surface.

Boxplots show that the copper and molybdenum populations differ significantly in data located inside versus outside of the probability shell domain. Contact profiles show a distinct change in copper grade at the shell boundary but a less obvious change in the molybdenum grades. Visual review of the sample data shows that, in most areas, the presence of low-grade molybdenum mineralization (<0.005% Mo) correlates well with the shape and location of the copper probability shell domain. The probability shell is used as a “hard” boundary domain, segregating inside data from outside data, during the estimation of copper and molybdenum grades in the resource block model.

## 14.6 Bulk Density Data

No density data was made available for this study. It is unknown if any testwork has been conducted to measure the density of the rocks at Mocoa. A historical resource estimate conducted in 1985 assumed a density of 2.7 t/m$^3$. This is reasonable assumption of the density of volcanic rocks that do not contain large volumes of sulphides and have not undergone intensive oxidation. A density of 2.7 t/m$^3$ has been used to calculate the resource tonnage presented in this report.

## 14.7 Evaluation of Outlier Grades

Histograms and probability plots of the distribution of copper and molybdenum inside and outside of the probability shell domain were reviewed to identify the existence of anomalous outlier grades in the composite database. Potential outlier samples were visually reviewed to determine their location in relation to the surrounding data. It was decided that the potential outlier samples would be controlled using a combination of traditional top-cutting and outlier limitations. Samples above the outlier limit threshold grades are restricted to a maximum distance of influence of 20 m during interpolation. Table 14.2 lists the elements, domains, top-cuts, outlier thresholds, and the resulting effects in the model.

The percentage of metal lost in the model due to top-cutting is considered appropriate for all elements.

**Table 14.2: Outlier Grade Controls**

| Element | Probability Shell Domain | Max | Top-Cut | Outlier Limit | Metal Loss in Model |
|---|---|---|---|---|---|
| Copper (%) | Inside | 5.33% | n/a | 2.50% | 1% |
| | Outside | 1.17% | n/a | 0.35% | |
| Molybdenum (%) | Inside | 1.247% | 0.700 | 0.400% | 1.5% |
| | Outside | 0.246% | n/a | 0.150% | |

## 14.8 Variography

The degree of spatial variability in a mineral deposit depends on both the distance and direction between points of comparison. Typically, the variability between samples increases as the distance between those samples increases. If the degree of variability is related to the direction of comparison, then the deposit is said to exhibit *anisotropic* tendencies which can be summarized with the search ellipse. The semi-variogram is a common function used to measure the spatial variability within a deposit.

The components of the variogram include the nugget, the sill, and the range. Often samples compared over very short distances, and even samples compared from the *same* location, show some degree of variability. As a result, the curve of the variogram often begins at some point on the *y*-axis above the origin: this point is called the *nugget*. The nugget is a measure of not only the natural variability of the data over very short distances, but also a measure of the variability which can be introduced due to errors during sample collection, preparation, and the assay process.

The amount of variability between samples typically increases as the distance between the samples increases. Eventually, the degree of variability between samples reaches a constant, maximum value; this is called the *sill*, and the distance between samples at which this occurs is called the *range*.

The spatial evaluation of the data in this report was conducted using a correlogram rather than the traditional variogram. The correlogram is normalized to the variance of the data and is less sensitive to outlier values, which generally gives better results.

Correlograms were generated using the commercial software package SAGE 2001© (Isaaks & Co.). Multidirectional correlograms were generated for the distributions of copper and molybdenum sample data located inside and outside of the probability shell domain. The results are summarized in Table 14.3.

**Table 14.3: Correlogram Parameters**

| | | | | 1st Structure | | | 2nd Structure | | |
|---|---|---|---|---|---|---|---|---|---|
| **Element/ Domain** | **Nugget** | **S1** | **S2** | **Range (m)** | **AZ** | **Dip** | **Range (m)** | **AZ** | **Dip** |
| Copper Inside Shell | 0.275 | 0.525 | 0.200 | 133 | 356 | 37 | 454 | 44 | 17 |
| | Spherical | | | 30 | 328 | -50 | 336 | 166 | 59 |
| | | | | 15 | 255 | 14 | 205 | 306 | 24 |
| Copper Outside Shell | 0.450 | 0.370 | 0.180 | 75 | 71 | 37 | 505 | 323 | 28 |
| | Spherical | | | 55 | 357 | -20 | 220 | 51 | -4 |
| | | | | 14 | 290 | 46 | 112 | 133 | 62 |
| Molybdenum Inside Shell | 0.471 | 0.242 | 0.287 | 245 | 318 | 16 | 714 | 25 | -23 |
| | Spherical | | | 96 | 116 | 73 | 199 | 60 | 63 |
| | | | | 71 | 47 | -6 | 111 | 121 | -13 |
| Molybdenum Outside Shell | 0.204 | 0.057 | 0.739 | 194 | 317 | 69 | 1481 | 34 | 67 |
| | Spherical | | | 142 | 39 | -3 | 364 | 11 | -21 |
| | | | | 41 | 308 | -21 | 172 | 104 | -8 |

Note: Correlograms conducted on 1.5 m drill hole composite data.

