APEX MINING CO., INC

2019 REPORT FOR ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND, PHILIPPINES

Within MPSA-225-XI-2005 and MPSA-234-XI-2007

March 2020

CP involved

Raul B. Cezar
Registered Mining Engineer
Lic. No. 1709
PMRC CP Reg. No. “EM 01709-20/11”

2. CERTIFICATE AND CONSENT OF CP

2.1. Certification and Consent

I, ***Raul B. Cezar***, do hereby certify:

- That I am a Licensed Mining Engineer registered with the Professional Regulation Commission of the Republic of the Philippines
- That I am a Consultant (Mining Engineer) of Philsaga Mining Corporation with an office address at Phil-Japan Friendship Highway Catitipan, Brgy Sasa, Davao City
- I graduated with a Bachelor of Science degree in Mining Engineering in March 1981 from Saint Louis University, Baguio City, Philippines with PRC license no. 1709.
- I hold the following Professional Qualifications and has been in good standing with the following professional organizations:
    - Philippine Society of Mining Engineer (PSEM)
    - Mindanao Association of Mining Engineer (MAEM)
- I have worked as a Mining Engineer for a total of 37 years since graduation from college. I have extensive experience and know-how in the evaluation of mining properties, in particular, Underground Mining Gold, Surface Mining Gold.
- I am aware of the definition of 'Competent Person' as defined in the Philippine Mineral Reporting Code (PMRC) and certify that by reason of my education, training, related work experience as well as affiliations with mining professional organizations, that I fulfill the requirements for a 'Competent Person' set out by the Philippine Mineral Reporting Code.
- I am responsible for the content of the Technical report titled "2019 REPORT FOR ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND, PHILIPPINES within MPSA-225-XI-2005 and MPSA-234-XI-2007**"** dated March 31, 2020.
- I have no interest in Apex Mining Company who engaged me to review the ore reserve estimation of Maco Mines.
- For the Technical Report, I am an independent reviewer applying all the required guidelines set out in the Philippine Mineral Reporting Code in the conduct of the review and evaluation
- I have read the guidelines spelled out in the Philippine Mineral Reporting Code and certify that this review has been prepared in accordance with the Code.
- I give consent to the filing of the Technical Report with the Philippine Stock Exchange and other regulatory authorities and any publication by them for regulatory and disclosure purposes, including electronic publication in the public company files on their websites accessible by the public of the Technical Report.
- As at the effective date of March 31, 2020, the technical report to the best of my knowledge and information believes, that the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading. I am responsible for the entire report however I have relied on other experts for some materials in this technical report.

2.2. Scope of work of each CP involved

Raul B. Cezar is the registered CP-Mining involved in the project. His scope of work is to review and audit the work of the Maco Geology and Technical Services Team.

2.3. Reliance on other experts indicating therein objective, nature, and coverage

There has been a reliance on the work carried out by the Maco geological and technical services team. All work that has been conducted has been reviewed by the CP. The CP certified report can only be as good as the data provided that was used to make it.

2.4. Signature(s) of the CP(s)

Raul B. Cezar
Mining Engineer
License Number 1709
PMRC Competent Person for Mining
CP Reg. No. EM 01709-020/11
Board Resolution No. 05-2011
Dated September 16, 2011

REPUBLIC OF THE PHILIPPINES)
CITY OF Davao City) SS

SUBSCRIBED AND SWORN to before me this MAY 2 8 2020 in Davao City, Philippines, affiant personally appeared to me and exhibited his PRC Registered Mining Engineer License No. 1709 as proof of his identity.

Doc. No. 495
Page No 100
Book No. LXXVI
Series of 2020.

HERACLIO T. MALAKI III
Notary Public
Until December 31, 2020
Serial No. 2019-094-2020
PTR No. 3394276 • 01-06-2020 • D.C.
IBP No. 107600 • 01-10-2020 • D.C.
Roll No. 45561

3. EXECUTIVE SUMMARY

Apex is a publicly listed company in the Philippine Stock Exchange. The company's project site is located in the Barangays of Masara and Teresa, Municipality of Maco, Davao De Oro Province in Southern Mindanao.

This report is a public release report on the economic assessment and ore reserve estimation of Maco Mines owned by Apex Mining Co., Inc. under a new management. It is designed to fully inform shareholders and the investment market of the Mineral Resources, Ore Reserves, and of the current activities and plans of Apex Mining Co. for the Maco Mines. This report follows on from the declared Mineral Resources of **3,720,000 tonnes at 6.6 g/t Au** containing **785,000 ounces of gold** within acceptable limits as outlined in the PSE – IRR PMRC guidelines. This is contained in the Technical Report signed by the PMRC-CP for Exploration results and Mineral Resource Estimation, Carlito A. Ausa, in the 2020 Resource Estimate of the Gold Veins within the Maco Mine dated March 2020.

The total combined proven and probable reserves are 1,915,000 tonnes grading 6.34 g/t gold, accounting for a total of 391,000 in-situ ounces of gold and 312,800 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

The economic assessment and ore reserve estimation have been prepared in accordance with the latest Philippine Stock Exchange (PSE) – IRR Philippine Mineral Reporting Code (PMRC).

The production and cost parameters of this gold mining and milling operation were obtained from the Apex Mine Finance and Engineering records and on the whole moderated by the experience of the operating engineers and finance group. The costs used in the economic assessment are historical figures and both parties agree there is no reason to expect future costs to vary significantly. This report relied greatly on the substantial information from the Apex Mine operation and also from applicable estimates made by the finance team.

It has become a common operational practice in the country for epithermal, narrow vein-type gold operations to maintain an ore reserve of from one- to three- years of production. To have more developed ore reserve than what is necessary would tie up capital, funds which otherwise could be used for operating expenses and others. This balance of what minable ore to maintain can only come from a very good understanding of the geology and intimate knowledge of the behavior of the vein system over time.

The economic assessment for the ability to mine the 1.915 M tons – ore reserve economically was done by using the same on a hypothetical mine with a mine life of three (3) years with provisions for further exploration and mine development to replenish what is mined to maintain or increase the ore reserve level.

Base Case Assumptions:

- Mine life of 3 years
  - Ore Reserve of 1.915 M tons @ 6.34 g/t Au,
  - replenished as exploration and mine development progresses;
- Mined Ore / Milled Ore over the projected mine life:
  - Stope ore: 701,523 tons @ 5.3g/t
  - Development Ore: 1,157,775 tons @ 5.2 g/t
- Development over the projected mine life of:
  - Off vein Development: 20,237m
  - On vein Development: 41,758m
- Operating Costs of:
  - Mining Cost: $ 30/t (2019 YTD cost of production/tons mined)
  - Milling Cost: $ 16/t (2019 YTD cost of production/tons milled)
  - Development Cost : $ 1,775.8/m (Mine development addition for 2016 / off vein development)
  - Overhead Cost: $ 11/t (2019 YTD cost of production/tons milled)
  - Environmental/Social Cost (incorporated in OH)
  - IP Royalty 1.0% of Gross Income
- Taxes:
  - Excise Tax: 2.0% of Gross Revenue
  - Business Tax: 2.2% of Gross Revenue
  - Income Tax: 30.0% of Net Income
- Production data:
  - Dilution Factor (to Ore Reserve Grade): 80 %
  - Mill Recovery: 80 %
  - Gold Price: $ 1,200 / Oz
  - Foreign Exchange: Php 50 / $1.00
  - Payability on Gold Sales: 99 %

The IRR and NPV are both very sensitive to both the Mill Recovery and Mill Head and less sensitive to Operating Cost and Capital Expenditures, respectively (refer to Annex _K- 4‘). Overhead cost can be reduced by increasing the tonnage at the mine site from 1,800 tpd to 3,000 tpd. This would effectively half the overhead cost assuming it is all fixed.

The Apex Mine has the distinct advantage of longevity where most of the capital put into it has long been recuperated by the operations. At times like this where gold prices are low compared to the five-year average, the capital required to put up a new mine would put a significant burden on the economic viability of a project as not only would the product have to pay for the operating costs, it would also have to contribute to the capital costs.

Some 573,022 ounces of gold (from 1976 to 1989) and 472,028 ounces of gold (from 2005 to 2019) have already been produced from typical ore bodies using the existing plant facilities. Mining and milling over a twenty-nine (29) year period from 1976-1989

and again from 2005-2019 on a commercial basis formally under a government monitoring system indicates essential production parameters, i.e. economic mining method and metallurgical process, are present.

The new management of Apex Mine, having acquired a property with an on-going mining operation, had the foresight and the capabilities to re-plan and start new development options. Maco mine which already has a developed mine with mine support infrastructure/facilities, an existing 1,800 tpd mill plant, and a proposed tailings dam whose ultimate capacity can accommodate 18 million tons of tailings, more than three times the tailings production of the base case 1,800 tpd operation for 10 years. Maco municipality and Davao De Oro province are hospitable to mining operations. The whole province welcomes mining as it welcomes new technologies and awareness in protecting the environment.

This does not mean that the potential of other ore bodies adjacent to the well-defined current operations are not being looked into. Further exploration work is continuously being done to prove up the area within the tenement however not included in this report. This continuous exploration initiative further reinforces the economic viability of the ore Reserve of 1.915 million tons at 6.34 g/t Au.

4. TABLE OF CONTENTS

4.1. Contents

5. INTRODUCTION

5.1. Who commissioned the report preparation and to whom it should be submitted

Apex Mining Co., Inc. (a listed Company on the Philippines Stock Exchange) has commissioned this report.

5.2. The purpose for which the report was prepared

This report is made in compliance with the requirement of the Philippine Stock Exchange (PSE) - to report the PMRC Compliant report in regards to economic assessment and ore reserve estimation.

5.3. Scope of Work or Terms of Reference

Apex Mining has title to several properties located in the municipalities of Maco and Mabini in Davao De Oro Province in southeastern Mindanao covered by **MPSA-225-XI-2005** and **MPSA-234-XI-2007**. This scope of work is only concerned with the gold mineralization within the fifteen known gold vein systems with face sample data delimited within the Apex claims at Maco Mines and does not take into account the copper deposits identified within the property**.**

5.4. Duration of the preparation, including field visits and verification

The Report for Economic Assessment and Ore Reserve Estimation commenced after the completion of the resource estimation which began April 2017. Once the resource block model was completed, the Apex technical team spearheaded by mine planning went to work to determine the minable reserve and the optimum production schedule resulting from the blocked reserve. Once the mining plan was created, the planning group discussed with Geology, Operations, and Finance, relevant issues in ore reserve estimation such as sampling and assaying practices, overall development methodology, mining methods and auxiliary support systems, capital and operating costs, mineral resource estimation, milling practices and costs and other support services. Compilation of data from previous development and production report was also done simultaneous to the preparation of the mineral resource estimation. The Apex Technical Services Team with the assistance of the corporate staff specialist began to compile the Technical Report once all the assumptions have been agreed upon. Other Apex Mining personnel handling the finance, safety, environment, and community relations were also consulted on the report preparation.

5.5. Members of the technical report preparation team

Alex Diambrang	Senior Geologist
Josel Retardo	Mine Planning Engineer Manager
Marivic Ulang	GIS Manager
Edgar Biego	GIS Administrator
Luz Valdueza	GIS Administrator
Marites Tuscano	QA/QC Administrator
Isaac Rivera	Jr. Resource Geologist

5.6. Host company representative

Host Company representative is Josel Retardo

5.7. Compliance of report with PMRC

The report follows the format outlined in the PSE Implementing Rules and Regulations for the Philippine Mineral Reporting Code (PMRC). It also adopted the ore reserve classification as stated in the PMRC.

6. RELIANCE ON OTHER CP

The undersigned has relied on the data provided by the Apex Mining Co., Inc. Technical Services Team. The actual estimates of the ore reserve blocks were done by the Apex Mining Co., Inc. Geology and Technical Services Team. All work that has been conducted has been reviewed by the CP. The CP certified report can only be as good as the data provided that was used to make it.

7. TENEMENT AND MINERAL RIGHTS

7.1. Description of mineral rights

7.1.1. Location of area (Barangay, Municipality, Province)

MPSA 225-2005-XI is located in barangays Teresa and Masara, Maco, Davao De Oro Province, while the **MPSA 234** which is composed of six different parcels located within the following barangays of the Municipality of Maco and some portions at the Municipality of Mabini, Province of Davao De Oro: Parcel-I is located at Barangay Tagbaros and some portions at Barangay Mainit; Parcel-II is located entirely at Barangay Mainit; Parcel-III is located at Barangays Masara, Mainit, and New Leyte; while Parcel-IV is located at Barangay Teresa with small portions at barangays Elizalde and New Barili and some portions to the south is located within the Municipality of Mabini; Parcel-V is located entirely within the Municipality of Mabini; and Parcel-VI's northern portion is within Barangay New Barili, Municipality of Maco with the southern portion at the Municipality of Mabini.

7.1.2. Coordinate locations as per MGB

MPSA 225-2005-XI is defined by the corner points with the following technical descriptions:

Corner	Latitude	Longitude
1	7°23'00.81"	126°01'14.76"
2	7°23'10.58"	126°01'14.76"
3	7°23'10.58"	126°02'13.46"
4	7°23'00.81"	126°02'13.46"
5	7°23'00.81"	126°02'18.35"
6	7°23'11.16"	126°02'28.72"
7	7°22'22.82"	126°03'17.13"
8	7°22'21.48"	126°03'15.80"
9	7°22'21.48"	126°03'21.67"
10	7°21'42.41"	126°03'21.67"
11	7°21'42.41"	126°02'42.55"
12	7°21'48.41"	126°02'42.55"
13	7°22'17.36"	126°02'13.45"
14	7°21'32.92"	126°02'13.45"
15	7°21'32.92"	126°01'53.89"
16	7°21'42.69"	126°01'53.89"
17	7°21'42.69"	126°02'03.67"
18	7°22'02.22"	126°02'03.67"
19	7°22'02.22"	126°01'44.11"
20	7°22'31.52"	126°01'44.11"
21	7°22'31.52"	126°01'24.54"
22	7°23'00.81"	126°01'24.54"

The six (6) individual parcels that comprise the MPSA-234-2007-XI are specifically bounded by the geographic coordinates with the following technical descriptions:

PARCEL- I

Corner	Latitude	Longitude
1	7°24'00.00"	126°00'30.00"
2	7°24'30.00"	126°00'30.00"
3	7°24'30.00"	126°01'00.00"
4	7°24'00.00"	126°01'00.00"

PARCEL- II

Corner	Latitude	Longitude
1	7°24'00.00"	126°01'17.28"
2	7°24'19.53"	126°01'17.28"
3	7°24'19.49"	126°01'33.56"
4	7°24'01.80"	126°01'33.56"
5	7°24'00.00"	126°01'30.00"

PARCEL- III

Corner	Latitude	Longitude
1	7°23’10.58”	126°01’55.33”
2	7°23’32.51”	126°01’33.50”
3	7°23’42.27”	126°01’33.52”
4	7°23’42.25”	126°01’43.30”
5	7°23’32.48”	126°01’43.28”
6	7°23’15.71”	126°02’00.00”
7	7°24’01.74”	126°02’00.00”
8	7°24’01.71”	126°02’12.69”
9	7°24’21.24”	126°02’12.74”
10	7°24’21.23”	126°02’19.45”
11	7°23’30.00”	126°02’19.33”
12	7°23’30.00”	126°03’00.00”
13	7°23’14.34”	126°03’00.00”
14	7°22’57.28”	126°02’42.84”
15	7°23’11.16”	126°02’28.72”
16	7°23’00.81”	126°02’18.35”
17	7°23’00.81”	126°02’13.46”
18	7°23’10.58”	126°02’13.46”

PARCEL- IV

Corner	Latitude	Longitude
1	7°22’30.00”	126°00’00.00”
2	7°23’00.00”	126°00’00.00”
3	7°23’00.00”	126°00’34.73”
4	7°23’10.58”	126°00’34.75”
5	7°23’10.58”	126°01’14.76”
6	7°23’00.81”	126°01’14.76”
7	7°23’00.81”	126°01’24.54”
8	7°22’31.52”	126°01’24.54”
9	7°22’31.52”	126°01’44.11”
10	7°22’02.22”	126°01’44.11”
11	7°22’02.22”	126°02’03.67”
12	7°21’42.69”	126°02’03.67”
13	7°21’42.69”	126°01’53.89”
14	7°21’32.92”	126°01’53.89”
15	7°21’32.99”	126°01’44.20”
16	7°21’13.45”	126°01’44.15”
17	7°21’13.64”	126°00’25.91”
18	7°22’12.23”	126°00’26.04”
19	7°22’12.23”	126°00’30.00”
20	7°22’30.00”	126°00’30.00”

PARCEL- V

Corner	Latitude	Longitude
1	7°20'30.00"	126°02'42.68"
2	7°21'42.41"	126°02'42.55"
3	7°21'42.41"	126°03'21.67"
4	7°21'23.00"	126°03'21.95"
5	7°21'23.02"	126°03'12.20"
6	7°21'13.25"	126°03'12.18"
7	7°21'13.23"	126°03'21.96"
8	7°20'30.00"	126°03'21.80"

PARCEL- VI

Corner	Latitude	Longitude
1	7°20'05.33"	126°00'00.00"
2	7°22'00.00"	126°00'00.00"
3	7°22'00.00"	126°00'06.46"
4	7°20'05.32"	126°00'06.204"

7.1.3. Number of claims and hectares covered

The MPSA 225-2005-XI contract area covers six hundred seventy-nine and two hundredths (679.02) hectares. Most of the MPSA 234-2007-XI area is within the 16 Municipality of Maco and this covers a total of 1,194.97 hectares and some portions within the adjoining Municipality of Mabini which covers a total of 363.56 hectares. The total area of MPSA 234-2007-XI is one thousand five hundred fifty-eight and fifty-three hundredths (1,558.53) hectares, comprising of six (6) individual parcels with the following respective areas:

Parcel 1 = 84.799 hectares
Parcel 2 = 29.625 hectares
Parcel 3 = 233.123 hectares
Parcel 4 = 883.681 hectares
Parcel 5 = 258.876 hectares
Parcel 6 = 68.423 hectares

TOTAL = 1,558.527 hectares

7.1.4. EP/MPSA/FTAA mode of agreement

The leases are under an MPSA mode of agreement.

7.1.5. Type of permit or agreement with government

The type of agreement with the government is as an MPSA.

7.2. History of mineral rights

The mining property originally existed as contiguous load claims comprising of 75 Declaration of Locations (DOLs) of nine hectares each and several claim fractions of various shapes and sizes with a total area of 679.02 hectares. The claims, named ASA-24, et al, were originally staked for gold, copper, silver, and other metallic minerals under the Philippine Bill of 1902. Prior to the MPSA Contract approval, the area was covered by Mining/Lode Lease Contract Nos. V-83; V-95; V-96, V-97, V- 124, and V-125 that were issued in 1994 to Apex Mining Company, Inc. The MLCs were subsequently applied for Mineral Production Sharing Agreement by Apex in 1998, initially denominated as APSA-242-XI. An amendment was filed by Apex for the same APSA in January 2005. The application was finally approved by the Philippine Government through its Department of Environment and Natural Resources Secretary last December 15, 2005.

The MPSA 234-XI-2007 was originally applied for MPSA in 2005 denominated as APSA-248-XI. It is composed of six individual parcels located adjacent to and around the MPSA-225-2005-XI. The application for MPSA was approved in June 2007 which was designated as MPSA- 234-2007-XI.

7.3. Current owners of mineral rights

Apex Mining Company Ltd. owns 100% of the mineral rights based on an MPSA agreement with the Philippine Government.

7.4. The validity of current mineral rights (date of validity of rights at the date of reporting)

The Mineral Production Sharing Agreement is valid for a 25- year term and renewable for another 25 years. The leases are issued under the Mining Act of 1995 (Republic Act No. 7942).

Surface rights are held with the government and the mining leases are issued as cooperative agreements between the people of the Philippines and the Company. MPSA No. 234-2007-XI expires in June 2032 and MPSA No. 225-2005-XI expires in 2030.

7.5. Agreements with respect to mineral rights

The Apex Mining Company is a holder of two Mineral Production Sharing Agreements with the government which was approved in 2005 and 2007 respectively.

7.6. For clarification of the net revenue that may be derived from the project, the following are included:

7.6.1. Royalties, taxes, advances, and similar payments paid or to be paid by the company to the mineral rights holder, joint venture partner(s), government, Indigenous People, local government, and others.

Table 1 outlines the royalties and encumbrances that the MPSAs are subject to:

Origin	Royalty	Act
Excise Tax	2%	Mining Act 1995
MOA with local people	1% plus provision of scholar ships, health program, infrastructure and other social programs	IRPA 1997

Table 1 Licence Royalties and encumbrances

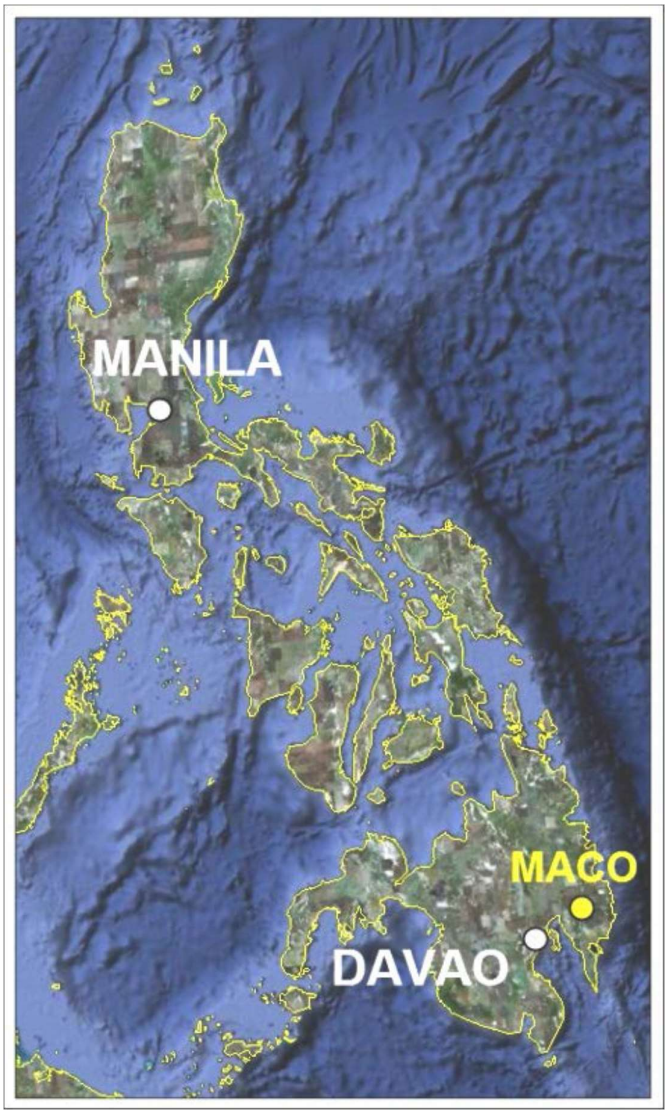
7.6.2. Receivables and payable sums to the company and mineral rights holder

There are no other receivables or payables as the company has 100% mineral rights on the property.

8. GEOGRAPHIC FEATURES

8.1. Location and Accessibility

The MPSA 225 and 234 contract areas are bounded by longitudes 126° 00’ 00” to 126° 03’ 21.8”E and latitudes 7° 20’ 05.33” N. It is some 950 aerial kilometers south-southeast from Manila and about 53 aerial km northeast of Davao City across Davao Gulf. From Manila, the area can be reached fastest and most conveniently by taking one of the daily commercial flights to Davao City then, from Davao, by land through the concrete-sealed Pan-Philippine (Maharlika) Highway by driving up north over a distance of some 74 km to the town of Mawab, Davao De Oro Province. From the Mawab highway junction, a 26-km road combination of concrete and gravel heads east- to southeastward following the Hijo-Masara river valley upstream. The Maco mine site is nestled at the upper reaches of Masara River within the adjoining barangays of Masara and Teresa in the Municipality of Maco, Davao De Oro Province.

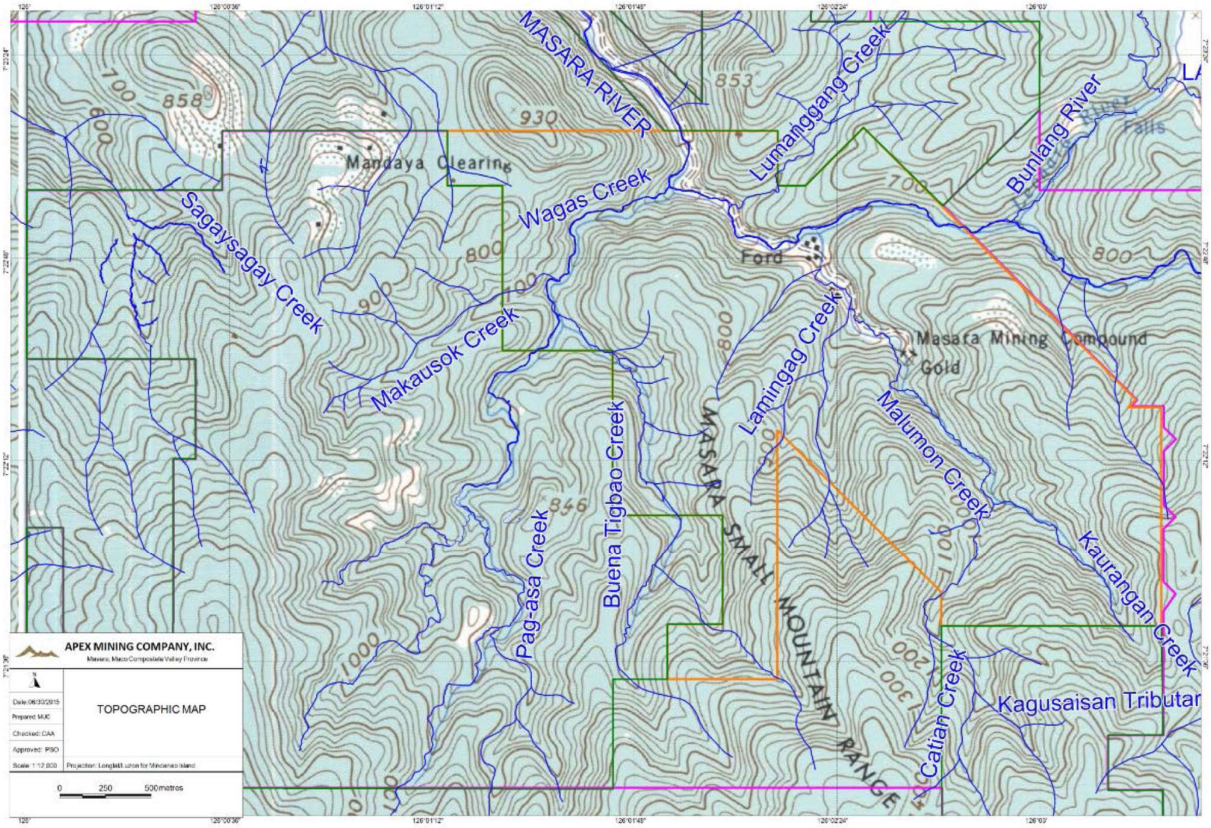


8.2. Topography, physiography, drainage, and vegetation

The contract areas occupy a generally rugged terrain with elevations ranging from about 500 to around 1300 meters above sea level. The terrain is characterized by deeply incised, V-shaped River channels with dendritic to radial drainage patterns in an early mature stage of geomorphologic development. Some geomorphologic features in the area indicate some structural controls.

The area is situated at the headwater portions of Masara River, the most dominant drainage system in the municipality of Maco. At its upstream portion, Masara is fed by its major tributaries consisting of Lumanggang, Bunlang, Malumon, Pag-asa-Kanarubi, Buena Tigbao, Wagas and Makausok creeks which drain the Contract area in a distinctly dendritic pattern. Masara River is one of the biggest tributaries of Hijo River, a major river system in Davao De Oro Province and Davao del Norte that drains also the municipalities of Mawab and Tagum. The Hijo River drains into the northern part of Davao Gulf.
Most of the areas within the tenement have been subjected to commercial timber operations in the past and most of the hardwood species are now gone. What thrives now on the mountain slopes are predominantly secondary- growth trees, locally named as buyo-buyo along with a lush tropical shrubbery with diverse species of vines and grasses that form the present vegetation cover.

Traditional swidden farming (slash and burn) is practiced by the indigenous Mansaka mountain tribe along with migrants from the lowlands. These resulted in scattered patches of clearings on the mountain slopes that are planted to rice, corn, coffee, coconut, bananas, and other seasoned crops.

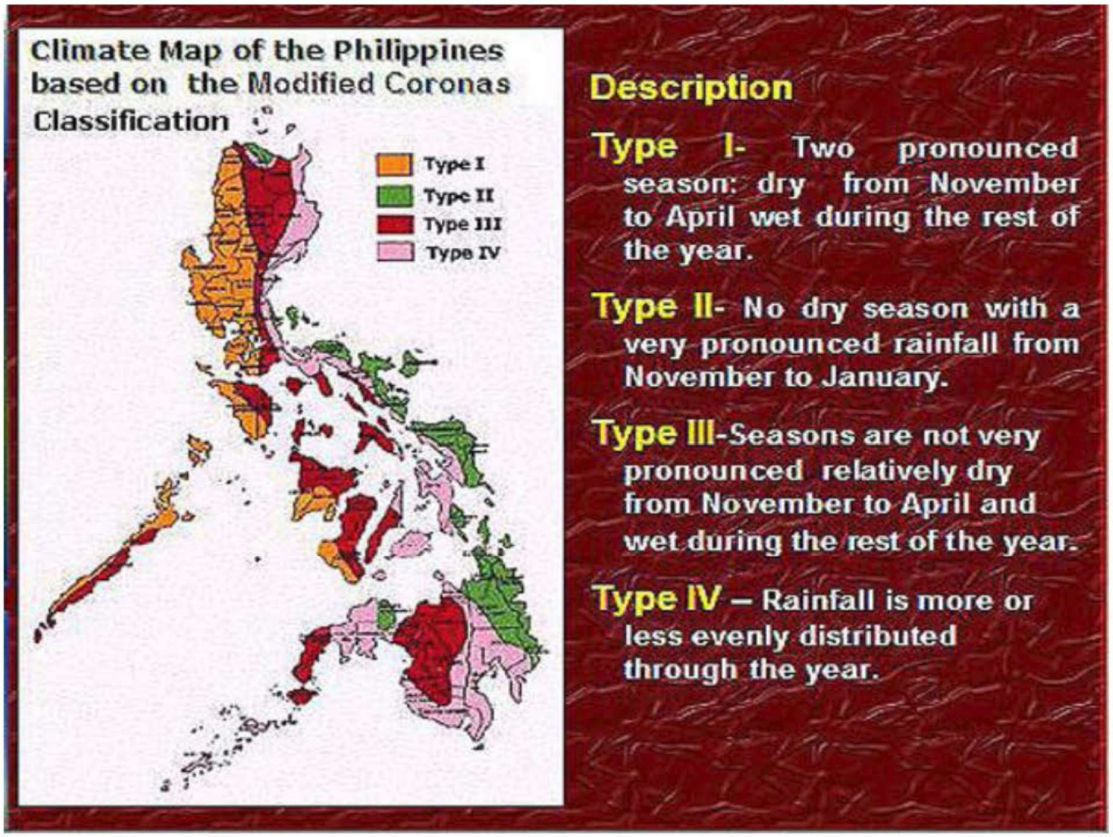


8.2.1. Topographic map showing tributaries of Masara River

8.3. Climate, population

8.3.1. Climate

The climate in Davao De Oro, as in the rest of Davao del Norte, Davao Oriental provinces and the Caraga Region, belongs to the Type IV climate system in the Modified Corona's Classification used by Philippine Atmospheric, Geophysical and Astronomical Administration (PAGASA). Type IV is characterized by no clearly- defined dry season with rains experienced almost throughout the year. However, the highest rainfall, equivalent to monsoon season, is usually experienced from October to February with the rest of the year relatively dry. The average annual rainfall determined in the general area based on rainfall records provided by the local PAGASA monitoring station is about 3,300 mm.



8.3.1.1. Climate Map of the Philippines

(From http://www.pagasa.dost.gov.ph)

8.3.2. Population

8.3.2.1. Birth and Death Rates

The Crude Birth Rate of Maco increased from 17.93 births per 1000 population in 2000 to 20.58 births per 1000 in 2010, an increase of 2.65 births per 1000 population. The municipality's Crude Death Rate, on the other hand, increased from 2.10 deaths per 1000 population to 3.90 deaths per 1000 population, an increase of 1.80 deaths per 1000 population over the same period (Table 8.3.2.1)

8.3.2.1.1. Crude Birth and Death Rates Municipality of Maco, Davao De Oro Province, 2000 to 2016

Year	Population	Birth		Death	
		No.	Rate/1000	No.	Rate/1000
2000	65,181	1,169	17.93	137	2.1
2001	66,936	1,036	15.48	140	2.09
2002	68,478	1,486	21.7	218	3.18

2003	70,056	1,402	20.01	122	1.74
2004	71,671	1,430	19.95	197	2.75
2005	73,322	1,545	21.07	334	4.56
2006	75,012	1,523	20.3	217	2.89
2007	70,906	1,627	22.95	247	3.48
2008	71,736	1,571	21.9	246	3.42
2009	72,575	1,326	18.27	285	3.93
2010	73,424	1,511	20.58	286	3.9
2011	79,283	1,339	16.88	287	3.61
2012	73,029	1,770	21.2	325	3.9
2013	74,490	1,685	20	270	3.2
2014	75,257	1,630	21.7	125	1.7
2015	81,277	526	6.47	325	3.99
2016	76,676	474	6.18	197	2.57

8.3.2.2. Morbidity and Mortality Rate

As far as the causes of morbidity and mortality incidence are concerned, acute respiratory tract infection is consistently the principal cause of morbidity in the municipality. Pneumonia, on the other hand, ranked first as the leading cause of mortality (Table 8.3.2.2)

Table 8.3.2.2 Morbidity and Number of Mortality per Cause Municipality of Maco, Davao De Oro Province, 2012-2014

Morbidity	No.	Morbidity	No.
Acute Respiratory Infection	5354	Pneumonia	101
Cerebrovascular Disease	194	Hypertensive Disease	46
Systemic Viral Infection	379	Malignant Neoplasm	17
Diarrhea and Gastroenteritis	1404	Fetal Death in Uterus	2
Wounds (all forms)	768	PTB	21
Parasitism	138	Ischemic Heart Disease	63
PTB	48	Unknown	91
Bronchitis	94	Transport Accident	19
Pneumonia	400	Other Form of Heart Disease	20

Source: Municipal Health Office, Maco

8.4. Land Use

The present land use of the area is generally subsistence-type agricultural or swidden farming with patches of the mountain slopes cleared of forest cover and planted to rice, corn, coffee, cacao, and various seasoned crops by the indigenous Mansaka tribe as well as by various settlers from the lowlands. The area has also been a traditional host to mining activities with Apex, North Davao and Hijo mines as the biggest mining operators in the district until about two decades ago when, due to low metal prices and other adverse factors, North Davao and Hijo mines were forced to shut down operations. Apex also barely survived the economic downturn. With the slowdown of large-scale mining, small-scale gold mining activities remained active in some parts of the Contract area which further intensified in recent years with the unprecedented rise in the price of gold in the world market.

Most parts of the Contract Area are within the timberland classification with some portions classified as alienable and disposable.

8.5. Socio-Economic Environment

Fifteen (15) public schools are offering purely primary courses, fifteen (15) public elementary schools, three (3) public secondary schools, and two (2) private schools offering secondary courses. There are no private nor public schools offering college courses except for vocational/technical courses on computer offered by the Maco Institute of Technology which is located in Maco town proper. The computer courses are part of the TESDA-assisted educational program.

The Maco Municipality operates a Main Public Health Center located at Barangay Binuangan along with 12 satellite barangay health centers located at various barangays. The Local Government Unit (LGU) at present has a part-time physician holding clinic and medical consultations at Barangay Masara at certain days of each week. The clinic serves the 15 upland barangays of Maco situated along the stretches of the Hijo and Masara river valley.

Probably because of its proximity to Tagum City, the capital of Davao del Norte which has several more advanced medical facilities, there are only a few private health clinics found in the town of Maco. There are only five (5) private clinics (one with 12-bed capacity) and one (1) private dentist, nine (9) medical practitioners, and nine (9) nurses, all situated in the town proper.

8.6. Environment features

The Masara mineralization has been correlated with a caldera system which has been recognized to be inherent geological and geo-morphological features of the district. The most prominent of these is the Lake Leonard caldera located to the east of Masara near the boundary with the adjoining North Davao tenement, where a crater lake, called Lake Leonard (named after Leonard Kniazzeff, a prewar American prospector of Russian descent who first documented it), remains one of the most unique geomorphological/ environmental features in the generally rugged landscape that characterized most of eastern Mindanao Cordillera.

This Lake Leonard National Park is a water-filled caldera and is the only National Park close to the MPSA contract areas of Apex.

9. PREVIOUS WORK

9.1. History of Previous Work

The following is the chronology of previous resource estimates done by Competent Persons (CP) over the Masara area:

- ***2017 UPDATE ON THE MACO GOLD PROJECT Compostela Valley, Philippines***
  By: ROLANDO PENA
  April 2017

  Scope of Work

  The scope of work is to review and audit the work of the Maco Geology and Technical Services Team.

  Summary

  The current exploration program is based on capturing historical data and creating a project-wide GIS, a 3D geological model for the mine operations and vein systems, and detailed surface mapping in the mine area. A surface and underground drilling program was started in late 2009 to extend known resources and to test the depth potential of vein and alteration systems identified through surface mapping and trenching and to verify previous work. The known porphyry copper systems are currently not being explored.

  The mine is currently producing approximately 4,200 ounces of gold per month at a milling rate of 1,800 tons per day. The milling rate increased by 300 tpd as compared to the 1,500 tpd milling rate in 2016. This is part of the planned expansion to a 3,000 tpd milling rate. The current global resource as of December 2016 is estimated at 428,800 ounces of gold (2,470,000 tons at 5.4 g/t Au) using a cutoff grade of 1.5 g/t Au. The resource is comprised of 430,000 tonnes at 6.5 g/t Au in the measured category, 910,000 at 5.4 g/t Au Indicated and 1,130,000 at 4.9 g/t Inferred. The categorization is deemed within acceptable limits as outlined in the PMRC guidelines.

- ***2017 REPORT FOR ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND, PHILIPPINES***
  By: RAUL B. CEZAR
  April 2017

  Scope of Work

  The scope of work is to review and audit the work of the Maco Geology and Technical Services Team.

  Summary

  This report is a public release report on the economic assessment and ore reserve estimation of Maco Mines owned by Apex Mining Co., Inc. under a new

management. It is designed to fully inform shareholders and the investment market of the Mineral Resources, Ore Reserves, and of the current activities and plans of Apex Mining Co. for the Maco Mines. This report follows on from the declared Mineral Resources of 2,460,000 tonnes at 5.4 g/t Au containing 426,900 ounces of gold within acceptable limits as outlined in the PSE – IRR PMRC guidelines. This is contained in the Technical Report signed by the PMRC-CP for Exploration results and Mineral Resource Estimation, Rolando E. Peña, in the 2015 Resource Estimate of the Gold Veins within the Maco Mine dated December 2016.
The total combined proven and probable reserves are 1,368,000 tonnes grading 7.10 g/t gold, accounting for a total of 312,540 in-situ ounces of gold and 250,000 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

- ***2015 RESOURCE ESTIMATE OF THE GOLD VIENS WITHIN THE MACO MINE***
  By: ROLANDO PENA
  AUGUST 2015

  Scope of Work

  The scope of work is to review and audit the work of the Maco Geology and Technical Services Team.

  Summary

  The current exploration program is based on capturing historical data and creating a project-wide GIS, a 3D geological model for the mine operations and vein systems, and detailed surface mapping in the mine area. A surface and underground drilling program was started in late 2009 to extend known resources and to test the depth potential of vein and alteration systems identified through surface mapping and trenching and to verify previous work. The known porphyry copper systems are currently not being explored.

  The Mine is currently producing approximately 3,000 ounces of gold per month with about 1,500 tons per day mined and milled, mainly from Sandy and Bonanza veins. The current global resource for the fifteen epithermal veins with face sample data as of August 2015, is estimated at 457,900 ounces (2,560,000 tonnes at 5.6 g/t Au). This is a 527,000-ton decrease on the February 2010 estimate with the production outpacing the resources that were replaced from continuing mine exploration and development. The resource is comprised of 213,000 tonnes at 8.7 g/t Au in the measured category, 505,000 at 8.4 g/t Au Indicated and 1,842,000 at 4.4 g/t Inferred. The categorization is deemed within acceptable limits as outlined in the PMRC guidelines.

- ***2015 REPORT FOR ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND, PHILIPPINES***
  By: RAUL B. CEZAR
  AUGUST 2015

  Scope of Work

The scope of work is to review and audit the work of the Maco Geology and Technical Services Team.

Summary

This report is a public release report on the economic assessment and ore reserve estimation of Maco Mines owned by Apex Mining Co., Inc. under a new management. It is designed to fully inform shareholders and the investment market of the Mineral Resources, Ore Reserves, and of the current activities and plans of Apex Mining Co. for the Maco Mines. This report follows on from the declared Mineral Resources of 2,560,000 tonnes at 5.6 g/t Au containing 457,900 ounces of gold within acceptable limits as outlined in the PSE – IRR PMRC guidelines. This is contained in the Technical Report signed by the PMRC-CP for Exploration results and Mineral Resource Estimation, Rolando E. Peña, in the 2015 Resource Estimate of the Gold Veins within the Maco Mine dated August 2015.

The total combined proven and probable reserves are 1,210,000 tonnes grading 7.86 g/t gold, accounting for a total of 305,800 in-situ ounces of gold and 244,600 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

- ***2010 RESOURCE ESTIMATE OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND PHILIPPINES***
  By: TOMAS D. MALIHAN
  FEBRUARY 2010

Scope of Work

The scope of work was to oversee, review, and audit the work of the Maco Geology team.

Summary

The exploration concept is based on an Arc Low Sulphidation model (Corbett 2004) for the Bonanza and Sandy Veins (main system currently mined at Maco Mine) and Arc High Sulphidation for the Sagay Sagay area.

The exploration program is based on capturing historical data and creating a project-wide GIS, a 3D geological model for the mine operation and vein system, and detailed surface mapping in the mine area. A surface and underground drilling program was started late 2009 to extend known resources and to test the depth potential of the vein and alteration system identified through surface mapping and trenching and to verify previous work. The known porphyry copper systems are currently not being explored.

The global resource for the known epithermal veins and their splits as of February 2010, is estimated at 585, 600 ounces (3, 087, 000 tonnes at 5.9gpt Au). This is a 268,000 tonnes increase on the January 2009 estimate with the full 14, 000 ounces of production being able to be replaced from continuing mine exploration and development. The resource is comprised of 694, 000 tonnes at 6.6 gpt Au in the Measured category, 1,435,000 at 5.9 gpt Au Indicated and 958, 000 at 5.5 gpt Inferred.

- ***2010 REPORT FOR ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF THE GOLD VEIN DEPOSITS OF MACO MINES IN MACO, DAVAO DE ORO PROVINCE, MINDANAO ISLAND, PHILIPPINES***
  By: Marcelo Bolaño
  April 2010

  Scope of Work

  The scope is to oversee, review, and audit the work of the Maco Technical Services Team.

  Summary

  The report follows on the declared Mineral Resources of 3.087 million tonnes at 5.9 g/t Au containing 585,600 ounces of gold within acceptable limits as outlined in the PSE – IRR PMRC guidelines. This is contained in the Technical Report of the PMRC-CP for Geology, T.D. Malihan, in his 2010 Resource Estimate of the Gold Vein Deposits of Maco Mines in Maco, Compostela Valley dated February 2010.

  A total combined proven and probable reserves are 1,110,000 tonnes grading 6.30 g/t gold, accounting for a total of 224,830 in-situ ounces of gold and 193,353 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

- ***APEX Mining Inc. Internal Resource Estimate***
  By: Scott McManus
  ASVI Contractor
  December 2011

  Scope of Work

  The scope is to report an internal resource estimate for the Maco Gold Project of Apex Minerals Ltd. The report is intended only for internal company usage and not intended for any public reporting or use for any kind of investment advice.

  Summary

  Resource Estimate for the Dons area;
  Indicated 2,100,000 tonnes at 6.1 ppm Au
  Inferred 690,000 tonnes at 5.5 ppm Au
  * At block cut off 1.5ppm Au
  Resource Estimate for the Maligaya area;
  Measured 1,100,000 tonnes at 5.0 ppm Au
  Indicated 410,000 tonnes at 4.4 ppm Au
  Inferred 2,740,000 tonnes at 4.2 ppm Au
  * At block cut off 1.5ppm Au

- ***RE-ESTIMATION OF THE 2011 RESOURCE OF MACO MINES LOCATED IN MACO, DAVAO DE ORO PROVINCE, SOUTHEASTERN MINDANAO ISLAND, PHILIPPINES***
  By: TOMAS D. MALIHAN
  RAMON A. L. FLORES
  MARCH 2012

  Scope of Work

  The scope of work is to review, audit, and, if found in order, certify the work of Apex's Technical Staff and its consultant who prepared the resource estimates.

  The CPs have relied mainly on the exploration data gathered by the technical staff and consultants of Apex including geological reports, plans, sections and statistical studies to arrive at the various resource estimates.

  Summary

  A surface and underground drilling program was started in late 2009 to extend known resources and to test the depth potential of vein and alteration systems identified through surface mapping and trenching, and to verify previous work.

  The vein systems of the mine from 2006 up to 2011 have reportedly produced approximately 830,000 tonnes of ore averaging 5.01 g/t Au.

  Re-estimation of the resource declared by Apex for Maco Mine used the geostatistical technique wherein the top cuts were determined for each vein's cumulative frequency histogram of assay values. Further, variogram ranges were used to classify resources: measured for those veins with both 1m composited face samples and drill hole intercepts and within the interpreted variogram range along strike; indicated up to twice of the variogram range as supported by geological continuity; and for inferred, the resource envelope of MacManus (2012) is used; all within the Apex supplied wireframe/ geological solid model. Each vein's average of specific gravity measurements were utilized, and if not available, the global average specific gravity was used. Ordinary Kriging was used to estimate 2.5x2.5x5m blocks, a size deemed suitable by Mine Operations staff. In this regard, the methodology adopted here appears to be more accurate than previous ones. Measured resources are marked both by composited face and drill hole samples. This was further modified due to geological considerations.

  The Mine's categorized resources for the 16 major vein systems /41 individually considered epithermal veins (where the vein and their splits' solids/wireframes are available) were determined. The pre-mining, undiluted resource in situ estimates are shown below:

  At 3g/t Au cutoff, the total undiluted pre-mining, in-situ resource is comprised of:
  140,000 tonnes at 8.4 g/t Au as measured;
  1,650,000 tonnes at 9.7g/t Au as indicated; and
  3,100,000 tonnes at 5.6 g/t Au as inferred.

At 1.5g/t Au cutoff, the total undiluted pre-mining, in-situ resource is comprised of:
190,000 tonnes of 6.7 g/t Au as measured;
2,240,000 tonnes of 8.1 g/t Au as indicated; and
3, 270,000 tonnes of 4.7 g/t Au as inferred.

- ***MACO RESOURCE ESTIMATE***
  By: ASVI TECHNICAL SERVICES GROUP LIMITED
  October 2012

Summary

Previous estimates have been completed for the Maco but they are not directly comparable to the current estimate due to the inclusion of different mineralized structures. Until 2009, estimates were mainly based on long section polygonal estimation. An estimate in 2011 appears to be the first estimate based on three-dimensional modeling of vein volumes and contemporary block modeling techniques.

Data available as at April 2012 for resource estimation consists of:

- Dons face samples: Face sample data collected during earlier phases of mining recovered by site geologists from hand-drawn plans.
- Maliagaya face samples: Face samples in structures currently being mined.
- Crew drilling: The previous mine operator (Crew Gold Corporation) carried out surface diamond drilling in the Malumon and Dons areas in 2006 and 2007
- Apex Dilling: Apex carried out surface and underground drilling in the Maligaya area during 2010 and 2011

Apex provided AMC with a single wireframe for each Arc Code interpreted from all available data including underground sampling, drilling, surface mapping, and compilation of structural geology. AMC used the wireframes and the true width of the structures indicated by sampling and drilling to produce separate hanging wall and footwall wireframes for each Arc Code.

The volume model was developed with the dual aim of representing the mineralized volume accurately and creating volume model parent cell dimensions at an appropriate size for grade estimation. It was initially developed with 5-meter x 5-meter cells that had a single cell of variable width across the vein. The model prototype was reset into a parent cell of 20-meter x 20-meter x 20-meter for estimation.

Estimation of the accumulation and the width was carried out using ordinary kriging using estimation parameters determined from the variography study. The accumulation and width were estimated into parent cells such that each sub-cell of a parent cell has the same values.

AMC reviewed the bulk density data (6,730 determinations) by Arc Code and assigned the average bulk density of each Arc Code to the corresponding vein. A global bulk density of 2.65 t/m3 was assigned to veins with no bulk density data.

All estimates for Dons veins have been classified as Inferred Resource because the provenance of the data is uncertain.

Veins with face sampling on close-spaced levels have been classified as Measured Resource. Halos around Measured Resource and veins with face sampling on wider-spaced levels have been classified as Indicated Resource. Halos around Indicated Resource have been classified as Inferred Resource but it has not always been extended to the limits of estimation where the available data are very wide-spaced.

- ***ESTIMATION OF THE 2012 GOLD RESOURCES OF MACO MINES LOCATED IN MACO, DAVAO DE ORO PROVINCE, SOUTHEASTERN MINDANAO ISLAND, PHILIPPINES***
  By: Ramon A. Flores
  Fernando G. Sajona,
  Darrel S. Ablaza
  Tomas D. Malihan
  September 2013

  Scope of Work

  The CPs have relied mainly on the exploration data gathered by the technical staff and consultants of Apex including geological reports, plans, sections and statistical studies to arrive at the resource estimates. This report, therefore, could only be as good as the data provided “as-is” to the CP. The objective of this work is to present a PMRC-compliant Resource Estimation Report in the Philippine Stock Exchange-prescribed format that meets the guidelines set by PMRC

  Summary

  An estimation of the resource used the geostatistical technique wherein the top cuts were determined for each vein’s cumulative frequency histogram of assay values. Further, variogram ranges were used to classify resources: measured for those veins with both 1m composited face samples and drill hole intercepts and within the interpreted variogram range along strike at 50m; indicated up to twice of the variogram range or at >50 to 100m as supported by geological continuity; and for inferred, the resource envelope beyond 200m to <=down dip of the vein and greater than 100m to <=200m the variogram range were used. Each vein’s updated average of specific gravity measurements was utilized, and if not available, the global average specific gravity was used. Ordinary Kriging was used to estimate 2.5x2.5x5m blocks, a size deemed suitable by Mine Operations staff and supported by variography. In this regard, the methodology adopted appears to be more accurate than previous ones. The Mine’s categorized resources for the 5 major vein systems and the pre-mining, undiluted resource in situ estimates are shown below:

At 3g/t Au cutoff, the total undiluted pre-mining, in-situ resource is comprised of:
412,000 tonnes at 6.90 g/t Au as measured;
80,000 tonnes at 3.58g/t Au as indicated; and
90,000 tonnes at 4.12 g/t Au as inferred.

COMBINED WEIGHTED TOTAL: 582,000 tonnes at 6.01g/t Au
(Measured + Indicated + Inferred)

At 1.5g/t Au cutoff, the total undiluted pre-mining, in-situ resource is comprised of:
631,000 tonnes of 5.43 g/t Au as measured;
160,000 tonnes of 3.08 g/t Au as indicated; and
90,000 tonnes of 4.12 g/t Au as inferred.

COMBINED WEIGHTED TOTAL: 881,000 tonnes at 4.87g/t Au
(Measured + Indicated + Inferred)

9.2. Brief description of the essential works carried-out by previous workers

Since the discovery and operation of the gold-based metal quartz veins by Davao Gold Mining Company, it expanded its operations in the area by initially utilizing the nearby 250-tpd flotation-cyanidation plant. Exploration and development activities followed intermittently, undertaken by the other Elizalde and Co. subsidiaries that include Panaminas Inc., Masara Mining Co., and Samar Mining Co. (SAMICO).

By 1953, Davao Gold Mining Company had blocked sufficient gold reserves that warranted the construction of a 70-tpd gold processing plant. However, it was only later in 1955 under SAMICO that the Masara Gold Project evolved into a producing mine with the construction and commissioning of a 250-tpd flotation/cyanidation plant.

Paul Ortega, the previous chief geologist reported that the SAMICO-initiated exploration works resulted in the discovery of additional copper deposits within the company's tenement which is also part of MPSA 234. Their open-pit copper before was located near Theresa area which encouraged the management to decide to shift to copper mining and productions in 1957. The old gold mill was converted into a copper ore processing plant that operated at 1,000tpd capacity. The copper operation continued even after Apex Mining Company purchased the property from SAMICO in 1973. In late 1974, the price of copper in the world market collapsed and Apex eventually decided to suspend all copper mining activities in Masara. However, despite the downturn in the copper market, Apex persisted in carrying out systematic exploration programs, albeit intermittently, in the known gold- and copper-bearing areas from 1975 to 1978. The exploration campaign yielded a drill-delimited resource estimated at 89M mt averaging 0.40% Cu and 0.40 g/t Au for the combined Mapula, Kurayao, and Teresa porphyry copper-gold deposits. The exploration efforts of Apex were also able to delineate an estimated 6,259,500 mt of epithermal-type gold-based metal quartz veins resource averaging 8.91 g/t Au for Masara Mines. Apex focused its activities in the Masara, Wagas, and Hope vein

areas where, from 1976 to 1989, the Company produced 573,022 oz of gold from about 3.5Mmt of gold ores extracted from these three veins.

In 1991, the mining operation was forced to stop due to festering labor disputes compounded by prolonged depressed gold prices. Apex carried out only limited activities including small-scale mining operations during most of the early 1990s.

In 1995, Base Metal Mineral Resources Corporation (BMMRC) signed a Mines Operating Agreement (MOA) with Apex to evaluate and develop Masara Mines. BMMRC commissioned ACA Howe International Limited to appraise the potential of the 11 known major veins found in the property. ACA Howe came out with an estimated global (underground) reserves totaling 2.589 million tonnes averaging 6.21 g/t Au. BMMRC started initially at 350tpd milling rate using the old Apex Flotation/CIP Mill with a plan to eventually increase the milling rate to 1000tpd. However, in 1997, the MOA between BMMRC and Apex was terminated when BMMRC decided to give up its option on the property. Left on its own, Apex initiated exploration and development work on the veins including those not previously worked by BMMRC.

In 2000, Apex decided to stop its mining operation in the face of continuing losses and prolonged uncertainty in the gold market.

In 2003 Apex entered into separate operating agreements with Goldridge Mining Corporation, Viclode Mining Corporation, and Mintricor, Inc. Goldridge worked the Masara and Manganese veins while Viclode operated the various levels of the “Don” veins. Mintricor, on the other hand, initiated plans to re-work some of the tailings, however, for some reasons, it was never able to advance the project to the operation stage;

On August 24, 2005, Crew Gold Corporation (Crew Gold) and its local subsidiary, Mapula Creek Gold Corporation, signed with Apex a Definitive Agreement to purchase the latter’s 72.8% shares in the company. The formal transfer of shares and ownership was completed on December 14, 2005.

In 2005, Snowden was commissioned by Crew Gold to review and evaluate the resource of Apex Mines and prepare an updated resource estimates for Apex. In its report to Crew Gold, Snowden concluded that there was substantial potential for new resources at Apex Mines that could sustain a viable gold mining operation beyond the 7.5 years projected mine life.

This was premised on Snowden’s observation that there were structures, both old and “new”, not included in the first estimate and which, with additional exploration, could probably increase the resource/reserve, substantially. Crew Gold carried out an intensive exploration work program to evaluate the contract area by surface mapping, surface, and underground sampling. Also, as part of Snowden’s recommendation, Crew Gold carried out an exhaustive drilling program to gather further information on the known gold veins and their continuance along strike and dip. This program also aimed to gather more subsurface data to justify elevating inferred resources into higher categories that would be useful to mine planners and the mining operation staff. The work program also included rehabilitation works of

old underground workings, mine development, and achieving production within 2006. In December 2006, Crew Gold refurbished and commissioned the Apex gold processing plant.

In November 2009, Crew Gold sold its rights to Mindanao Gold, a wholly-owned subsidiary ASVI, a Malaysia-listed exploration, and mining company. ASVI subsequently renamed Masara Mines as Maco Mines in recognition of the host municipality, Maco, rather than just the host barangay, Masara. The Maco Mine geological staff and its consultant firm ASVITSG, an ASVI subsidiary, have been working on the verification and confirmation of the resources declared by Crew Gold in the Maco Mine area and are also exploring aggressively to find additional resources within the known structures. The Team had been working to capture and verify all data for a geostatistically-based computer model of the deposit which could assist in better definition of ore shoot morphology and predictability. The exploration efforts were also geared in the identification and discovery of hitherto, unknown gold-bearing structures, and porphyry copper deposits.

Apex Mining Company, Incorporated with its reaffirmation of the Company's advocacy for responsible and sustainable mining, and in compliance with DAO 2015-07 (requires all mineral agreement holders who are engaged in metallic operations to secure the ISO 14001 certification) conferred its ISO 14001:2015 Environmental Management System certification last September 30, 2016, under the certifying body, Certification International Philippines, Inc.

9.3. Conclusions of each of the previous workers

Table 9.3.1 presents a summary of the various resource estimates made for the Masara mines along with the classifications or codes and other notes. Citations in the text are in the references section, which may include other reports and communications cited elsewhere in this work.

9.3.1. Previous resource estimates and codes to classify and methodologies

Year	Author(s)	Reserve or Resource	Methodology	Applicable Code used to classify	Notes
2017	Rolando Pena	Resource	Ordinary Kriging, Geostatistical	PMRC	
2017	Raul Cezar	Reserve	Ordinary Kriging combined with block filtering	PMRC	
2015	Rolando Pena	Resource	Ordinary Kriging, Geostatistical	PMRC	
2015	Raul Cezar	Reserve	Ordinary Kriging combined with block filtering	PMRC	
2012	Malihan and Flores	Resource	Geostatistical	PMRC	41 Selected Veins, updated SPGR per vein; strike,dip and plunge considered as with QAQC
2011	McManus	Resource	Inverse Distance		Geological Model Update
2009	TMalihan	Resource	Review of Tsantos	PMRC	Classifies and provides a report stating the 2009 Resource to be PMRC Compliant
2009	Tsantos	Resource	Long Section, Polygonal method (Avg Grade per Block)	Categories used are based on USGS 1980 code but reports as NI 43-101 compliant by Crew gold and PMRC compliant by Apex to respective Stock exchange	Very conservative with most of the resource being readily converted to reserve. Reviewd by TDMalihan, Cp Geology. Not compliant as no report presented
2007	Jensen and Peters	Resource	Long Section, Polygonal method (assigned grade per block with payability penalty)	Code is not specified but reported as NI 43-101 compliant Crew gold	Conservative but then some infered blocks go beyond the scope of the methodology stated to bulk out of inferred resources. Report is not suitable for a compliant format.
2006	SDDominy	Resource	Long Section, Polygonal method (assigned grade per block with payability penalty)	NI 43-101	
2004	MGB	Reserve	Long Section, Polygonal method (Avg Grade per Block)	Claims to be JORC compliant but Snowden says it is not	
2001	Apex	Resource (stated as Reserve)	Long Section, Polygonal method (assigned grade per block with payability penalty)	Roughly USGS 1980	SG 2.45 t/m3
1995	ACA Howe	Resource + Reserve	Long Section, Polygonal method (Ave Grade per Block)	USGS 1980	SG 2.5 t/m3

9.3.2. Global Resource Tonnage and Grade reported

	Number of veins included in the resource	Global Resource Tonnage	Grade (g/t Au)
Rolando Pena, 2017	12 major and splits	2.5Mt	5.4 @ 1.5g/tCutoff
Raul Cezar, 2017	12 major and splits	1.4Mt	7.10g/t
Rolando Pena, 2015	12 major and splits	2.5Mt	5.6 @ 1.5g/tCutoff
Raul Cezar, 2015	12 major and splits	1.2Mt	7.8g/t
Malihan and Flores 2012	41 major and splits	6.6Mt	5.9 @1.5g/tCutoff
MacManus 2011	46 major and splits	7.0Mt	5.0 @1.5g/tCutoff
Malihan, 2010	14 major veins	3.1Mt	5.9 @3.0g/tCutoff
Apex, 2009	14 major veins	2.8 Mt	5.7g/t
Crew, 2007	14 major veins	10.4Mt	6.1g/t
Snowden, 2006	14 major veins	5.7 Mt	6.3g/t
MGB, 2004	11 major veins	6.1 Mt	7.8g/t
Apex, 2002	11 major veins	5.9 Mt	7.1g/t
Howe, 1995	11 major veins	2.6 Mt	6.2g/t
LMMCL, 1994	12 major veins	4.3 Mt	5.9g/t

10. HISTORY OF PRODUCTION

10.1. Production History of Apex Mines (Excluding MPSA 234)

From 1976 to 1989, Apex extracted 573,022 ounces of gold from about 3.5 M mt of gold ores.

In 1991, operations were forced to stop due to festering labor disputes aggravated by prolonged depressed gold prices, Apex carried out only limited to small scale mining operations until 2000 when mining activity was finally suspended.

In 2003, Apex entered into separate operating agreements with three mining contractors, Goldridge Mining Corporation, Viclode Mining Corporation, and Mintricor Inc. Apex got a percentage of the contractor's gold production as per contract agreement.

From 2005 when the operation was revived under Crew Gold, and up to October 2009, Apex produced a total of 45,929 oz of Au and 150,707 oz of Ag.

From November 2009 to 2012, Apex under ASVI (Mindanao Gold), produced a total of 79,570 oz of Au and 386,141 oz of Ag.

From January 2013 to 2019, Apex under Monte Oro produced a total of 346,526 oz of Au and 848,432 oz of Ag. Monte Oro came in as a majority in November 2013.

10.2. Areas mined within the Tenement Area

The copper ores were mined from the Kurayao and Wagas areas while the gold mined from the mid- 1970s to 1980s was produced from the several vein systems within the tenement particularly from the Hope veins, the Don veins and the Wagas- Masarita veins.

Starting in 2005, when Crew Gold took over, development and mining were concentrated in the Maligaya and Malumon areas, wherein the Bonanza, Masara, and Sandy vein systems were the major sources of gold ores.

At present, the development and mining were given attention to areas of Maligaya, L870, Barabadan, and Masarita area. The vein systems that are producing ores from stoping and were actively being developed as well are Bonanza hwsplit (BHWS), Sandy North (SDN), SDN slit, and Sandy.

Since the last estimation, the company expands its development to reach areas potential for additional reserves such as Jessie vein, SDN2, MST2 split, a lower extension of BHWS, and several SDN Splits. This resulted in several tons mined outside the reserve, though this was unintentional, the opportunity to the delineation of new areas was considered to gather additional information. Promising veins were developed simultaneously in different levels. The development ore extracted from such areas was considered as incidental ore while stoping tons were treated as normal ores. The table below shows the number of tons mined outside reserve since the previous reserve estimation.

Table 10.2.1. Tons Mined Inside and Outside Reserve per Year

	2017				2018				2019			
	Stope		Stope		Stope		Stope		Stope		Stope	
	Inside		Outside		Inside		Outside		Inside		Outside	
Vein	Tons	grade	Tons	grade	Tons	grade	Tons	grade	Tons	grade	Tons	grade
BHWS	23,517	7.74	-	-	33,538	6.40	-	-	11,253	4.82	1,543	5.98
SDN	87,755	6.61	19,637	6.19	112,612	6.18	25,745	5.98	55,667	3.78	78,641	4.42
SDN Split	-	-	11,858	4.12	-	-	7,939	3.15	-	-	16,377	4.67
BNZ	-	-	-	-	-	-	-	-	-	-	-	-
MAS	-	-	-	-	2,516	7.50	-	-	3,040	3.51	-	-
MST2	26,577	4.92	72	2.26	1,820	5.06	10,149	5.75	-	-	4,340	3.11
MST2 Split	-	-	-	-	-	-	3,899	6.95	-	-	14,687	4.59
SDN2	-	-	-	-	-	-	7,660	5.09	-	-	34,168	5.13
MAI	13,679	4.45	-	-	2,591	4.21	2,743	3.51	716	1.92	314	1.50
MAI Split	7,337	4.56	-	-	7,005	6.66	3,538	5.81	135	3.40	-	-
WGS	2,432	5.26	-	-	850	2.01	-	-	-	-	270	1.49
DNC	-	-	1,487	2.43	-	-	811	2.89	-	-	-	-
Subtotal	**161,298**	**6.20**	**33,054**	**5.27**	**160,932**	**6.20**	**62,484**	**5.37**	**70,811**	**3.91**	**150,341**	**4.59**
% Outside Reserve			2.42%				4.57%				10.99%	

The number of tons mined outside reserve didn't exceed beyond 15% having only 10.99% as the highest percentage in 2019. This newly delineated areas will be included in this year's reserve estimation. The company will continue to find ore replacement by delineating new areas with resource/reserve potential.

10.3. General description of mining, ore beneficiation, concentrate, mineral product market

Several mining methods have been employed throughout the years of mining operations in the Masara District. The first two decades of mining employed the conventional shrinkage method.

In the late 2000s, the ore was primarily extracted through cut-and-fill. In areas where the vein is thin, conventional mining was done like modified shrinkage. In the middle of 2010, long hole mining was introduced.

Other mining methods, such as the modified shrinkage method is used where it is applicable. Ore then goes through primary and secondary crushing before proceeding to a two-stage milling- rod mill and ball mill.

After grinding, the ore goes through the thickeners followed by gold and silver recoveries by cyanide leaching and absorption to activated carbon in the CIL tanks. The loaded carbon will then undergo stripping and the precious metals deposit onto steel wools, after which, recovered sludge will then be refined by smelting. The final product is doré which usually contains 14-20% Au, 75-80% Ag, and 1-5% other elements.

10.4. Tonnage mined and metals sold

10.4.1. Tonnes mined and milled at Maco by Apex Mill production

Month / Year	Tonnes Mined				Tonnes Milled	Mill Head	
	Ore	Au, g/t	Waste	Total		Au	Ag
December 2006	13,129	4.07	66,379	79,508	1,529	4.29	18.72
2007	78,077	3.83	228,609	306,686	84,965	3.17	13.59
2008	166,971	4.59	85,642	252,613	171,760	4.59	20.99
2009	148,417	5.88	52,048	200,465	151,320	5.09	32.69
2010	214,650	5.24	117,678	332,328	192,586	4.92	30.78
2011	208,849	4.99	165,499	374,348	202,581	4.73	32.01
2012	234,033	3.90	139,840	373,873	233,096	3.8	22.4
2013	289,015	4.78	253,350	542,365	280,451	3.66	22.7
2014	258,596	6.01	286,282	544,878	234,928	3.89	21.85
2015	438,424	5.61	266,057	704,481	316,147	5.42	34.39
2016	514,327	6.06	203,111	717,438	452,948	4.68	29.98
2017	509,066	5.24	155,182	664,248	578,892	3.91	22.86
2018	665,797	4.94	267,077	922,874	611,188	4.24	22.44
2019	573,611	3.74	241,001	814,612	711,788	2.18	19.00
Total	**4,302,962**	**5.03**	**2,527,755**	**6,830,717**	**4,224,179**	**3.98**	**24.56**

10.4.2. Apex Mill Production

Month / Year	Bullion, Au oz	Bullion, Ag oz
December 2006	133.9	439.1
2007	7,229	21,791
2008	21,619	60,181
2009	20,727	79,968
2010	25,659	113,007
2011	26,256	146,294
2012	23,877	116,071
2013	26,797	151,830
2014	28,691	159,561
2015	43,139	227,417
2016	54,681	309,623
2017	60,185	315,447
2018	70,564	328,797
2019	62,468	353,627
TOTAL	**472,028**	**2,284,054**

11. REGIONAL AND DISTRICT GEOLOGY OF MASARA GOLD DISTRICT

The Company's tenements are located in the known gold district of Masara that belongs to the richly endowed East Mindanao Ridge (EMR). The EMR has been a major mining region since before World War II and still the favored dwelling locality for gold and other precious metal hunters. The EMR is part of the Pacific Cordillera of Mindanao Arc that extends from the Au-Cu province of east Mindanao to the Jose Panganiban-Paracale gold district in Camarines Norte in Southern Luzon and the Baguio-Mankayan mineral district in Central Cordillera of Northern Luzon. The East Mindanao Au-Cu province is roughly 300 km and comprises of micro blocks that correspond to the three Au-Cu districts namely; the Surigao District, the Central District, and the Masara District.

The dominant structural feature in the region is the Philippine Fault Zone (PFZ), a major regional structure that extends for 1,200 kilometers from southern Mindanao to northern Luzon in a north-northwesterly direction. This major wrench structure is generated by the oblique subduction along the Philippine trench and absorbs stresses from the opposed plate motions not accounted for by the subduction and has created a long-lived extensional tectonic regime within which all the known major gold and copper districts are situated (Pubelier et. al.1991, and Quebral, 1994). The EMR straddle the PFZ which provides the main source of Tertiary volcanism and mineralization. Locally, gold mineralization is controlled by strike-slip faults parallel to the Philippine Fault or splay structures off the rift fault and dilationary structures that develop orthogonally to the main structures as a result of strike-slip movements on structures parallel to the PFZ. The Masara District, which includes the known Masara-Hijo-Amacan copper-gold deposits, is situated in what appears to be a dilational jog of the Philippine Fault within caldera structures.

The geology of the region comprises an Early Tertiary ophiolitic basement overlain by andesitic lavas and pyroclastic beds, sandstone, shale, conglomerate, and limestone. The volcano-sedimentary sequence is intruded by Late Tertiary dacite and quartz diorite plutons. The lithology are herein arranged from oldest to youngest, including a) Pre-Cretaceous Basement Complex consisting of amphibolites, schists, and serpentinites, b) Cretaceous-Paleogene Sediments - Basic Volcanics (Masara Formation), c) Paleogene-Oligocene Sediments, d) Lower to Upper Miocene Limestone, e) Pliocene to Pleistocene Volcanic Flows and Pyroclastics and f) Quaternary Alluvium.

The older rock sequence that includes the Pre-Cretaceous basement complex through the L-U Miocene Limestone layer is intruded by Middle to Late Miocene quartz diorite stocks and dikes; Middle Miocene to Pliocene microdiorites, aplites and plagiophyric andesites; and Pliocene to Pleistocene andesitic to dacitic volcanics such as plugs, domes, hypabyssal - plagiophyric dikes and pyroclastics (Malihan et al,2011).

The emplacement of later and deeper diorite intrusives along the main northwest structural trend in the district probably accounted for the source of hydrothermal fluid emanating from dioritic magma. The hydrothermal fluids, during the later intrusive phase, partially replaced the metasediments and volcanics and gave way to the gold and copper mineralization found in the district.

11.1. Stratigraphy

Apex area is basically underlain by the oldest rock unit in the district known as the Masara Formation of about Pre-Tertiary in age. It is characterized by metamorphosed intercalated basaltic andesite to andesite flows with occasional occurrence of interbedded sedimentary package observable in the southwestern portion of the tenement. Overlying the Masara Formation is the Paleogene to Oligocene Hijo Formation which consists of volcanic flows, pryroclastics, and volcaniclastics with associated calcirudites and calcarenites and locally contains bodies of serpentinites. The Hijo Formation is conformably overlain by the younger Limpacan Limestone, dating to the Lower Miocene and can be well observed in Limpacan Area, near Barangay “Onse”, forming sheer walls and sharp ridges. Masara and Hijo Formations are intruded by the following intrusives: (1) Middle to Late Miocene quartz diorites which occur as mini-stocks, hybrid dikes, cupolas and apophyses; (2) later microdiorite, aplite, and feldspar porphyry dikes; (3) Pliocene to Pleistocene andesite to dacite plugs, domes, and hypabyssal dikes; and (4) pre- and post-ore Plio-Pleistocene plagiophyric dikes (bird’s eye porphyry). The quartz diorite unit is light-colored, phaneriticporphyritic, and composed of plagioclase, quartz, hornblende, and minor pyroxene. While, the pre- and post-ore andesite to dacite porphyry dikes contain phenocrysts of plagioclase, quartz, hornblende, and biotite set in a granular matrix of sodic plagioclase and quartz. Abound in most, if not all, high ridges in the area are loosely unconsolidated pumice-rich pyroclastic deposits. This young volcanic rock surrounds the caldera of the Leonard Knaissef volcano, representing the deposit of the latest volcanic activity in the area.

11.2. Structural Geology

11.2.1. Regional Geology of the Masara Gold District (modified from RA Flores and TD Malihan, 2013)

a) a steep NE-dipping, NW-trending left-lateral strike-slip faults representing local sections of the Philippine Fault System;

b) a large Valles-type caldera (Sillitoe and Bonham, 1984) or volcanic center (Shimron, 1981; Esguerra, 1982), with the periphery apparently defined by a ring (crescentic) fault zone;

c) a less dominant set of second-order NW and NE conjugate faults, and

d) a N-S system of gravity faults.

The thrust faults (mostly post-ore?) were recognized also as fairly distributed at the central area and where, toward the area's perimeter, the thrusts generally dip away from the volcanic center. Thrusting movements definitely took place before the Pleistocene. A few minor sub-parallel sets of folds with northerly to north-northwesterly axes are found at Masara proper as well as southwest and west of Apex claims (Mercado et al, 1987).

The Masara gold-copper deposits have been inferred to be apparently situated within a dilational jog, along a splay of the Philippine Fault and within or at the peripheries of the postulated Masara Caldera. The dilational jog mainly consists of NW to WSW- trending left-lateral strike-slip faults that were later infilled by gold-based metal quartz veins and plutonic to hypabyssal intrusives. The strong parallel structural pattern (i.e., major NW and NE conjugate fractures) is probably the result of a left-lateral strike-slip couple created by an approximately E-W trending primary compressive stress (sigma 1). The stress field responsible for this structural pattern must have had a maximum E-W compression with consequent maximum strain directed to the north, giving rise to the dominant second-order NW and NE faults.

Slightly re-oriented pressures formed the less dominant set of second-order shears and minor north-trending folds, while north striking central Masara fractures that were subsequently converted to high angle gravity faults arose from the relaxation of stress (Mercado et al, 1987).

This structural scenario would likely develop dilational portions along the WSW-ENE portions of the NW to WSW-trending sinistral strike-slip faults. The sudden relaxation of the E-W directed primary compressive stress could develop NS- to NNE-trending normal faults. This structural analysis is supported by the prolific occurrence of gold and base metals along the WSW-ENE bends of the vein systems. Similarly, the porphyry Cu-Au deposits are emplaced along NS to NNE-trending structures which are apparently controlled by thrust and normal faults.

Coller (2011) made an exhaustive study of the structural setting of the Masara District in relation to the regional tectonic setting and the characteristics of the major vein systems found in the district (see Figure 11.3.1).

The major structural features defined within Apex's MPSA area and its general vicinity consist of 1) NW-trending, steep NE-dipping left-lateral strike-slip faults

correlated with and representing the local segments of the Philippine Fault System; 2) a large Valles-type caldera or volcanic center, the periphery of which is defined by a ring fracture zone; 3) a north-south system of gravity faults, and; 4) a less dominant set of second-order northwest-northeast conjugate faults. Post-ore thrust faults are fairly well-distributed central to the area; toward the area's perimeter, the thrust fault generally dips away from the volcanic center.

A few minor sub-parallel sets of folds with northerly to the north- northwesterly axes are also found at Masara proper as well as west to southwest of the Apex tenement. The NW-trending fault system is most dominant near the caldera center and its structures have been generally paralleled, if not followed, by an inner set of major auriferous quartz veins. Some of the gold-bearing veins and the known porphyry copper-gold deposits follow the conjugate northeasterly faults and the peripheral ring fracture system.

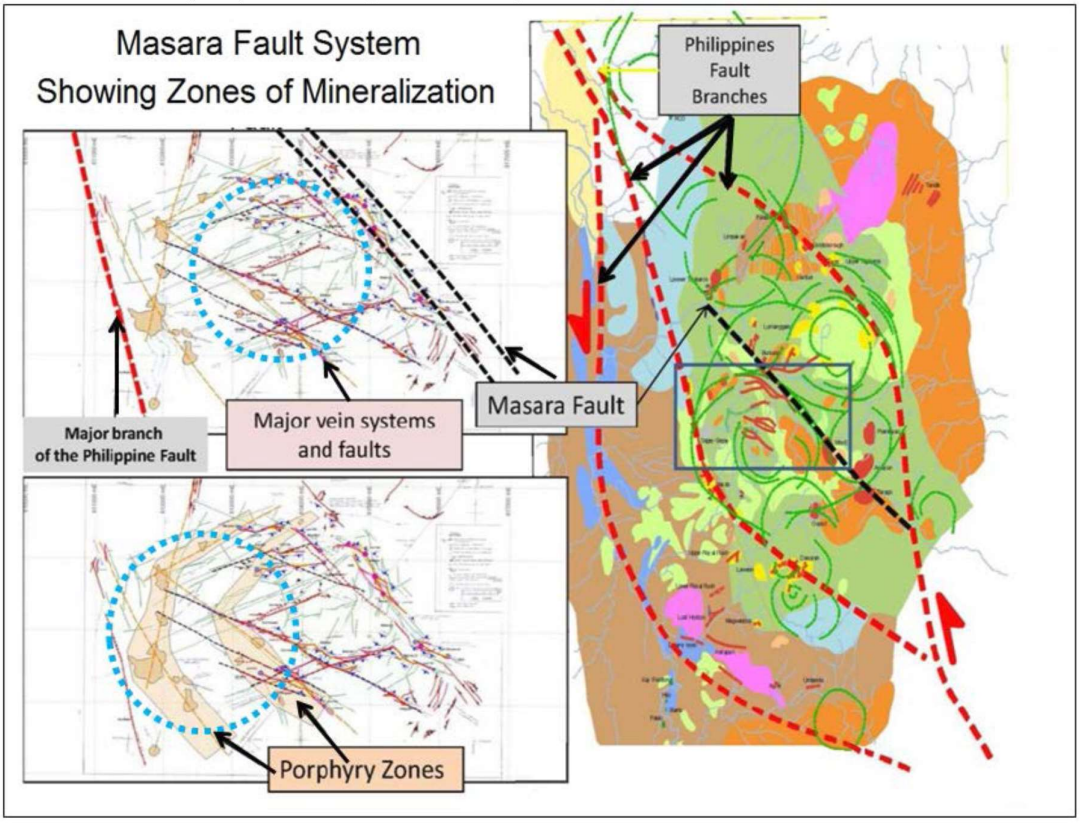


Figure 11.2.1 Regional Geology of the Masara Gold District (modified from RA Flores and TD Malihan, 2013).

The Apex tenement is situated specifically at the southern Pacific Cordillera of Mindanao Arc (PCA) - terrane and along with the early to mid-Tertiary calc-alkalic to high potassium diorite intrusive and co-magmatic andesite complex which is typical of the Masara Gold-Copper District.

The Masara District, which includes the known Masara-Hijo-Amacan copper-gold deposits, is situated in what appears to be a dilational jog of the Philippine Fault Zone within caldera structures.

12. MINERAL PROPERTY GEOLOGY

12.1. Geological work undertaken by the company in the property including scale of mapping and laboratory tests undertaken for the samples

Apex (under Crew Gold) engaged an extensive exploration drilling campaign in 2005 with a total of 212 coring holes with length reaching 43,760 meters until December 2007. Another additional drilling campaign was made possible in late 2009 with underground and surface drill rigs to further prove extensions of known veins at vertical depth and horizontal strike lengths.

Geophysical surveys were also conducted in the third quarter of 2006 which includes Induced polarization (IP) and magnetic survey. With the geophysical survey was a grid soil sampling at 25-meter grids along the IP gridline. A 1:2000 scale map was generated from these surveys. In December 2012, an additional Airborne Geophysical Survey was conducted at Apex tenement by the Thomson Aviation with a total of 31 flights.

In 2014, surface and underground mapping at the company's claim were consistently conducted until at present. The mapping underground was concentrated at the ore producing area such as Bonanza, Bonanza hanging wall split, Sandy North, and Sandy Veins while the surface mapping focused on other priority vein systems like extensions of Sandy veins and its splits, Sandy North and Bonanza hanging wall split. All underground mapping works were compiled at 1:250, 1:500, and 1: 1000 scale maps. For the detail and semi-detailed surface mapping, it was plotted and compiled at 1:500 and 1:1000 scale maps.

Since 2007, mining operations in MPSA 225 took regular face samples every 1.2 meters to 2 meters or on every underground blasting advance. Sampling of raises and stopes were also conducted in every advance or approximately 1 meter.

12.2. Local Geology

The Maco geological setting is characterized by a suite of shallowly eroded volcanic, subvolcanic intrusive complex and sedimentary package. This regionally disposed dominantly massive andesitic and volcaniclastic country rock package (Masara Formation or MF) is cut by high-level intrusive (Masara Intrusive Complex or MIC) and a later sub-volcanic intrusive complex (Amacan Volcanics or AV) (Figure 12.2). The multi-phase intrusive suite comprises predominantly of diorite, with subordinate stock-like bodies of andesite porphyry. The sub-volcanic complex is equally multi-phase with stock-like bodies of dacitic and andesitic composition extensively widespread towards the north and apparently emplaced at a later phase than the intrusions.

These volcanic, intrusive and sub-volcanic complex that host various vein-style gold mineralization has once been subaerially emergent and shallowly eroded.

An apparent erosional unconformity or paleosurface can be found in the western part of tenement along the contact of MF and the overlying presumably younger basal conglomerate. This paleosurface is now represented by a thin layer of poorly

consolidated dominantly carbonaceous mudstone which underlies thick limestone capping. Together, the limestone and its basal clastic sediment package forms part of the district-wide Masara Limestone (ML).