## 14.9 Model Setup and Limits

A block model was initialized in MineSight® and the dimensions are shown in Table 14.4. The extents of the block model are represented by the purple rectangle shown in Figures 14-1 through 14-5. The selection of a nominal block size measuring 10×10×5 m is considered appropriate with respect to the current drill hole spacing, and the selective mining unit (SMU) is considered appropriate for a deposit of this type, scale and location.

**Table 14.4: Block Model Limits**

| Direction | Minimum | Maximum | Block Size (m) | Number of Blocks |
|---|---|---|---|---|
| East | 312,400 | 314,800 | 10 | 240 |
| North | 136,500 | 139,100 | 10 | 260 |
| Elevation | 800 | 2300 | 5 | 300 |

Blocks in the model were coded on a majority basis with the probability shell domain. During this stage, blocks along a domain boundary are coded if >50% of the block occurs within the boundaries of that domain.

The proportion of blocks which occur below the topographic surfaces are also calculated and stored in the model as individual percentage items. These values are used as weighting factors to determine the in-situ resources of the deposit.

## 14.10 Interpolation Parameters

The block model grades for copper and molybdenum were estimated using ordinary kriging (OK). The results of the OK estimation were compared with the *Hermitian Polynomial Change of Support* method, also referred to as the *Discrete Gaussian Correction*. This method is described in greater detail in Section 14.11.

The Mocoa OK models were generated with a relatively limited number of samples to match the change of support, or Herco (HERmitian COrrection), grade distribution. This approach reduces the amount of smoothing or averaging in the model, and, while there may be some uncertainty on a localized scale, this approach produces reliable estimations of the recoverable grade and tonnage for the overall deposit. The interpolation parameters are summarized in Table 14.5.

**Table 14.5: Interpolation Parameters**

| Element/ Domain | Search Ellipse Range (m) | | | Number of Composites | | | Other |
|---|---|---|---|---|---|---|---|
| | X | Y | Z | Min/block | Max/block | Max/hole | |
| Copper Inside Shell | 500 | 500 | 500 | 10 | 40 | 10 | 1 DH per octant |
| Copper Outside Shell | 500 | 500 | 500 | 10 | 40 | 10 | 1 DH per octant |
| Molybdenum Inside Shell | 500 | 500 | 500 | 10 | 40 | 10 | 1 DH per octant |
| Molybdenum Outside Shell | 500 | 500 | 500 | 10 | 40 | 10 | 1 DH per octant |

## 14.11 Validation

The results of the modeling process were validated using several methods. These include a thorough visual review of the model grades in relation to the underlying drill hole sample grades, comparisons with the change of support model, comparisons with other estimation methods, and grade distribution comparisons using swath plots.

### 14.11.1 Visual Inspection

A detailed visual inspection of the block model was conducted in both section and plan to ensure the desired results following interpolation. This included confirmation of the proper coding of blocks within the probability shell domain. The distribution of block grades was compared relative to the drill hole samples to ensure the proper representation in the model.

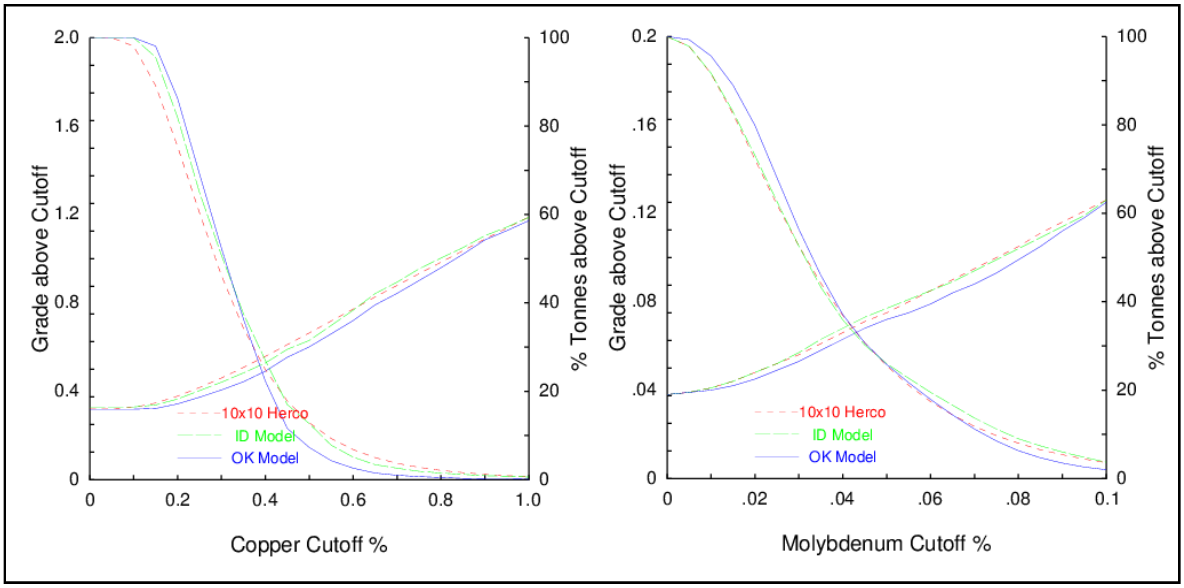
### 14.11.2 Model Checks for Change of Support

The relative degree of smoothing in the block model estimates is evaluated using the *Discrete Gaussian Correction*; it is also referred to as the *Hermitian Polynomial Change of Support* method (Journel and Huijbregts, Mining Geostatistics, 1978). With this method, the distribution of the hypothetical block grades can be directly compared to the estimated OK model through the use of pseudo-grade/tonnage curves. Adjustments are made to the block model interpolation parameters until an acceptable match is made with the *Herco* (HERmitian COrrection) distribution. In general, the estimated model should be slightly higher in tonnage and slightly lower in grade when compared to the Herco distribution at the projected cut-off grade. These differences account for selectivity and other potential ore-handling issues which commonly occur during mining.