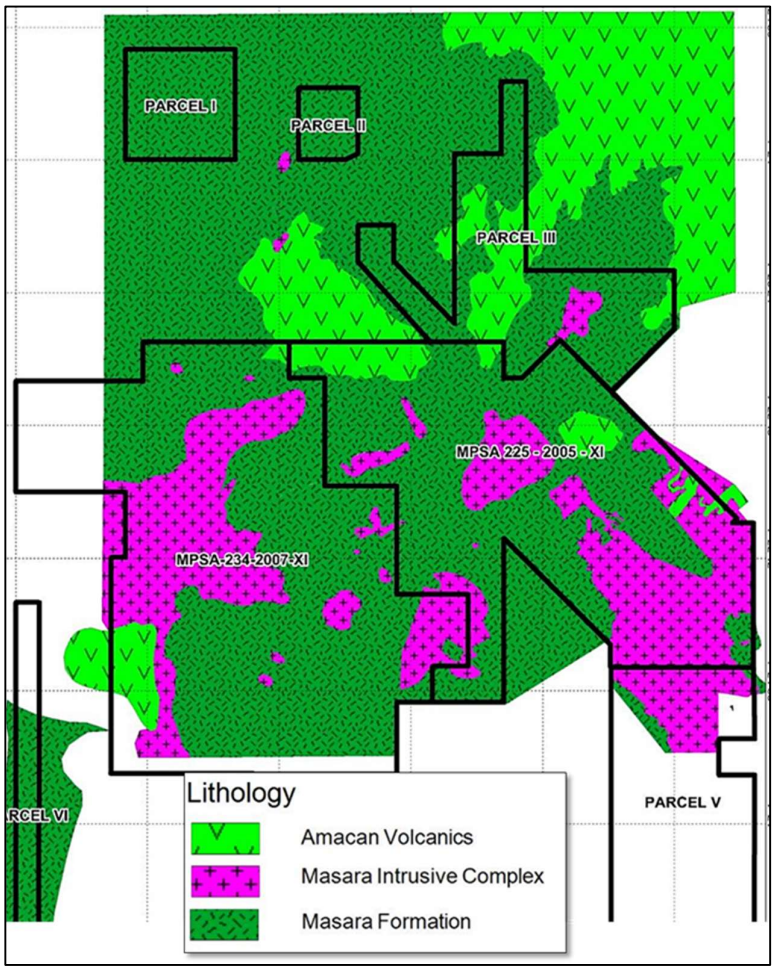


Figure 12.2: Geologic map of Maco mine

12.3. Description of various geological structures and their trends

The major structural features defined within Apex's MPSA area and its general vicinity consist of 1) NW-trending, steep NE-dipping left-lateral strike-slip faults correlated with and representing the local segments of the Philippine Fault System; 2) a large Valles-type caldera or volcanic center, the periphery of which is defined by a ring fracture zone; 3) a north-south system of gravity faults, and; 4) a less dominant set of second-order northwest-northeast conjugate faults. Post-ore thrust faults are fairly well-distributed central to the area; toward the area's perimeter, the thrust fault generally dips away from the volcanic center.

A few minor sub-parallel sets of folds with northerly to north-northwesterly axes are also found at Masara proper as well as west to southwest of the Apex tenement. The NW-trending fault system is most dominant near the caldera center and its structures have been generally paralleled, if not followed, by an inner set of major auriferous quartz veins. Some of the gold-bearing veins and the known porphyry

copper-gold deposits follow the conjugate northeasterly faults and the peripheral ring fracture system.

13. MINERALIZATION IN THE PROPERTY

13.1. Overview of the mineralization

At least four types of mineralization have been identified within the Apex property. These are the (1) sub-epithermal Au-base metal veins (2) porphyry-related Cu-Au mineralization; and (3) skarn mineralization.

13.1.1. Sub-epithermal Au-Base Metal Veins

At least ten of the known vein systems are classified as sub-epithermal Au-base metal veins, namely; Bonanza-Bonanza, Hanging Wall Split-Masara, Sandy-Sandy North, Manganese, Jessie, Maria Inez, St. Francis, Don Calixto, Fern, Masarita-Masarita 2 and Wagas. These were classified as sub-epithermal veins due to the high base metal sulfide content (30-80%) and are associated with propylitic- and skarn-altered host rock as observed in the underground headings instead of the characteristic argillic alteration for low sulfidation mineralization.

Mineralization within the Masara Gold District is structurally controlled by a series of faults directly associated with the Philippine Fault Zone. Vein mineralization is characterized as fault-controlled massive sulfide breccia which were later overprinted or bounded by quartz, carbonates, and Mn-rich carbonate veins exhibiting crustiform-colloform, vuggy or cockade textures.

These veins strike NW to WSW and dip steeply to the northeast. Dip deflection however is also observed for the steeply dipping veins. Vein mineralization generally persists for several kilometers with vein widths ranging in some high-grade portions from 1.0-5.0m.

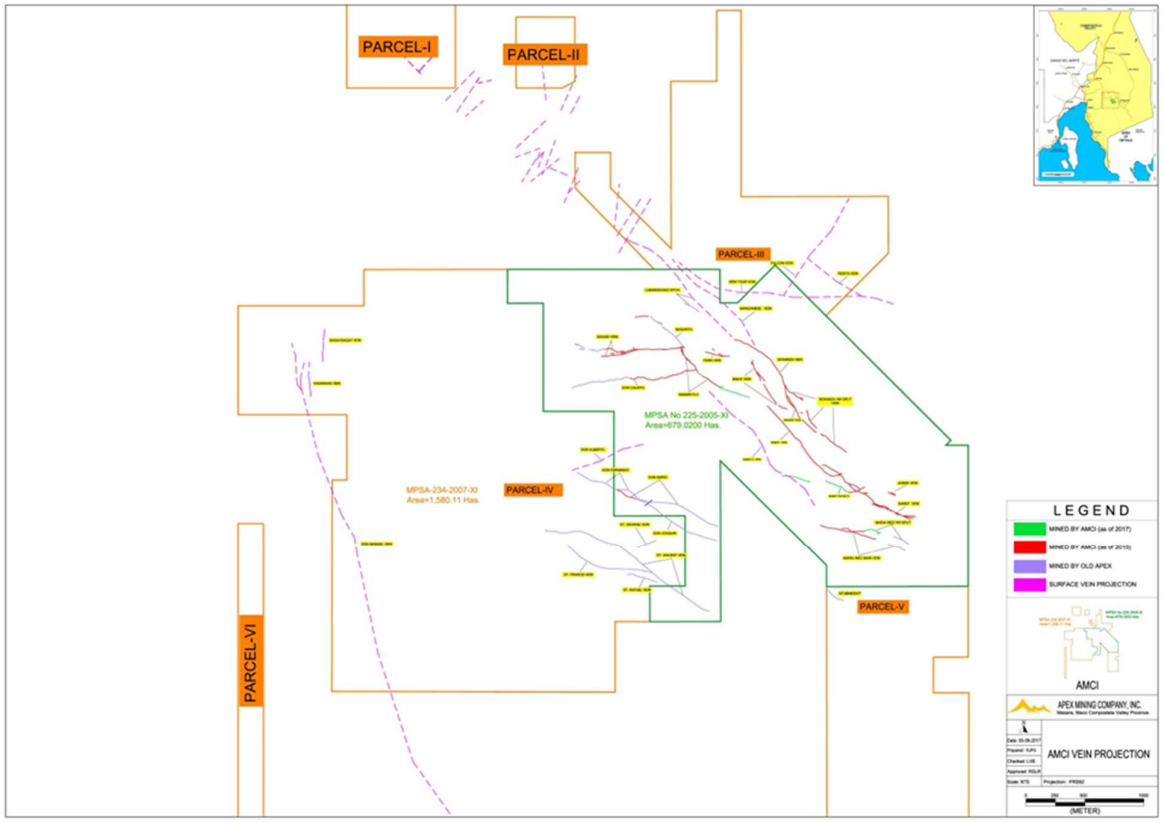
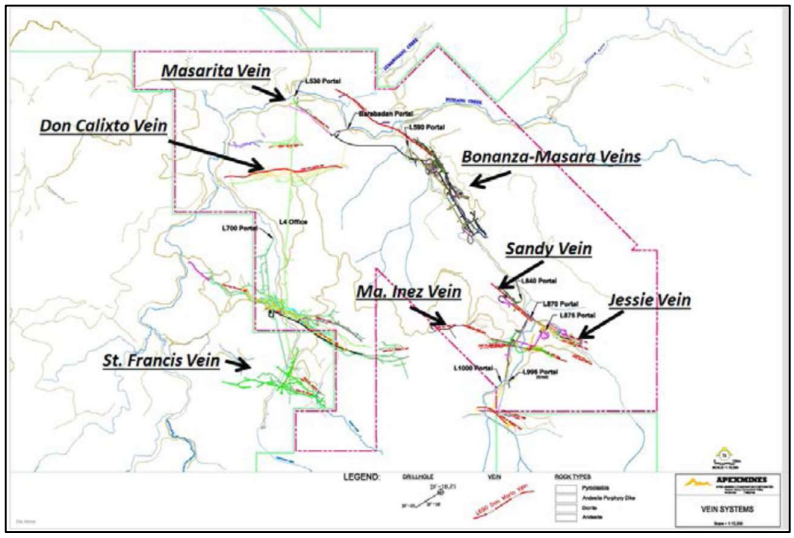


Figure 13-1. AMCI tenement map showing vein projections of the identified Maco vein systems.

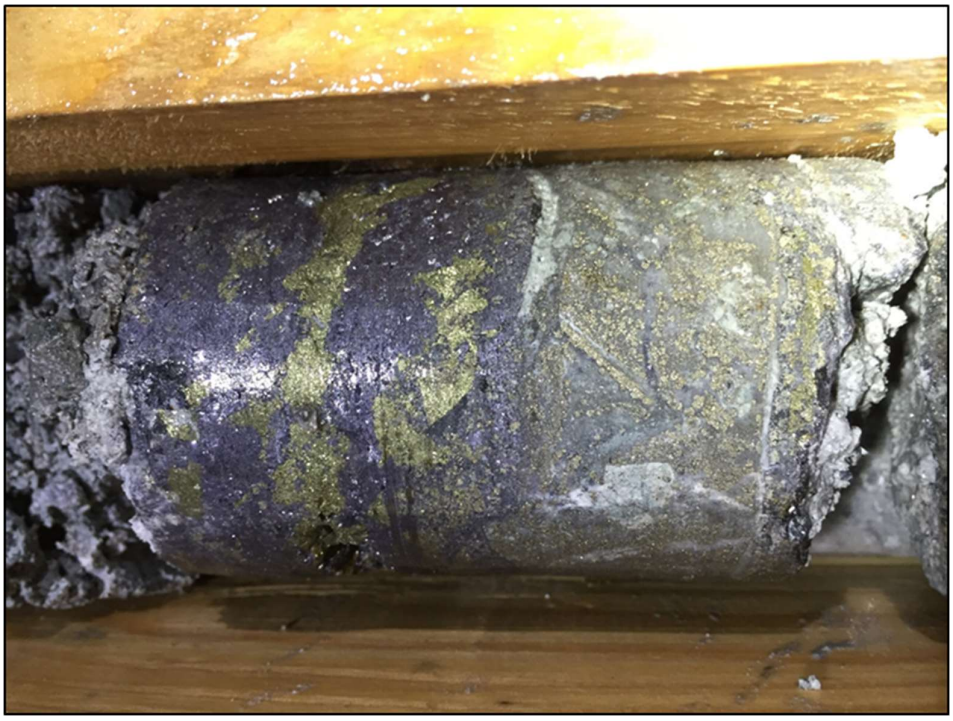


13.1.1.1. Gold-based metal quartz veins systems

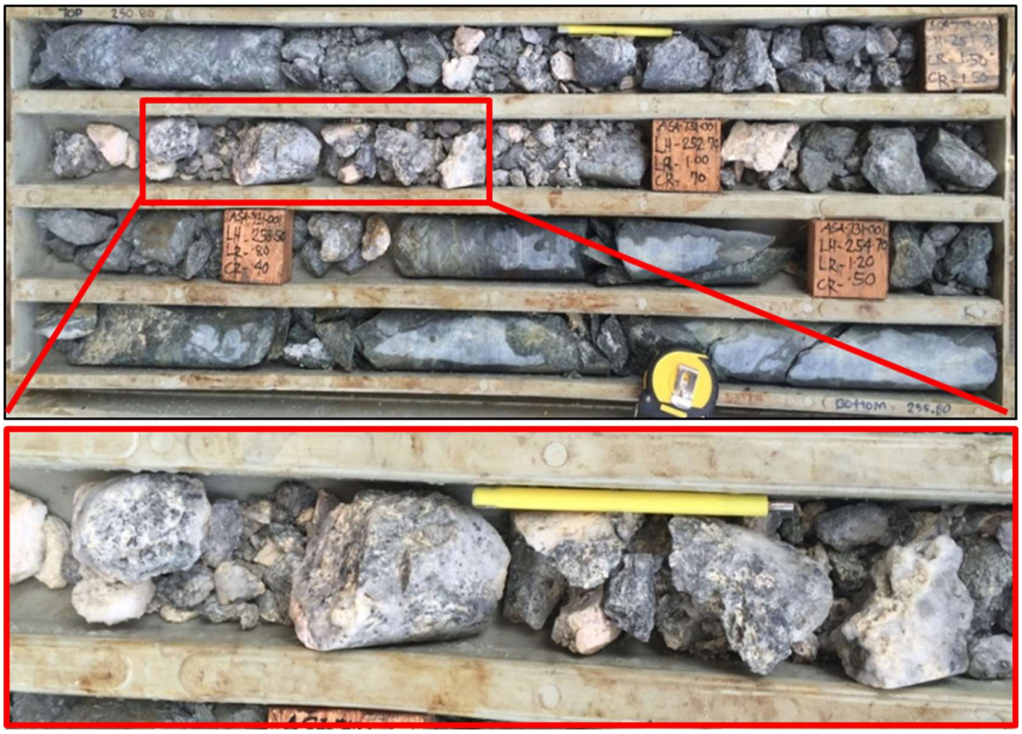
Figure 13-2. MST-590-005 intercept at 194.1-195.1m identified as Don Calixto vein and characterized as base metal - carbonate vein.

13.1.1.2. ASA-785-012 intercept at 330.7m showing crustiform-colloform banded quartz+rhodonite+rhodochrosite+sulfide vein. Late-stage vuggy carbonate veins also noted with bladed texture.

13.1.1.3. ASA-590-004 intercept displaying multi-phased breccia with angular to sub-angular sulfide-rich clasts and quartz-calcite-rhodochrosite veins.



13.1.1.4. Massive sulfide (gn+py+cpy) vein breccia intercept in MST-590-008.

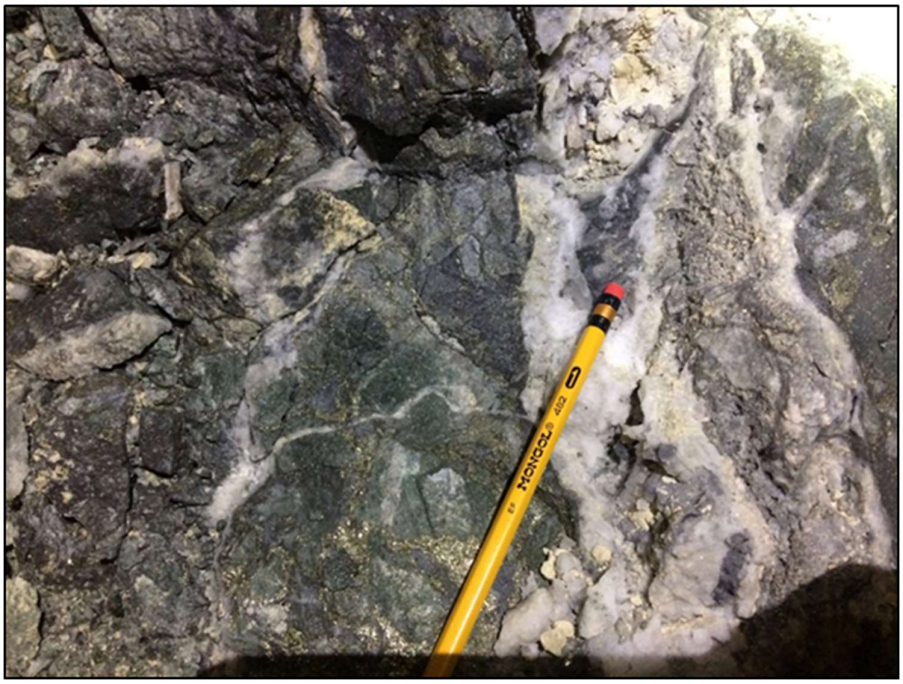


13.1.1.5. Vuggy, quartz-carbonate-rhodochrosite vein breccia intercept in ASA-731-001 with sp-gn-py-cpy.

13.1.1.6. Quartz-carbonate vein breccia intercept in MST-560-004 at 117.4-117.7m. Carbonate veins show colloform-crustiform banding.

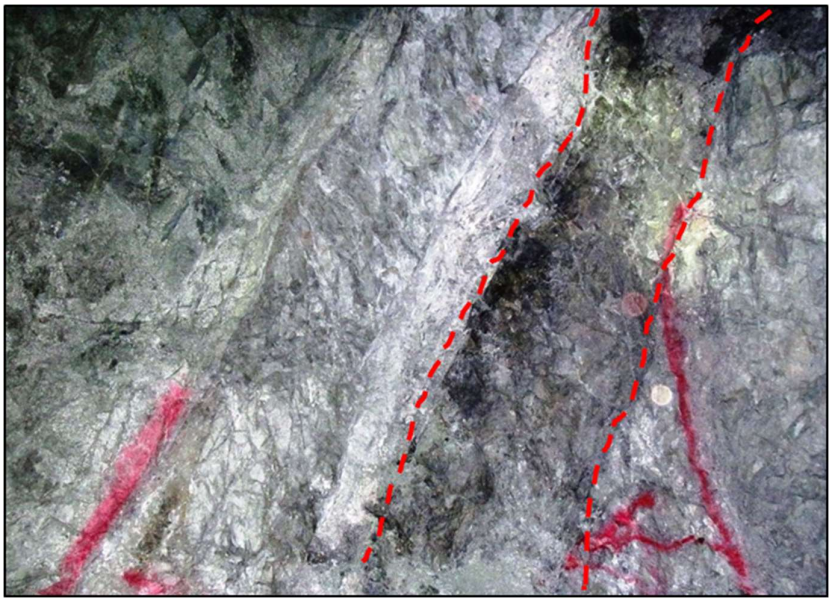
13.1.1.7. Vuggy quartz+carbonate vein in ASA-545-003 at 116.9-117.1m.

13.1.1.8. Vuggy quartz+pyrite+chalcopyrite vein with angular diorite clasts in ASA-590-020 at 56.8-57.8m. Sulfides occur along vein selvages.

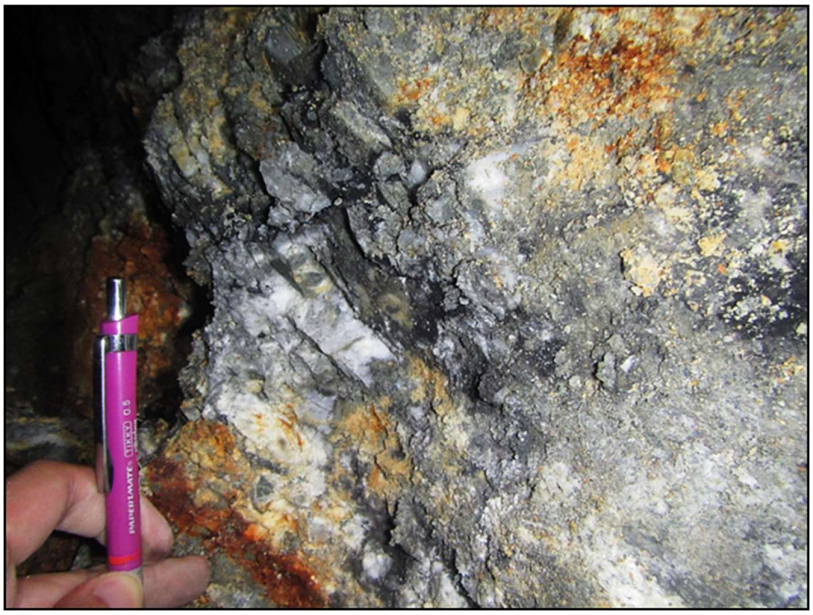


13.1.1.9. Carbonate+quartz vein breccia with py+cpy disseminations and patches exposed underground at heading Level 560 SDNS ODE 102S position.

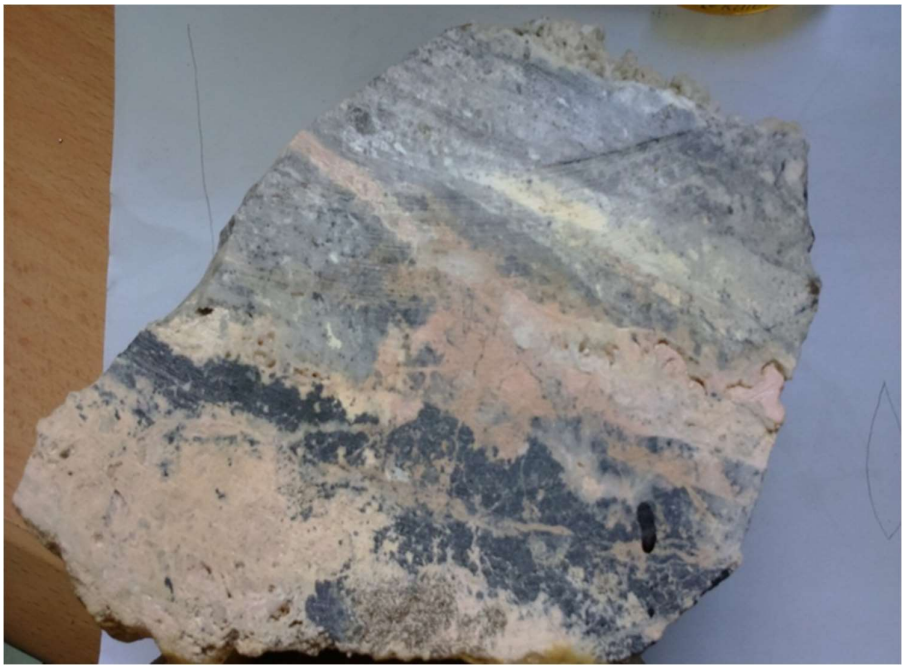
13.1.1.10. High Au grade massive sulfide (py-cpy) vein hosted by propylitic-altered andesite at Level 490 BNZ ODE.



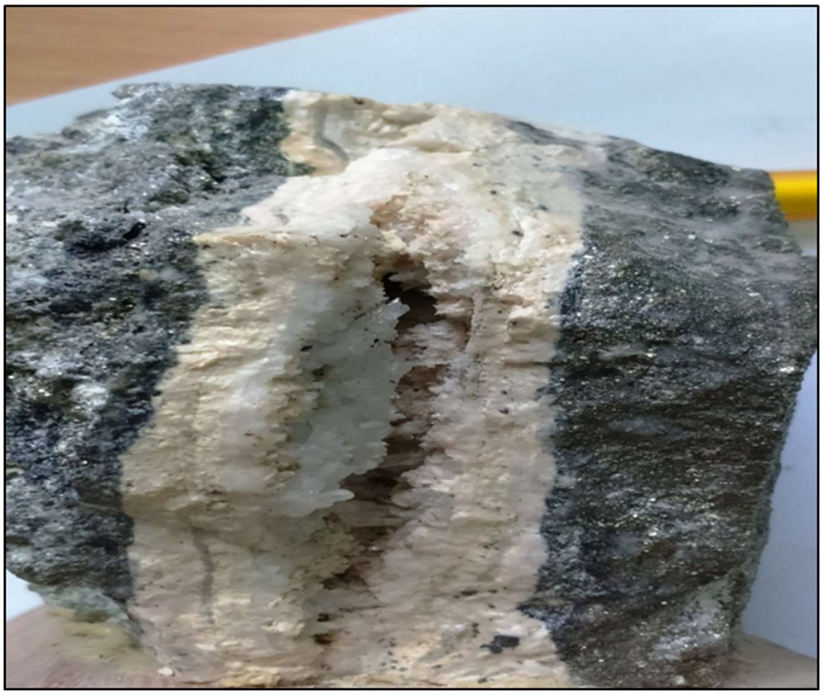
13.1.1.11. Massive sulfide (py-cpy) vein with argillic alteration halo at Level 680 SDN ODE.



13.1.1.12. Grey and white chalcedonic quartz veins associated with black sulfide veinlets exposed at Level 545 MST2 ODW 52N position.



13.1.1.13.Level 590 SDNS ODW hand specimen showing quartz-carbonate-galena crustiform-colloform bands. Incorporated silicified diorite clasts with relict feldspar laths and disseminated cpy-py.



13.1.1.14.Level 635 SDN ODE hand specimen exhibiting drussy, vuggy quartz+carbonates in massive sulfide (py-cpy-gn) vein.

13.1.2. Porphyry Copper-Gold Deposits

The cluster of Cu-Au porphyry prospects is situated within the central to western portion in Parcel IV of MPSA-234-2007-XI. The high-grade Maco vein-type mineralization towards the east in MPSA-225-2005-XI was previously postulated to be spatially, temporally, and genetically related to these porphyry deposits.

Currently identified prospects consist of (1) Pagasa, (2) Mapula, (3) Theresa, (4) Kurayao, (5) Kanarubi, and (6) Quiamonan. Vertical and lateral extents of these Cu-porphyry bodies were not well constrained due to the limited drilling campaigns targeting these areas. Out of the six prospects, only Mapula, Kurayao, Theresa, and Pag-asa were previously drilled.

The porphyry-Cu mineralization in the tenement defines two arcuate belts which may be related to a collapsed caldera structure. These lineaments limit the western extent of the fault-controlled Au-bearing vein structures (Coller, 2011). The E-W fault-controlled veins (Don Alberto, Don Fernando, Don Mario, St. Francis, and St. Vincent) however overlap with the porphyry-Cu mineralization.

Recent reprocessing and subsequent interpretation by CSRWG of magnetic data from the airborne survey by Thomson Aviation Pty. Ltd. over the AMCI tenement in 2012 revealed a broad magnetic low that encompasses the majority of the abovementioned prospects. In addition, the delineated elliptical magnetic anomaly served to define the extent of the AMCI porphyry deposit down to a depth of 500 meters.

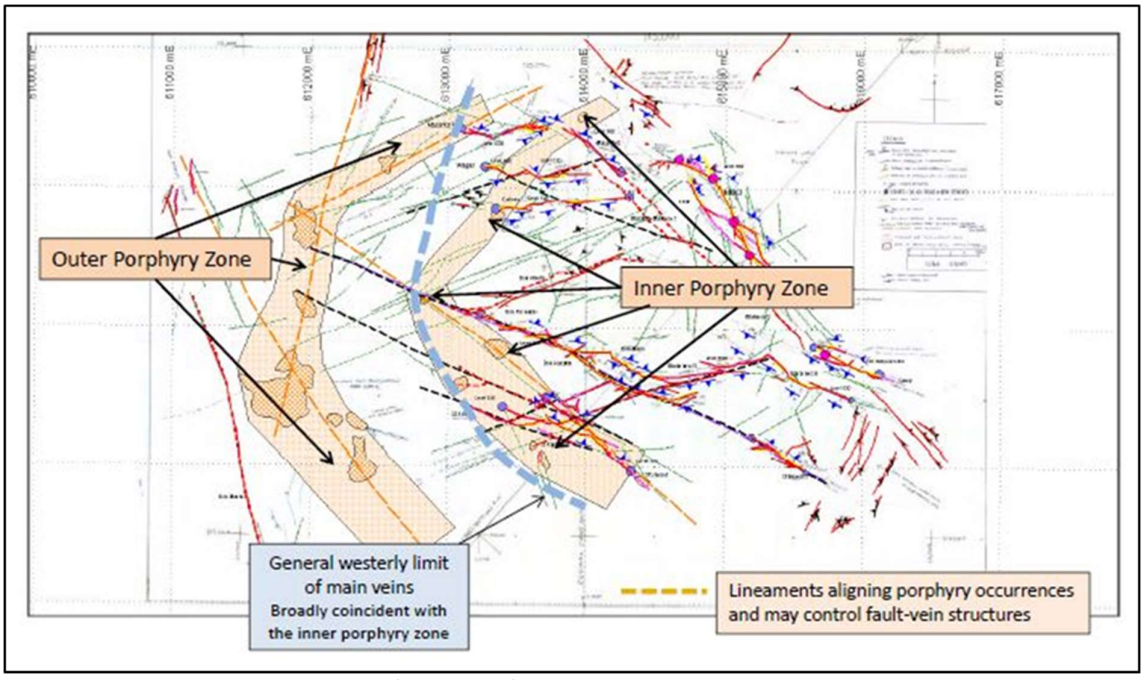


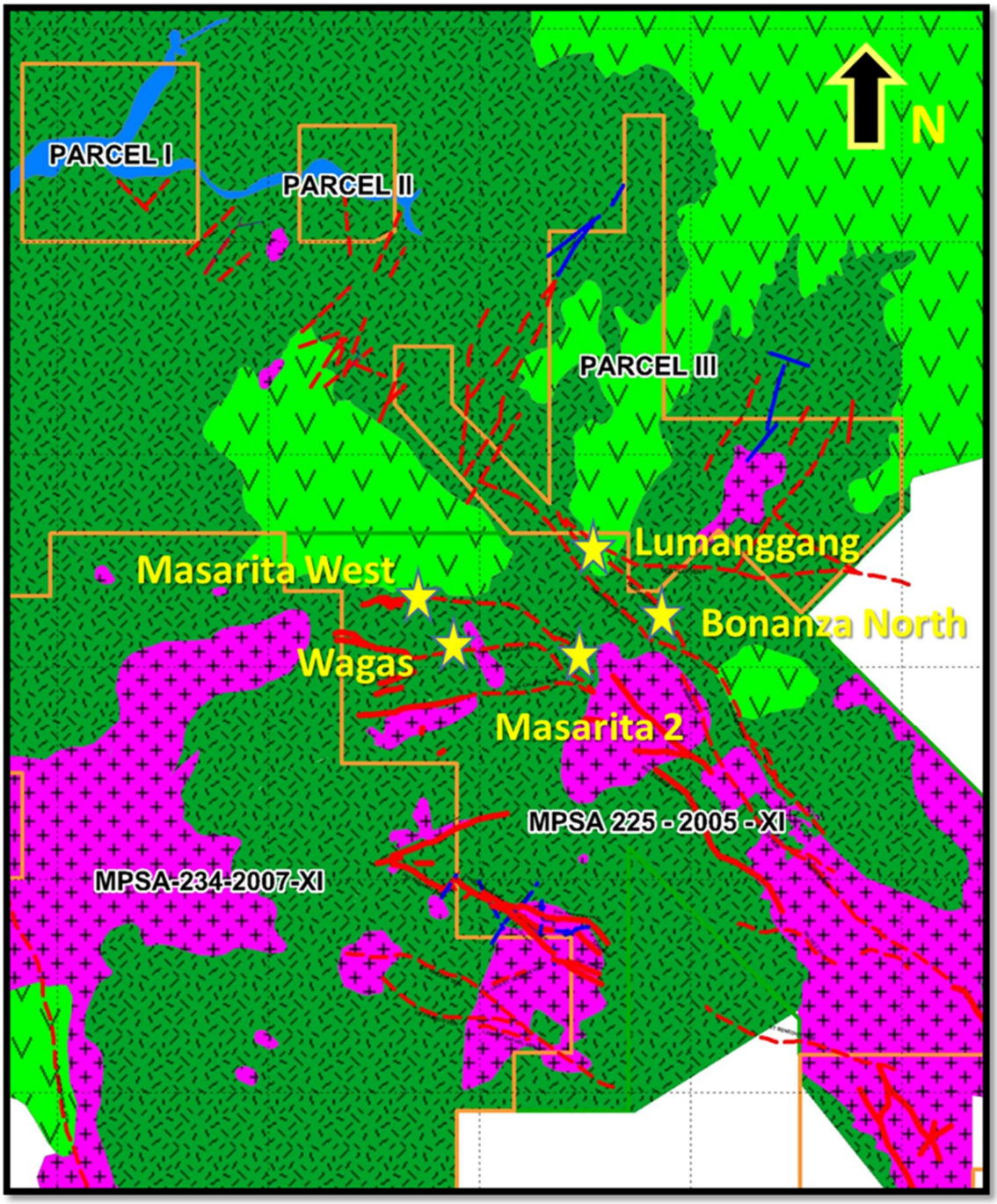
Figure 13.1.3.0: Porphyry Copper-Gold Mineralization in relation to the Maco Gold (adapted from RA Flores et at, 2013).

13.1.3. Skarn Mineralization

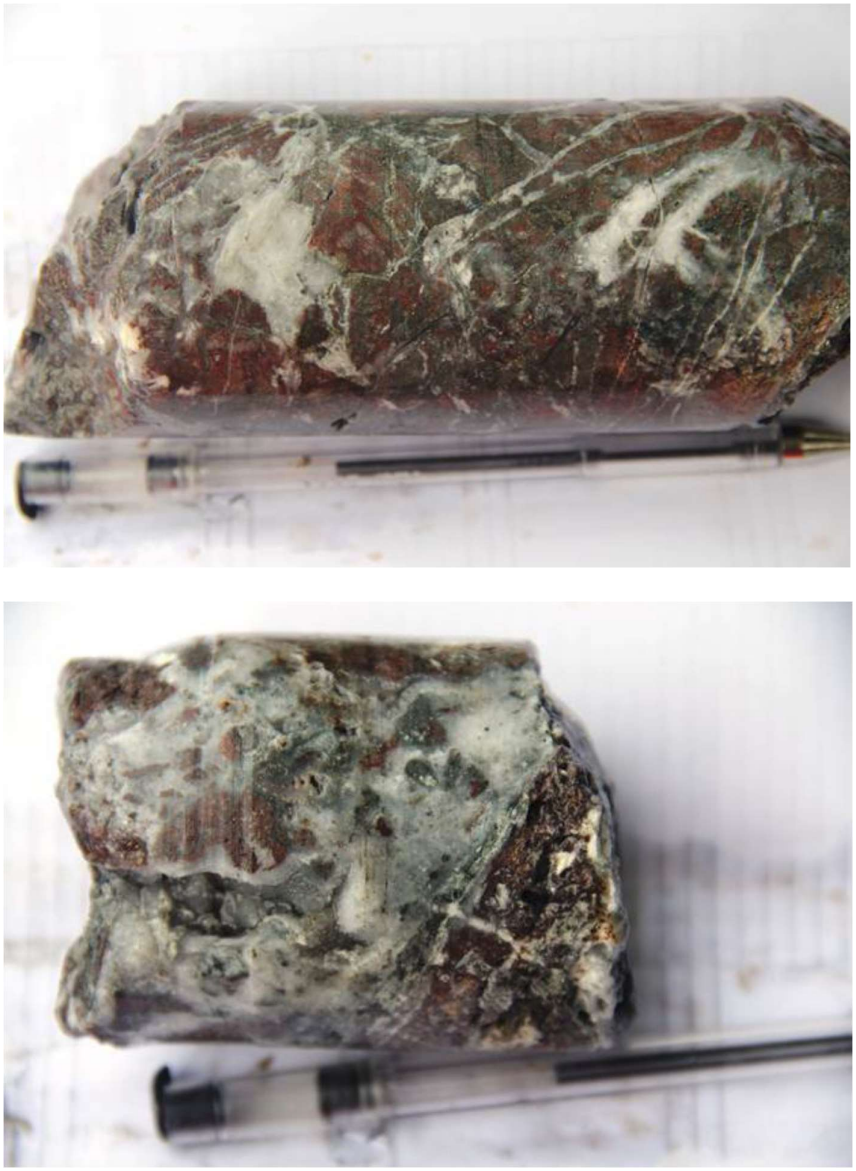
Localized skarn mineralization was noted within the tenement from surface exposures, underground headings, and diamond drill hole intercepts.

A recent study (I.F.E. Esguerra, 2106) identified a total of five skarn zones (Figure 13-17) and observed in close proximity to the Au-bearing veins. Skarn assemblages identified were (1) garnet skarn: garnet - diopside ± epidote ± tremolite ± calcite ± pyrite (2) magnetite skarn: magnetite ± pyrite ± garnet ± chalcopyrite, (3) epidote skarn: epidote - tremolite ± garnet ± sulfides and (4) pyrite skarn: pyrite - epidote ± magnetite ± chalcopyrite ± calcite.

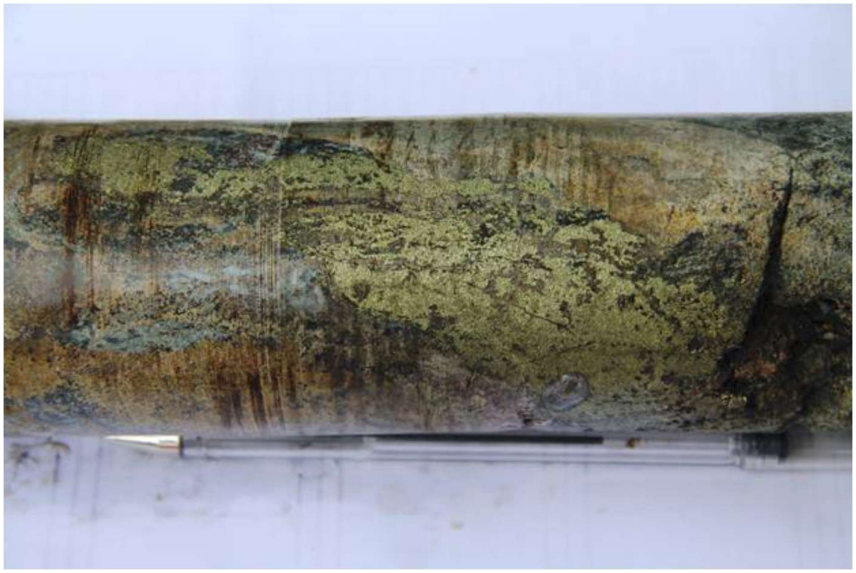
Based on the recent work skarn mineralization although widespread, are non-contiguous and currently not considered potentially economical Au mineralization targets. The potential and economic viability of skarn mineralization within the AMCI tenement requires further evaluation.



13.1.3.1 Geologic map showing the spatial distribution of recently identified skarn zones (I.F.E.Esguerra, GEOCON 2016).



13.1.3.2. Monomictic crackle breccia characterized by angular garnet skarn clasts set in vuggy, drussy quartz+calcite vein intercepted in DNC-530-104 at 85.4m.



13.1.3.3. DNC-530-104 intercept at 86.4m showing reddish-brown garnet skarn with semi-massive chalcopyrite.

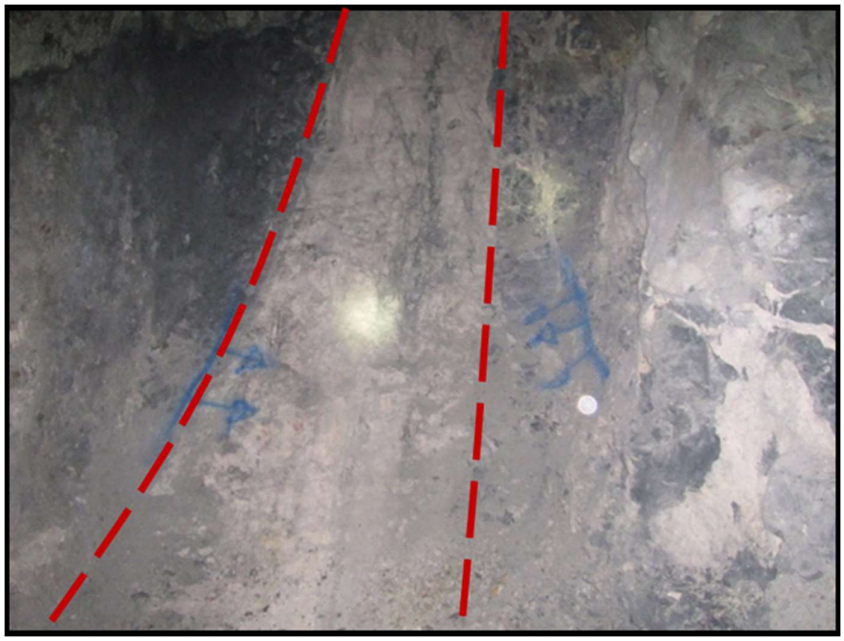
13.2. General style of mineralization along the Epithermal- Base metal vein systems within the property

Gold mineralization within the district is multiphasal and generally comprised of massive sulfides, sulfide- and silica-rich breccias, plus quartz, carbonate, and Mn-rich carbonates and silicates occurring as either stockworks or exhibiting drussy, vuggy crustiform-colloform, cockade or colloidal textures.

High Au mineralization generally coincides with vein zones primarily composed of massive sulfides and sulfide-quartz breccias ranging <1.0-3.0m in width. Sulfide content percentage for these high-grade zones are approximately between 30-80%. Sulfide minerals are comprised of pyrite, chalcopyrite, galena, and sphalerite. Visual identification of bornite(?) and covellite(?) in vein hand specimens will have to be verified through ore microscopy. Gangue minerals are composed of quartz, carbonate, and Mn-rich carbonates and silicates.

13.3. Length, width, depth of mineralization

The existing NW-WNW trending AMCI vein systems have already been developed approximately 1,000m along strike with vein splits at least 100m in length. Vein widths range from 1.0-1.5m with swells reaching greater than 4.0m. Current mine development has established a vertical depth of approximately 400m (from Level 900 down to Level 545) for the Sandy Vein with the potential for extending this below the existing mine levels. Mineralization of the existing AMCI vein systems remains open at depth.



13.3.1. Approximately 1.2m wide carbonate+base metal sulfide vein exposed at Level 590 SDN ODE MV 134S position. The vein is composed of carbonates, galena-sphalerite stringers/lenses with minor rhodochrosite and disseminated py+cpy

13.3.2. Massive sulfide (py-cpy) - quartz breccia trending N57W 60NE exposed at Level 605 BHWS ODW 62S position.

13.3.3 Multiphase vein zone exposed at Level 756 SDY ODE 142S position. The 3.5m wide vein zone is composed of sulfide-quartz breccia with late carbonates. Sulfides are comprised primarily of pyrite and chalcopyrite with minor galena and sphalerite.

13.4. Element grade levels and patterns

No recent comprehensive study was done on the grades of other elements and their possible relationship with each other. Concerning other base metals, galena appears to have a direct relationship with gold. Higher grade ore shoots are usually noted to contain appreciable galena within them. For the other base metals, the relationship with gold has not been established.

Mercado et al (1987) noted some zoning patterns although not too well defined. Apparently, base metal concentration on topmost to intermediate levels—previously L+4 (L690) to L+7 (L780)—is higher, as manifested in massive replacement lenses of sphalerite, galena, and chalcopyrite, than those in L+4 (L690) down to Level 0 (Elev. 555). These were observed in Masara, Don Joaquin, and St. Francis veins.

13.5. Wall rock alteration and paragenesis

Results from X-ray diffraction analysis by CSRWG of samples collected in 2015 from the underground identified 3 alteration mineral assemblages, namely; sericitic, chlorite-sericite, and propylitic. Samples taken from Level 780 SDN MV, Level 780 SDNS, Level 605 and Level 560 BHWS, Level 785 MAI HWS, Level 785 MAI ODW DXC 155E and Level 560 WGS 68W SL exhibited chlorite-sericite alteration. The sample was taken from the hanging wall at Level 780 SDN MV showed sericitic alteration while the hanging wall sample taken at Level 780 SDNS exhibited propylitic alteration. As observed in the underground, the chlorite-sericite and sericitic alteration commonly occurs as alteration halos immediately adjacent

to the mineralized veins and structures and may persist for 2.0-5.0m into the host rock. These alteration assemblages however only overprint and are secondary to the propylitic alteration observed in the eastern part of the AMCI tenement area covering the existing mine development.

14. EXPLORATION

14.1. Geological work done

14.1.1. Geological data generated from mapping and surface sampling

Daily underground and surface exploration mapping activities generate valuable geological data useful for both mine planning and mine operations. The data consists of rock types, weathering, oxidation, color, grain size, structures, texture, alteration, veining, and mineralogy. All these data are plotted on plan maps and sections to show all relevant geologic features such as:

- Visible boundaries of ore and any other significant mineralization
- Boundaries of major lithological units
- Position and orientation of major structures such as folds, faults, prominent joint sets, and others
- Alteration patterns
- Major veins or vein sets
- Geotechnical data such as degree of fracturing, rock hardness, and others as required by the engineers

Channel cut samples are collected across the mineralized zone, vein and alteration from outcrop, surface trench, and underground working. The sampling dimension is dictated by the mapped geology, structure, and mineralogy and based on the individual geologic boundary that each feature would indicate to be a mineralization control. The usual sampling width, e.g., contact to contact of alteration zone or vein, is from at least 0.3m to maximum 1.5m continuous channel sampling from hanging wall to the footwall.

14.1.2. Geological map and sections

The following geologic maps and sections are being produced and/or worked daily or on an as-needed basis.

14.1.2.1. Underground Maps:

Level Maps (Scales 1:250, 1:500m, 1:1000m)
Sections (Scales 1:250, 1:500m, 1:1000m)
Geologic Face Maps (Scale 1:100)
Vertical Longitudinal Plans (Scales 1:1000, 1:2000)

14.1.2.2. Surface Exploration maps:

Area Geologic Maps (Scales 1:500, 1:1000)
Area Geologic Sections (Scales 1:500, 1:1000)

14.1.3. Sample location map

The level, face, and surface maps serve practically as the location plan for the collected samples.

14.2. Surface Mapping

A 1:1,000-scale detailed geologic mapping exercise was conducted in 2015-2016 by the exploration group in MPSA 225 and MPSA 234, which encompasses the prospects of Kaurangan, Aknit-Biocadan, PJAC-St Benedict and MST2/SDN2 (Figure 14.2). The assessment below is sourced on geological and alteration mapping with follow up trenching that generated targets for scout or resource drilling.

For the three prospects, some >2,000m cumulative strike-length of the vein was inferred.

The explored areas possess varying styles of supergene and hypogene gold mineralization and are typical of intermediate-sulfidation epithermal gold system hosted in a volcanic, intrusive, and subvolcanic complex. The mineralization appears to display polyphasal mineralization style from massive, veins/veinlets/stockworks, base-metal rich breccias, and fault vein/breccia structures.

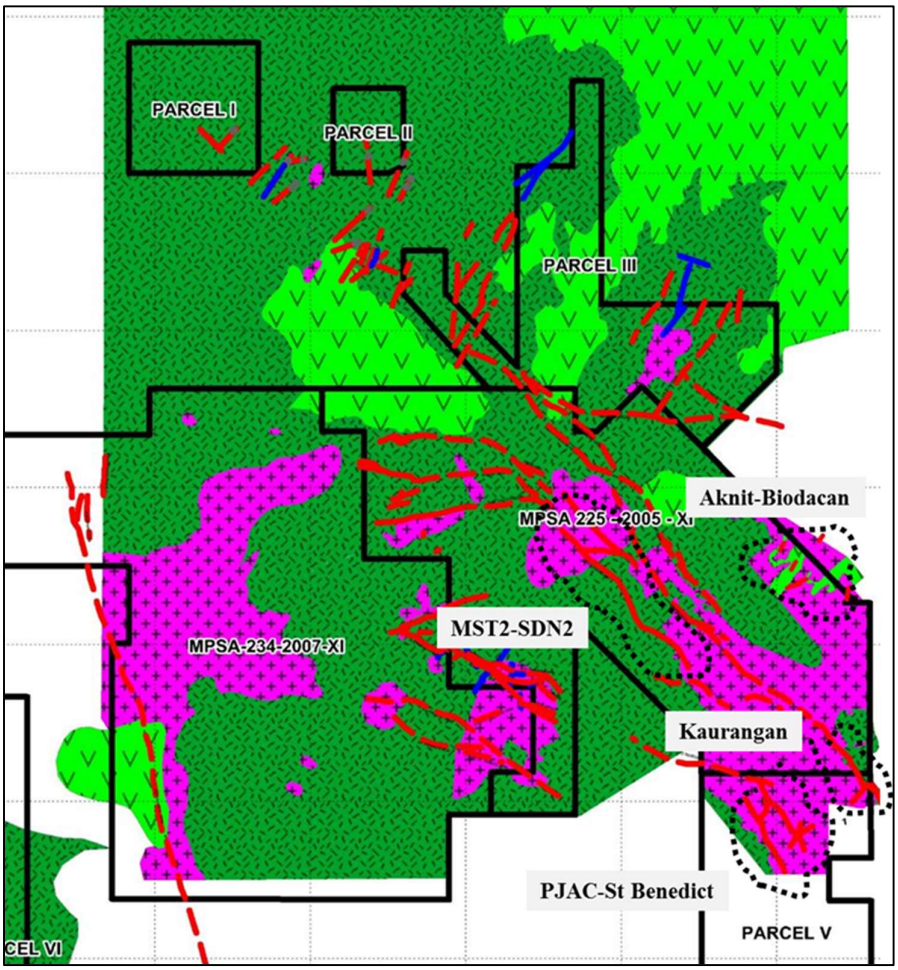


Figure 14.2: Vein extensions identified from 2015-2016 mapping

14.2.1. Outcrop sampling

For outcrops, mostly measured channel cut sampling is conducted while grab sampling is seldom done, and if ever, this is for indicative grades only. The intervals for sampling are marked out on the exposed mineralized zone, vein, or rock exposure and based on the individually indicated geological boundary which indicates mineralization control.

Where mineralized structures are steep-dipping, the appropriate sample is a horizontal channel along the floor or wall (or if that is where the best outcrop is). Where there is no certainty as to the attitude of the mineralized zone, a sample consisting of both horizontal and vertical channels, composited over selected horizontal intervals, are used.

14.2.2. Trench sampling

The procedure for trench sampling is the same as for sampling any continuous rock or mineralized exposure as that in outcrop. Intervals for sampling are marked out on the exposed mineralized zone, vein, or rock exposure based on their indicated geological boundaries that are considered to be mineralization

controls. Where mineralized structures are steep-dipping, the appropriate sample is a horizontal channel along the trench wall. Where there is no certainty as to the attitude of the mineralized zone, a sample consisting of both horizontal and vertical channels composited over selected horizontal intervals, are used.

14.3. Drilling and Sampling

14.3.1. Type of drilling program

Apex in recent years initiated several drilling campaigns. The drilling campaign under Crew Gold covered the latter portion of 2005 up to 2007. This was followed by the drilling campaign under ASVI-Mindanao Gold which commenced during the latter portion of 2009 up to 2013. Current Apex management continued with the drilling campaign underground to provide operations with advanced information on the lateral and vertical vein continuity while the objective of the surface exploration drilling was to identify additional vein targets for intermediate and long-term mine development.

The 2005 campaign was a Resource Definition Diamond Drilling Program implemented upon the approval of MPSA-225-2005-XI. The program concentrated on the delineation of the Masara-Bonanza-Sandy-Maria Inez veins following the NW-SE strike length approximately 2.5km extending along the Malumon River valley. Several other vein systems were also included, namely Don Fernando-Don Joaquin system, Bibak, Jessie, St.Benedict, Masarita, and St. Francis. The secondary objective for the St. Francis drilling campaign was to delimit the porphyry mineralization within the area. A total of 212 holes were drilled with an aggregated 43,760m drill core output. The majority of the drilling campaign were surface drill holes with only five holes collared underground.
Surface holes normally started with PQ size which is reduced to HQ after about 100m. Further reduction to NQ size is also resorted to if necessary to reach the target depth.

The following drilling program started late 2009 with an underground Kempe rig assigned to provide mine operations advance information for on-vein development. By January 2011, additional Kempe and LM55 rigs were deployed underground plus surface rig was commissioned for surface drilling. Another LM55 underground rig was commissioned by early 2012.
In early 2014, the current Apex management continued with the underground drilling campaign proposed by ASVI-Mindanao Gold to define the near mine vein extensions. In addition to the underground drilling, Apex contracted the services of Quest Exploration Drilling (QED) during mid-2015 to identify additional vein targets for intermediate and long-term mine development through surface exploration drilling.

Surface drilling by QED contractor commenced on June 16, 2015 which covered both MPSA-234-2007-XI and MPSA-225-2005-XI. One unit (1) CS1400 and one (1) CS1000 rig was deployed to prove the continuity and economic viability of identified vein systems within the tenement. The purpose of the drilling campaign during the third quarter of 2015 was to determine the vertical and lateral vein extensions of Don Fernando, Don Joaquin, Calixto-L,

and Don Mario. Furthermore, the campaign also served to delimit the Cu-porphyry mineralization towards the west and determine its relationship to the Au-bearing veins. During the fourth quarter of 2015, the objective of the drilling program targeting the Wagas, Masarita and Lumanggang Hitch Vein was to prove the western extensions of the mentioned vein systems. During the latter portion of 2015 the goal of the drilling campaign in the northwest of the existing mine operation was to determine the extension of the high Au-grade Bonanza vein towards the northwest in addition to delineating the Manganese and New Year veins. The total meters of surface diamond drilling achieved for the year 2015 was 6,337.5 meters from 22 holes.

Conventionally, underground drilling (except for Kempe rigs which utilize AQ-sized drill rods) commence with HQ collar and later reduced to NQ size upon necessity or depending upon circumstances downhole. Surface drilling however commence with PQ collar, which is later reduced 100m downhole to HQ and subsequently reduced to NQ 300m downhole.

14.3.2. Drill site spacing, depth of drilling

Drill site spacing for the 2005 Resource Definition Core Drilling Program was initially at 100m interval which was later on followed with in-fill drilling to reduce the drill spacing to 50m. Drilling depth was dependent upon the projected vein intercepts and ranged from about a hundred to three hundred meters.

During this drilling campaign, the following were some of the drilling statistics recorded:

- Lowest elevation reached by a drill hole (MS-01) was 328 ASL (MS-01)
- The deepest drill hole was recorded by SB-03 at 420.10 m
- Shallowest hole was 80.30m deep recorded by BV-03
- Average length per drill hole was 206.42 m
- Average dip/inclination is -58°

The drilling program is a combination of in-fill, resource definition, and production support drilling. Targets are relatively shallow and spacing is generally designed at 25m to 50m intervals. Exploratory holes are usually drilled deeper depending on target structures.

During the ASVI drilling campaign, drilling statistics was being recorded:

- Lowest elevation reached by a drill hole (BNZ – 019) was 110 ASL
- The deepest drill hole was recorded by MPDH – 002A at 916.70m
- Average length per drill hole was 166.95m
- Average dip/inclination is -51.5°

14.3.3. Core Logging

Drill cores are fast logged at the drill site for initial interpretation. Once delivered at the core house, the cores are photographed after which, detailed logging is conducted and the lithology, mineralization, alteration, core recovery, and geotechnical characteristics are recorded. The core log sheet is encoded together with the assay results and other drill hole data in a database for

geological modeling and mine planning. The specific gravity is determined in the assay laboratory.

14.3.4. Drill sample method and interval

The geologist determines the sample intervals after geological logging of the hole. The sampling interval is determined by a lithological or stratigraphic boundary or when a significant change in mineralization or alteration style occurs. If a vein will be sampled, the hanging and footwall of the vein will also be sampled. The minimum sampling width for vein zones is 0.30m while the maximum width is 1.00m. For the wall rocks, the maximum sampling interval is 2.0m.

The sampled cores are cut into half (or a quarter of the sample is a duplicate) with one half left in the core box as a reference while the other half sent to the assay lab for analysis. This is only applicable to PQ-, HQ-, and NQ- size cores while for AQ size drill cores, the whole core is sampled and sent to the lab.

14.3.5. Drill core photographs

Drill cores are photographed upon arrival in the core house. Previous practice undertaken by Crew Gold is that they took photos only of the wet core. During ASVI until today' drilling campaign, cores were also photographed dry. Capturing dry core photos started early in 2010.

Photographs of dry cores aid the Engineering as significant fractures and veins may be hidden or obscured when cores are photographed wet. For geological purposes, however, wet photographs of cores bring out important geological features more clearly.

14.4. Exploration Geochemistry

14.4.1. Description of geochemistry survey type: drainage, soil, rock, vegetation, bog, etc.

The geochemical survey done in the Masara area, albeit scanty at best, was the detailed grid soil sampling covering the Maligaya-Malumon area conducted in 2006 under the watch of Crew Gold.

A soil sampling was done in the middle of 2010 in MPSA-225 wherein 419 soil samples were collected in the area. Additional soil sampling by ASVI was also done in Parcels III and IV of MPSA-234.

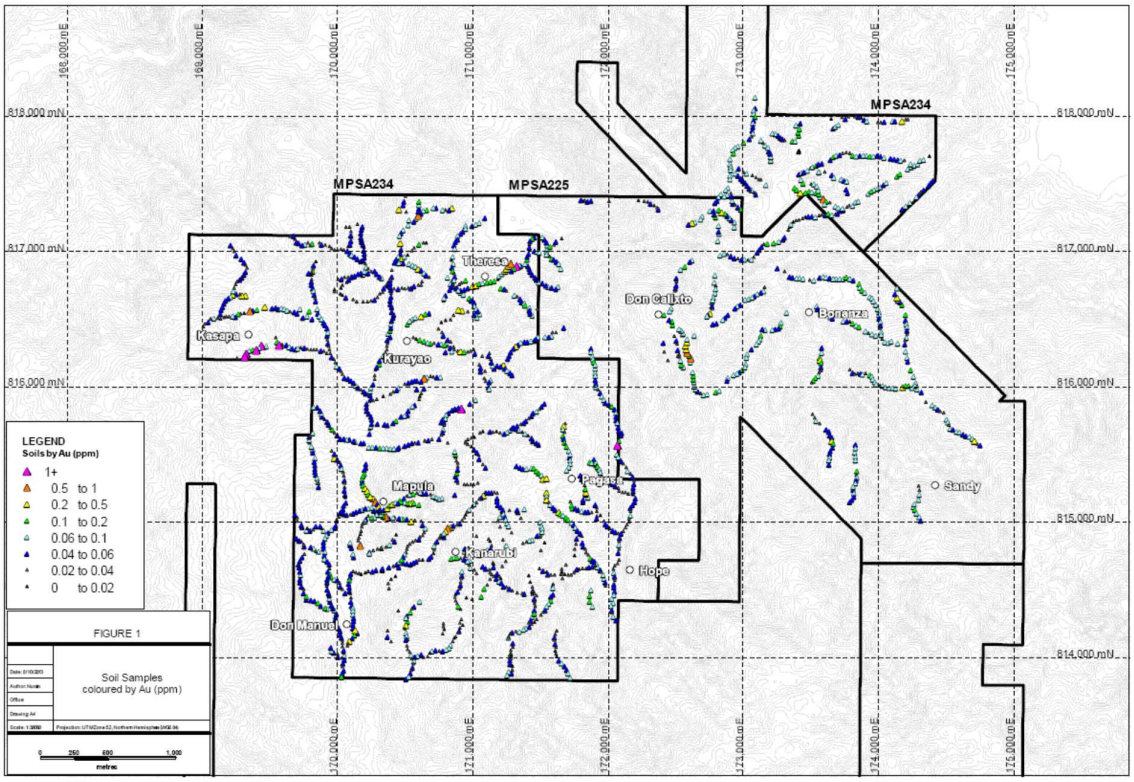


Figure 14.4.1.1 Map showing the ridge and spur sampling points and the Au grade.

14.4.2. Description of sampling and analytical methods employed

In conjunction with the IP Resistivity survey, the soil grid geochemical sampling method was simultaneously applied to test also the sulphide quartz vein systems and splits that are concealed under the study area. The end objective was to delimit any significant gold spatial dispersion patterns that could indicate the concealed gold-bearing veins or structures. Soil samples were collected at every 25m grid interval along the IP lines. All samples were analyzed only for gold using the Fire Assay method. Geochemical results were plotted and compiled in a 1:2000 m scale base map.

14.4.3. Definition of background, threshold and anomaly levels for the elements determined

There were no available records to show whether or not the assay results were treated and computed to define the background, threshold, and anomaly levels for gold. The ranges of values are shown on the map for various color codes.

14.4.4. Application of synthesis and interpretive techniques (for single and multi-element) to bring out significant geochemical features related to mineralization

There were no indications whether or not statistical analysis was a preferred technique in the subsequent geochemical interpretation.

14.4.5. Description of geochemical anomalies detected

Several spatial distribution trends of soil gold values were indicated based on the geophysical and geochemical base map on a scale of 1:2000.

14.5. Applied Geophysics

14.5.1. Description of the geophysical method used and objective of the survey

The Induced Polarization (IP) and the magnetic method was used to detect and test the earlier known major sulphide quartz vein systems that are concealed under the Maligaya-Malumon area for further geologic mapping, sampling, and evaluation.

14.5.2. Description on whether a geophysical contractor, independent consultant or an in-house staff was engaged in the conduct of the geophysical survey

McPhar Geoservices Philippines Inc. conducted a geophysical survey over the Maligaya- Malumon area in 2006.

14.5.3. Description of equipment used, its limitations and the survey parameters Adopted

Equipment used was the McPhar P660 unit with ~ 2.5 kva motor generator with the following survey specifications:

Electrode Array :	Dipole-Dipole
Electrode Interval :	25 m
Frequency :	AC1 = 0.125 Hz ?
	AC2 = 2.50 Hz ?
Separation, N :	1-5? (inclusive)

14.5.4. Description on how the survey was carried out (design of stations with respect to mineralization trends)

Based on the available base map, the limited survey was undertaken covering two (2) adjacent areas namely; IP Area 1 over the Maligaya area and IP Area 2 over the Malumon area.

In IP Area 1, the designed grid lay-out was 100m by 25m consisting of three (3) 700 m.-gridlines with an aggregate of 87 stations at 25m interval. In the IP Area 2, the grid layout was 200m by 25m consisting of two (2) 700m-gridlines, one(1) 800m-gridline and one(1) 1,125km-gridline with aggregate of 137 stations at 25m interval.

The design grid layout followed the generally northwest strike trend on the surface of the major veins namely: Manganese, Masara, and Bonanza in

Maligaya area while Sandy, Jessie, and Sandy main veins and splits in Malumon area.

14.5.5. Description of interpretive tools used

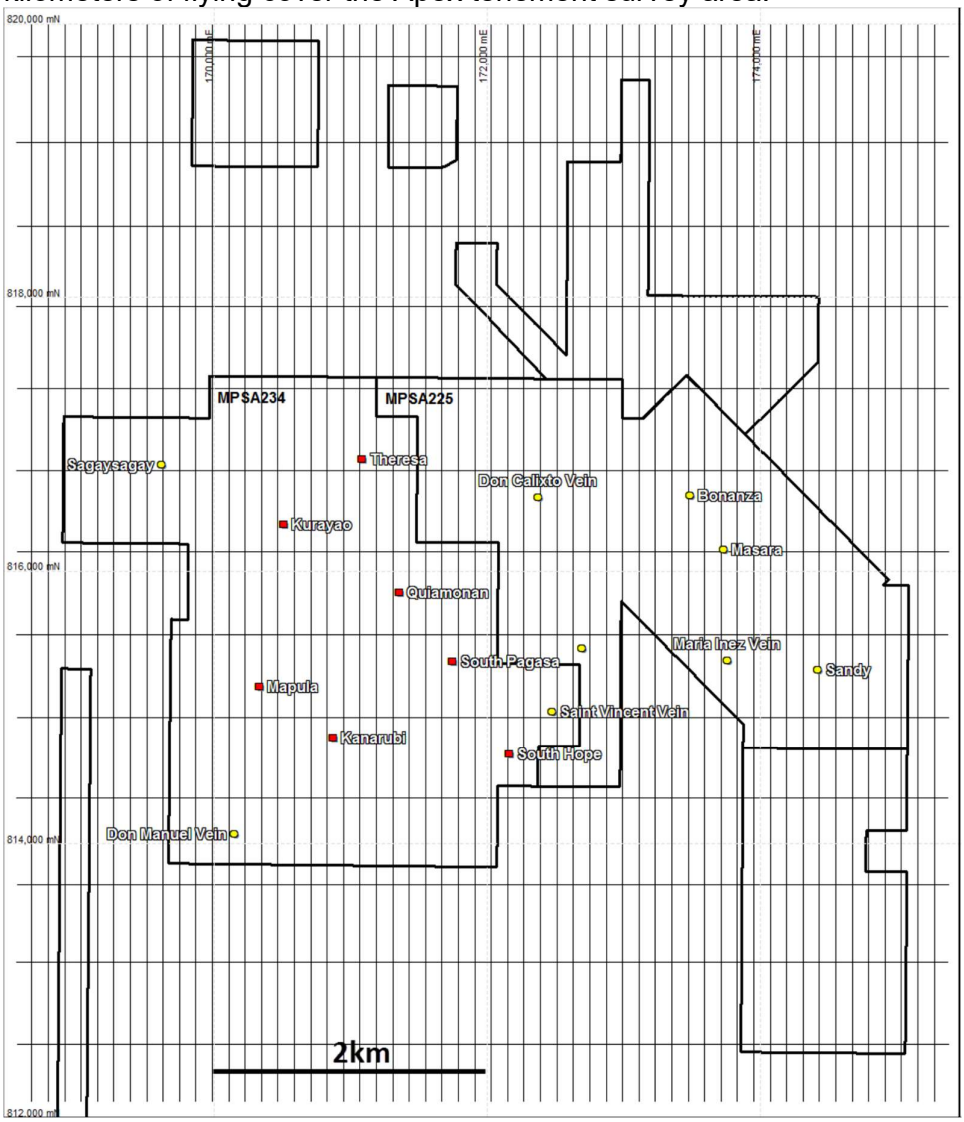
14.5.5.1. High-Resolution Aeromagnetics

Apex contracted an airborne geophysical survey using Thomson Aviation Pty Ltd (based in Griffith, Australia) to acquire data coverage over tenements MPSA225 and MPSA234 within the Masara district, Maco Mine area. The survey read both aeromagnetic and radiometric data at a nominal elevation of 40m above the terrain. Flight lines were spaced at 60 meters and tie lines at 600 meters. The survey was flown with an Aerospatiale Squirrel, single-engine jet turbine helicopter (VH-TEQ) using north-south traverse lines to optimally intersect the predominantly NW-SE oriented structures. A forward-mounted 'stinger' was mounted on the aircraft to accommodate the GPS and magnetometer sensors. The spectrometer, radiometric-recording crystal sensors were mounted on the floor of the helicopter.

14.5.5.1.0 Thomson Aviation survey aircraft and base station used for diurnal field monitoring.

14.5.5.2. Survey Coverage

Figure 14.5.5.2.0 Displays the survey flight line coverage over MPSA225 and MPSA234. North-south oriented flight lines on 60m line spacing, 40m flying height cover the entire MPSA225 and MPSA234 Apex tenements was acquired. Tie lines were flown on 600m spacing. A total of 974.8 line kilometers of flying cover the Apex tenement survey area.

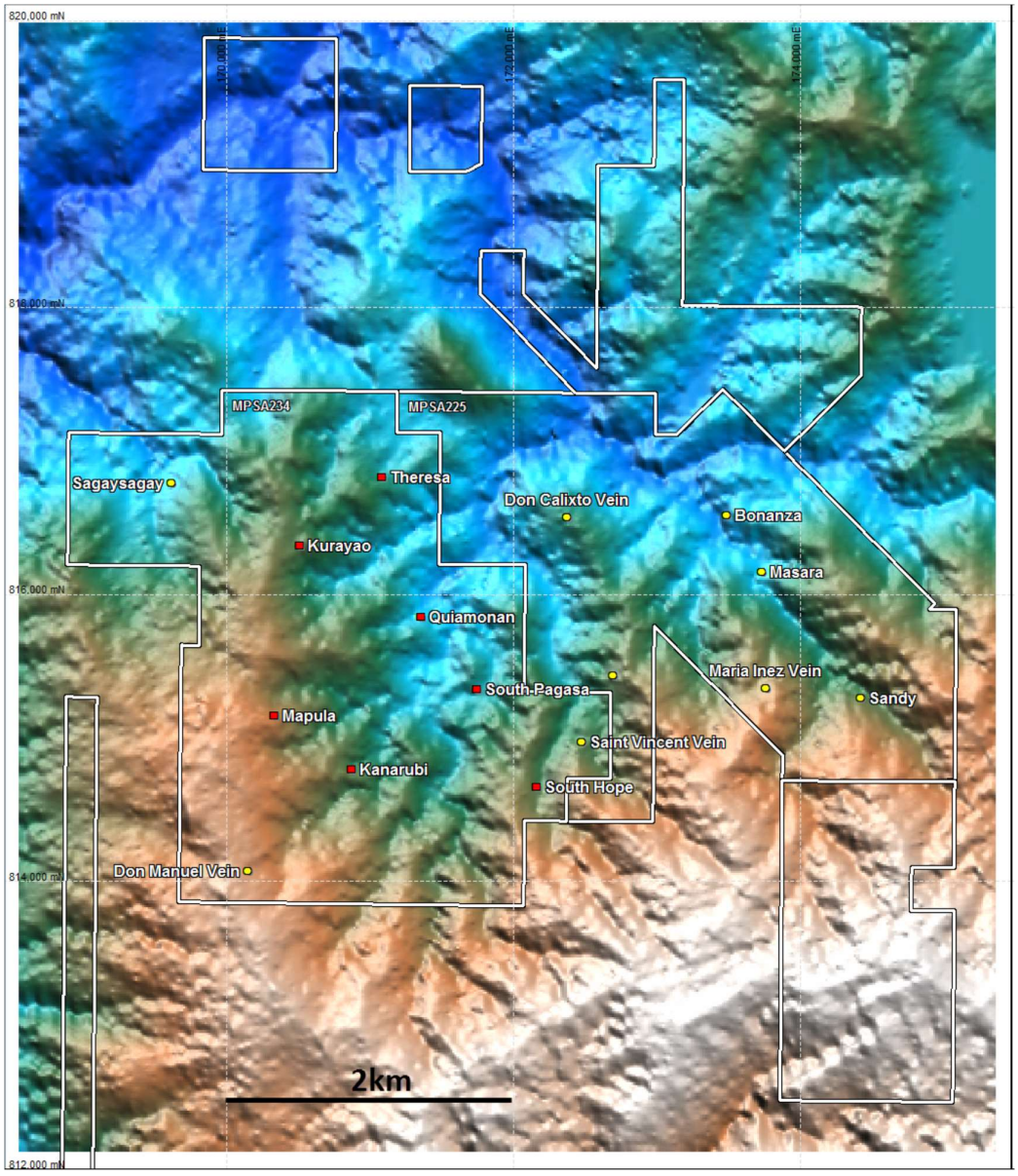


14.5.5.2.0 Flight line orientation over Apex tenements MPSA225 and MPSA234. For clarity every second N-S orientated flight line is displayed above, a survey was completed on 60m survey spacing, with east-west tie lines flown on 600m spacing

14.5.5.3. Topographic Elevation Data

A detailed elevation model can be generated from the survey recorded radar altimeter and GPS vertical DTM estimation, to derive accurate elevation data. The airborne survey elevation model has a vertical accuracy of approximately 0.5m and lateral precision of less than 25m. The terrain in the

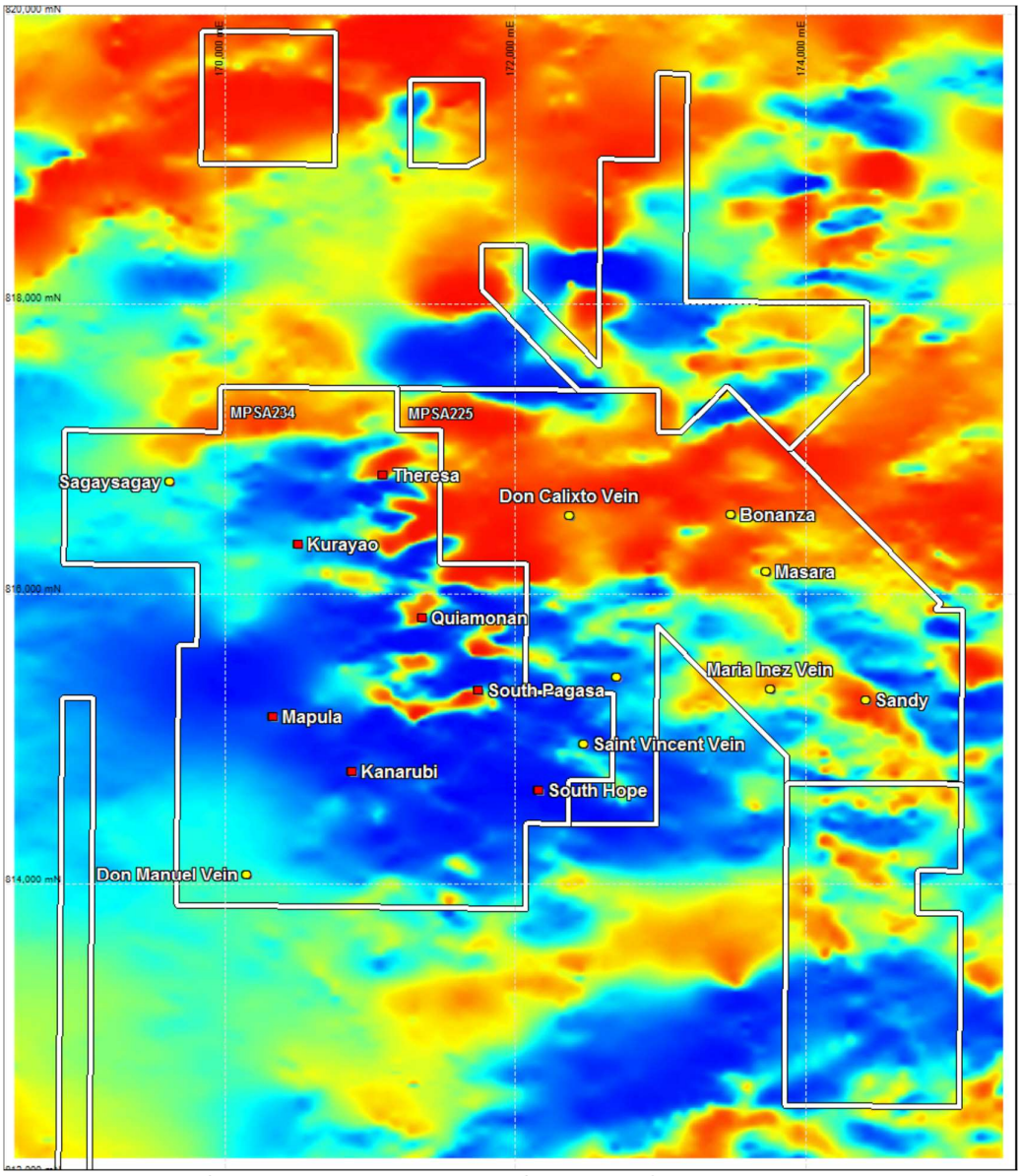
survey area can be described as rugged with steep mountainous areas, especially to the south of the survey area. Lake Leonard lies in the NE corner of the survey at about 900 meters ASL.



14.5.5.3.1 Detailed topographic elevation model derived from the airborne survey acquisition.

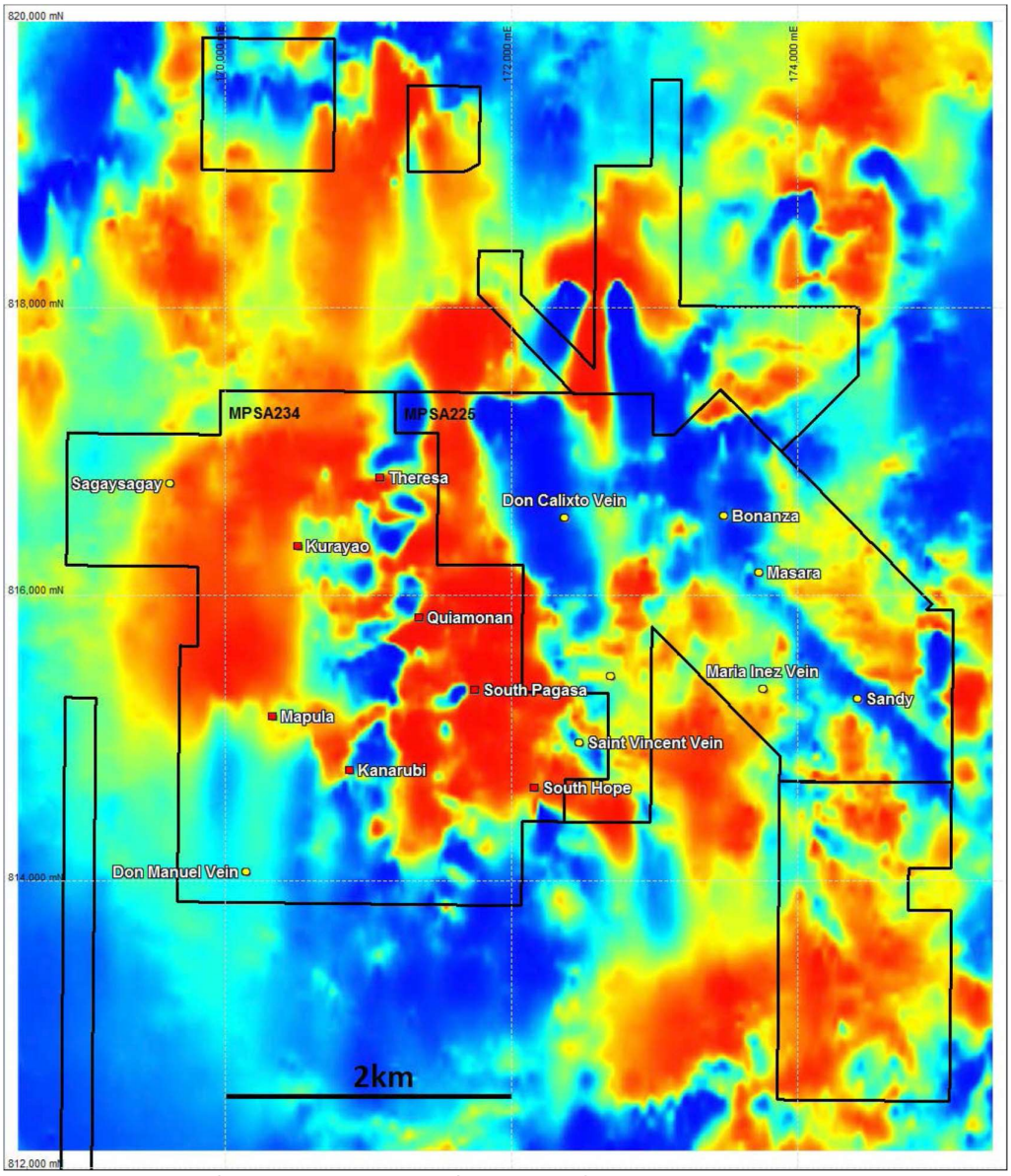
14.5.5.4. Airborne Magnetic Data

Figure 14.5.5.4.1 displays the Total Magnetic Intensity (TMI) data acquired by the survey.



14.5.5.4.1 TMI (Total Magnetic Intensity) image of the aeromagnetic survey over MPSA225 and MPSA234.

Reduction to the pole (RTP) processing was undertaken to assist in defining the location of localized anomalies. This processing mathematically transforms the TMI data from the area recorded, to an artificial location centered as if recorded at the magnetic pole. The effect of this on the anomalies within the data is to migrate their positions to lie beneath imaged magnetic peaks (in the absence of remanence), whereas the TMI source locations will lie beneath the maximum gradients of the imaged TMI data. In addition, the polarity effect whereby a northern hemisphere negative anomaly (again, for a normally magnetized source without remanence), will be removed in the RTP processed data image.



14.5.5.4.2 RTP (Reduction to Pole) image of the aeromagnetic survey over MPSA225 and MPSA234.

Several observations can be made from the magnetic data:

- The prominent NW-trending fault lineation extends from Sandy – Masara – Bonanza and continuing in a northwest orientation.
- Lineations and magnetic trend offsets throughout the majority of the survey indicate a highly fractured and structurally complex faulted area. The major structural direction appears to be to NW, but lower angle (WNW trending) features are also present. NE and NNE lineations also exist.
- Although several prominent zones of elevated magnetic anomaly groupings lie adjacent and along obvious structural lineations (faults), other high magnetic response anomaly centers do not appear to be structurally bounded. Assuming such anomalies are indicative of elevated magnetite content, they represent obvious locations of

intrusive and potential association with volcanic margins and potential mineralization in the cases where magnetite association is present.

- In addition to these high magnetic anomalous zones however, there are also low magnetic response zones that are relatively isolated and in many cases with curvilinear or semi-circular margins. These areas are also prospective as being indicative of magnetite destruction and consequent potential fluid alteration of magnetite-hosted rocks that have been subject to chemical change.

14.5.5.5. Airborne Radiometric Data

In addition to the magnetic data acquired during the airborne survey, radiometric data was also collected.