The Herco distribution is derived from the declustered composite grades which are adjusted to account for the change in support, moving from smaller drill hole composite samples to the larger blocks in the model. This transformation results in a less-skewed distribution, but it has the same mean as the original declustered samples.

Both the copper and molybdenum models were validated, inside and outside of the probability shell, using the Herco approach. All models show an appropriate degree of correlation with the Herco distributions. Examples from the copper and molybdenum models within the probability shell domain are shown in Figure 14-16.

**Figure 14-16: Herco Plots of Copper and Molybdenum Inside the Probability Shell Domain**

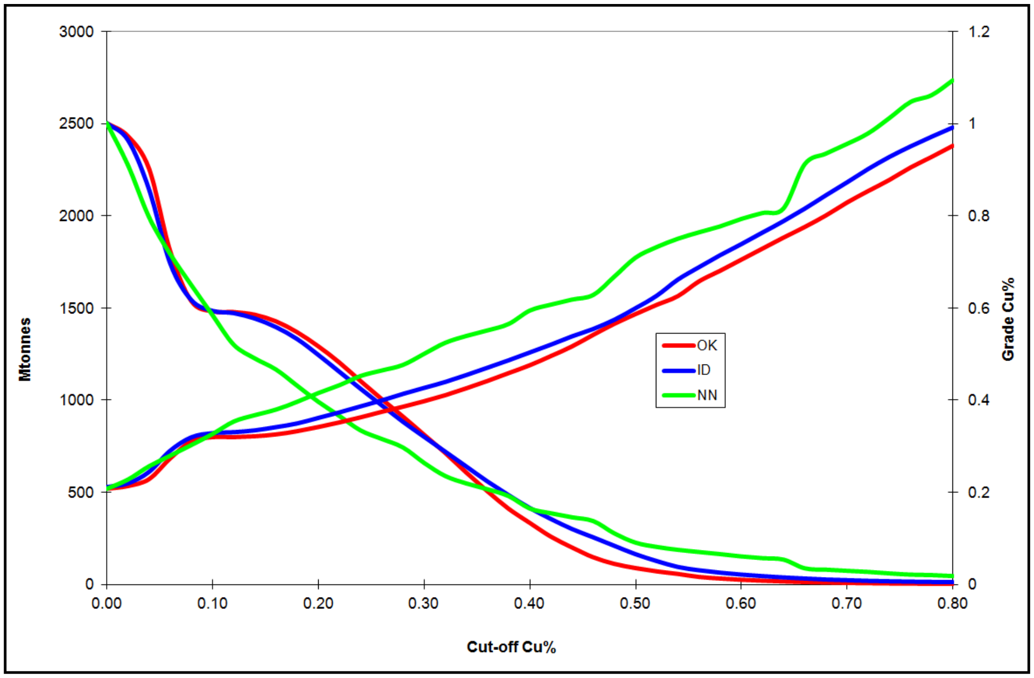



Source: Sim Geological, 2016.

### 14.11.3 Comparison of Interpolation Methods

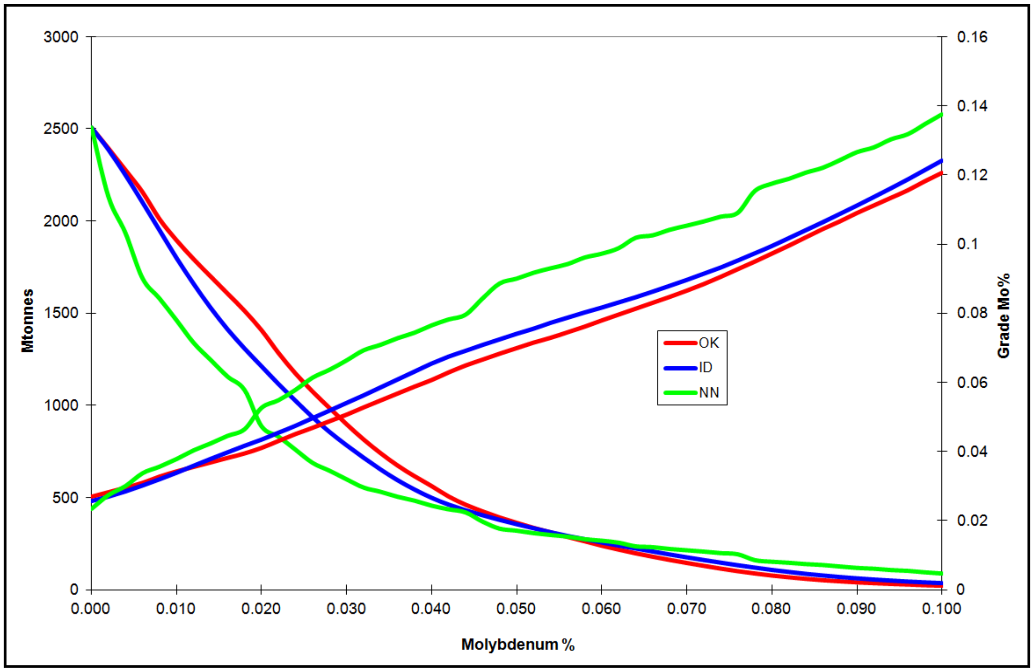
For comparison purposes, additional grade models were generated using both the inverse distance weighted (ID) and nearest neighbour (NN) interpolation methods (Note: The NN model was created using data composited to 5 m intervals). The results of these models are compared to the OK models at a series of cut-off grades in a series of grade/tonnage graphs. Examples of the copper and molybdenum models are shown in Figures 14-17 and 14-18, respectively. Overall, there is very good correlation between the models. Reproduction of the model using different methods tends to increase the confidence in the overall resource.

**Figure 14-17: Grade Tonnage Comparison of Copper Models**




Source: Sim Geological, 2016.

**Figure 14-18: Grade Tonnage Comparison of Molybdenum Models**




Source: Sim Geological, 2016.

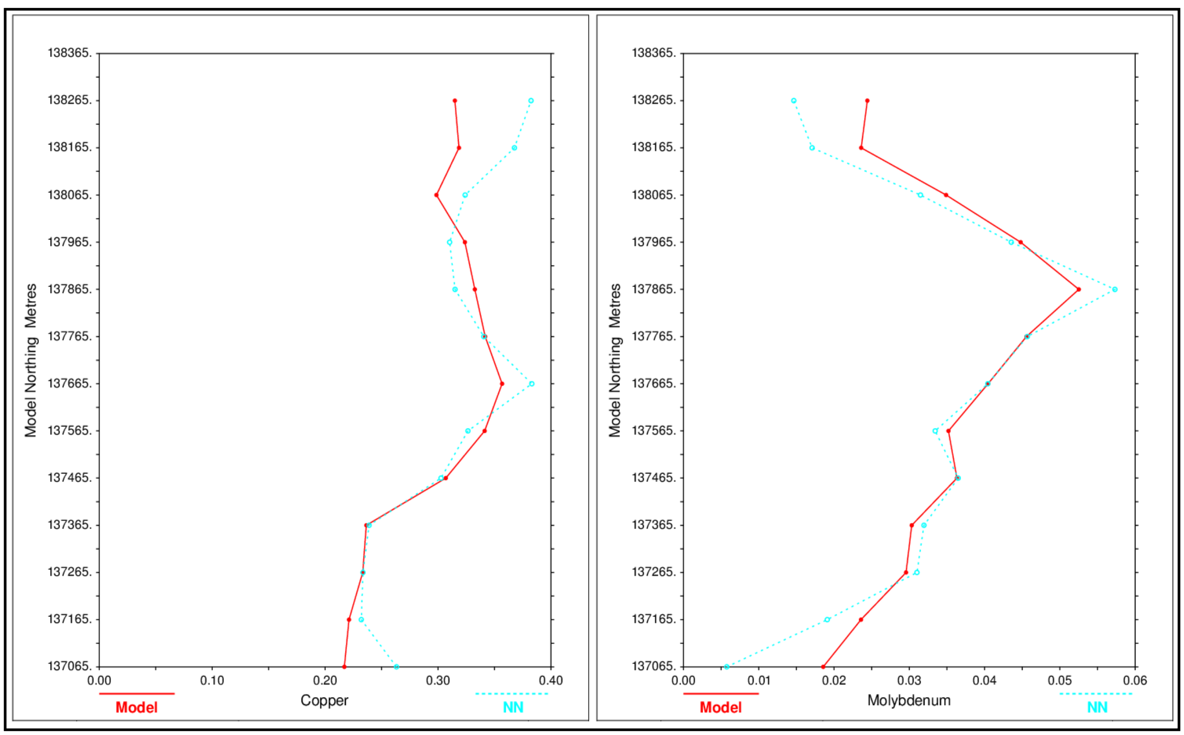
### 14.11.4 Swath Plots (Drift Analysis)

A swath plot is a graphical display of the grade distribution derived from a series of bands, or swaths, generated in several directions throughout the deposit. Using the swath plot, grade variations from the OK model are compared to the distribution derived from the declustered NN grade model.

On a local scale, the NN model does not provide reliable estimations of grade, but, on a much larger scale, it represents an unbiased estimate of the grade distribution based on the underlying data. Therefore, if the OK model is unbiased, the grade trends may show local fluctuations on a swath plot, but the overall trend should be similar to the NN distribution of grade.

Swath plots were generated in three orthogonal directions for the distributions of the copper and molybdenum OK and NN models inside and outside of the probability shell domain. There is very good agreement between these modeled elements. Examples of the copper and molybdenum models inside the shell domain in west-east swaths are shown in Figure 14-19. The degree of smoothing in the OK model is evident in the peaks and valleys. Note: The graphs indicate a relatively strong correlation between copper and molybdenum.