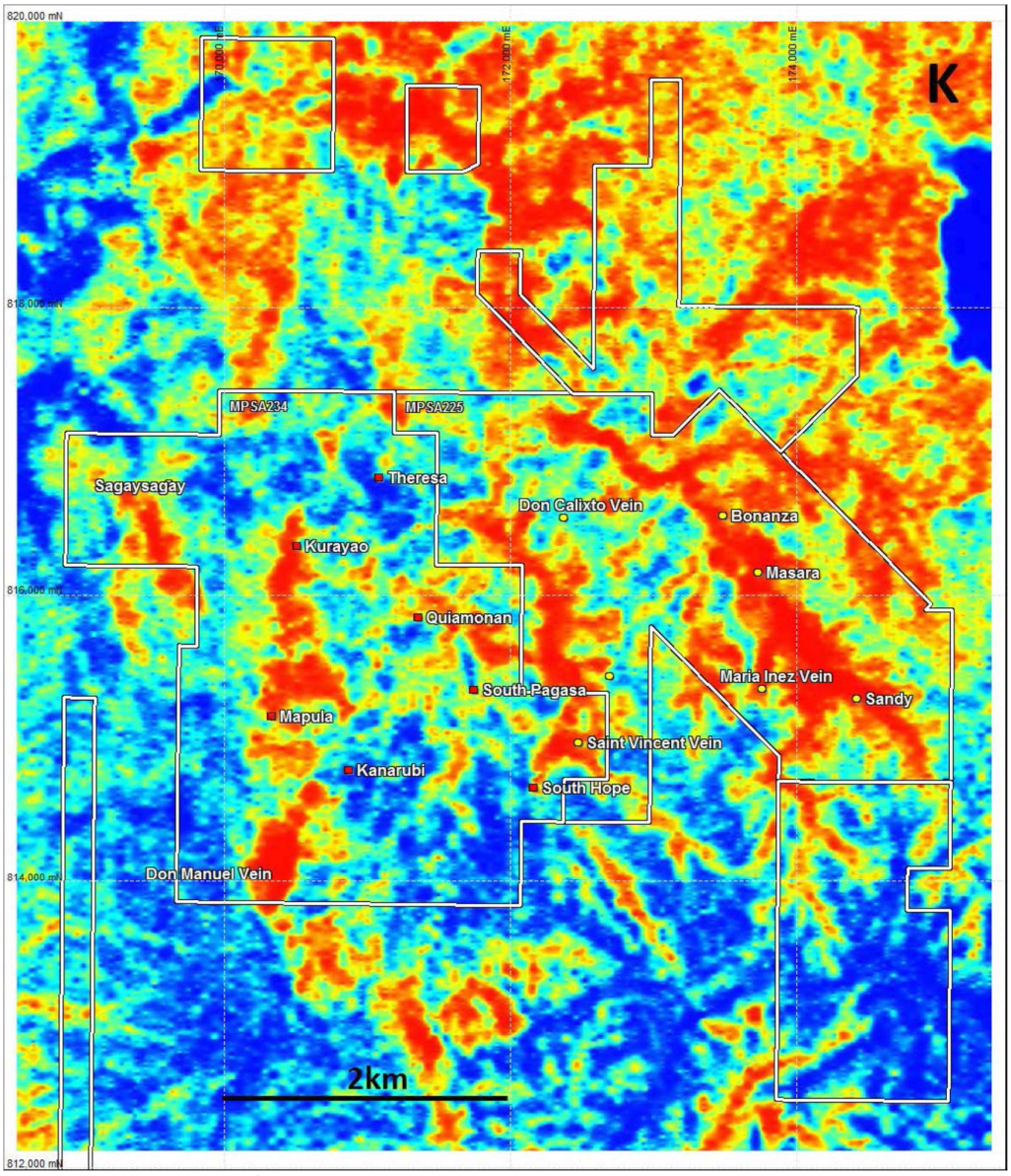
The radiometric survey specification demanded a doubling in conventional crystal detector size and this has been effective in increasing signal-tonoise for intrusive enhancement, porphyry detection and alteration effects in the survey coverage.

14.5.5.6. Potassium Data

An image of the acquired potassium concentration (as a percentage of potassic mineral content) derived from the gamma-ray spectrometer for the area is presented in Figure 14.5.5.5.1.

Several observations can be made from the potassium data:

- The potassium radiometric data has zones of high count readings primarily in the north and NE parts of the survey area. Several zones are also located in the south and many of these are relatively linear and dendritic suggesting a topographic correlation. When compared with the DTM figure 14.5.5.3.1, a significant correlation is noted, especially in the southern areas. Note that this correlation is observed for high, linear trends of the potassium response, but also low counts of potassium in some areas. The inference therefore, is that the area being drained by the various drainages, is determining the potassium response where such correlation is seen.
- Lake Leonard has low to zero counts over the water



14.5.5.5.1 Image of potassium spectrometer channel data

14.5.5.7. Uranium Data

An image of the uranium concentration derived from the gamma-ray spectrometer is presented in Figure 14.5.5.6.1.

Of note in the uranium data is:

- The uranium spectrometer data has strong count rates over the outcrops of the northern Miocene limestones. The data effectively maps the extent of these lithologies in the NW and west.

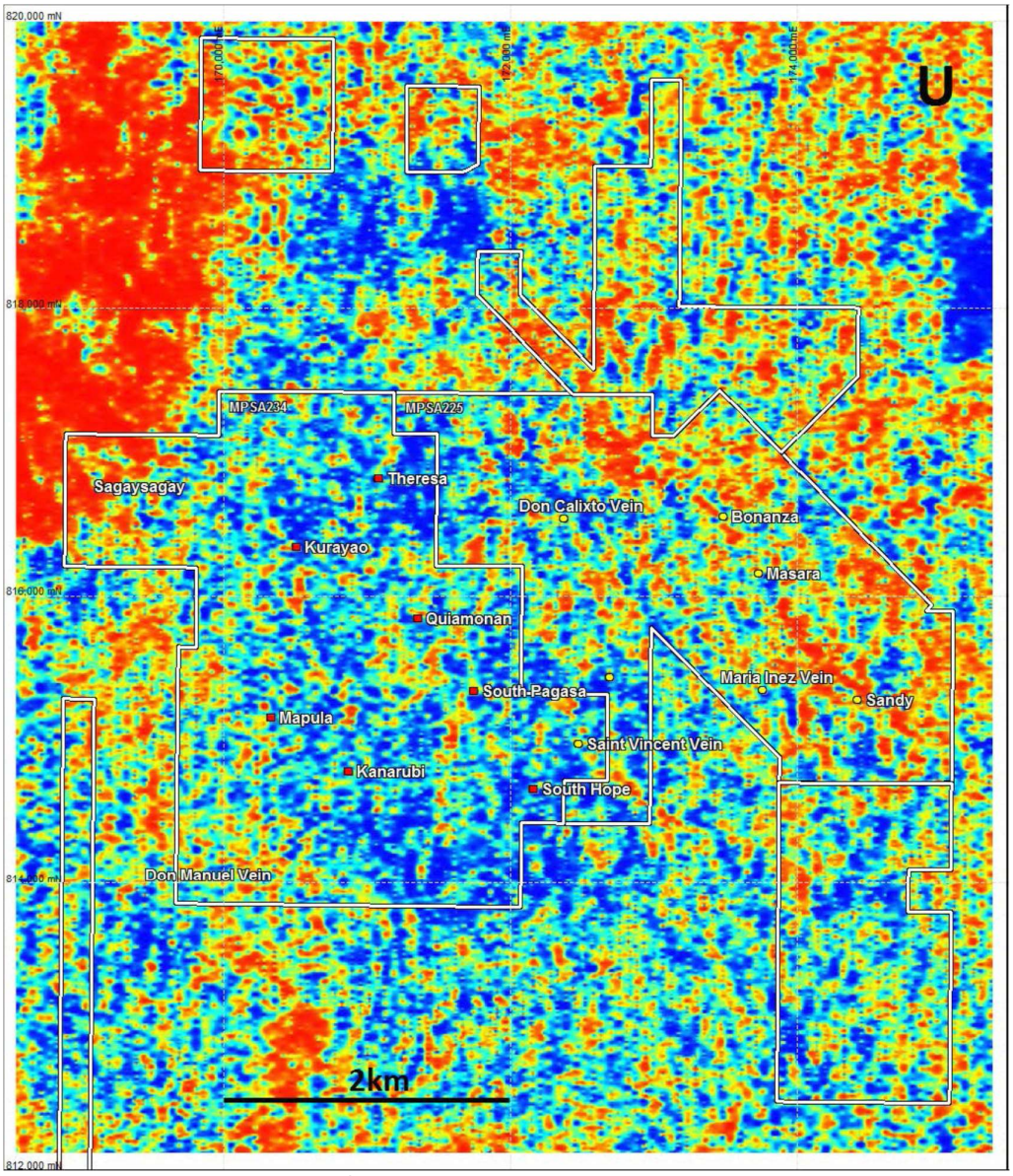


Figure 14.5.5.6.1 Image of uranium spectrometer channel data

14.5.5.8. Thorium Data

An image of the thorium concentration derived from the gamma-ray spectrometer is presented in figure 14.5.5.7.1. Of note includes:

- The thorium data shows a moderate-high trend along the NW-fault between Sandy-Masara-Bonanza in the eastern part of the survey.

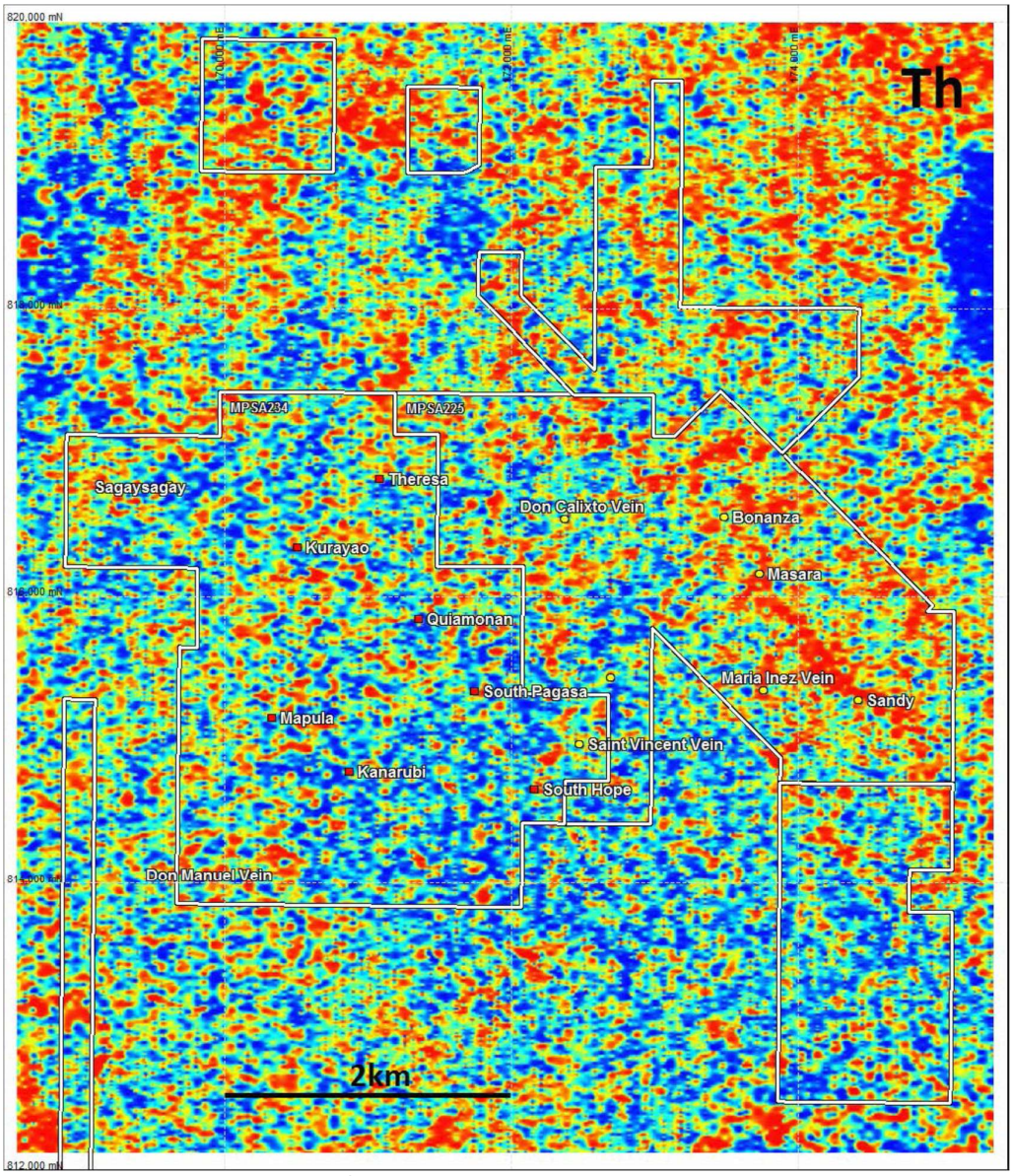


Figure 14.5.5.7.1 Image of thorium spectrometer channel data

- The thorium response over limestone occurrence is variable and not as definitive as the potassium or the uranium data channels.
- A central, broad, low thorium area is evident over the structurally complex zone indicated by magnetics.

14.5.5.9. Total Count Data

An image of the total gamma-ray response for the survey is presented in figure 14.5.5.8.1.
Many of the already described features from the various radiometric channels are evident in the total count data. Important points to note are:

- Many of the topographically-related anomalies evident in the potassium data are also apparent in the total count imagery. The

strong spectrum response in and around the potassium spectrometric energy level results in the dendritic patterned anomalies.

- The NW-fault lineation is apparent between Sandy-Masara-Bonanza in the total count response, but in the NW, the trend is evident but subtle and apparent only because of the truncation of low or high zones of total count readings rather than a lineation with elevated counts itself.

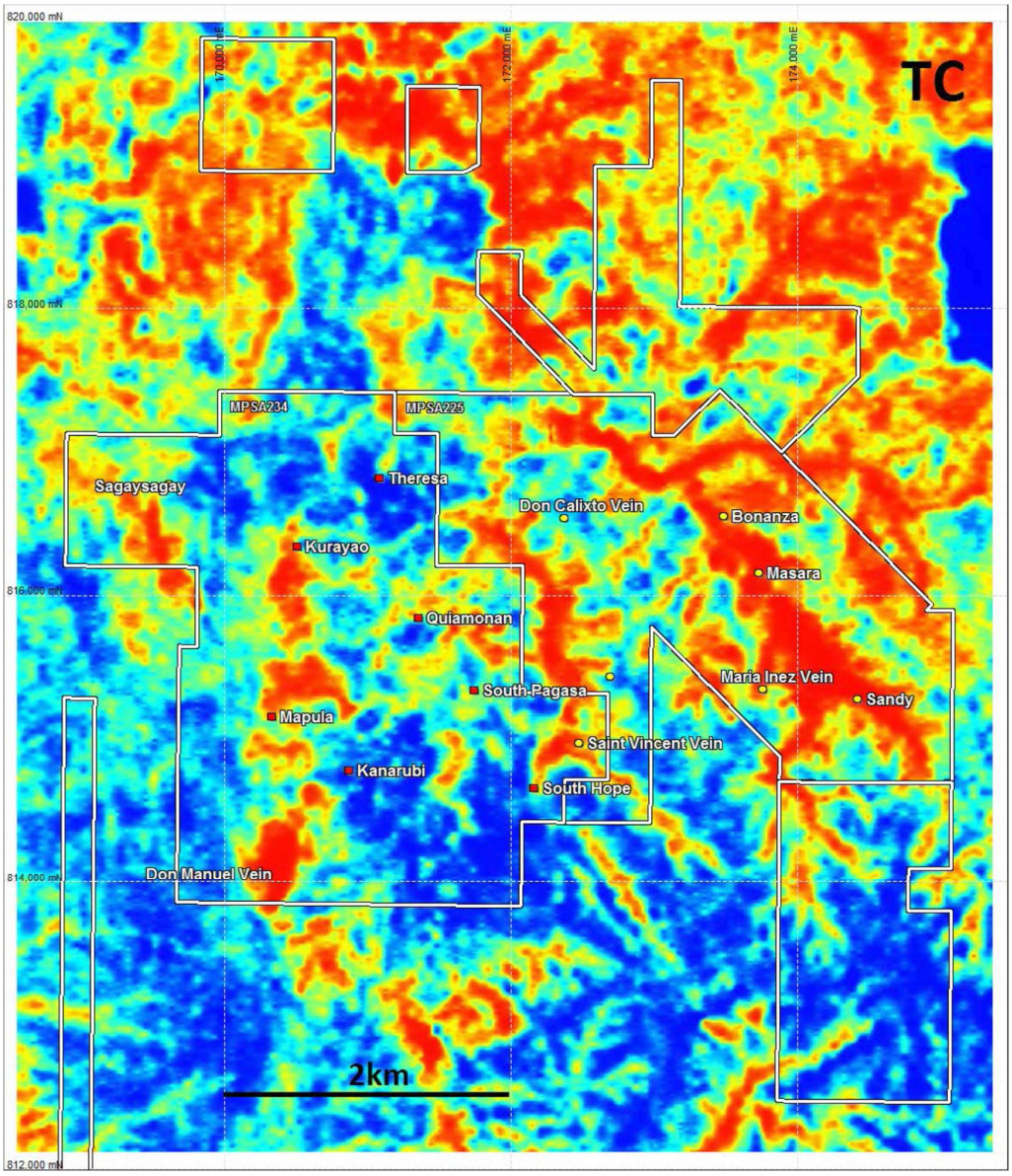


Figure 14.5.5.8.1 Image of total count spectrometer channel data

14.5.5.10. Structural Lineament Interpretation

Regional structural mapping of the magnetic and radiometric datasets has been completed. A series of magnetically prominent domains becomes

evident when examining the magnetic RTP dataset. The most significant of these includes:

- A central area of elevated, localized magnetic anomalism, defined by relatively high amplitude, short-wavelength anomalies. This zone and an extension to the SE, reflect relatively near-surface or outcropping elevated magnetite-bearing rock types (typically andesites and diorites).
- The NW-trending structural dislocation which dominates the eastern side magnetic data defines a significant structural trend between Sandy-Masara-Bonanza. The NW-trending fault is evident, not only as a strong offsetting feature of anomalies in the data but also as a series of localized anomalism with decreased magnetic response indicative of fluid movement and alteration effects along its structure.
- Within the magnetic data centralized on MPSA234, a series of large semi-circular trends outlining a zone of highly elevated magnetic response is likely to indicate the main zones of magnetite enrichment interpreted to be associated with the broad outline of intrusive events and porphyry boundaries.

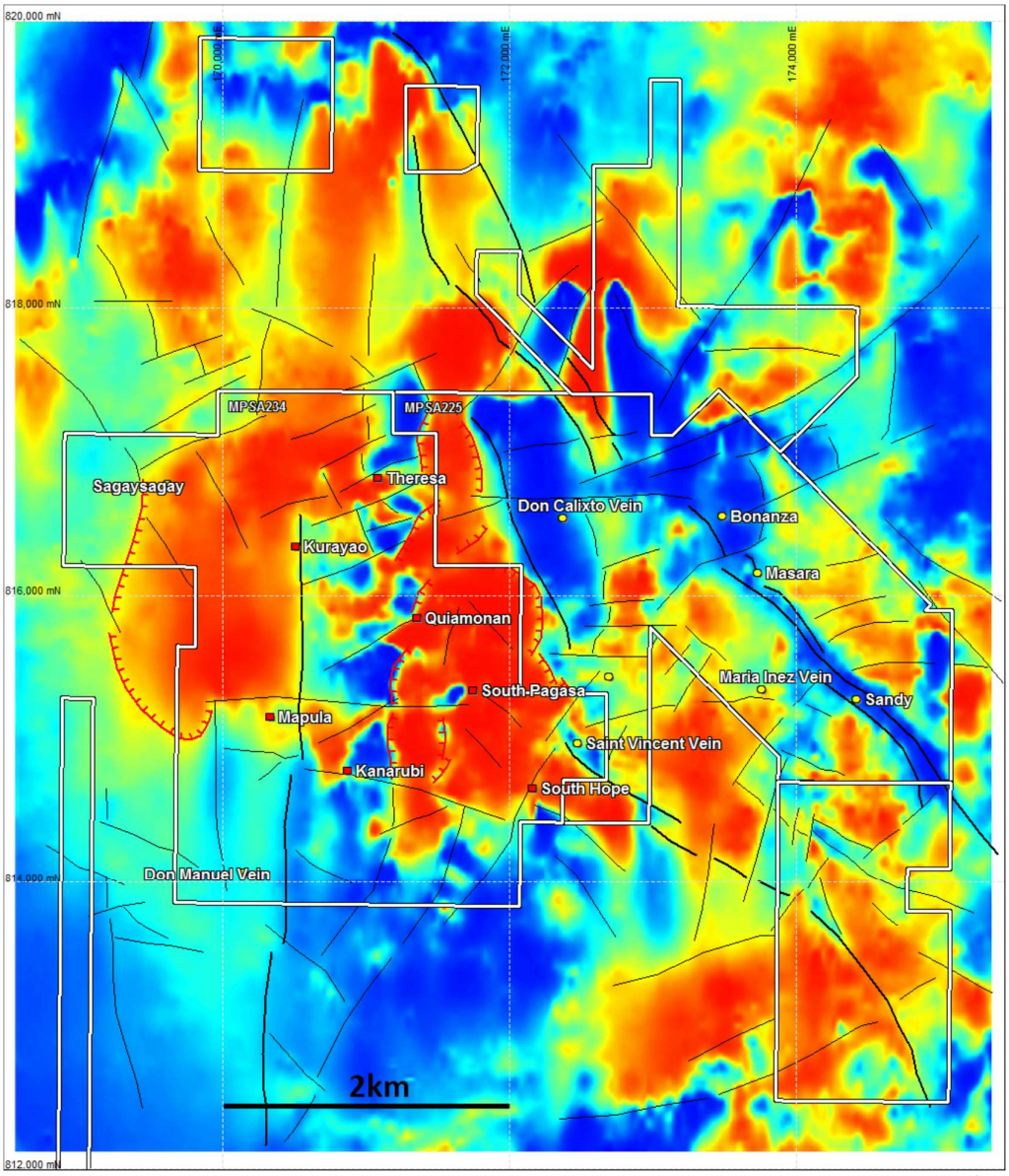


Figure 14.5.5.9.1 Regional structural lineament mapping interpreted from airborne geophysical data. Structure linework is displayed over the RTP magnetic image.

Dominant structures typically in an NW orientation have been mapped in thicker black line weight to distinguish them from typically subordinate cross-cutting structures mapped in thinner black linework. The dominant structural orientation is NW orientated, with NE, NNW, and E-W cross-cutting structures providing offset and structural complexity. The margins of the inferred intrusive centers located within MPSA234 are mapped in bold red linework and form circular caldera shaped to arcuate-curvilinear trends.

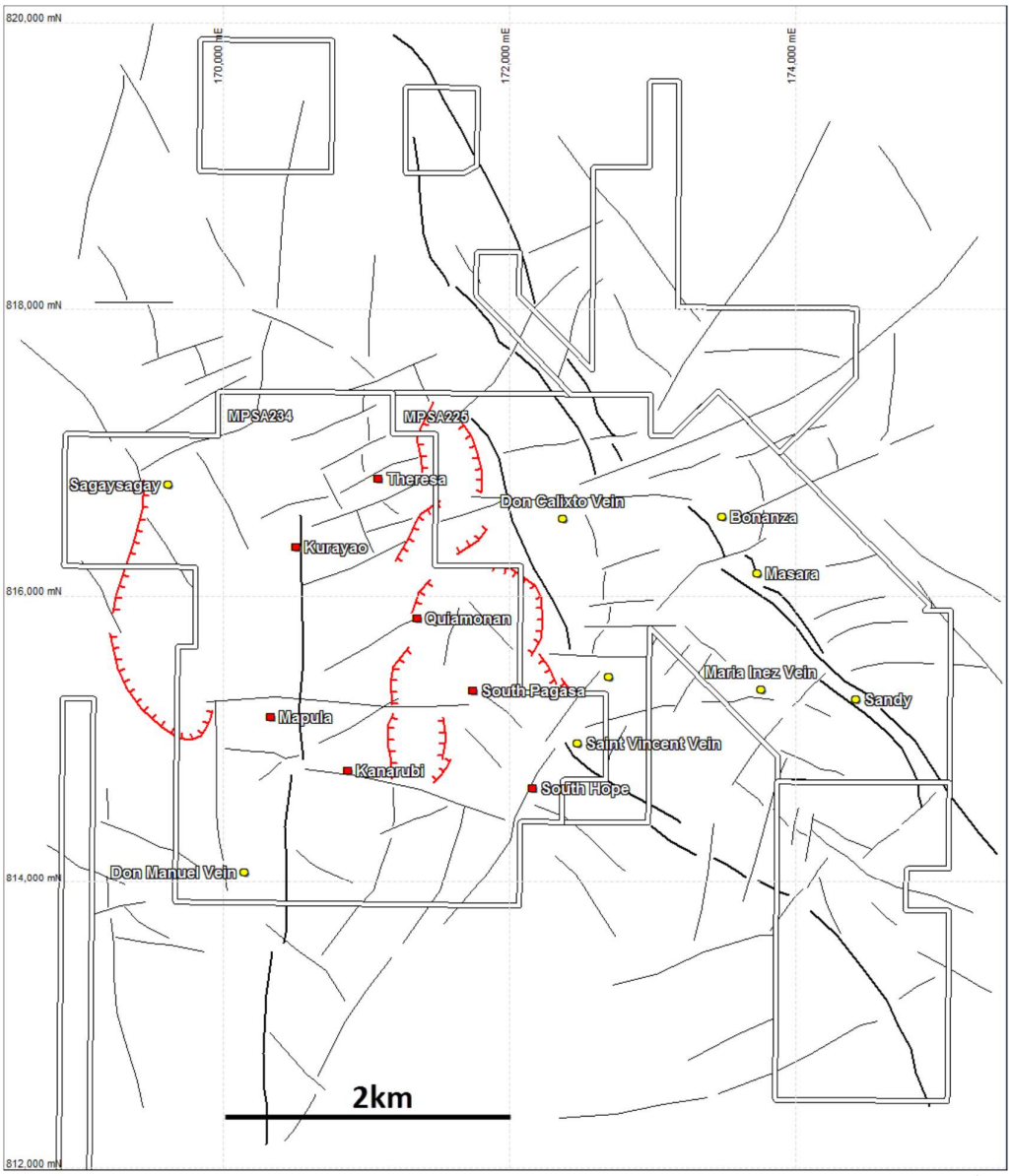


Figure 14.5.5.9.2 Regional structural lineament mapping interpreted from airborne geophysical data.

None of the highlighted internal magnetite and caldera boundaries are complete in their outline. Extensive interaction of other volcanic centers, subsequent overprinting and disruption, plus extensive structural and fault deformation over geological history, has produced a highly complex series of indicated intrusive centers evident in the magnetic data. Extensive faulting and structural disruption, in particular, is strongly evident and this has further produced offsets and truncations of trends which now are evident as only parts of the porphyry and caldera margins.

14.5.6. Discussion of essential results with respect to the objectives

The ER/IP data were collected by McPhar Geoservices Philippines Inc. using a McPhar P660 unit with a dipole-dipole configuration and an electrode

separation of 25 meters. Seven chargeability and resistivity pseudosections were produced. Three profiles were located in the Maligaya area, while four other profiles were placed in Malumon. All survey lines were placed at ~45° azimuth, oriented perpendicular to the NW-SE trending vein systems that are currently being mined for gold deposits. In the Malumon area, high chargeability and high resistivity zones are observed in the southwestern portion of the pseudosections. The high chargeability and high resistivity zones are coincident with the NW-SE trending linear feature on the magnetic tilt derivative map, which is also inferred as the mapped Sandy-Masara vein system. In the Maligaya area, the high chargeability zones with variable resistivities are associated with the Bonanza vein. Superposition of the ER-IP pseudo sections onto the magnetic tilt derivative map reveals that the high chargeability zone is variably distributed over tilt derivative highs and lows. East-west trending structures identified in the magnetic tilt derivative map generally coincide with chargeability lows. However, measurement of the chargeabilities over these E-W trending structures did not persist through the depth at which high chargeabilities to the southwest were observed. It is, therefore, possible that a highly chargeable body associated with the E-W trending structures exists at depth and may be similar to the highly chargeable body beneath the NW-SE trending Sandy-Masara-Bonanza veins.

14.6. Sample Preparation, Analysis and Security

14.6.1. Security and Chain of Custody of Samples

Sampling at the site is always conducted under the supervision of a geologist. The samples are then delivered and turned over to the Maligaya Sample Preparation Laboratory, and eventually to the AMCI Assay Laboratory. The transfer and storage of samples are monitored by the QA/QC Department through the use of transmittals submitted every time sample custody changes hands. The sample dispatching flowcharts for mine, exploration, and drilling samples are shown in the figures below (Figures 1 & 2). Rejects and unused duplicates of mine samples are stored for 3 months before being sent to the mill for feeding while those of exploration and drilling samples are permanently stored in the core house for future reference.

14.6.2. Preparation and assay facility

Samples from the drilling campaign conducted by Crew Gold (2005-2009) were sent to the McPhar Laboratory in Manila for sample preparation and analyses. An in-house assay laboratory was later on established by Crew Gold in the mine site. Under Monte Oro Resources & Energy Inc., a separate sample preparation laboratory was constructed and additional analytical equipment for the assay laboratory, such as a new Atomic Absorption Spectrophotometer, was acquired.

14.6.2.1. Sample preparation equipment

The Maligaya Sample Preparation Laboratory (MSPL) is equipped with the following:

1. **DRYING OVEN**– As metal contents are reported in dry weights, samples are dried before preparation.

Drying Process:

a) The sample is loaded in a drying pan along with its sample tag.
b) The pan is charged inside the oven at 160oC for mine samples and at 120oC for drill core samples.
c) Mine samples are dried for 3-4 hours while exploration and drill core samples are dried for 6-8 hours.
d) The drying pan is taken out using tongs or a trolley.
e) After the sample is withdrawn, it is immediately sent for crushing to minimize moisture drawn from the atmosphere.

2. **JAW CRUSHER** – A Jaw Crusher is used to rapidly reduce the size of samples before secondary crushing using the Boyd Crusher.

Crushing Process:

a) The sample is loaded in a drying pan along with its sample tag.
b) The pan is charged inside the oven at 160^{o}C for mine samples and at 120^{o}C for drill core samples.
c) Mine samples are dried for 3-4 hours while exploration and drill core samples are dried for 6-8 hours.
d) The drying pan is taken out using tongs or a trolley.
e) After the sample is withdrawn, it is immediately sent for crushing to minimize moisture drawn from the atmosphere.

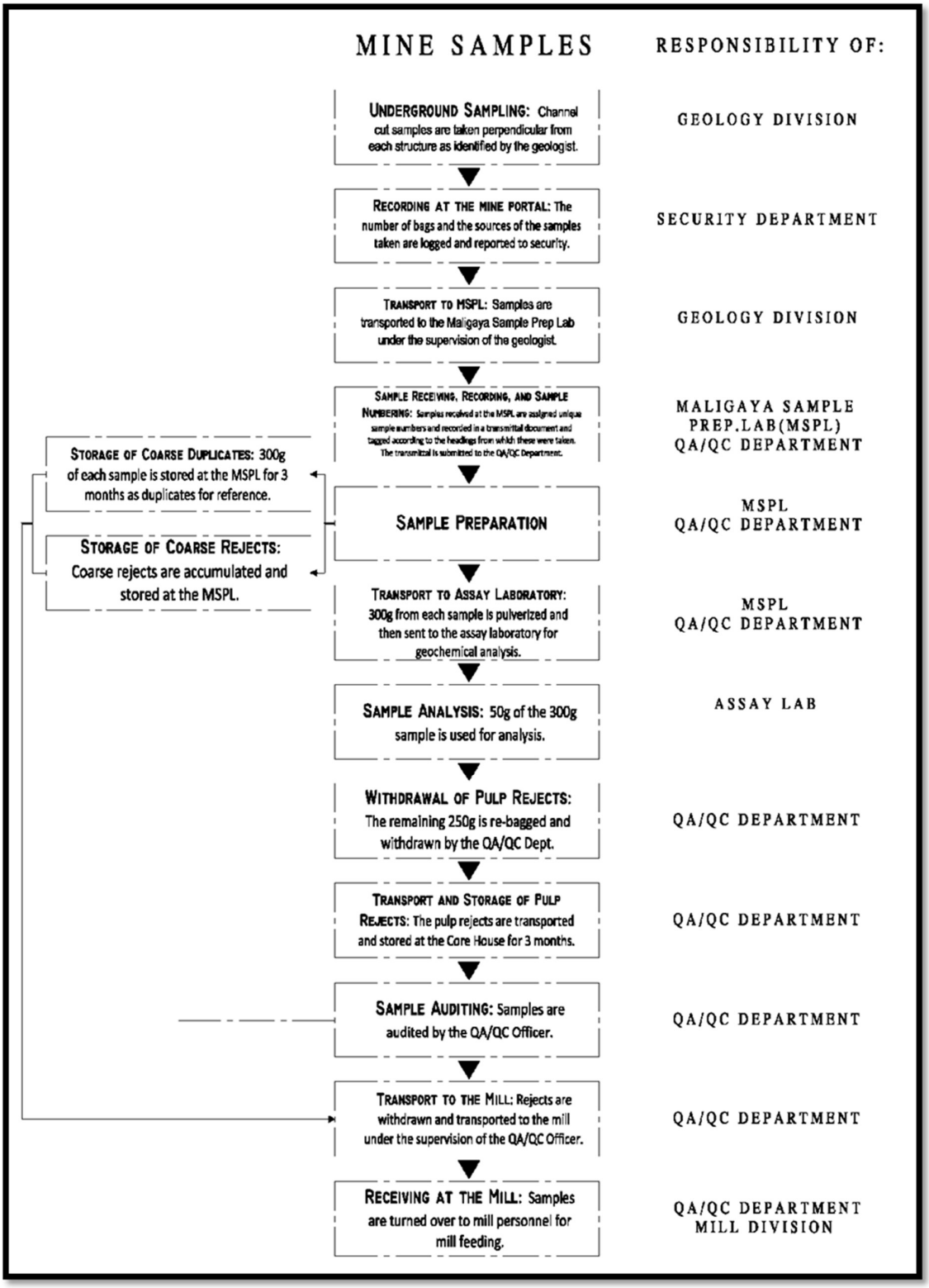


Figure 14.6-1: Sample dispatching flowchart for mine samples

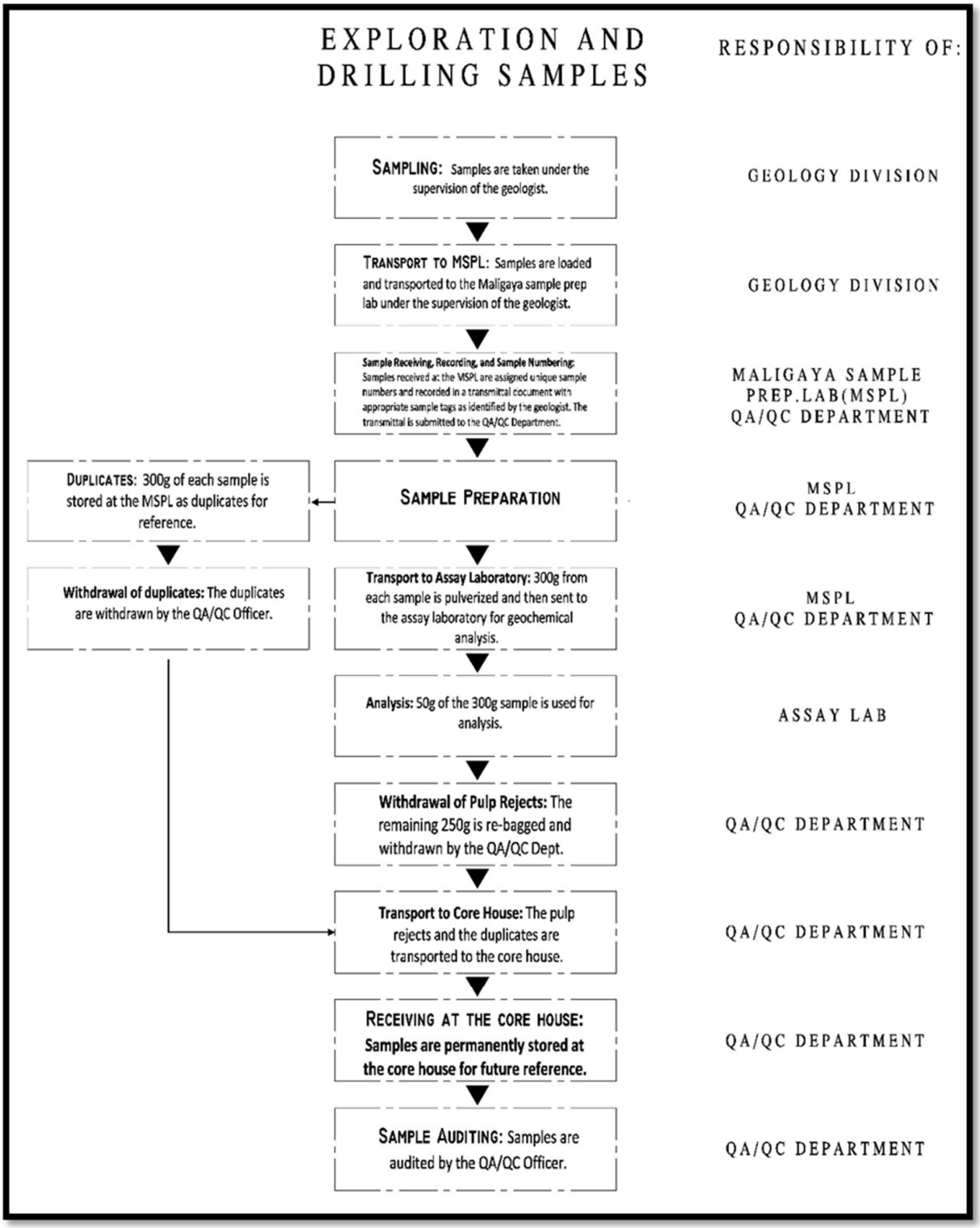


Figure 14.6-2: Sample dispatching flowchart for exploration and drilling samples

3. **BOYD CRUSHER**– The Boyd Crusher reduces the sample fragments to less than 2mm. It has two movable jaws, one top driven and one bottom driven, which allow for variation in output size and jaw wear.
Crushing Process:

a) The sample is loaded to the opening at the top of the Boyd crusher.
b) The Boyd crusher finely crushes the sample and then transfers the materials to the Rotating Sample Divider via a vibrator feeder.
c) The Rotary Sample Divider then splits the material into portions adjusted by the operator which collects in two trays at the bottom.
d) The portion for pulverizing is transferred to the original drying pan with the sample tag, while the other is kept as a duplicate.
e) A flushing sample (barren limestone) is fed to the Jaw Crusher, followed by cleaning using compressed air.

4. **PULVERIZER**– A Rocklabs Ring Mill is used to pulverize the materials from the Boyd Crusher to a fine grind of 95% passing 200 mesh.

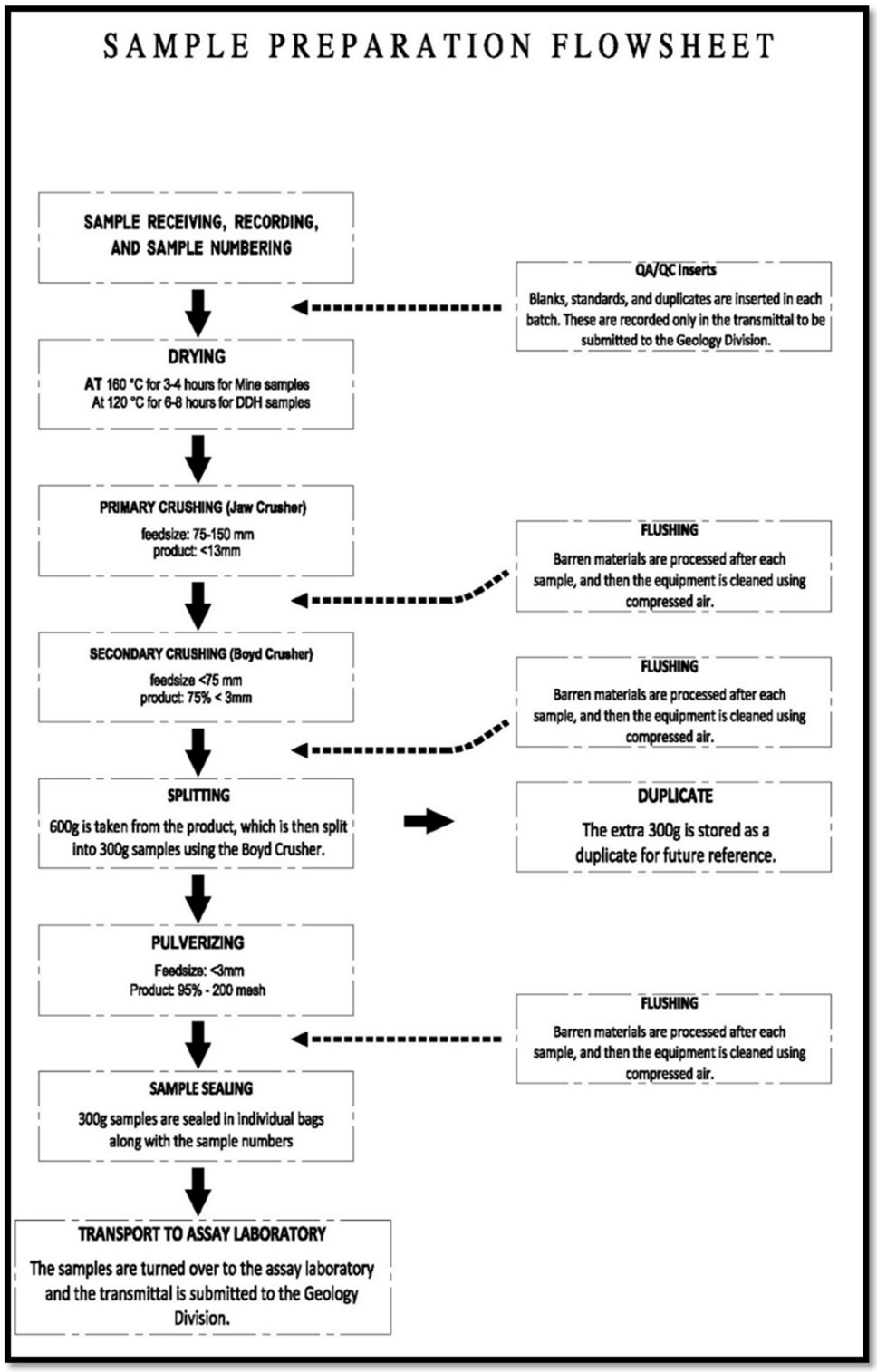
Pulverizing Process:

a) The sample is loaded into the bowl (500g to a 1000g bowl).
b) A pneumatic airbag then presses the bowl.
c) The bowl rotates to grind the samples at a pre-set timer depending on the sample type (7 to 10 min.).
d) The pulverized sample is transferred to the drying pan.
e) Barren limestone samples are processed followed by cleaning using compressed air.