**Figure 14-19: Swath Plots by Northing for Copper and Molybdenum Inside the Probability Shell Domain**




Source: Sim Geological, 2016.

## 14.12 Resource Classification

The mineral resources for the Mocoa deposit were classified in accordance with the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May, 2014). The classification parameters are defined in relation to the distance to sample data and are intended to encompass zones of reasonably continuous mineralization.

Blocks within a maximum distance of 200m from a drill hole are included in the Inferred category. This distance is, in part, based on ranges exhibited in grade and indicator variograms. The range of continuity of mineralization is also evident from visual observations of the nature of the distribution of copper and molybdenum mineralization in the deposit.

Resources in the Indicated and Measured categories require a higher degree of confidence in the estimation of grade in the model, something that cannot be achieved based on the current distribution of drilling at Mocoa. Note: There are no resources in the Measured or Indicated categories at this stage at Mocoa.

**Inferred Resources:**
Model blocks which are within a maximum distance of 200 m from a single drill hole.

## 14.13 Mineral Resources

CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May, 2014) provides the following definition:

> "A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."

The "reasonable prospects for eventual economic extraction" requirement generally implies that quantity and grade estimates meet certain economic thresholds and that mineral resources are reported at an appropriate cut-off grade which takes the extraction scenarios and processing recovery into account.

The Mocoa deposit forms a relatively continuous zone of copper and molybdenum mineralization over an area measuring approximately 1.2 km east-west by 1.4 km north-south and extending to depths of more than 1 km below surface. The "reasonable prospects for eventual economic extraction" were tested using a series of floating cone pit shells based on projected technical and economic assumptions.

The resource-limiting pit shells were generated using recoverable copper-equivalent (CuEqR) grades that include contributions from copper and molybdenum and adjustments for projected metallurgical recoveries.

The following technical and economic parameters were assumed:

- Operating costs:
  - Mining: open pit US$2.50/t.
  - Processing: US$10.00/t.
  - G&A: US$2.00/t.
- Pit slope: 45 degrees.
- Metal prices: US$3.00/lb Cu; US$10.00/lb Mo.
- Metallurgical recoveries: copper 90%; molybdenum 75%.

The recoverable copper-equivalent grades were calculated using the following formula:

$$\text{CuEqR} = (\text{Cu\%} \times 0.90) + (\text{Mo\%} \times 3.33 \times 0.75)$$

Due to the polymetallic nature of the deposit, mineral resources were presented on a copper-equivalent basis. Copper equivalents (CuEq) are determined in model blocks using the contributions of copper and molybdenum and do not include adjustments for recoveries and refining charges. Based on the assumed metal prices (US$3/lb Cu and US$10/lb Mo), copper-equivalent grades are calculated using the following formula:

$$\text{CuEq} = \text{Cu\%} + \text{Mo\%} \times 3.33$$

The total Inferred mineral resource estimate for the Mocoa deposit is shown in Table 14.6. Using the projected operating costs listed here, the base case cut-off grade for the Mocoa resources is estimated to be 0.25% CuEq.

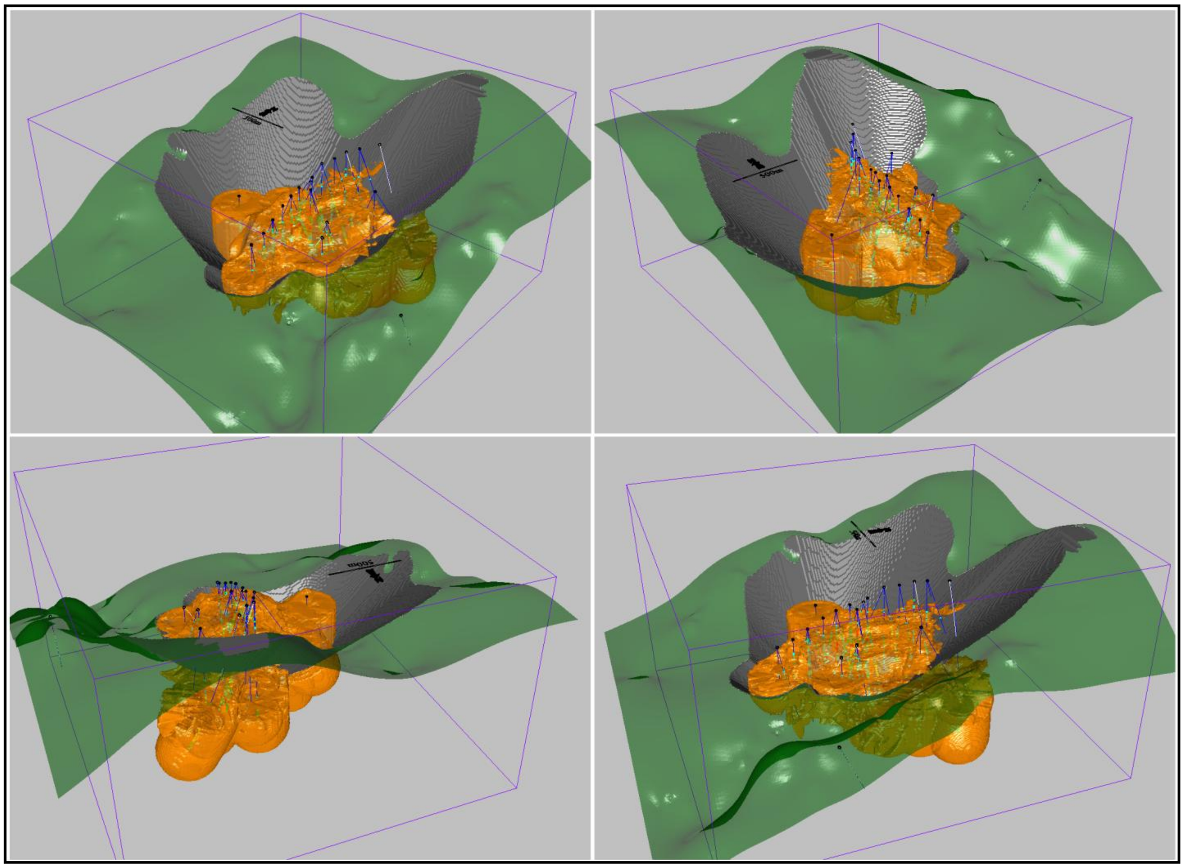
**Table 14.6: Estimate of Inferred Mineral Resources**

| Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|
| | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| 636 | 0.45 | 0.33 | 0.036 | 6.31 | 4.60 | 510.5 |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo% × 3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

Figure 14-20 shows several isometric views of the extent of resources in the Inferred category above a cut-off grade of 0.25% CuEq in relation to the resource-limiting pit shell. As stated previously, the drilling results indicate that the deposit remains open to the west, east and north, but the images in Figure 14-20 show that the potential on the northern side is restricted by the higher waste stripping required in this direction. It appears that the greatest potential to expand the resource exists to the west and east of the current drilling.

**Figure 14-20: Isometric Views of Inferred Mineral Resource at Mocoa**



Source: Sim Geological, 2016.

Table 14.7 shows the total resource at a series of cut-off limits to provide additional information regarding the sensitivity of the resource.

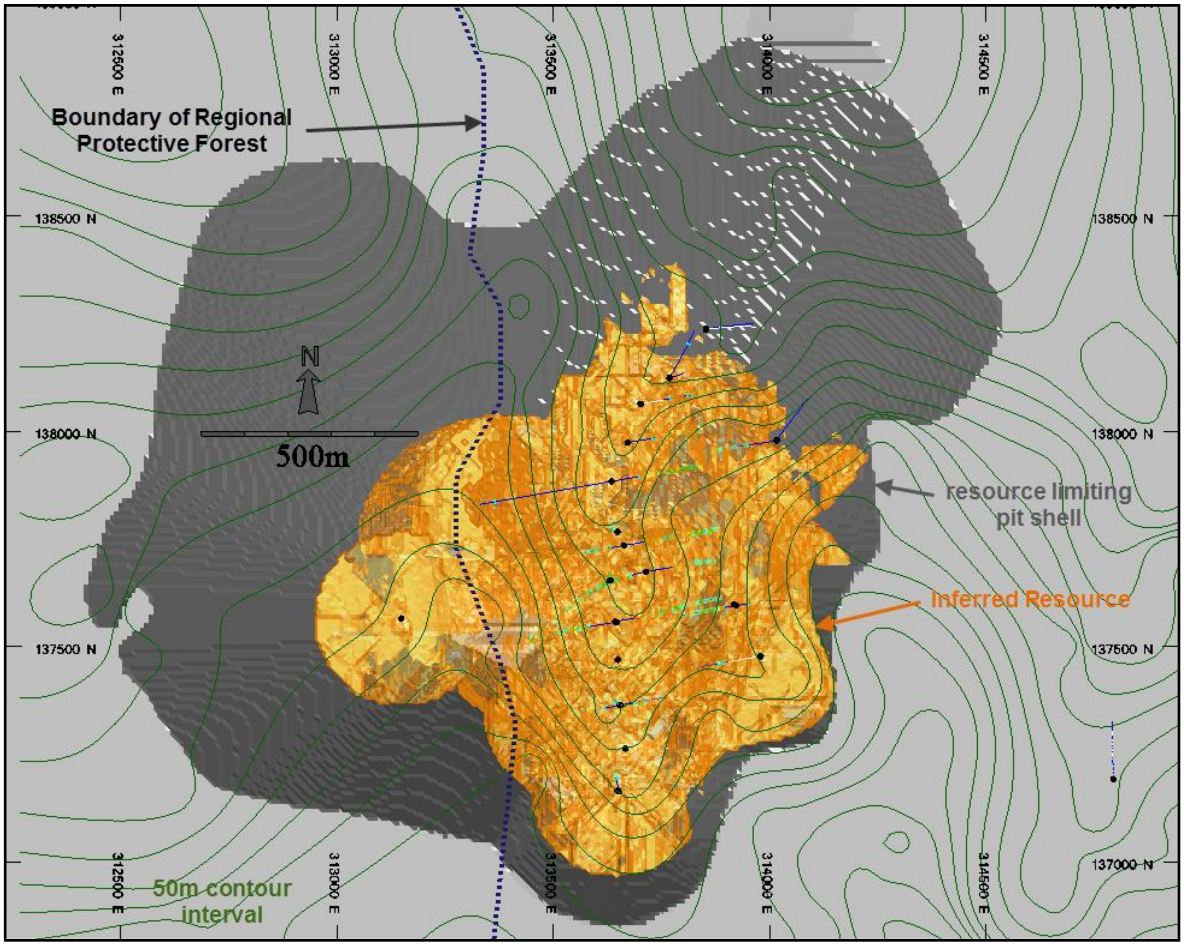
**Table 14.7: Sensitivity of Inferred Mineral Resources**