Figure 14.6-3: Sample Preparation Equipment: (A) Drying Oven (B) Jaw Crusher (C) Boyd Crusher (D) Pulverizer

14.6.3. Sample preparation

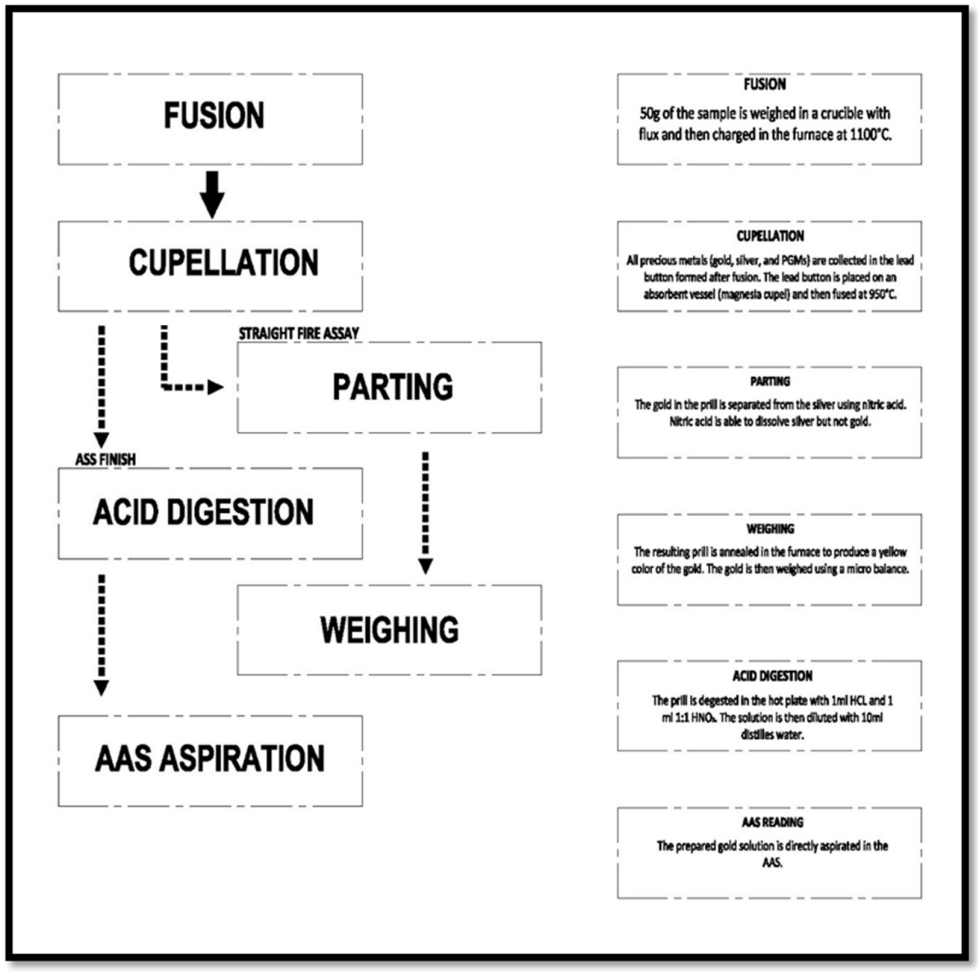
Flow chart 14.6.3.1 shows the sample preparation procedure followed by the Maligaya Sample Preparation Laboratory.



Flowchart 14.6.3.1 Sample preparation flowchart

14.6.4. Analytical methods used

The main analytical method used for gold is fire assay with a detection limit of 0.02 g/t. The other method utilized for base metals and low-grade samples (Au and Ag less than 0.5 ppm) is AAS with a detection limit of 0.002 g/t for Au and 0.001% for base metals. The general procedure for fire assay is shown in the figure below.



Flowchart 14.6.4.1 Fire Assaying Method

The various stages in fire assaying are described as follows:

1. **Fusion –** The furnace is pre-heated for about 1 hour until the temperate of 1100ºC is attained. The sample is charged for about 60-90 minutes. The melt is poured into a mold and the lead which contains the precious metals (Au, Ag, PGMs) would sink to the bottom while the slag would form above. The product is then pounded to separate the slag from the lead. Once separated, the lead is shaped into a cube while the slag is sent as waste.

2. **Cupellation-** The lead button is placed on a magnesia cupel and then charged in the furnace at a temperature of 950 ºC for

45-60 minutes. The cupel absorbs the lead, leaving the precious metals called “prill/dore”.

3. **Parting/Annealing**- The “prill/dore” obtained after cupellation is placed in a porcelain crucible. The dore is weighed in a microbalance. To separate silver from the gold, a parting solution with 1 part nitric acid and 3 parts water is added to the crucible. Nitric acid dissolves silver but not gold. The silver solution is decanted in the container and the gold is washed with distilled water 3 times. The gold is dried in the hot plate and annealed in the furnace for 15 minutes.

4. Finishing Technique- refers to the final step in the assaying process wherein gold is dissolved in the acid and the solution is determined.

a. **Gravimetric Method (Part and weigh method)** – This is a conventional method for determining gold. The lower detection limit is 0.02g/t Au. Gold grades above 50g/t Au are re-analyzed with sufficient addition of Ag inquartation to obtain an adequate ratio of Au:Ag for dissolution.

b. **Atomic Absorption Spectrophotometer (AAS) Finish**- This method is used for (low to very low grade) exploration samples. The lower detection limit is 0.002 g/t Au. Gold grades above 2 g/t Au are re-analyzed using a gravimetric finish to check the results.

c. **TWO ACID DIGESTION- AAS Finish**- This uses a combination of HNO3 and HCL, and is currently applied to silver and base metal (Cu, Pb, Zn) grade determinations. The solution is analyzed using AAS after the digestion process. The detection limit is 0.001% for Ag, Cu, Pb, and Zn.

15. QUALITY ASSURANCE/ QUALITY CONTROL

15.1. Quality Assurance/ Quality Control of Sample preparation and analysis

The AMCI Assay Laboratory has appointed an Analytical Chemist with the main task of implementing the internal QA/QC program of the laboratory. The Geology Division also implements its own QA/QC, acting as an external entity to the assay laboratory, through a department in-charge of monitoring proper sampling procedures, dispatches, and analytical results. The department is run by a QA/QC officer reporting to the Grade Control and Resource Geologists.

15.2. Quality control procedures

1. **Certified Reference Materials (CRM)** – CRMs used both by the assay laboratory and the geology division are purchased from reputable commercial laboratories. Each CRM has a certificate of analysis indicating the mean grade and the tolerance limits to be used for evaluating the performance of each analytical procedure. The matrices and the grades of the CRMs in use were selected in such a way that they are similar to the samples being analyzed in AMCI.

    - One CRM is inserted in every batch of samples sent for analysis. To ensure that the analysts are blind to the mean grade, each CRM is assigned a unique control number recorded by the QA/QC officer and the name is erased. The results are then checked against the tolerance limits indicated in the certificates to check the accuracy of the analytical procedures.

2. **Blanks** – The AMCI Assay Laboratory uses certified blanks purchased from reputable external laboratories, while the geology division uses both certified and in-house blanks. Limestone samples were pulverized, homogenized, and then split and sealed into 300g samples. One batch of 25 samples was sent to the AMCI Assay laboratory and another batch to Intertek, a laboratory based in Manila, for fire assay. The results from both laboratories certify that the samples are barren, and may be used as blanks for QA/QC.

    - One certified blank is inserted in each batch of drilling and exploration samples, while internal blanks are used for mine samples. As the in-house blanks appear similar to regular samples, these are inserted at random locations within each batch to ensure that the analyst is not aware of which sample is barren. The sample number of the blank insert is reported in the transmittal to be submitted to the geology division. The assay results of the blank inserts are then used to monitor whether there are any cases of contamination.

3. **Duplicates** – A duplicate of one randomly selected sample in each batch is also inserted in each batch.
    - For the selected sample, 900g is taken instead of 600g. 300g is sealed as a duplicate, and the remaining 600g is pulverized and then split into two using the Rotary Sample Divider of the Boyd Crusher. The sample numbers of the original and the duplicate in each batch are recorded in the transmittal. Similar to blank inserts, the analysts are unaware of which samples are duplicates. The absolute relative deviations of the results of the duplicates are then used to evaluate precision.

4. **Grind Checks** – To ensure reproducibility of assay results, the pulverized samples are checked if 95% passes 200 mesh.

- Two samples in every batch are screened using the procedure outlined below:

    i. Weigh 100g of dry pulp.
    ii. Wet sieve the pulp through the 200 mesh screen.
    iii. Dry the oversize.
    iv. Weigh the oversize.
    v. Calculate the weight of the undersize by subtracting the weight of the oversized from the total.
    vi. Calculate the percentage of the material passing 200 mesh by dividing the weight of the undersize with the total weight, multiplied by 100%.

5. **Flux Test** – This test is performed to check if the chemicals to be used for analysis are contaminated with gold.

- One crucible in every batch is loaded with flux and then charged and treated as a normal sample.

15.3. Presentation and Analysis of Quality Control Data

The results of the various tests are statistically and graphically analyzed every month, weekly if there is sufficient data within the week, to identify outliers and notable trends. The results are communicated with all parties involved such that if peculiar results are identified, these may be properly investigated, and the causes of which resolved.

1. Certified Reference Materials

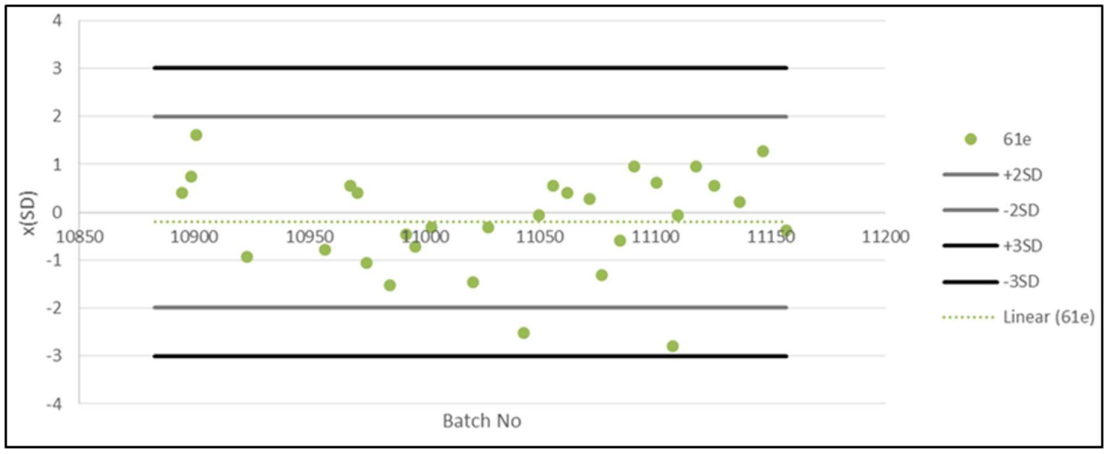


Figure 15.3.1: Scatterplot Used for the Analysis of CRM Assay Results

- The recommended value is the certified mean.
- The tolerance limits are calculated as ±2 and ±3 times the standard deviation indicated in the certificate provided by the supplier.

The deviations of the assay results from the certified mean value are calculated in terms of the multiples of the certified standard deviation. Results with absolute

differences below 2 SD are ideal, while those between 2 SD and 3 SD are still acceptable but may prompt investigation if consistently obtained. A fitted trend line, supported by visual inspection of the scatterplot, is used to detect for bias. Data is further sorted per CRM and similar analyses are made. As CRMs with low, medium, and high grades are used, the accuracy for all grade ranges can be evaluated.

2. **Blanks**

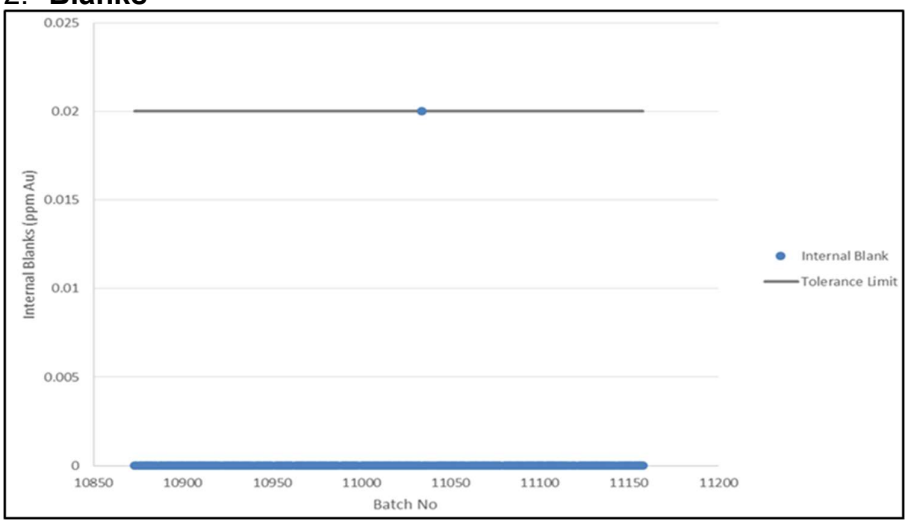


Figure 15.3.2: Scatterplot Used for the Analysis of Blank Inserts

Assay results of the blank inserts are plotted in sequence to easily identify possible occurrences of contamination. The tolerance limit for blanks is set at 0.02 ppm Au.

3. **Duplicates**

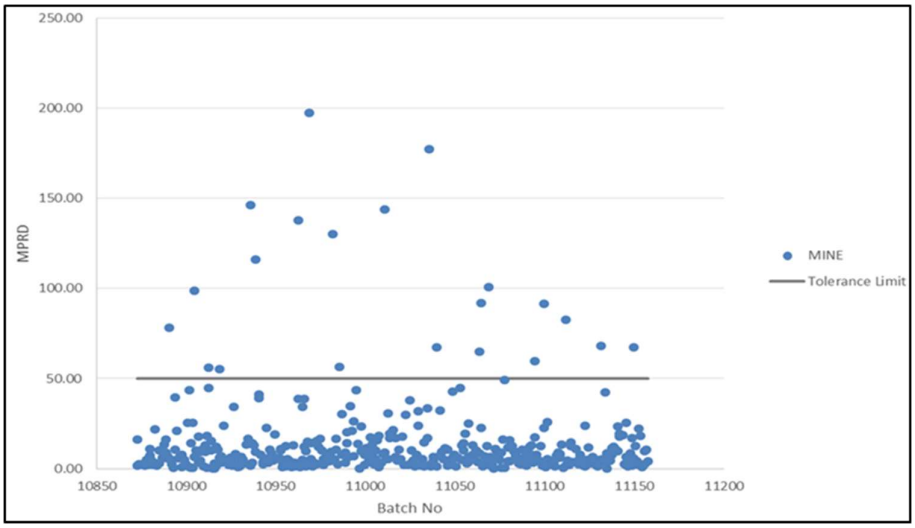


Figure 15.3.3: Scatterplot Used for the Analysis of Duplicate Pairs

Considering the highly variable nature of gold, precision is evaluated using the Mean Percentage Relative Deviation (MPRD). MPRD is calculated by dividing the difference of the original and duplicate sample grades by the mean, multiplied by

100%. The tolerance limits are set at 50% MPRD. The MPRD values are plotted per batch as shown below to make it easier to identify patterns.

15.4. Statement of the CPs on the quality of sample security, preparation, and analysis

The Apex Resource Estimation Team and the company's consultants have demonstrated industry-standard practices and continuing efforts in safeguarding the quality of samples, as well as in their preparation and analysis, to come up with a valid and verifiable database utilized in resource estimation.

16. DECLARED MINERAL RESOURCES

16.1. Mineral Resources estimates

The table below contains the ore resource estimate lifted from **"2020 MINERAL RESOURCE ESTIMATE OF THE GOLD VEINS WITHIN MPSA-225-2005-XI".** The current global resource for the fifteen epithermal veins with face sample data as of October 2019, is estimated at 945,000 ounces (5,920,000 tonnes at 5.0 g/t Au).

MINERAL RESOURCE (1.5 g/t Au cutoff)			
CLASSIFICATION	TONS (000 t)	GRADE (gpt)	OUNCES Au
Measured	380	5.8	70,000
Indicated	3,220	5.0	517,000
SUB-TOTAL	**3,600**	**5.1**	**587,000**
Inferred	2,320	4.8	358,000
TOTAL	**5,920**	**5.0**	**945,000**

17. ECONOMIC ASSESSMENT OF THE MINING PROJECT

17.1. Description of Mineral Resources estimates used as the basis for conversion to Ore Reserves

17.1.1. Database used in the estimation of resources

The database includes:

- Development drives 3d projection stored as survey data
- Drill holes stored as 4 separate excel files (headers, survey, assay, rock code)
- Face samples stored as 4 separate excel files (header, survey, assay, rock code)
- Vertical section plans stored in AUTOCAD that include projected position of drill data face samples, development, and structures
- Cross-sections and Level development plans stored as hard copies
- Face mapping stored as hard copies
- Wireframes representing each vein and each corresponding hanging wall and footwall stored as dxf files
- Wireframes representing voids or mined out areas within each vein stored as dxf files

17.1.2. Integrity of database

The database has suffered somewhat from being stored in several formats and locations. Checking during the preparation of this resource estimate highlighted some issues that were fixed immediately. This has led to a campaign of a total verification of all data against original data and drill core and stored in a specialized server database to reduce inadvertent error.

17.1.3. Data verification and validation (limitations)

All of the data is valid and is constantly being validated. However, during spot checks it was found some data was valid but not verified. A quick survey was undertaken and obvious outliers resolved. A campaign of total verification, mostly in the face sample data, was started in August 2014. Whilst this is a concern, the issues have been mostly resolved and have not changed the outcome of the resource blocks they affected. Coupled with the fact that it is an operating mine with good comparative reconciliations, the risk represented by the verification issues is considered low.

17.1.4. Cut-off grades used in the estimations

A historic block lower cut of 1.5 g/t Au has been used for accepting blocks into the resource. The cutoff is considered appropriate considering the planned mine cutoff grade of 1.5 g/t Au once the mine and mill have ramped up to 3,000 tpd. Material in the 1 to 3-gram range is often mined and blended with very high-grade ore and put through the mill. As the resource estimation methodology is Ordinary Kriging, over smoothing of the estimated blocks is expected and as such top cuts were applied during estimation, using the 97.5^{th}, 95^{th}, and 90^{th} percentiles for measured, indicated, and inferred blocks, respectively.

17.1.5. Mineral Resource estimation method used

The estimation methodology used was Ordinary Kriging. Variograms were created per vein to determine the lateral and vertical continuity of grade along the vein. Each vein is then subdivided into a normalized block model and block characteristics such as percent mineralization were computed for each block based on the appropriate wireframes.

Weights are then assigned to data points (drill hole and face sample) around each block to determine its grade and the level of confidence in the grade estimate. Blocks were also assigned a classification based on the location of data in its proximity and the characteristics of the variogram for the particular vein.

Tonnages were calculated by summing the volume of each block (2x2x4) whose grade is above the resource cutoff of 1.5g/t Au multiplied by the percent mineralization multiplied by a fixed specific gravity of 2.60.

17.1.6. Mineral Resource categories used (PMRC/JORC)

Categories used are:

- Measured – For blocks with data from at least four octants around the block and search radius equivalent to one-third of the range of the modeled variogram for each vein
- Indicated – For blocks with data from at least two octants around the block and search radius equivalent to two-thirds of the range of the modeled variogram for each vein (2 data points minimum)
- Inferred – For blocks with at least 2 points of data within a search radius equal to the full extent of the range of the modeled variogram for each vein

17.2. Type and level of Feasibility Study.

A Feasibility Study was undertaken and completed in July 2015. The study demonstrated that the conversion of Mineral Resource to Ore Reserves was technically achievable and economically viable and that all modifying factors have been considered.

17.3. Brief Description of the Project

17.3.1. Planned Mining and Processing Operations

The planned mine and mill capacity is 1,500 tpd for the first five years with a planned expansion to 3,000 tpd thereafter. As additional ore blocks are prepared, the production will ramp up to 3,000t/day. Portions of the mill plant such as the gold room and the crushing sections are in the process of being upgraded to handle 3,000 tpd. A SAG will be installed in the future to handle 3,000 tpd.

17.3.2. Mining Method and Capacity

The planned mining methods described below support the estimate of ore reserves in the subsequent report section.

The factors that most significantly affected the choice of mining methods are:

- high-value ore which would benefit from high mining recovery
- The nature of ground conditions in the vein and the need for safety in the stopes along with predictable mining, keeping the excavation under control

- Flexibility to chase sinuos veins and vein splays
- Ability to follow narrow veins with complex geometry

The main mining method planned are;

- mechanized cut and fill in 2.5m cuts, with overhand sequencing;
- longhole stoping retreat mining with delayed backfill
- shrink stoping with delayed backfill

Backfill will consist of a mix of development waste rock and surface quarried waste rock. A combination of these mining methods is employed across various work areas to produce the 1,500tpd to be delivered daily to the mill.

17.3.3. Processing Method and capacity

The milling process involves 3-stage crushing, two parallel closed-circuit milling, thickening, carbon-in-pulp (CIP), elution, refining, and tailings treatment.

The run-of-mine ore is delivered to the mill stockyard and piled according to grade. For comminution, the crushing section uses a jaw crusher in series with a cone crusher. The crushed product is then stockpiled to the fine ore bin to feed the grinding section. The grinding section consists of two parallel circuits (1) a primary mill (rod mill) and a regrind (ball mill) in closed-circuit with the hydrocyclones and (2) a closed-circuit single-stage ball mill with hydrocyclones. The cyclone overflow is fed to the thickener where some of the water are removed from the slurry to increase % solids.

The thickened slurry containing 45% to 50% solids are then fed to the cyanidation or carbon-in-pulp (CIP) circuit. The gold and silver contained in the ore are dissolved using cyanide and oxygen as the slurry passes through a series of agitated tanks. Activated carbons are then added in the last seven tanks of the CIP circuit to collect the dissolved gold and silver. 100

Lime is also added in the circuit to raise the basicity of the slurry to at least pH 10.0.

The carbon loaded with gold is then pumped to the stripping section where it is washed with acid and put in the elution columns. The gold is then stripped from the carbon under high temperature (110oC) and pressure (>60 psi) using a caustic soda and cyanide solution. The solution containing the gold continuously passes through an electrowinning circuit to recover the gold and silver. Finally, the electrowinning sludge containing gold and silver are smelted to produce gold/silver bullion.

The product is then sold to Heraeus Precious Metal, a precious metal processing group based in Germany with several branches around the world. The gold smelting for the AMCI dore is done by Heraeus Hong Kong.

See Annex ‗C-1‘for process flowsheet.

17.3.4. Ore to be Mined / Product to be produced

The final product is Dore, usually weighing 13-17 kg per bar and assaying 15-20% Au, 75-80% Ag, and 1-5% other elements.

17.3.5. Prospective Markets or Buyers

Apex Mining Company, Inc. has an exclusive contract for all goods produced with Heraeus Precious Metal

17.3.6. Estimated Mine Life

A hypothetical estimated mine life of ten years is used in this study. It has become a common operational practice in the country for epithermal, narrow vein-type gold operations to maintain an ore reserve from one- to three- years of production. To have more developed ore than what is necessary would tie up capital, funds which otherwise could be used for operating expenses and others. This balance of deciding what mining rate can be maintained can only come from a very good understanding of the geology and behavior of the vein system over time. On-going exploration and development may extend the mine life longer than the assumed 10-years.

17.3.7 Total Project Cost/Financing

See Annex ‗K-1'.

17.3.8 Production Cost / Production Schedule

See Annex ‗K-1'.

17.4. Marketing Aspects

17.4.1. World Supply and Demand Situation

Generally positive implied performance for 2020

Gold rallied by 4% in December 2019, increasing by an additional 6% by 7 January 2020. While we believe that there are various reasons for this move, tensions in the Middle East linked to the US-Iran confrontation ultimately pushed the gold price to an almost seven-year high in early January.

Subsequent comments by President Trump aimed to ease concerns, pushing the price down to the US$1,560/oz-US$1,550/oz level as of 10 January 2020. Yet, gold remains still 2.6% higher relative to the end of 2019.

We expect that investor positioning related to this specific event will likely influence gold's performance in the near term. But over the medium term, broader financial and geopolitical uncertainty and developments in monetary policy will play a more important role.

https://www.gold.org/goldhub/research/outlook-2020

17.4.2. Prospective Markets or Buyers

Apex Mining Company, Inc. has an exclusive contract for all goods produced with Heraeus Precious Metal. Gold also can be sold to gold buying stations of the Central Bank of the Philippines.

17.4.3. Product Specifications

The final product is Dore, usually weighing 13-17 kg per bar and assaying 15-20% Au, 75-80% Ag, and 1-5% other elements.

17.4.4. Price and Volume Forecasts

The figure shows a yearly production forecast for both gold and silver with corresponding prices of $1,250/oz for gold and $18/oz for silver.

17.4.5. Sales Contract (see Annex _A')

17.5. Technical Aspects

17.5.1. Mining Plans

17.5.1.1. Mining Method

17.5.1.1.1. Mining Methods Considered

The following are the different mining methods currently used and will be used depending on the prevailing ground condition and geotechnical characteristics of the ore.

Bench & Fill

This method is applied to veins and surrounding walls with high rock quality index that can hold large openings for a short span of time. This method creates a larger stope opening as the entire pillar in-between level approx. 12m height is blasted creating a total opening of approx. 18 meters connecting the upper and lower mining levels. Blasting is done every 3 rings (2.4m) or more as dictated by the geologic characteristics of the ore and the wall rocks. Every ring has an interval of 0.8m. Long holes are drilled to blast vertical slabs off the ore block.

Constant monitoring and supervision are undertaken during drilling to provide less room for errors especially in following the right hole inclination and drill pattern with respect to hole location. Hole deviation is a critical problem especially in hard ground areas wherein drill holes tend to bend and eventually could result in bootlegs and hang-ups.

ANFO is used as a primary charge along with a two-1kg primer located at the bottom and mid-section of the column charge. This method of charging minimizes the occurrence of misfires and facilitates better rock fragmentation.

Backfilling is done after cleaning of blasted materials and is a critical part of the mining cycle. This type of mining method was based on modified Avoca which originated from Avoca Mines, Ireland. This mining method is suitable for GOOD to FAIR ground conditions like in Masara and Bonanza vein system.

Mini - Bench & Fill

This is just a variation of the bench-and-fill method. The only difference is by splitting the entire sublevel height into half. This is achieved by slicing the first 6 meters pillar from the lower sublevel before taking the other half 6 meters pillar from the upper level.

Uphole and downhole drilling is done by a long hole machine. ANFO is used as a primary explosive charge. This method has the advantage of minimizing hole deviation, reduced blasting vibration due to lower charge density, and minimum ore and waste dilution. This method however has a lower productivity compared to the bench and fill method as it requires more time to be spent in fixed activities in the mining cycle e.g. equipment movements, preparations in drilling and charging, re-entry time, etc.

Backfilling is done after taking the whole 12-meter pillar and still plays a critical part in the mining cycle.

Longhole Open Stoping (Bench & Fill) with delayed backfill

This method applies the same principle as of the bench-and-fill method. However, this is more applicable in veins and wall rocks with higher rock quality index that can hold larger stope opening for a longer span of time. Backfilling can only be done after the entire stope length is mined out. Backfilling although in a delayed manner, still plays an important role in completing the entire mine cycle as mining (overhand) cannot commence in the upper level as long as the backfilling activity is not yet through in the lower lever.

Modified Longhole Shrinkage Method

Modified Shrinkage Method can be applied in a steeply dipping vein (at >70 degrees) with regular ore boundaries stable enough to be self-supporting and is limited to vein widths less than 2.5m. In this method the ore is mined on vertical slices from drift to upper elevation blasted using longholes. The broken ore will be temporarily stored in the stope to serve as a support on walls.

Comprehensive studies concerning the caving abilities of ore and wall rock characteristics shall be undertaken before this method will be chosen. Compacted ore could result to pack ups and are very dangerous if not properly treated. Slabbing of surrounding wall rocks as the ore is drawn could also result in high dilution of ore and waste materials. The decision of leaving the stope without backfill or with backfill will depend on the geologic characteristics of the wall rock itself.

Cut & Fill

This method is used in areas with weak and poorly defined wall contact. In areas where the rock surrounding the ore zone is too weak to use long hole stoping, or the sides of the ore-zone are irregular and drilling long holes would create too much dilution, then cut and fill is applied. This method uses broken rocks as a platform in making horizontal slices of the ore from bottom to top. Variations are made to adopt different vein conditions; mechanized cut and fill are used in wide veins while handheld for narrow veins.

Mechanized Cut and fill is used in wide veins particularly in Bonanza and Bonanza HWS, it utilizes Jumbo to drill and blast horizontal slices within the entire stope length. While in veins less than 2.5m handheld cut and fill is used to create smaller openings with minimum ore-and waste dilution, and maximum ore recovery. Handheld breast stoping employs the same techniques with the mechanized breast stope method the only difference is that it uses a handheld drill instead of a jumbo drill.

Chosen Mining Method

Based on the available review of the vein system‘s characteristics two possible methods were considered with applied variations to fit the stope‘s limitation.

• Longhole Open Stoping with Backfill (ModifiedAvoca)

• Horizontal Cut and Fill

These options were chosen based on ore geometry, competency of wall rock and vein, and safety of workers and equipment.

Longhole Open Stoping with Backfill (Modified Avoca)

Working Hours: The available hours to work per shift underground was estimated at a maximum of 5 hours in an 8 hours shift. Three (3) hours for the shift change, transport to and back from the mine, resting time, access to the stope, equipment checks, and re-fuelling.

Working Hours

Total Shift	8	Hours
Shift Changing	0.5	Hours
Access to Mine	0.5	Hours
Stop Time	0.5	Hours
Access to stope	0.5	Hours
Back to Surface	0.5	Hours
Refuelling, etc.	0.5	Hours
Working Time	5	Hours

The production cycle includes the following steps:

- Drilling;
- Charging and Blasting;

- Scaling the brow and mucking;
- Services – Watering of the ore, Geology, Survey, re-support, scaling, pipes and electrical cables retreat, etc;

Blocks of 15meters maximum length are planned to be mined before backfilling. Drilling and Blasting: For the drilling, an average of 2.5m stope width was considered, with a burden equal to half of the stope width. Each row will have 3holes (11meters length). The drilling diameter considered was 64mm. The long hole jumbo drilling performance considered was 50m per shift, with 15% re-drilling.

Drilling, Charging and Blasting		
Average Width	2.5	m
Burden	0.8	m
Hole length	11	m
Volume per Row	22	m3
Tons per Row	57.2	m
# of Holes per Row	3	holes
Hole Diameter	64	mm
Meters Drilled per Row	33	m
Meters Drilled per shift	50	m
Rows Drilled per Shift	1.52	Rows
Tons Drilled per Shift	86.67	Tons
# of Rows per Blast	3	Rows
Tons per Blast	171.6	tons
Charging and Blasting	1	shift
Shifts per Blast	2.98	Shifts
15% Re-drilling		

Mucking: After the blast and the water spraying of the ore, mucking takes place. A loader (LHD) with a 5ton bucket was considered, with a cycle time of 7.1minutes.

Mucking		
Bucket Capacity	5	Tons
Charging	3	min
Discharging	0.5	min
Distance to ore bay	150	m
Velocity	5	km/h
cycle	7.1	min
LHD Availability	75.00%	
Working Time per shift	3.75	hours
Cycle per shift	31.69	cycles
Tons per Shift	158.45	tons
Shifts to Muck a blast	1.08	shifts

For the services (scaling, water spraying, repair vent pipe, retreat pipes, and electrical cable, survey, geology, etc), 1 shift per blast was considered.

For each blast, a total of 5 shifts are needed to complete the mining cycle. It should be noted that drilling and mucking of a stope, although on different levels, cannot be done at the same time due to the fact the drill holes breakthrough on the mucking level and due to ventilation problems for drilling brought about by the LHD exhaust.

After mucking in the stope is completed (the length considered was 15 meters), backfilling is undertaken. All the waste available in the surroundings can be transported back into the stope.

Stope Dimensions		
W	2.5	m
L	15	m
H	11	m
Volume	412.5	m3
Tons	1072.5	tons
Days to Mine a Stope	10.55	days
Drift Dimension		
W	4	m
L	15	m
H	4	m
Volume	240	m3
Volume to backfill	652.5	m3

652.5 cubic meters of volume is needed to backfill a stope of 15meters length. It was considered that hydraulic fill is used to minimize the production stoppage (ore blasting to stop until the backfill is completed.

A backfill plant capacity of 400m3/day was considered, with 1 shift to transport materials, 3 shifts to build the fence, and 3 shifts to clean and prepare the level to start production. A total of 13 shifts (rounded to 5 days) are needed to complete the backfill cycle.

This means that a total of 13 days is needed to complete the mining/backfill cycle of a stope, achieving a 70 tons/day performance with an 85% efficiency factor.

Backfilll cycle		
Materials	1	Shift
Building fence	3	Shifts
Days to backfill stope	6	Shifts
Clean level	3	Shifts
TOTAL	13	Shifts
TOTAL Backfill	4.33	Days
Days to mine and backfill	13	Days
Efficiency factor	85%	
Tons/day	70.125	tons/day

Ore Development

Parallel to the stope production, there is the normal ore development on the sub-levels. For 60 meters advance per month and 3 operating drifts per mining panel, a total of 200 tpd is achievable per area.

Drift Productivity		
H	4	m
W	4	m
L	60	m/month
Volume	960	m3
Tons	2,496	Tons per month
Payability	80.00%	
Tons of Ore	1996.8	Tons per month
Tons of Ore	66.56	tpd
3 Operating drifts	199.68	tpd

Horizontal Cut and Fill

When ground conditions permit, horizontal cut and fill method is also used. This is done using handheld and mechanized methods.

Handheld

Working Hours: The available hours to work per shift underground was estimated at a maximum of 5 hours in an 8 hours shift. Three (3) hours for the shift change, transport to and back from the mine, resting time, access to the stope, equipment checks, and re-fueling.

Drilling and Blasting: For the drilling, an average 2.5m width was considered with a drift height of 2.46m. Each row will have 18holes (1.7meters length) with a drilling diameter of 32mm. The handheld drill performance considered was 25m per hour. For the services (scaling brow, re-support brown, repair vent pipe, retreat pipes, and electrical cable, road grading, survey, geology, etc.), a 0.5 shift per blast was considered.

Mucking: After the blast; mucking takes place. A loader (LHD) with a calculated 4.25tonnes bucket capacity was considered with a cycle time of 6.2minutes. A total of 52 tons of stope ore is expected daily with this production cycle. After mucking in the stope is completed, backfilling is undertaken. All the waste available in the surroundings can be transported back into the stope. 24tons per day is the required backfill volume.

Ore Development

Parallel to the stope production, there is the normal ore development on the sub-levels. For 45 meters advance per month, a total of 23 tpd is achievable per area.

Mechanized

Working Hours: The available hours to work per shift underground was estimated at a maximum of 5 hours in an 8 hours shift. Three (3) hours for the shift change, transport to and back from the mine, resting time, access to the stope, equipment checks and re-fueling

Drilling and Blasting: For the drilling, an average 3m width was considered with a drift height of 2.73m. Each row will have 38holes

(2.0meters length) with a drilling diameter of 45mm. The jumbo drill performance considered was 30m per hour.

For the services (scaling brow, re-support brown, repair vent pipe, retreat pipes, and electrical cable, road grading, survey, geology, etc.), a 0.5 shift per blast was considered.

Mucking: After the blast; mucking takes place. A loader (LHD) with a calculated 4.25tonnes bucket capacity was considered with a cycle time of 6.2minutes. A total of 69tons stope ore is expected daily with this production cycle. After mucking in the stope is completed, backfilling is undertaken. All the waste available in the surroundings can be transported back into the stope. 33tons per day is the required backfill volume.

17.5.1.2. Mine Design/Mining Parameters/Geotechnical Parameters

Each vein system was analyzed by the Rock Mechanics Section of the Mine Geology Department to determine its rock mass rating (RMR) based on rocks hardness, discontinuities, presence of water, infill strength, and the like. Modifying factors are applied to account for in situ and induced stresses, stress changes, and the effects of blasting and weathering. Corrected rock mass rating (CRMR) is used to classify ground condition, from good to bad, and declares the minimum required support to apply to safely mine an area based on the CRMR.

Support Requirement Evaluation

Based on the assessment of the characteristics of the vein system in the Maco Project and its corresponding rate in the CRMR, the following standards are derived and established to address the several geotechnical conditions in the underground.

Support Requirements – Production

Support design of production heading is mostly based on observed and anticipated ground conditions. The designed support requirement is almost similar to development although the design varies depending on what mining method is to be applied in the area.

Shotcrete Application

This is used to provide short and long term stability to access headings and on preventing mass dilation and raveling of rocks. Before the application of shotcrete, surface preparation is required to ensure its quality and maximum performance. The thickness of shotcrete application is dependent on the ground condition determined by the Rock mechanics.

Backfill

Due to the limited production of mill sands, broken rocks are used instead. Backfill materials may include blasted waste materials from

adjacent openings or at the drift at an upper elevation. It is hauled from muck bay and placed to open stope to provide support and stabilize walls and serves as a platform in mining the next level.

Fill Requirement

Waste fill is a critical part of mining operations which requires a considerable amount of backfill to continue the mining cycle. Most of them come from development headings.

Fill parameter and assumptions

Fill requirement = ore tons / 2.6

Assume 80% of the voids are to be filled = fill requirement x 0.8

Volume of void waste = waste tons/2.6

The volume that can be filled by broken tons of waste (available fill in terms of volume) = waste tons/1.8tons per cu.m

1.8tons/cu.m – observed density of broken waste

17.5.1.3. Development Parameters and Cycle

Development Parameters

The development of the different vein systems consists basically of a ramp system using trackless equipment. The existing adits mined by the predecessor companies were trimmed and widened to serve as the main access to the identified ore resource of the different vein systems. The previous size of decline is 4.0m x 4.5m section but recently reduced to 3.0m x 3.5m to address the problem in caving and ground stabilization. The 15meters vertical interval is retained.

The ramp system will be subsequently developed from the adits primarily by decline 1:7 grade some 50 to 90 meters on the footwall of the veins to serve as the main haulage access. Access to the veins from the decline will be by crosscuts 3.0m x 3.5m in section until it intersects the vein. These crosscuts will be extended 10 meters beyond the vein for the possible existence of sub-parallel veins on the hanging wall.

From the cross cuts, a 3.0m x 3.0m handheld ore drives will be advanced on the intermediate levels following the strike the vein. This can be driven simultaneously with the decline development.

Incidental development ore will be stockpiled separately for delivery to the mill after ample geologic sampling, mapping, and geotechnical evaluation and analysis of the vein structures.

Twenty (20) - meter Stockpiles on the side of the crosscut is excavated for re-muck bays. Similarly, ventilation raise access is excavated from the cross-cut where a 3 x 3.5 m raise is bored by raise climbers to connect the next ventilation raise access on the level above. These raises will be developed every level and will necessarily be holed out to

the surface for secondary access and main exhaust airway. Drop board regulators will be constructed on each ventilation raise access to control airflow for proper distribution in the mine.

Ventilation during development will necessarily be by force ventilation. Unless the ventilation raises are connected to the upper levels and the centralize raise connected to the surface, the advancing face will be ventilated by fans mounted on the portal and ducted towards the working faces.

Decline development – Excavation of the decline will employ the conventional drill-blast-clean method. The 3.0m x 3.5m size although reduce from the previous size, still continuously allows the use of relatively bigger equipment for more efficient drilling and cleaning of blasted muck. An average of 1.4 meters per day advance is programmed for a single heading using single boom jumbo drills and scoop trams for cleaning. Multi-face development headings will be advanced once locations of the crosscuts are reached. Ore materials from the ore drives will be realized once the crosscuts are completed.

Installation of appropriate supports, rock bolts, wire mesh, and the introduction of wet-mix shotcrete closely follow the advancing face. To facilitate clean-up of blasted rocks, muck bays will be constructed at every crosscut and at every 50 meters from to the next 15-meter level to allow one loader (LHD) to clean up the muck from the face to be dumped into the muck bay while another loader will pick up the pile from there for disposal to the surface spoil dumps. Spoil dumps are predetermined on the surface where crushers are installed.

For every 60-meter vertical interval, a footwall drive will be driven towards the second ramp system on the same section of the vein.