| Cut-off (CuEq%) | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| 0.15 | 721 | 0.42 | 0.31 | 0.035 | 6.68 | 4.85 | 549.9 |
| 0.2 | 683 | 0.43 | 0.32 | 0.035 | 6.54 | 4.77 | 530.2 |
| **0.25 (base case)** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |
| 0.3 | 553 | 0.48 | 0.35 | 0.039 | 5.81 | 4.24 | 470.4 |
| 0.35 | 433 | 0.52 | 0.38 | 0.042 | 4.96 | 3.62 | 404.6 |
| 0.4 | 330 | 0.57 | 0.41 | 0.047 | 4.12 | 2.99 | 341.8 |
| 0.45 | 259 | 0.61 | 0.44 | 0.051 | 3.47 | 2.50 | 293.2 |
| 0.5 | 201 | 0.65 | 0.46 | 0.056 | 2.87 | 2.04 | 247.9 |
| 0.55 | 148 | 0.69 | 0.49 | 0.061 | 2.26 | 1.60 | 199.6 |
| 0.6 | 106 | 0.74 | 0.52 | 0.067 | 1.73 | 1.21 | 155.8 |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo% × 3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

The total Inferred mineral resource estimate for the Mocoa deposit is shown in Tables 14.6 and 14.7. A Regional Forest Reserve boundary intersects the western part of the deposit as shown in plan in Figure 14-21. The separation of mineral resources along this boundary is shown in Table 14.8.

**Figure 14-21: Plan Showing Regional Protective Forest Boundary in the Mocoa Area**




Source: Sim Geological, 2016.

**Table 14.8: Estimate of Inferred Mineral Resources Inside and Outside the Forest Reserve**

| Location | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| Inside Forest Reserve | 159 | 0.43 | 0.33 | 0.031 | 1.52 | 1.16 | 107.8 |
| Outside Forest Reserve | 477 | 0.46 | 0.33 | 0.038 | 4.78 | 3.44 | 402.7 |
| **Total** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo% × 3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

Table 14.9 shows the portion of the resources separated above and below the interpreted surface; this represents the base of visible oxidation.

**Table 14.9: Estimate of Inferred Mineral Resources by Oxide Type**

| Location | Mtonnes | CuEq (%) | Cu (%) | Mo (%) | Contained Metal | | |
|---|---|---|---|---|---|---|---|
| | | | | | CuEq (Blbs) | Cu (Blbs) | Mo (Mlbs) |
| Oxide and Transition | 139 | 0.41 | 0.32 | 0.026 | 1.25 | 0.99 | 78.3 |
| Sulphide | 497 | 0.46 | 0.33 | 0.040 | 5.06 | 3.61 | 432.7 |
| **Total** | **636** | **0.45** | **0.33** | **0.036** | **6.31** | **4.60** | **510.5** |

Notes: 1) In-pit resource contained within shell generated using US$3/lb Cu and US$10/lb Mo. CuEq%=Cu%+Mo% × 3.33.
2) Base case cut-off grade for in-pit resources is 0.25% CuEq.

Other than the location of the Forest Reserve and the portion of the resource that is partially oxidized, there are no other known factors related to environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource.

# 15 MINERAL RESERVES

At present, there are no mineral reserve estimates for the Mocoa Project.

# 16 MINING METHODS

This section is not applicable.

# 17 RECOVERY METHODS

This section is not applicable.

# 18 PROJECT INFRASTRUCTURE

This section is not applicable.

# 19 MARKET STUDIES AND CONTRACTS

This section is not applicable.

# 20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

At the effective date of this Technical Report (October 6, 2016), water permits were obtained and were in effect during the 2008 and 2012 B2Gold drill programs. New permits and authorizations will be required for the next drilling campaign.

Baseline environmental studies and community discussions will commence before the next drill program.

# 21 CAPITAL AND OPERATING COSTS

This section is not applicable.

# 22 ECONOMIC ANALYSIS

This section is not applicable.

# 23 ADJACENT PROPERTIES

There are no other exploration projects in the Mocoa area.

# 24 OTHER RELEVANT DATA

There is no other relevant data or information.

# 25 INTERPRETATION AND CONCLUSIONS

Based on the evaluation of the data available from the Mocoa property, the authors of this Technical Report have drawn the following conclusions:

- At the execution date of this Technical Report, Libero Copper holds a 100% interest in the Mocoa property (subject to a total 3% NSR royalty).
- The Mocoa deposit forms a relatively continuous zone of copper and molybdenum mineralization over an area measuring approximately 1.2 km east-west by 1.4 km north-south and extending to depths of more than 1 km below surface.
- The Mocoa copper-molybdenum mineralization remains open to the north, west and east.
- Drilling to date has outlined an Inferred resource (at a 0.25% CuEq cut-off) of 636 Mtonnes at 0.33% Cu and 0.036% Mo which contains 4.60 billion pounds of copper and 510.5 million pounds of molybdenum.
- Approximately 20% of the contained metal in resources is currently located inside a regional forest reserve.
- Preliminary metallurgical work indicates that the copper-molybdenum mineralization can be recovered using conventional methods.
- Challenges facing continued exploration and evaluation of the Mocoa deposit include its remote location, lack of road infrastructure, steep topography and high annual rainfall.

# 26 RECOMMENDATIONS

Further work is warranted to assess the size, grade distribution and metallurgy of the Mocoa copper-molybdenum deposit before further economic studies advance the project. Specific recommendations are separated into two phases. The proposed work in Phase 2 is conditional on the successful completion of the Phase 1 program.

**Phase 1:**

- Conduct an additional soil and rock chip sampling survey to assess untested exploration targets. The estimated budget is US$75,000.

**Phase 2:**

- Conduct a 2,000 metre drill program to test additional surface anomalies. The estimated budget is US$500,000.

# 27 REFERENCES

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# 28 DATE AND SIGNATURE PAGES

**CERTIFICATE of QUALIFIED PERSON**

I, Michel Rowland Brepsant, FAusIMM, do hereby certify that:

1. I am an independent consultant with an address at av. Brasil 1125 3rd floor, Quito, Ecuador.

2. I graduated with a DES degree from the University of Dijon in France in 1964.

3. I am a fellow of the Australasian Institute of Mining and Metallurgy, Registration Number 225364.

4. I have practiced my profession continuously for 50 years and have been involved in over 10 studies, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Ecuador and Colombia.

5. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.

6. I am an author of the technical report titled “Mocoa Copper-Molybdenum Project, Colombia, NI 43-101 Technical Report” dated June 15, 2018, with an effective date of October 6, 2016 (the “Technical Report”). I am responsible for sections 1-10, 13, 20, 23, 24, 27 and portions of sections 25 and 26.

7. I personally visited the property and examined drill core stored in Medellín from October 4th to 8th, 2016.

8. I am independent of Libero Copper Corporation and related companies, the vendor and the property, applying all of the tests in Section 1.5 of NI 43-101.

9. I have had no prior involvement with the Mocoa Copper-Molybdenum Project

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

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

Dated this 15th day of June, 2018.

"original signed and sealed"

________________________

Michel Rowland Brepsant, FAusIMM

**CERTIFICATE of QUALIFIED PERSON**

**Robert Sim, P.Geo, SIM Geological Inc.**

I, Robert Sim, P.Geo, do hereby certify that:

1. I am an independent consultant of:

SIM Geological Inc.

508 1950 Robson Street

Vancouver, British Columbia, Canada V6E 1E8

2. I graduated from Lakehead University with an Honours Bachelor of Science (Geology) in 1984.

3. I am a member, in good standing, of Engineers and Geoscientists British Columbia, License Number 24076.

4. I have practiced my profession continuously for 34 years and have been involved in mineral exploration, mine site geology and operations, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am a co-author of the technical report titled "Mocoa Copper-Molybdenum Project, Colombia NI 43-101 Technical Report" dated June 15, 2018, with an effective date of October 6, 2016 (the "Technical Report") prepared for Libero Copper Corporation ("the issuer") and accept professional responsibility for section 14 and portions of sections 1, 25 and 26.

7. I have not visited the Mocoa property.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am independent of the issuer and related companies, the vendor and the property, applying all of the tests in Section 1.5 of NI 43-101.

11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 15th day of June, 2018.

"original signed and sealed"

Robert Sim, P.Geo.

## CERTIFICATE of QUALIFIED PERSON

### Bruce M. Davis, FAusIMM, BD Resource Consulting, Inc.

I, Bruce M. Davis, FAusIMM, do hereby certify that:

1. I am an independent consultant of:

   BD Resource Consulting, Inc.

   4253 Cheyenne Drive

   Larkspur, Colorado USA 80118

2. I graduated from the University of Wyoming with a Doctor of Philosophy (Geostatistics) in 1978.

3. I am a Fellow of the Australasian Institute of Mining and Metallurgy, Number 211185.

4. I have practiced my profession continuously for 40 years and have been involved in mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am an author of the technical report titled *NI 43-101 Technical Report on the Mocoa Project, Columbia*, dated June 15, ,2018, with an effective date of October 6, 2016 (the "Technical Report") and accept responsibility for sections 11 and 12 and portions of sections 1, 14, 25 and 26.

7. I have not visited the Mocoa Property.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am independent of Libero Copper Corporation and related companies, the vendor and the property, applying all of the tests in Section 1.5 of NI 43-101.

11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 15th day of June, 2018.

"original signed and sealed"

Bruce M. Davis, FAusIMM