For the advancing face of the decline to be dry, portable submersible pumps would have to be readily available. A 100 feet head stage pumps will be required at each advancing face. Water sumps and pump stations are also planned to be excavated along the decline for stage pumping and ultimately discharged to the surface for de-silting before disposal to the creeks and nearby streams.

17.5.1.4. Mining Recovery, Dilution, and Losses

The rate of dilution relies on the geometry and grade distribution in the deposit and on the choice of the mining method. The following cases show how the rate of dilution affects the manner of vein access during development. In underground mining a 100% recovery is virtually impossible. Pillars are often left, so that actual recovery depends on the mining method. This pillar approximately 3-5 meters in height is designed to hold the fill materials above and for development and future mining activities to safely continue below active mining levels. In many cases a recovery of 50- 60% may be reasonably assumed, with complementary loss of ore or tonnage. A 90% mining recovery means at 10% loss of tonnages.

17.5.1.5. Planned Capacity/Production Schedule/Estimated Life of Mine

The planned mine and mill capacity is 1,500 tons per day while the design and preliminary works to a 3,000 tpd operation is on progress. This will be scheduled for when adequate ore blocks are developed to increase mining and milling to 3,000 tpd.

The ore production schedule in this report is based on the mining and development rates and the geometry of the veins, and the overall mining schedule was presented in the figure below. The estimated life of mine based on the computed present measured and inferred resources are of two (2) years. The current ore resource will be increased as exploration and mining development proceeds.

17.5.1.6. Working Schedule (see Annex _B-8‘)

17.5.1.7. List of Mining Equipment and Auxiliary Machinery/Mine Infrastructure (see Annex _B-9‘)

17.5.1.8. Mine Development Plans and Schedule

17.5.2. Processing Plans (see Annex _C‘)

17.5.3. Mine Support Services

17.5.3.1. Power Source/Power Generation Plant

17.5.3.1.1. Requirements

The APEX Mining Co., Inc. Underground Mining and Mill Plant operation’s power requirement is supplied currently through various power providers namely, National Power Corporation/ Power Sector Assets and Liabilities Management (NPC/PSALM), Therma Marine Inc. (TMI/STEAG), Filinvest Development Corporation (FDC) and for the additional requirement a planned contract with San Miguel Corporation (SMC), GN Power Corporation and others is line – up negotiations.

The power supply of the company is transmitted through National Power Corporation (NGCP) 138kV Transmission Line from Tindalo, Nabunturan Substation with an estimated distance of 22.0Km to Mine Site.

On our receiving 138kV Main Substation with a capacity of 10MVA and 12MVA Power Transformers, a set of 69kV sub-transmission Lines were built to transmit power to Mill Plant and Mine Operations Active Areas Distribution Lines (4.16kV) then further stepped down to 480V level to cater the electric motor and

other loads. (Please refer to Table 3 below for the Projected Power Requirement)

To maintain the reliability of the system, a new set of power plants was constructed to supply the critical load of the company during power outages from the Grid.

Table 3. Power Requirements

Power Requirements	PROJECTED 2020			PROJECTED 2021			PROJECTED 2022		
COST CENTERS	KW-HR	Php(4.87/kW-Hr)	%	KW-HR	Php(4.81/kW-Hr)	%	KW-HR	Php(4.80/kW-Hr)	%
	X 1,000	X 1,000		X 1,000	X 1,000		X 1,000	X 1,000	
MINE									
Ventilation	44,450	216,472	40%	50,561	243,198	42%	50,776	243,723	42%
Dewaatering	12,797	62,324	12%	14,187	68,241	12%	14,577	69,968	12%
Compressor	10,774	52,470	10%	12,084	58,124	10%	12,207	58,592	10%
Jumbo Drills	13,679	66,615	12%	14,576	70,111	12%	15,074	72,356	12%
MAINTENANCE(MOTORPOOL)	313	1,527	0.28%	314	1,512	0.26%	313	1,500	0.26%
ADMIN, OFFICES AND STAFHOUSE	473	2,303	0.43%	474	2,280	0.39%	471	2,263	0.39%
MASARA STREET LIGHTS (SDMP)	19	92	0.02%	19	91	0.02%	19	90	0.02%
LEVEL 4 AREAS	93	454	0.08%	94	450	0.08%	93	446	0.08%
MILL PLANT	27,683	134,816	25%	27,753	133,490	23%	27,599	132,474	23%
Annual KW-Hr & Cost	110,282	537,072	100%	120,062	577,497	100%	121,128	581,413	100%
Annual Tonnage	762,709			682,904			531,087		
KW-Hr/Ton	144.59			175.81			228.08		

17.5.3.1.2. Supply Alternative

The Internal Power Generating Capacity was already upgraded to 9.1MW with the installation of 2 units 1.5MW (Recon) and 2 units 1.5MW (New) that replaced 2 units derated 1.5MW Diesel Generating Set at L-4, 2 units 2MW (New) that replaced derated 1.5MW Diesel Generating set at L880 and 1.8MW Diesel Generating Set at L590 and additional 2.0MW Diesel Generating Set for L590 serving as a back-up power supply for the Mine Operations during total power outages and power curtailment during maintenance of power provider.

There is already an on-going project between AMCI and NGCP to synchronize the units to their grid to have a more flexibility/reliability of the external/internal power supplies (SCADA/RTU are already installed and on-going wiring/hardware and communication works are on the process for NGCP to AMCI).

To further increase the internal power generating capacity, a proposal to build a bigger capacity units of 3.5MW/5.0MW(Bunker Fired) to cope up with the increasing Mine/Mill Operations and to

build up its capability for “TOTAL BLACKOUT / 138kV TRANSMISSION LINE BREAKDOWN” and likewise in preparation to the company’s projection to increase Mine and Mill production up to 4500TPD.

17.5.3.2. Mechanical Shop/Mine Services

The Mechanical Shop and its crew provide the preventive and corrective maintenance to all underground and surface equipment of the mine. The mechanical crew is on three (3) shift basis, 24/7 to address all the problems and give support to the mine and mill operation.

Servicing of mine equipment is done at the mechanical shop at L+840 and L+590 Maligaya shop. These shops which are situated beneath the mine portals are provided with facilities and personnel that perform preventive maintenance on a twenty-four-hour basis. Rock drill repair shops are constructed underground at strategic locations at levels L+870 and L +545. Said shops are accessible through the decline ramps using service vehicles for transporting supplies, parts, and equipment.

A motor pool at the surface is available for the servicing of light and heavy equipment. Major repairs which covers overhauling of mechanical components and fabrication of structures is also catered by the motor pool

17.5.3.3. Assay Laboratory

Please refer to TR-03

17.5.3.4. Industrial Water Supply

Masara is dissected by a well-developed network of surface drainage comprising of the headwater tributaries of Masara River, Malumon Creek, Lamingag Creek, Maubog Creek, and Buenatigbao Creek. These surface waters produce sufficient flow all year round and serve as an alternative source both for domestic and process purposes.

Mine Operation utilizes water for the underground supply of exploration drilling rigs, jumbo drills for drilling blast holes, and RDM’s for conventional mining. In addition to drilling requirements, water is also important to the mines for washing various underground equipment, trucks, and service vehicles. Minor uses of water at the mines are for sanitation uses of mine personnel like washing and bathing, for flushing toilets, housekeeping of different working areas, and the production of pre-mixed concrete.

Mine Operation consumes roughly about 200 cu.m/hr of water. Of this total, more than 77% goes to the supply for underground drilling (exploration drilling rigs, jumbos, rock bolters, and rock drill machines). Only 23% of total water usage goes to all other purposes.

The table below shows the breakdown of water usage in the mines and facilities.

Unit	# of units	Usage / Availability	Hourly Consumption *(cu.m/hr)*	Hours per day	Daily Consumption *(cu.m/day)*
JUMBO DRILLS	19	90%	12.038	21.60	260.03
ROCK DRILL MACHINE	75	90%	43.200	21.60	933.12
DIAMOND DRILLING	5	90%	72.000	21.60	1,555.20
SHOTCRETE MACHINE	6	90%	3.802	21.60	82.11
SHOPS & OTHER FACILITIES	20	100%	40.000	24.00	960.00
				Total	**3,790.46**

17.5.3.5. Availability of Alternative Sources of Mine Support Services

17.5.3.5.1. Mine Dewatering

The materials in suspension can, in general be separated in —settling sumps. The materials in suspension are often deposited on the inner periphery of the pipes, forming encrustations that carry from a thin glaze to a rough laminated crust which is difficult to remove. Scaling of the delivery pipes not only increases the friction losses in pipes but also reduces the effective diameter of the delivery range. The main methods of disposal of mine water above the self-draining level is through drainage adits and tunnels below. The self-draining level is by pumping. It is essential, for efficient and economical pumping of mine waters, that deleterious matter such as grit must be removed. When the topography is suitable, adits may be driven as a self-draining level to dewater a mine. In the Maligaya portal, the Level 530 Masarita drive is a self-draining tunnel used to dewater the following levels such as L575, L560, L545, and Level 530 in Maligaya both Ramp#1 and Ramp #2. Another drain tunnel is currently being developed for level 380 to dewater levels between 530 and 380. The advisability of such drainage tunnels is a matter of the economic cost of the adit. Together with the

capital cost and interest charges should be lower than the perpetual cost of pumping.

17.5.3.6. Mine Ventilation (see Annex ‗G')

17.5.4. Environmental Protection and Management Plan

17.5.4.1. Environmental Impacts and Control

17.5.4.1.1. Land Resources

This section will deal with the acceptable impacts associated with the construction, development, mining operations and mineral processing activities

17.5.4.1.1.1. For underground mining operations

The development and mining of the ore reserve blocked in the different vein structures that are prioritized for development and stoping will be by a combination of handheld stopes and mechanized underground methods. This type of mining operations will require the use of Jumbo Hydraulic Drill (Jumbo) and Pneumatic pusher leg for ore extraction and Load Haul Dump (LHD) together with Low Profile Trucks (LPT) for ore transportation to the processing plant location. There are at least three underground ore sources or veins that will be prioritized for development with the portals of the tunnels accessing them varying in distance from about 1.2 kilometers (Maligaya portal, the nearest) to four or five kilometers (L875 Sandy vein portal, the farthest).

The use of cement concrete for underground support will be extensively employed in the underground mining operation. The mine development requires around 7500 meters of ore level development, the driving of about 4000 meters of ramps/decline to develop the vein system, and about 600 meters of development raises and winzes.

Backfill method

The fact that the dip of the Maco veins are sub-vertical, the use of waste materials to backfill the voids created after the ore extraction is imminent. This is to stabilize the hanging wall contact and provide a working floor for mining the next ore blocks above.

Waste materials used for stope backfill will utilize all the waste generated from underground development using equipment with loaders and LPT's to transport the waste inside the stopes.

Potential contaminants in underground mining operations, which the proponent would be required to control, include:

- Acid mine water – acid mine drainage is common in areas where underground openings intersect the water table and where the rocks contain iron sulphides (pyrite, pyrrhotite, etc.) or any other base metal sulphides associated with the ore materials being mined. This is the type of material that the company will be developing for mining in its MPSA Contract area.
- Nitrogen compounds from blasting materials – this could be considered a relatively small amount but nitrate residues will contribute to eutrophication of waterways draining the mining area. Explosive is very necessary for the mining operation to break the ore and the host country rock to more manageable sizes for handling and hauling to their respective dump or stockpile sites.
- Oil and fuel oil used for engines and lubricants – oil forms a thin film over the water surface and can interfere with the re-oxygenation of water. It may also coat the gills of fish resulting in possible fish kills.
- Suspended solids from mine water – this may range from colloidal suspensions to coarser particles comprising of mud, clay, silt or sandy sediments that could settle readily of the bottom when current velocity drops or slackens such material may be part of the ore, gangue materials or wall rocks in underground workings. This may interfere with the purification of water by diminishing light penetration and hence photosynthesis reactions. Sit deposition can lead to clogging of waterways that could aggravate flooding and also interfere with navigation by reducing the depth of water along navigation routes or in pier facilities.

17.5.4.1.1.2. General

The development of the project calls for the construction and maintenance of the necessary infrastructure and facilities such as:

- Road networks – when Apex Mining Co., Inc., suspended its operations in March 2000, road maintenance was neglected as the responsibility was not immediately assumed by the local government. With the takeover of the Apex property by the new management, the road rehabilitation and maintenance will be assisted by the Company through funds provided to the provincial government. Road widening, grading, surfacing, and compaction as well as drainage canal construction, will be either undertaken by the Company with its manpower and equipment or by contributing funds for roadways through the provincial government.

- Explosive magazines, buildings, and offices, water supply, bunk powerhouse, refinery and laboratory buildings, ore storage silos with sufficient capacity to keep the 1,500 tons per day ore production that will be fed continuously to the mill processing plant and a new Tailings Storage Dam are some of the project facilities that will be constructed. Contaminant related to the construction of these infrastructures and facilities includes the following:
- Metals as ions or complexes, from copper, lead, zinc, and iron. These metals may be beneficial to the human body and even to animals in small concentrations but could be harmful when ingested in excessive amounts. Heavy metal can be harmful to fish and other aquatic lives, impair the function of the reproductive system of these aquatic animals and when human eat the fishes, the heavy metals that could have accumulated in the tissues of fishes can enter the food chain and cause health impairments to human and other land-based animals. The health effects may be acute or chronic. One potential source of contaminants is the material impound in the tailings pond.
- Reagents from various process effluents, such as alkalis, frothers, and collectors, modifiers, sodium cyanide, and coagulants. An effluent containing a mixture of these potential contaminants may have an overall toxicity, which is different from that of its components. Cyanides are lethal to fish in very low concentrations (e.g., as little as 0.04 mg/l CN for trout). The company is mining for gold, so cyanide will be an integral part of its milling operation.
- Oil and fuel-oil used in power plants, service vehicles, and the mining equipment that could be washed out from machine shops, motor pools, and heavy equipment yards may be also detrimental to the environment, as earlier mentioned.
- Other chemicals including pesticides and herbicides, paint solvents and oils, and transformer fluids in heavy electrical equipment may also cause environmental problems if they find their way into the waterways.
- Suspended solids from surface drainage and process effluents and building construction are matters that should be closely monitored by the company. Installation of proper safeguards to mitigate any accidental release into the environment is a commitment.

17.5.4.1.1.3. Others

The company may have to stockpile excess development wastes materials from its underground mining operations to the surface and also erect mining facilities. These activities often have

considerable negative aesthetic impact on the existing landscape. Ancillary works such as access roads, power lines, etc. can be particularly unsightly during the duration of the mining operations and more so, after the closure of the mine where the scarring of the landscape does not readily disappear and could exist over a prolonged period. Population growth and infrastructure development are commonly associated with mine development. The negative perception about these effects is largely determined by the degree and success of planning that would address the attendant social and economic issues that go with the increased population.

17.5.4.1.1.4. Control Strategies

They will employ the most common and effective control technologies used to address environmental concerns arising in the base metals mining industry. Where possible, the company would collect all mine water effluents, including those from the mill plant and other sources at a single point where they can be directed to (a) the concentrator as process water; (b) to the treatment facility – knowing that the plant tailings impoundment is usually the best one; or, (c) to the environment if their chemical characteristics would not cause any harmful effects if released. If the opportunity of reducing the volume of underground mine water is limited, the company would embark on the method of sealing and grouting old underground workings and other openings to minimize if not eliminate seepages of potential contaminants. The most common method of chemical treatment of acid mine drainage water consists in neutralizing free acid and precipitating metals as hydroxides under alkaline conditions.

Waste is aerated to oxidize ferrous iron, which normally occurs in acid mine waters. Hydrated lime is the most frequently used precipitating and neutralizing reagent.

17.5.4.1.1.4.1. Progressive Rehabilitation

The mining method is by underground mining, land surface disturbance is expected to be minimal compared to open-pit mining, the latter usually requiring rehabilitation from time to time when certain sections of the mined are mined out. This involves the planting of vegetation either in the forms of seedlings and/or cuttings in disturbed areas and installation of engineering measures to prevent soil erosion.

17.5.4.1.1.4.2. Rehabilitation Standard

The site will be left in such a condition that it would not pose any danger or harm to anybody including animals. Stabilizing the slopes and reforesting the areas affected during mining activity

are the planned rehabilitation efforts for restoring the contract area. Mined out stopes and surface areas affected during mining activity are the planned rehabilitation efforts for restoring the contract area. Mined out stopes will be backfilled and tunnel portal sealed to prevent the entry of people, particularly high graders, who might be exposed to risk underground. Sealing all openings will also minimize if not prevent the generation of acid mine drainage that could contaminate the waterways.

17.5.4.1.1.4.3. Rehabilitation Methods

Rehabilitation in underground mine usually involves mine out underground working that, for safety and environmental concerns, have to be filled up with either development rock waste and/or cyclone mill tailings from the milling plant. If these sources of fill materials are not operationally feasible, a separate quarry operation will be established, and crushed aggregate in the slurry form will be pump into the mined-out areas which will be done continuously as mining progresses. Cement may be added to the aggregates slurry to increase its strength and stability. This technique of underground mine rehabilitation may be the method most favored by the company. Tailings pond areas, will be rehabilitated according to the plans that will be presented to the Environmental Management Bureau of the DENR. But pending the determination of its stability, it will first be revegetated especially at the slope of the dike to prevent erosion and accelerate its blending with the surrounding landscape.

17.5.4.1.2. Water Resources

17.5.4.1.2.1. Acceptable impacts associated with the potential source(s) of water contamination

There is only minimal sedimentation coming from underground works. What should be looked into here is the degree of water acidity which could be mitigated by installing proper treatment facilities and other pollution control measures. Siltation would most likely occur if there are stockpile dumps for ore materials for the mill or related surface constructions for infrastructure and support works. There would also silt build up on mill facility, but with a low rated tonnage for this project, this can be relatively easy to control or contain.

17.5.4.1.2.2. Mine dewatering or drainage including utilization for road watering, processing, disposal by evaporation

17.5.4.1.2.2.1. Process Water

With its array of mine and mill equipment, water will be required as a coolant for the equipment. This adds to the

necessity of conserving water resources and minimizing wastage.

17.5.4.1.2.2.2. Tailings Pond

Water in the tailings pond, normally, should be recycled back to the mill. The company uses the siphon methods of recycling. It is similarly monitored to check its quality and acidity. Tailings and the water in the tailings pond should also be monitored to check gold values that could indicate the efficiency of the milling operation or lack of it.

17.5.4.1.2.2.3. Infrastructures

For its domestic water requirements and milling purposes, water may be sourced from underground thru deep wells or it can be sourced from existing creeks by putting up water dams. The present need for water can be utilized from both sources, either surface or underground. The company will monitor the contamination of water from fuel and oil used for mobile equipment and machinery and regulates the ways of fuel and oil disposed of or handled by installing oil & water separator at the motor pool.

17.5.4.1.2.2.4. Sewerage

The small compact community nestled on mountainous terrain has a more or less confined sewerage system and with a lesser volume of sewage to be disposed of. This offers a lesser adverse effect on the total water system in the area. This is, as long as domestic sewages are not allowed to be dumped into the existing waterways but provided with engineered disposal storages built at a safe distance from river and creek banks.

17.5.4.1.2.2.5. Solid Waste Disposal

The activity offered by the project similarly would bring in garbage and other potential contaminants both from direct operation to domestic discards. In line with present regulations, a program has to be put in place to properly collect garbage and contaminants that, if left unattended, could affect the health and safety of company employees and the barangay residents aside from being eyesores and a potential source of water pollution.

17.5.4.1.2.2.6. Product waste and consumable use, storage and disposal

The mine and mill operations require numerous product lines and goods that are needed in sustaining their operations. These unavoidably generate waste products not only from the materials used themselves but including the containers and packages that come with these product lines and goods as well. If not properly disposed of or handled, this will add to the pile of unwanted garbage.

17.5.4.1.2.3. Control Strategies

17.5.4.1.2.3.1. Tailings Pond

The first stage dam or starter dam crest elevation for the 500 metric tons/day tailings containment was set at elevation 610.00 m. (with the core trench at elevation 570.00 m). The required volume of fill for the first stage dam embankment was about 51,000 compacted m^3 and this was placed last 2006. By 2007, the starter dam was raised further up to elevation 634m to give time for the construction of the Phase 2 dam.

The second phase of the dam is named as Maco Tailings Management Facility (MTMF) which developed out of a series of design options involving different dam locations along Lumanggang Valley. The final axis downstream of the starter dam was identified after the initial site clearing and foundation excavation where more favorable abutments have been exposed.

MTMF is a modified rolled-fill earth-fill dam. National government regulations as well as internationally accepted criteria have been applied in the design: DENR Memorandum Order No. 99-32, US Corps of Engineers Design Criteria, and ICOLD Design Criteria. Primary embankment materials consist of Low Permeability Zone, Low to Medium Permeability Zone, and Rockfill. The additional safety measure against seepage and leakage involved the installation of the HDPE liner anchored to the grout cap up to elevation 620m. The succeeding 5-meter increment dam raise from elevation 620 to 645m did not continue the use of the said liner but tailings beaching was implemented. The finer particles of tailings have a sealing effect on the upstream face of the dam, thus, this method is more economical. Based on the analysis of piezometer readings, this technique had considerably reduced the pore pressure values.

Presently, Phase 3B (650-655m) dam raise is on-going. The subsequent raises from 620m were implemented in a

5-meter increment because of its economic advantage-invested cost on the dam is spread through the years of its useful life instead of a one-time build-up that needs big capital outlay. The company is engaging a 3rd party consultant to undertake the construction monitoring and surveillance of the consecutive dam raises to ensure quality and timeliness of construction.

The expansion of Mine and Mill production also requires maximizing the raise of the MTMF. Accordingly, a study has been made to identify the maximum possible dam raise of the current tailings pond. The study included the appraisal of local geology; hydrologic and geotechnical parameters; alternative developments; recommendation, construction cost, and specifications. With this assessment, the maximum possible dam raise is at 678m level. Because of the presence of highly pervious dacite pyroclastics at the left abutment, the 678m level dam will require extensive engineering intervention. Consequently, it was recommended that the most desirable dam raise is at elevation 660m. With the planned increase in production, the 660m dam has a life of 6.2 years. In preparation for the mine life of more than 8 years, a pre-feasibility study was conducted on the possible dam site identified within the tenement. Feasibility Study and Design will be undertaken within the year. Also, there is an on-going plan to further increase the dam to 670m but it is still on the designing stage.

17.5.4.1.2.3.2. Tailings pond seepage collectors

Provision of impermeable blanket on the tailings pond floor and the dam can reduce if not eliminate seepages depending on how the dam will be engineered and construct. A complementary draining device will also be provided to collect seepage which could be pumped back to the mill plant as part of process water.

17.5.4.1.2.3.3. Freshwater Dams

The company has no plan to build a freshwater dam. Water for domestic use will come from a traditional spring where a huge concentrate cistern will be constructed as a water reservoir complete with water distribution pipes tapped to it. To safeguard against contamination, it is kept away from the reach of human activity and is restricted entry to humans or unauthorized people by enclosing it with a

barbed-wire fence. To monitor possible contamination, the water will be sampled periodically and analyzed in a laboratory in Davao City

17.5.4.1.2.3.4. Treatment of residual voids or worked-out underground mine

Mechanized mining using the Decline Method will be the mining technique that will be employed in this project. Waste rock materials produced from underground development activity will be used to backfill mined-out stopes within the vein. There will be no pillar to be left instead of concrete pillars that will be put up as pillars. Concrete pillars will have an added advantage over rock pillars as it will also help seal acid mine water from seeping into the underground drainage system and find its way into the waterways draining the surface area. Concrete pillars could also be used in sealing off the sources of harmful gases quite common in some of the known veins in Masara.

17.5.4.1.2.3.5. Diversion Banks

Depending on surface disturbance or effects of day-to-day mine activity, construction of diversion banks would have resorted if deemed necessary to contain any pollutants and induce or control water flow especially as the area is traversed with several creeks or waterways.

17.5.4.1.2.3.6. Sedimentation control dam or silting pond

This will depend on the observations made during the development and mining operation. The company may opt to put up a silting dam or settling ponds to minimize sediment influx into waterways as a result of its mine development and operation.

17.5.4.1.2.3.7. Groundwater

Protecting groundwater necessitates a good understanding and education by both the company employees and the residents of the surrounding communities or barangays. This should be made part of a water management plan that should involve not only the company‘s personnel but also the host community. As part of the control, all regulations and guidelines such as ways of containing or preventing contaminants from finding its way into waterways and eventually into the groundwater

should be well-understood and appreciated by everybody. Regular water sampling is conducted to ensure that water quality is within the standards.

17.5.4.1.2.3.8. Sewage and others

Infrastructure and domicile constricted by the company are already provided with its sewerage system, the least of which are septic tanks. Additional infrastructures that will be put up by the company will be similarly provided with a proper sewerage system. This is to ensure that solid wastes and all forms of contaminants will not be allowed to find its way into the natural drainage system. Control or sediment traps will be installed if deemed necessary to prevent contaminants from mixing into natural water bodies. Other incentives or initiatives to employees and the residents that will discourage pollution of waterways and the groundwater would also be promoted.

17.5.4.1.2.4. Noise

17.5.4.1.2.4.1. Acceptable levels emanating from potential source(s) of noise

17.5.4.1.2.4.1.1. Service vehicles, including off-highway trucks

It is expected that more motor vehicles would again pass through the community roads. However, with the present level of activity and the community‘s location in a mountainous enclave, the noise generated by motor vehicles is not expected to be much of a nuisance and should be just within tolerable levels to cause too much inconvenience to people residing along the Masara road. For large diesel vehicles, at 8 meters distance, it has a decibel reading of 90. Traffic noise at the main road during night and daytime is only 35 and 70-90 decibels, respectively, which is well below the threshold of pain of 120 decibels that is the recommended standard to tolerance.

17.5.4.1.2.4.1.2. Explosives

Use of explosives in underground blasting definitely can affect miners if no proper Personal Protection Equipment (PPE) and the adequate training in the handling of explosives are provided to them. Rules and advances in the techniques in explosive use are already standardized to minimize its ill effects and ensure the safety of miners. What is important is that the noise produced by compressed air powered rock drills used for drilling blast

holes and the vibrations that occur during blasting. The Air compressor at a meter distance has a noise level of 110 decibel, which is near the 120-decibel threshold of pain.

Overpressure of air blast generated during blasting operations will result in structural effect. At 140 g cu. cm. air pressure, concrete plaster cracks begin, and, at higher pressures, masonry cracks may be evident. Ground vibration velocity at 230 will cause serious cracking of masonry structure.

17.5.4.1.2.4.1.3. Crusher and other ore treatment plants

Mill tenders or workers exposed to the daily grind of crushers, ball mills, conveyors, and other equipment in the mill plant have to take precautions, as it will affect their health if exposed continually and beyond the normal level. A concentrator processing having a capacity of 7,500 tons per day and at 90 meters distance could experience a noise level at 70 decibels. The Jaw Crusher would have a noise level of 100 decibels from the operator‘s position. The Apex mill rated capacity, however, will be only 500 tons per day to a maximum of 1,500 tons per day. Workers assigned in this phase of the operation will be provided with proper earplugs or mufflers to suppress the noise decibels to which they will be exposed daily in their job.

17.5.4.1.2.4.1.4. Earthmoving Plant

Earthmoving equipment in the underground is limited to the LHD and LPT equipment which has a noise level of 74 to 109 decibels equivalent to a diesel engine and measured in the operator‘s cab. Miners whose work assignments necessitate working with underground tools and equipment can be considered at risk with these high levels of noise. They will be likewise provided with the proper hearing protection aids to protect their health.

17.5.4.1.2.4.1.5. Powerhouse and others

Since powerhouse operates only occasionally as a backup power during power outages or blackouts, the operators and the community residents residing near it will be exposed to noise pollution only over limited time durations and so, within tolerable levels. It could equal to a diesel engine with noise level at 74-109 decibel. Operations of hauling equipment for ore and waste material from the

mine to the beneficiation plant, or to stockpile areas are also a potential generator of noise produced by their engines running and ground vibration caused by their sheer size and heavy load.

17.5.4.1.2.5. Control Strategies

17.5.4.1.2.5.1. Restriction of hours of activity

In underground operations, the blasting hours will be announced of scheduled to avoid surprising the residents as much as possible, blasting at night, during weekends, or on holidays, shall be avoided. The effect of blast and blasting vibration can be controlled by the following:

- Overcharging should be avoided
- Blasting patterns will be designed in conformity with maximum instantaneous charge permissible
- Use of delays technique in blasting to limit the maximum instantaneous charge of denotation.
- The company will use low energy rather than high energy detonating fuse.
- Blasting shall be done by experts and all people involved in this operation will be provided adequate safety apparels such as sound mufflers, etc.

Numbers of vehicles and routes will be planned properly to keep noise levels as low as possible in populated areas.

17.5.4.1.2.5.2. Permanent or Temporary relocation of residence affected

If necessary, people living near the mine site, especially when the mill plant will be constructed, shall be relocated in areas safe enough for residential purposes and away from industrial noise. Noise barriers will be constructed between the industrial areas and the residential areas if noise generation cannot be avoided. Expert advice shall be consulted on the most advantageous positioning. Buildings, waste earth banks, and existing landforms can all be used as noise barriers.

17.5.4.1.2.5.3. Changing mining methods or equipment used

To reduce noise, the company will carefully design the buildings and observe proper planning for the site. Proper equipment selection will also be observed, like the following:

- The plant must be located as far away as possible from existing residential areas or townsite.

- Compressor house must be constructed of concrete blocks with soundproof doors rather than corrugated sheeting.
- Concentrator or plant building must be constructed with a double wall.
- Exhaust ventilation fans for underground workings must be placed below ground. Conveyors will be employed, if warranted, rather than diesel engine trucks for transporting broken ore or waste materials.
- As much as possible, compressed air powered equipment and machineries will be replaced with electric-powered devices.
- Regular maintenance of all equipment and vehicles will be observed always to reduce noise from worn parts.
- The use of silencers and mufflers will be considered.

17.5.4.1.2.5.4. Soundproofing of residence

The company is not keen on employing this kind of mitigating measure in controlling noise. Residential houses if any, near the project site are constructed with indigenous materials and are very temporary. If ever residents and families will be affected, they will just be relocated with the company shouldering all the expenses in relocating them

17.5.4.1.2.5.5. Periodic Hearing Check-up for workers

Workers in noisy areas will periodically undergo audiometric examination at company expense, not only to detect the most sensitive individual workers to noise effect but also to check the efficiency of hearing protection devices issued to them. Based on existing regulation, the company shall always observe noise level as specified, as follows: 85 dB (A) for daily exposure level with no peak sound pressure exceeding 140 dB (A).

17.5.4.1.3. Air Quality

17.5.4.1.3.1. Acceptable level of air quality

Potential environment contaminants in the atmosphere generated by mining activity include:

• Dust elements, whose nature is similar to the elements composing suspended solids in liquid effluents;

• Gases produced by combustion processes such as blasting, internal combustion engines: carbon monoxide, carbon dioxide, carbon dioxide, nitrogen oxides, and sulphur dioxide;

• Natural gas occurrences such as methane, although not common in base metal mines;

• In Apex Mines, the common harmful gases encountered underground include natural carbon dioxide generated by residual volcanic activity as this is a known volcanic area, and; hydrogen sulfides from the oxidation of sulfide-bearing materials exposed by mining to the attack of oxidation.

As a company‘s policy, it will conduct an assessment of the health hazards resulting from exposure to dust, which requires determination of their chemical and mineralogical composition, particle size, concentration of particles in the air, as well as the conditions and time exposure.

As an example, chronic exposure to free crystalline silica dust, under certain conditions of concentration, particle size, and time, may lead to silicosis, pneumoconiosis that is a serious, progressive and irreversible disease. The effect associated with exposure to toxic metals, such as lead, nickel, cadmium, mercury, and arsenic, is systematic intoxication. Asphyxia by carbon monoxide is well known and irritant to the upper dioxide. Hydrocarbons by internal combustion engines can be carcinogenic.

17.5.4.1.3.2. Dust from mining activity

Airborne dust is a hazard in underground operations. The dust has essentially the same composition as the material which is mined, namely: (a) the ore containing the minerals; (b) waste rock removed from drifts, etc. which are excavated to give access to the ore, and; (c) any surface that is disturbed.

17.5.4.1.3.3. Dust from plant processing area

Studies have shown that particulars liable to remain in the atmosphere are classified by size as follows:

- <0.1µm: aerosol resulting from combustion processes.
- -1.0µm: formed vapor condensation
- >0.1µm: dust by vapor formed by communication.

Sources of dust processing area may come from screens in outdoor crushing plants, exhaust from de-dusting installations, dryer chimneys, waste dumps, ore stockpiles, and in bins and tailings disposal. By this very nature of handling large quantities of material, the company needs to address these concerns about

contaminants in the atmosphere to safeguard the health of its workers.

17.5.4.1.3.4. Fumes from flotation and concentration storage and CIL/CIP Areas

In addition to airborne contaminants, such as dust from crushing which were mentioned earlier, some toxic chemicals are present in the beneficiation plants. Harmful agents include organic reagents (e.g., xanthates, etc.) mixed in powder form to flotation circuit during copper concentrate processing.

17.5.4.1.3.5. Gases from underground Mine Shafts

Common gases in underground mines include methane resulting from the decay of timbers supports, carbon dioxide emanating from rock strata, hydrogen sulfides from oxidizing sulfide minerals. Oxygen deficiency can be a serious safety threat in underground mines whenever there is the presence of reducing ore.

17.5.4.1.3.6. Dust from vehicle movement

The composition of dust from vehicle movement depends upon the composition of the ore being mined and the country-rock as mentioned earlier. Dust is commonly generated in large amounts along unsealed roads from vehicles and equipment passing through these roads. Within the mine, dust generations will be kept to a bare minimum by continuous watering down on haul roads.

The harmful gases are those generated from internal combustion engines like diesel and gasoline engines, aside from carbon monoxide and nitrogen hydroxide, significant amounts of hydrocarbons, sulfur dioxide, and carbon dioxide are also produced by these engines.

17.5.4.1.3.7. Potential pollution sources from exploration and diamond drilling activities

One potential pollutant during diamond drilling activity is the sludge material produced from rock cuttings as the drill bit advances are carried up suspended by drilling mud and water to the surface. When not properly confined in mud pits provided for them in all drill sites and decanted, drill sludge could overflow and spill into the waterways causing potential environmental issues. The other main sources of pollution agents and contaminants include fluids, fuel, and other oil products that could be spilled during drilling operations, either by accident or through the

careless acts or indifference of untrained or uninitiated drilling helpers and personnel. Domestic waste produced in drilling camps that usually come with drilling operations could also contribute to land disturbances, erosion, and aquifer contamination. The more visible environmental effect however of most exploration operations is the surface disturbance resulting from road and drill pad construction and the operation of drilling and support equipment like bulldozers and service vehicles.

17.5.4.1.4. Control Strategies

17.5.4.1.4.1. Dust suppression

The company will always adopt the wet method of reducing dust generation. For example, hydraulic drilling can significantly reduce dust emission during blast-hole drilling. Also, the use of water sprays in operations such as the transfer of dusty material and crushing is highly effective if routinely done. To further increase the efficiency of the wet methods, wetting agents will be used, an example of which is the ordinary washing detergent.

For the most important element of air quality control in underground mine, the company will have a properly designed ventilation system. If at all unfeasible to reduce dust to acceptable levels, dust masks and respirators will be issued by the company to workers assigned especially in more critical working areas. In blasting operations where both dust and poisonous fumes are normally generated, measures to minimize exposures to the effects of blasting operations will be adopted by the company such as the following:

- Segregation in time, that is, wait sufficient time before re-entry into the blasted mining area.
- Wetting down with water before blasting;
- Ventilate adequately. Other principles of dust suppression that the company will apply are as follows:
- Ore storage building, overhead conveyors for crushed ore transport, crushing and screening areas, and concentrate loading, if any, should be enclosed.
- At the planning stage, the citing of the mill plant should be considered taking into account wind speed and direction to minimize dust blowing towards the local residential areas.
- Made use of dust collection hoods and exhaust with a high-efficiency particulate collection such as wet scrubbers to suppress dust.
- Water tank truck to conduct watering at the roadbed.

17.5.4.1.5. Conservation Values

17.5.4.1.5.1. Nature Issues

17.5.4.1.5.1.1. Acceptable levels of impacts

Potential impacts on the environment have to be specially studied by experts specially commissioned for this type of research as the project area is remotely situated. Environment specialists and consultants would be used throughout the planning and development stages of the project.

Among the matters that may be covered by the environmental studies are nature conservation, national parks, protection of flora and fauna, endangered species and special scientific study sites, critical habitat, and protected areas, if any.

17.5.4.1.5.1.2. Control Strategies

The control strategies appropriate for this issue would be that mining and the ancillary activities must be limited only in certain zones away from and, as much as possible, minimizing the effect on the delicate environment. If deemed necessary, special measures may have to be introduced to avoid any adverse impact that may have to be introduced to avoid any adverse impact on these natural species in particular, and to the environment in general.

17.5.4.1.5.2. Visual aesthetics

17.5.4.1.5.2.1. Acceptable levels of impact

The disposal of mine wastes and mill tailings especially above ground and the erection of mining facilities have considerable negative aesthetic impacts on the local geography. Ancillary works such as access roads, ports, unsightly, during mine operations, and after mine closure.

17.5.4.1.5.2.2. Control Strategies

It would be the policy of the company to contain the mine waste and tailings pond after closing down the mine. This is to ensure the safety of people and domestic animals. As a rule a mine closure program would be incorporated into the

planning proposal, and even into mine operations during its active lifetime.

Geotechnical stability of the pile and/or the impoundment will be looked into by the company. Stabilization, usually by introducing and nourishing vegetation cover, must be done to minimize if not prevent wind and water erosion. With acid-genic water seepages and run-off resulting from oxidation of sulphides in the waste material have to be found.

The buildings and plant facilities will be demolished and usable materials salvage for its remaining value during closure when this time comes.

Other control strategies could be selecting materials, colors, and shapes of buildings to blend with local scenery, keeping heights of buildings as low as possible, and constructing and vegetating leading faces of waste disposal at an early stage.

17.5.4.1.5.3. Recreation and Education

17.5.4.1.5.3.1. Acceptable levels of impacts

Of former mining sites, the cost of reclamation, problems of toxicity, and the poor financial return experienced during the later periods of the operation are likely the major constraints in deciding the form of land use to adopt following the closure of the mine.

Mines, however, usually hold great fascinations to the general public and can act as powerful tourist attractions. There are several cases in the celebrated mining districts in the southeastern United States where huge open pits left from now closed large-scale open-pit copper miners were converted into tourist attractions. In the world-famous Kalgoorlie mining district in Western Australia, the so-called Golden Mile, a strip of an immensely gold-rich piece of land that has, over almost two centuries yielded more than 55 million ounces of gold, has been converted into a huge open-pit reputedly the largest of its kind in the world. It is still operating producing gold by mass mining method and is one of the major tourist spots near the city of Kalgoorlie where the mining operation can be safely viewed from a view deck specially built for tourists. In the Philippine for example, we have the underground mines of Benguet Corporation in the Baguio District that has been converted into a tourist, a water reservoir, and educational attraction.

Others developed it into nature trails, campsites, playgrounds, and other facilities for water-based recreation. From an economic point of view, abandoned mines were converted into mushroom growing ventures and some, into firing ranges. If a mine is situated near a town, large waste and tailings covered areas may be utilized either for agriculture, parks, or even residential or housing sites after stabilization.

17.5.4.1.5.3.2. Control Strategies

The reclamation of abandoned and closed mine sites is regulated by law here in the Philippines. The company would adopt these practices and put them into general use.

The reclamation project of the company would be designed by skilled staff and should be accepted by the local administrative authorities before implementation.

Funding requirements for reclamation would be deposited in the bank in an escrow account during the operation of the mine as required by the mining law.

17.5.4.1.5.4. Heritage and Cultural Values

17.5.4.1.5.4.1. Acceptable levels of impact

As in above, the views by development planners as well as the indigenous peoples on the land status in Davao De Oro Province where the contract area is situated similarly holds possible conflict in the present administration of lands or defining heritage and cultural value of the land. It may not be directly on the property itself, but adjacent lands that may be covered by such claims would similarly have been impacted on the development program of the company.

17.5.4.1.5.4.2. Control Strategies

Dealing with cultural and heritage concern at this time need a two-pronged approach. One is for the company, to define, evaluate and come up with a development program on the cultural value of the land and adjacent community, as can be contained, and the other approach is for the company to relate with known stakeholders for cooperation and immediate resolutions on what concerns ‘one has to the other‘. The latter strategy is seen closer to produce immediate results as it can reduce backlogs in negotiations and allow faster consensus building.

17.5.4.1.5.5. Social Issues

17.5.4.1.5.5.1. Acceptable levels of impact

Present sentiments against mining in many parts of the country have to be considered by the company, regardless of its supposed built-in advantage of Apex having operated in the area for the past decades.

17.5.4.1.5.5.2. Control Strategies

The company through the Community Relationships Department will provide coordinated effort with the mine camp and host communities regarding socioeconomic assistance from the company. This would have among its programs the following support works.

- Assist educational programs in public schools in the host communities
- Assist the host communities in their livelihood projects and skill training programs;
- Support Infrastructure projects, and;
- Assist or cooperate with local governance activities.

17.5.4.1.5.6. Approach and Scope of Environmental Monitoring Program

17.5.4.1.5.6.1. Significant impact to be monitored

Apex employs trackless underground Decline Mining Method and the CIL (Carbon-In-Leach) Processing of the gold ore. Monitoring shall start during the development stage and will be intensified during the exploration stage when environmental impacts are anticipated. Among the significant impacts that the company would strictly monitor include:

- During the development stage, the generation of dust along haulage and transport routes. Also. Siltation resulting from the rehabilitation of the underground workings.
- During the exploitation stage and aside from those identified already during the development stage, noise, air quality and possible fire from underground blasting and beneficiation of the gold ore would also be monitored.
- The most important parameter that needs serious attention is the water quality. This is due to the complex nature of the ore that the generation of acid

mine drainage can be expected to be an environmental concern. Also, the processing of the gold ore will produce a lot of mill tailings whose proper disposal will be a paramount concern.

17.5.4.1.5.6.2. Sources of Impacts

17.5.4.1.5.6.2.1. Mining activities/infrastructure

As stated earlier, it‘s the production of dust and the water pollution that would be the most direct effect of the mining activities and construction of infrastructure. A properly designed monitoring program has to be carried out. The main features that would be included in the company‘s monitoring program include:

- Definition of objective: baseline studies before mining; assessment of any current damage, prediction of the effect of mining and water-reuse possibilities.
- Selection of parameters to be measured: some of the more important factors to be measured are as follows:
    - Physical: temperature, turbidity TDS, and water flows.
    - Chemical: conductivity, alkalinity, pH, hardness, color, CODIBOD, nitrogen, phosphorous, and metals.
    - Biological: phytoplankton, zooplankton, benthic organisms, fish, and waterfowl.
- Selection of sampling location: this will enable a representative sample to be taken and to be easily accessible for routine sampling. Sufficient sampling locations would be established to allow monitoring of important locations.
- Sampling procedures: adequate equipment will be available and trained personnel will be assigned on this task.
- Analysis: samples are submitted to a qualified laboratory; preparation of samples necessary before transmission and procedures of analysis have to be specified.

17.5.4.1.5.6.2.2. Noise

To determine the extent of workers’ exposure to noise, the measurement will be made and the results compared to the

adopted standards. Exposure time will likewise be observed. The company will select among the following instruments for noise measurement that is compatible with the actual situation in the mine:

- Sound level meter
- Noise dosimeter
- Frequency analyzer
- Impact or impulse noise meter
- Calibrator

The office of the Occupational Health of the DOLE, which has prepared the practical guideline on noise evaluation and control, will be used as a basis in the monitoring of noise.

17.5.4.1.5.6.2.3. Air Quality

The presence of air contaminants in the workplace can be assessed through techniques of air sampling and analysis. The concentration of airborne contaminants in the workplace varies with respect to time and location. Therefore, the company must design an adequate sampling strategy to ensure the representation of the procedure. This sampling strategy refers to how, where, when, and for how long to sample as well as the required number of samples.

Airborne dust that could cause pneumoconiosis and the respirable fraction of the dust that can penetrate the pulmonary spaces are the target of the company‘s monitoring program. The chemical and mineralogical composition will likewise be monitored to assess the risk of silicons. So much so also for lead, nickel, cadmium, and arsenic compound should be evaluated similarly. To be more effective in this endeavor, direct reading devices with built-in alarm systems would be considered by the company.

17.5.4.1.5.6.2.4. Conservation Values

The company shall put in a program that shall promote the wise and productive use of resources and supplies being extracted and utilized in the operation.

Parameters to be monitored; these would refer to actual versus targeted use or consumption in the extraction and use of gold, mill consumption of lime, cyanide, explosives materials and including electricity, fuel and oil, and others.

Purposes of monitoring: to determine actual production and use and determine the impacts of the resources as it is used or if not being utilized.

Monitor methods: It can be easily charted or recorded based on production and consumption data or records from the company.

Monitor locations: these are centered on mine and mill production and consumption activities.

Monitoring frequency: quarterly (based on company monthly record).

17.5.4.1.5.6.2.5. Heritage and Cultural Values

This would involve the program of interaction with Indigenous People and the company shall put forward advances in enriching heritage and cultural values of the community.

Parameters to be monitored: underground activity may not encounter any historical values but all surface activities may have an impact on the growing consciousness of natives on their heritage past. Thus, the company shall be sensitive to their cultural values while doing its works.

Purpose of monitoring: identification of possible incursion or interaction with native values and historical past.

Monitoring method: actual observation and interaction with community leaders.

Monitoring locations: within the claimed area and nearby community.

Monitoring frequency: as it comes and with the yearly assessment.

17.5.4.1.5.6.2.6. Social Issues

Being recognized now as the most sensitive issue, the company shall be putting in a pro-active and re-active group to pre-identify record and put in an acceptable approach with community and regulators.

Parameters to be monitored: these may include the socio-economic and environmental record of the community before and during mining and milling operations. These would provide increase or decrease of community growth on a specific parameter,

Purpose of monitoring: this would provide the company a better management approaches on issues raised or activity ask to be done.

Monitoring method: These indications or socio-economic measures including environmental records can be compared based on LGUs or agencies' statistical records.

Monitoring locations: Host and adjacent Barangays.

Monitoring frequency: quarterly or semiannual.

17.5.4.2. Mine Closure Plan

17.5.4.2.1. Closure Objective

The mining operation has closed the landscape of the area due to underground tunnel development and construction of the tailings containment facility. The existing Flora and fauna were disturbed due to the operations while the livelihood of the host communities and workers to be displaced will be socially affected. To address the environmental and social impacts of the closure of the mining operations, this decommissioning plan was conceptualized to conform to the following objectives:

- To comply with existing Mining Law and other existing environmental laws, rules, and regulations.
- To eliminate adverse long-term environmental impacts by:
    - Restoring the ecological balance of the area affected by the mining operations realistic to enhance flora growth and faunal habitations.
    - Perform and enhancing the natural feature of the places;
    - Address impacts of floods, siltation, and landslides;
    - Stabilize the land surface affected by the mine.
    - Finalize land use for a better sustainable development approach.
- To address the negative public image of any mining operation through social and ecological responsibility.
- To improve effective development strategies for better opportunities after closure like Eco-tourism, Nature Park, Camps, etc.
- To continue and sustain all community development, health, and safety projects for the wellbeing of the impacted Barangays after cessation of operations.

17.5.4.2.2. Rehabilitation Program

The mining method is by underground mining. Land surface disturbance is expected to be minimal compared to open-pit

mining, the latter usually requiring rehabilitation from time to time when certain sections of the mine are mined out. Considering, the provisions stated in the mining regulations that rehabilitation should be started five (5) years before the expected closure of the mine, was followed by the company and progressive rehabilitation of mined-out areas which is currently practiced. Mitigating measures are in place to protect the neighboring communities from the impacts of floods and landslides. Implementation of the company's Environmental Protection and Enhancement Program (EPEP) has been carried out and other detailed activities will be continued after the closure of the mine.

As provided for in the regulations and when the mine is closed because of depletion of the ore reserve, all infrastructure and facilities will be demolished and disposed of properly. The site will be left in such a condition that it would not pose any danger or harm to anybody including animals. Stabilizing the slopes and reforesting the areas affected during mining activity are the planned rehabilitation effort for restoring the contract area. Mined out stopes will be backfilled and tunnel portal sealed to prevent the entry of people, particularly high graders, who might be exposed to risk underground. Sealing all openings will be done to minimize if not prevent, the generation of acid mine drainage that could contaminate the waterways.

17.5.4.2.3. The implication of Mine Closure and Final Land Use for Each Mine Component

The implication for mine closure and final land use for each mine component are defined as follows: The infrastructures at the mines sites are the haulage roads, tailings dam, mine waste dump, portal/underground tunnel, water tanks, CIL tanks, Detox tank, Reagent tanks, motor pool, oil depot, office buildings, core house, crushers, conveyor lines, substation and explosives magazines. The major mine components to be addressed in the closure plan; therefore, are the tailings dam, portal/underground tunnel, tanks (CIL, Detox, Reagent), oil depot, crushers, motor pool, conveyor lines, mine waste dump area, topsoil stockpile areas, and the polishing pond.

17.5.4.2.3.1. Portal and Underground Tunnel

Implication for Closure

The portal/underground tunnel is a shallow opening on the ground. The portal/underground size is 3m X 3.5m wide. Abandonment of the portal openings may cause bar-down and will escalate erosion and possible generation of Acid Rock Drainage (ARD).

After-use of the portal/underground

Mined out stopes will be backfilled and tunnel portal sealed to prevent the entry of people, particularly high graders, who might be exposed to risk underground. Sealing all openings will be done to minimize if not prevent the generation of acid rock drainage that could contaminate the waterways.

Result of progressive rehabilitation

As part of the company‘s committed progressive rehabilitation, areas surrounding the portals have been planted with forest and fruit tree species. The area was rehabilitated while the existing vegetation was enhanced.

17.5.4.2.3.2. Tailings Dam

Implications for closure

It will contaminate the existing river systems and surrounding flora and fauna will also be affected. The possible collapse of the dam will contaminate the river system and destroy downstream farm lots.

After-use of Tailings Pond

After the use of the dam, water quality will be assured to conform with DENR Standard. Application of sodium metabisulfite will reduce the level of cyanide content on the water at the dam and cyanide compound can be easily degraded through ultraviolet rays. Embankment will be stabilized to assure stability. This can be used as a sanctuary for wild duck and other migratory birds.

Rehabilitation or Final Land use of the area

Dam embankment will be stabilized by planting any type of vegetative measure like cover crops and shrubs planting. For a while, the tailings dam will become a sanctuary to wild ducks and other bird species.

17.5.4.2.3.3. Mine Waste Dump

Implication for closure

The company may have to stockpile excess development waste materials from its underground mining operation to the surface and also erect mining facilities These activities often have considerable negative aesthetic impacts on the existing landscape. Mine waste may cause acid rock drainage. This may have little implications for waste is being used for surfacing road maintenance.

After use of Waste Dump

Slope stabilization of the area and the site will be filled with topsoil and then planted with fast-growing plantation species, fruit trees and any cover crops to protect the area from erosion.

Rehabilitation or Final Land use of the area

As final land – use, this area will serve as a park, rest, and recreation area for people on the surrounding community.

17.5.4.2.3.4. Building Infrastructure

Implication for closure

The closure of the mine will leave all existing facilities abandoned. All facilities particularly the Tailings Dam, Mill Plant and accessories, Mine Portals, buildings for offices, and shops will be affected. These will be demolished or recovered either for sale or other uses.

After use of Building Infrastructure

Since Apex Mining Co., Inc., through its foreign subsidiary has another mine potential in the country, some equipment can be transferred to these new projects. Some buildings might be demolished while some can be retained either for educational purposes of the community.

Rehabilitation or Final Land use of the area.

As a final land use, the abandoned area where buildings were demolished will be revegetated and rehabilitated by planting forest trees to sustain the vegetative cover. Through this, soil contamination in the area can be avoided.

17.5.4.2.4. The objective of Mine Closure and how these relate to the mine and its Environmental and Social Settings

The mining operation has changed the landscape of the area due to underground tunnel development and construction of the tailings containment facility. The existing Flora and fauna were disturbed due to the operations while the livelihood of the host communities and workers to be displaced will be socially affected. To address the environmental and social impacts of the closure of the mining operations, this decommissioning plan was conceptualized to conform to the following objectives:

- To comply with existing Mining Law and other existing environmental laws, rules, and regulations.
- To eliminate adverse long-term environmental impacts by:
    - Restoring the ecological balance of the area affected by the mining operations realistic to enhance flora growth and faunal habitations.
    - Perform and enhancing the natural feature of the places;
    - Address impacts of floods, erosion, siltation, and landslides;
    - Stabilize the land surface affected by the mine.
    - Finalize land use for a better sustainable development approach.

- To address the negative public image of any mining operation through social and ecological responsibility.
- To improve effective development strategies for better opportunities after closure like Ecotourism, Nature Park, Camps, etc.
- To continue and sustain all community development, health, and safety projects for the well-being of the impacted Barangays after cessation of operation.

17.5.4.2.5. Results/Lessons Learned from Progressive Rehabilitation Already Completed

Mining site rehabilitation and reclamation are continuing activities of the company. Having experienced reclamation and rehabilitation, the following are the inferred advantages and limitations:

- With the on-going progressive rehabilitation the company has implemented, it has learned some experiences which are either advantageous or not.
- For areas subjected by earth-moving activities, topsoil will be restored. High slopes will be vegetated by planting cover crops like grasses.
- During actual mining operations, benches and terracing were already installed and will just require maintenance work after closure.
- Areas abandoned have been re-vegetated as early as the early stage of construction which means these areas need only to be maintained after closure.

As part of our community reforestation program, the company has entered into five (5) MOA‘s with the government on reforestation works. This gave a very positive image for the mining industries, namely;

- Pan-Philippine Highway Green Chain through —Adopt a street or park project
- Seedlings Assistance for the Green Philippine Program
- Adopt-A-Mountain: Adopt-A-Mining Forest
- Adopt-A-Mangrove Eco-Tourism Forest Project located at Barangay Bongabong, Pantukan, ComVal Province
- Adopt-A-Mangrove Eco-Tourism Forest Project located at Barangay Bucana, Maco, ComVal Province

17.5.4.2.6. Stakeholder Involvement

17.5.4.2.6.1. Objective: To ensure that concern and interest of all stakeholders are considered after mine closure and implementation of FMRDP Stakeholders:

- The host communities from the barangays of Teresa, Masara, and Mainit all of Maco, Davao De Oro Province.
- Government Agencies namely, DENR / MGB as the lead agency, EMB, local authorities, and other agencies involved in planning, welfare, education, and employment as may be necessary.
- Non-government organizations within the locality that may have concerns regarding the mine closure.
- Major stockholders responsible for putting-up the operation.

17.5.4.2.7. Risk Assessment

17.5.4.2.7.1. Identify Sources of Risk Base on Safety, Environmental, Social and Cost

17.5.4.2.7.2. Summary of Mine Rehabilitation Scenarios, Uncertainties and Assumptions

- MPSA-225-2005-XI and MPSA 234- 2007-XI will be completely exhausted by its mineral reserves by the year 2026. Progressive rehabilitation will continue until the exhaustion of its reserves. Mine closure will have less impact on the community in terms of socioeconomics activities since livelihood projects, other small industries, and employment opportunities will continue and remain. Payment of existing taxes under the law will continue.
- An uncertainty would be an early closure of the mining operations due to the lowering of ore reserves and its grade. The price of gold will also play a vital parameter for the closure of the mine.

17.5.4.2.8. Final Mine Rehabilitation and/or Decommissioning Plan or Mine Closure Plan

17.5.4.2.8.1. Final Land Use of the Area

- Areas vacated by workshops and plant facilities will be converted to forest farm lot.
- Other areas were devoted to tree planting, orchard, and cropland.

- The forest nursery and agroforestry farm will serve as a demo farm for educational purposes.
- Housing area is another option given the population growth and other facilities.
- Other areas were set aside for school buildings and government centers.
- The tailings dam will be devolved into a sanctuary for wild ducks and other bird species.

17.5.4.2.8.2. Mine Closure Criteria and Performance Standards for all Identified Mine Components (see Annex _I-2)

17.5.4.2.9. Details of Decommissioning Plan

17.5.4.2.9.1. List of Areas and Equipment that requires decommissioning

- Portals, Ventilation raised, and underground tunnels covered by MPSA-225-2005-XI and MPSA No. 234 – 2007 – XI due to mineral exhaustion by 2026.
- Tailings Dam
- Mineral Waste Dump
- Crushers, Motors and Buildings, conveyor lines and facilities; Motor pool shop, facilities; explosives magazines; and office buildings.
- Various Heavy Equipment.

17.5.4.2.9.2. Description of Decommissioning Strategy, Timing, and Techniques are chosen for each mine component including mitigating measures to minimize potential adverse environmental impacts

17.5.4.2.9.2.1. Decommissioning and Rehabilitation of portal and underground Tunnels

17.5.4.2.9.2.1.1. Objectives

- To Stabilize the underground within 5 years
- To re-vegetate the covered portals
- To mitigate the impacts of erosion, siltation, and landslides.

17.5.4.2.9.2.1.2. Decommissioning and Rehabilitation Strategy

- Backfill of underground tunnels
- Sealing the portals
- Restoration of topsoil
- Planting of grasses and fast-growing trees
- Raising of tree seedlings at Company Central Nursery to supply the rehabilitation program

17.5.4.2.9.2.1.3. Active Passive Care

- Continue tree planting and replanting of mortality
- Continue protection and maintenance like brushing of vines and competing weeds, application of fertilizers.
- Continue protection from fire, animal, human and natural interventions.
- Monitor deformation or erosion of slopes
- Monitor seepage of water from underground
- Monitor encroachment of squatters

17.5.4.2.9.2.1.4. Criteria of Measuring Against Objectives

- Pictures from fixed points in the area updated at year-end;
- The survival rate of planted species;
- Incidence of slopes erosion and incidence seepage

17.5.4.2.9.2.2. Decommissioning and Rehabilitation of Tailings Dam

17.5.4.2.9.2.2.1. Objectives

- To Stabilize the Tailings Dam within 5 years
- To re-vegetate the area
- To mitigate the impact of erosion, siltation, and landslide.
- To enhance the biodiversity of plants and animals
- To stop contamination on any body of water

17.5.4.2.9.2.2.2. Decommissioning and Rehabilitation Strategy

- Maintenance of embankment by proper surfacing regularly.
- Planting of grasses and fast-growing tree species along slopes.
- Enrichment planting on low-density forest adjacent to the area.
- Construct spillway that can contain 100 years flood-gauge.

17.5.4.2.9.2.2.3. Active Passive Care

- Sustain tree planting activities with regular care and maintenance.
- Continue protection from fire, animal, human and natural interventions.
- Monitor all soil erosion-prone areas.
- Check and stop the encroachment of squatters.
- Maintain and improve seedling nursery for production and disposition.

17.5.4.2.9.2.2.4. Criteria of Measuring Against Objectives

17.5.4.2.9.2.3. Decommissioning and Rehabilitation of Mine Waste Dump

17.5.4.2.9.2.3.1. Objectives

- To stabilize all Mine Waste Dam within 5 years from closure
- To re-vegetate the area and enhance the biodiversity of plants and animals.
- To mitigate the impacts of soil erosion and landslides.

17.5.4.2.9.2.3.2. Decommissioning and Rehabilitation

- Backfill the surface with topsoil
- Planting of grasses and fast-growing tree species
- Raising of tree seedlings at Company Central Nursery to supply the rehabilitation program

17.5.4.2.9.2.3.3. Active Passive Care

- Continue tree planting and replanting of mortality

- Continue protection from fire, animal, human and natural intervention
- Monitor deformation or erosion of slopes
- Monitor encroachment of squatters
- Continue raising of seedlings

17.5.4.2.9.2.3.4. Criteria of Measuring Against Objectives

- Pictures from the fixed points in the area update at year-end.
- The survival rate of planted trees
- Incidents of encroachment and soil erosion

17.5.4.2.9.2.4. Decommissioning and Rehabilitation of Building Infrastructure and Equipment such as Crusher and Motor Pool Buildings and Facilities, Explosives Magazines, etc.

17.5.4.2.9.2.4.1. Objectives

- To maintain peace and order and safekeeping of company assets
- Sell disposable items
- To return to original or approved alternative use.

17.5.4.2.9.2.4.2. Decommissioning and Rehabilitation Strategy

- Remove all equipment and demolished buildings not intended for community use.
- Rehabilitate areas for tree planting
- Maintain drainages installed

17.5.4.2.9.2.4.3. Active Passive Care

- Put warning signs to keep the area off-limits to unauthorized persons
- Continue maintenance of the revegetated areas to ensure high survival of seedlings;
- Monitor established drainage to ensure it is functioning proper
- Establish and maintain fences

17.5.4.2.9.2.4.4. Criteria of Measuring Against Objectives

- Pictures from fixed points in the area updated at year-end;
- Percent Survival
- Number of buildings removed and retained for community use.

17.5.4.2.9.2.5. Socio-Economic Activities

17.5.4.2.9.2.5.1. Objectives

Continue and sustain all community development projects and come up with more livelihood projects for the community.

17.5.4.2.9.2.5.2. Livelihood Programs

- Community – based forest management project
- Train the residents in handy craft making such as beads making, mat weaving, rope making, masonry, electrical installation, livestock raising, etc.;
- Sustain livelihood dispersal program
- Agro-forestry project to residents;
- Recycle, re-use of waste materials by residents.

17.5.4.2.9.2.5.3. Sustainability Measures

- Coordinate with local, National government agencies to conduct trainings and livelihood projects with the community.
- Regular livelihood skills training schedule;
- Monitor livestock dispersal and other livelihood accomplishments
- Assist with marketing agroforestry products.

17.5.4.2.9.2.5.4. Criteria for Measuring Against Objectives

- Pictures of livelihood activities, including community produced.
- Result of inspection for tree planting.
- Socio-economic impact planting analysis.

17.5.4.2.9.3. Details of Mine Rehabilitation Plan

17.5.4.2.9.3.1. Maps Detailing Planned Topography, Hydrology and Biology Information at Closure

17.5.4.2.9.3.1.1. Topography

The MPSA Contract Area of Apex Mining Company, Inc. is situated in a general rugged terrain with elevations ranging from about 500 to close to 1,300 m above sea level. The terrain is characterized by deeply incised, v-shaped river channels with dendritic to radial drainage patterns suggestive of an early mature stage of geomorphic development and structural control.

The topography of the mine site will relatively be the same before the mine closure.

17.5.4.2.9.3.1.2. Hydrology

The contract area is situated in the upper reaches of the Masara River, the most dominant drainage system of Maco. In its upstream portion, Masara is fed by its major tributaries consisting of Malumon, Pag-asa, Buenatigbao, Wagas, and Makausok creeks which drain the contact area. It is one of the biggest tributaries of Hijo River, a major river system in Davao De Oro and Davao del Norte provinces. It drains also the municipalities of Mawab and the City of Tagum. Hijo River drains into the northern part of Davao Gulf.

17.5.4.2.9.3.1.3. Biological Information

17.5.4.2.9.3.1.3.1. Plants

The original rainforest has been largely exploited by commercial logging concessions who harvested most of the more useful varieties of timber in the past. Further denudations were inflicted by swidden farmers who followed the loggers with the slash and burn method of farming in clearing the mountain slopes. Secondary forest growths of mostly softwood varieties now cover most parts to the contract area with scattered patches cleared, cultivated, and planted to fruit-bearing trees, coconut, corn, coffee, bananas, vegetables, and other crops.

17.5.4.2.9.3.1.3.2. Animals

Wild boars and deer are still spotted occasionally around the vicinity and sometimes, local hunters peddle wild boar or deer‘s meat. These species, however, have greatly diminished in number compared to a few decades ago as settlers from the low land encroached into their natural habitats. Monkeys are also found and occasionally spotted along with some species of snakes, squirrels, flying lemurs, and lizards. Other species found are various species of birds and butterflies along with diverse species of insects.

17.5.4.2.9.3.2. Topography and Biological Work Completed Each Year

Rehabilitation and re-vegetation is a continuing activity of the company for its disturbed area during mining operations. The total area planted during progressive rehabilitation is 1,200 hectares up to the life of mine. The remaining area to be rehabilitated from the closure in the year 2026 will be about 15 hectares. In 2027, about 15 hectares will be rehabilitated. In 2028, another 15 hectares will be rehabilitated. The remaining 15 hectares will be rehabilitated in 2029.

17.5.4.2.9.3.3. Description of the Rehabilitation Strategy, Timing, and Techniques Chosen to Meet the Rehabilitation Success and Closure Criteria

By the time the deposit had been exhausted in 2026, the Company had already rehabilitated about 1,200 hectares mined-out, open and denuded areas within the mining site. The remaining areas to be rehabilitated from the time of closure will be about 60 Hectares. Rehabilitation and revegetation will be completed in about four (4) years after closure or in 2026. Maintenance and monitoring of planted areas will be continued until 2030 or until the plants have grown to be self-sustaining. This decommissioning plan will be ready for implementation after the inevitable closure of mine due to some uncontrolled circumstances.

17.5.4.2.9.3.4. Description of the Objectives and Methodology of any Research or Rehabilitation Trials to be Conducted

The research or rehabilitation trails' objective is to design and develop rehabilitation strategy and technology for degraded and disturbed upland areas within APEX Mines – Masara, Maco, Davao De Oro Province operation. Specifically:

1. To establish a nursery for the production and propagation of selected and screened plant species suitable for the rehabilitation of mined out and disturbed areas.

2. To establish, develop, and manage sustainable tree plantation with the mined-out and disturbed areas.

3. To establish an Agroforestry Demonstration farm in the mined-out areas as a flagship project.

4. To conduct built-in studies and experiments (nursery and plantation) for the development of models and protocols in the re-vegetation of mined-out areas.

17.5.4.2.9.3.4.1. Establishment of Monitoring Program to Evaluate Success against the Rehabilitation Acceptance Criteria

Please see Annex ‗I-5'.

17.5.4.2.10. Details of Social Plan

17.5.4.2.10.1. Retrenchment Package

It may be too early to discuss the retrenchment package at this point when we are still in the development stage of our Company. We are looking at a mine life of 16 years or mine operation until 2026 based on existing ore reserves.

As such, the company is committing to provide to affected employees when the company ceases operation, a retrenchment package under existing laws as follows:

- Separation pay following Company policy and labor laws
- Commutation to cash of all unused vacation and sick leaves
- Conduct of livelihood/entrepreneurship seminars for affected employees
- Possible transfer of affected employees to other operations of the Company.

17.5.4.2.10.2. Labor Support Policies and Programs

The company encourages separated employees to engage in business with the Company in terms of 3rd party services and/or labor contracts or dealership.

As such, they shall be given proper orientation and trainings before separation. Opportunities may be available at other mine operations of the Company within the country.

17.5.4.2.10.3. Transfer of Social Assets and Services

There are already present facilities and assets extended to the public and these were turned over the local government units for their use and maintenance. Among these facilities and assets are:

- School buildings
- Roads and concrete bridge constructed
- Educational devices
- Medical and dental equipment
- Potable water systems (Tanks, Pipeline, etc.)

There may be other facilities and structures that can be later on converted to school buildings or offices but these of course should be negotiated between the local government unit and the Company.

To sustain the economic wellbeing of the people in the affected communities, the company will train the resident in some livelihood programs appropriate in the area, such as raising of goats, livestock, handy craft making, fishpond, agroforestry farming, dressmaking, manpower agency, etc. Tree planting and maintenance shall have to be farmed out to the residents. These activities shall have to be periodically monitored and sustained by the company even after the plant closure over some time.

17.5.4.2.11. Schedule of Operation Cost

17.5.4.2.11.1. Detailed program of work, including activity, schedules/timelines, rehabilitation and decommissioning procedures and protocols, health and safety measures, and detailed budgets/cost to implement expected activities

17.5.5. Mine Safety and Health Plan

17.5.5.1. Safety Table of Organization

Please see Annex ‗J-1'.

17.5.5.2. Central Safety and Health Committee(CSHC)

The VP/Resident Manager organized and established on-site a Central Safety and Health Committee to monitor the implementation of the Company‘s Safety, Health, Environment (SHE) Policies, and Standards. Membership of this Council comes from many levels as practicable and includes:

- VP-Resident Manager
- Division Managers
- Department Managers
- Safety Engineer/Officer
- Medical Doctor/Nurse
- One (1) representative from each contractor
- Four (4) Rank & File Employees Representatives from Underground, Mill, and Services Departments and other Company staff as appropriate.

17.5.5.3. Safety Responsibility and Accountability

Please see Annex ‗J-2‘

17.5.5.4. Organizational Rules

All relevant statutory and contractual safety and health requirements shall be observed. The principal statutory requirements to be observed during the execution of the company project include the following:

17.5.5.4.1. Government and Local Government Unit (LGU) Standards, Laws, Rules, and Regulations.

- DENR Administrative Order (DAO) 2000 – 98 also known as the Revised Mine safety Rules and Regulations.
- R. A. 9003 – Solid Waste Management
- DENR (DMC 99 – 32) - Mine Waste and Tails Management
- DOLE Safety, Health, and Regulations.
- Guidelines in the certification of Heavy Equipment Operators mechanics and welders issued by TESDA.
- Related Administrative Orders and Executive Issuances.
- The Philippines Road Rules and Regulations Handbook.

17.5.5.4.2. Codes

- The National Building Code of the Philippines
- The Labor Code of the Philippines.

- Philippine Society of Mechanical Engineers (PSME) Code.
- Philippine Electrical Code
- National Plumbing Code of the Philippines.
- Code of Practice for Safety and Health in the construction.
- Code of Practice for Safety in the use of chemicals at work
- Code of Practice for Management of alcohol and drug-related issues in the workplace.
- Code of Practice for Scaffolding Safety.

17.5.5.4.3. Company General Safety Rules and Regulations

Please see Annex ‗J-3'

17.5.5.5. Safety Meetings

The CSHC members will meet monthly to address and review all aspects of Safety & Health of the company including the following:

- Safety & Health Administration and records
- Emergency (First Aid facilities/Fire Fighting/Rescue equipment)
- Shops and Warehouses
- Earthworks/Excavations
- Scaffolds and Working platforms
- Cranes and Lifting Appliances
- Company structures, machines, and equipment
- Gas welding/cutting
- Safe use electricity
- Means of access and ladders
- General housekeeping
- Attitudes of staff & workers
- Contractor's performance
- Actions arising from Safety & Health Audits.
- Safety induction, training, and promotions
- Accident statistics.

The secretary for the meeting will draw up the minutes of the meeting. After approval obtained from the chairman, the minutes of the meeting are to be distributed to the following personnel:

a) All CSHC members

b) MGB and DOLE

A copy shall be circulated among the other staff of the company for their information and attention:

Departmental Safety Meeting

- Personnel have the responsibility to attend safety meetings when required.
- Personnel that are required to attend safety meetings should come on time.
- Participants at the safety meetings must be prepared before attending the said meeting. As a general rule, everyone will be required to attend a safety meeting at least once a month.
- All personnel have the responsibility to bring safety issues to the meeting for discussion.
- Participants at the safety meeting must take note of what has been discussed agreed upon and other points necessary for the improvement of safety conditions.
- Participants at the safety meetings must take note of what has been discussed agreed upon and other points necessary for the improvement of safety conditions.
- Participants to the meeting must ask, if in doubt.
- Participants have the responsibility to make the meeting productive and beneficial.

Pep – talk or Tool – Box meeting – a 10-minute pep-talk will be conducted the first hour of the shift before commencement of work

17.5.5.6. Management and Employee Training

Managers will undergo extensive Safety trainings in – house and outside to change their attitude towards Safety as this is very vital in the operation. It is also worth noting that those hired middle management were selected based on their experiences and trainings form their mining companies.

Reference manuals available to guide the management are the following:

- Mine Safety & Health Standards (DAO 2000-98)
- Safety & Health Plan
- Philippine Mining Act of 1995
- Loss Control Management Manual
- Safety and Health Manual
- Standard Operating Procedures (SOPs) – By Departments

The newly hired employee, Visitors, suppliers, and Contractors Safety Induction

All newly hired employees and contractors of the company must undergo a full safety induction before commencing their business or job.

- Visitors, suppliers, and contractors will likewise undergo a brief induction covering the main and salient points of the area they are to visit.
- For newly-hired company employees and contractors, the induction must cover government and company policies and procedures including safety signs, safety consciousness, responsibilities, and

PPE use and importance. Every newly hired employee is given a copy of the policies, rules, and regulations.

On the other hand, the company has lined-up trainings to employees in coordination with the Training Department. The type and schedule of trainings for implementation are outlined below. The budget has been incorporated to the Training Department.

See Annex _J-4 for the proposed safety training programs for 2020.

17.5.5.7. Planned Inspections

The identification of hazards in the workplace and the implementation of corresponding corrective actions are paramount in our efforts to prevent injuries and loss. Regular workplace inspections will be undertaken to carry out this identification of hazards and the implementation of corrective actions. Procedures:

- The Department Manager shall identify situations, areas, structures, facilities, tools, and equipment that needs to be inspected and develop inspection checklist.
- The Department Manager shall inspect at least once a month, using the developed checklists of identified area/structure/facilities/tools/equipment within their areas of responsibilities.
- Substandard practices and conditions identified during the inspection shall be recorded.
- Recommendation or corrective actions needed to eliminate or minimize the risks posed by substandard practices/conditions shall be formulated with responsibilities and timing of actions identified by the Department Manager.
- Monitoring and follow-up on the progress of the implementation of corrective actions shall be done at least once a month by the Safety office, the results of which shall be discussed during safety meetings.

Planned inspections were also organized in two (2) operations. These are the Mine and Mill divisions. These two operational divisions are scheduled weekly and operational meetings follow the publicized findings and formulate mitigating measures.

17.5.5.8. Accident / Incident Investigation and Reporting

- Any type of accident whether near Misses, Non-Lost Time Accident, Lost Time Accident, and Property Damage, should be reported immediately to the immediate supervisor or the Safety Office within twenty-four (24) hours.
- Any type of accident shall be subject to investigation to determine its immediate and basic cause(s) to prevent recurrence of the same.
- Evidences from the occurrence of the accident shall be preserved for use in the investigation process.

- The duty to conduct an immediate investigation of an accident/incident rests on the immediate supervisor of the person injured or directly involved.
- Accident investigation may also be undertaken by the Safety personnel concerned to ensure a thorough investigation.
- Any Lost Time Accident shall be investigated and reported within 24 hours to the VP/Resident Manager through the Safety Manager.
- Those who witnessed the occurrence of the accident/incident shall make himself/herself available for his/her statements on the accounts of the accident that happened.
- Personnel involved or those who witnessed the accident shall give true and correct accounts of the accident to the best of his/her abilities in order not to mislead the accident investigation.
- During the investigation process, the standard incident/accident form for the company shall be used.
- Recommended measures shall be monitored and followed-up to ensure its implementation.

17.5.5.9. Accident / Incident Analysis

Systematic cause Analysis Techniques (SCAT) will be adapted in the analysis of any accidents in the mine. The SCAT will enable all Safety personnel to learn how to tract an actual and potential loss effectively and systematically from occurrence to deficiencies in the system of work. Basic concepts of Risk and Hazard Management are also discussed below as a primary tool before an accident happens.

Risk Assessment procedure stages:

- Hazard identification – identify hazards (source of injury/disease).
- Risk assessment – analyze the consequences (i.e. potential for injury/disease) identify the probability (i.e. likelihood of the event, exposure to the event, and the likelihood of the maximum outcome of the consequences) combine consequence and probability to establish risk prioritize the risk (noting the unacceptable).
- Hazard elimination and control – determine what action to take for unacceptable risks (evaluate methods ‘of removing reducing or controlling the risk).
- Evaluation and monitoring – re-assess the risk (i.e. consider how the situation would be after the actions have been taken).

Hazard control:

- Elimination – plan to eliminate the hazard.
- Substitution – replace the material or process with a less hazardous one.
- Engineering and Design – design of protective barriers to improve the process design to minimize exposure of people to risk.

- Administration – providing administrative controls through proper training and safe work procedures.
- Personal protective equipment – use only properly fitted equipment.

17.5.5.10. HEALTH CONTROL AND SERVICES

Noise Monitoring and Control

To eliminate the risk of permanent damage to the hearing of workers who are exposed to excessive noise levels. Safety Officers and the mine pollution control officer shall carry out noise assessments. The Safety Manager and related supervisory staff shall determine the most appropriate measures to reduce exposure levels with the following priority.

• Use of silenced / quiet equipment or method.

• Use of noise-reducing devices such as silencer or enclosure to reduce the noise level.

• Use of personal protective equipment. An ear protection shall be used when a person is required to work in areas where a noise of 85dBA with time exposure of 8 hrs.

Dust Monitor and Control

While protection of individual workers engaged in the underground and milling operations could be achieved by local exhaust systems, wet methods and PPE such as dust nuisance or health risk to residents in the vicinity of mining area and building or construction site would be difficult. The following measures to a certain extent minimize the nuisance caused to the general public:

- Provision of an efficient and effective local exhaust system at the source of dust emission.
- Where practicable, water spraying or wet methods shall be employed.
- Enclosures or shrouds shall be considered for the isolation of dusty processes.
- A wheel washing bay and other washing facilities shall be provided for cleaning dump trucks and other vehicles leaving the mining area.

Control of Hazardous Substances

For all hazardous substances which will be used for mining and construction. The Division Managers shall work out a schedule stating what and when those materials will be used. Also the material safety data sheet (MSDS) for the product shall be obtained from relevant suppliers.

The schedule of hazardous substances to be used and their MSDS shall be forwarded to Safety Department and Pollution Control Officer (PCO) for preparation of the risk assessment for the handling of those hazardous substances and to determine the exposure limit and appropriate first aid

treatment in case of injury caused by those substances. A master file for all hazardous substances MSDS shall be located in the dangerous good storage area, Safety file, warehouse file, notice boards, and work areas.

All hazardous substances being used on-site shall be kept by the warehouse and is to be updated every month.

Multi-Gas Detectors were issued to Mine Underground Operations to directly monitor/control the concentration level of toxic gases such as CO, CO2, and H2S. Likewise, the Safety and Loss Control Department is always monitoring the gas concentration level of toxic gases daily through shift officers.

17.5.5.11. Emergency Preparedness

See Annex _J-5‘ for the Emergency Response Procedures.

17.5.5.12. Good Housekeeping

Good housekeeping means maintaining the necessary standards of domestic cleanliness and tidiness to make sites and workplace safe, healthy, pleasant places in which to work. It may be summarized by the phrase —A place for everything and everything in its place. The purpose of housekeeping is to promote order and cleanliness at the site. This is to:

- Eliminate accident and fire hazards
- Conserve space, time, material and effort
- Obtain and maintain good working conditions

Roads and passageways shall be kept clear of obstructions at all times.

Stairways shall be kept clear of all materials and will be properly lit at all times.

All access ways and passageways shall be kept clear at all times. Stacked materials shall not project into access ways or passageways.

Floors shall be cleaned frequently and kept in good condition, firm, and level. Worn spots and other defects shall be reported for repair immediately.

Small tools and materials shall not be permitted to lie around where they may present a slipping or tripping hazard. Special racks for tools will be provided. Improper stacking and storage of materials shall not be tolerated. Proper clearance shall be allowed between the ceilings and the tops of stacks. All stacked materials shall not present a tripping hazard.

Application of 5‘S for good housekeeping shall be applied.

Refuse and or garbage materials within the mine site/camp are collected daily and disposed at Material Recovery Facility located at Kennel Area, Brgy. Teresa. Likewise, waste/garbage materials of the four (4) impact

barangays are also collected every Monday and disposed to the MRF. Garbage Bin has been provided per area to segregate biodegradable, non – biodegradable, and recyclable materials.

Scrap materials from the surface and underground are also collected, segregated, and stocked at Level 4 FAM Shaft Area for disposal to prospective buyers.

17.5.5.13.Personal Protective Equipment

To enhance the implementation of PPE Policy, the standard of each PPE is hereby discussed.

Protective Clothing

- Adequate clothing must be worn at all times to protect the body from harm.
- Badly – torn clothing must not be allowed as it may be caught up with moving parts of machinery or other objects.
- Long-sleeved shirts and long pants must be worn for personnel involved in brushing activities or for those working in forested areas.
- All clothing must be adequately washed and cleaned before wearing to avoid skin health problems.
- Long-sleeved shirts and long pants must be worn when cutting or welding materials.
- Leather – type aprons should be worn in the laboratory.

Head Protection

- Hard hat or skull guard must be worn in the following designated areas/activities;
    - All Industrial Areas (Mine Areas, Plant, Workshops)
    - Drilling operation
    - Building construction sites
    - Core logging operation
    - Road/access track construction
    - Inside equipment where the operator‘s shield is inadequate or not available
    - Areas or sites where overhead hazards exist.
- Damage hard hat should be replaced with a new one in good condition.
    - Intentional damage, destruction, or graffiti writing of/on hard hats will not be tolerated.
    - Hard hat is not required inside offices.
    - A hard hat is required as signposted.

Eye and Face Protection

- Wearing safety glasses/eye shield is mandatory in the following areas/activities:
    - All Industrial Areas (Mine Areas, Plant, Workshops)
    - Drilling operation.

    - Grinding or cutting of metals using abrasive and revolving cutting discs.
    - Any work involving the use of liquid or dry chemicals.
    - Dusty work environment.
    - During prolonged exposure to sunlight.
    - Exposure to excessive illumination.
    - Anytime indicated by safe operating procedures.
    - Rock/chip sampling.
- Wearing of the face shield is required in the following activities:
    - Electrical cutting or welding or oxyacetylene work.
    - Core cutting.
- Grinding or cutting of metals using abrasive or revolving cutting discs.
- Anytime indicated by safe operating procedures.

Foot Protection

- Wearing safety shoes/boots is required in the following activities/areas:
    - All Industrial Areas (Mine Area, Plant, Workshops)
    - Drilling operation.
    - Building construction sites.
    - Core logging operation.
    - Road/access track construction.
    - Core packing/hauling activities.
- Safety shoes must be worn inside heavy equipment such as backhoe, bulldozer trucks, etc.
- Safety shoes/safety boots are required in any area where there is a likelihood of feet being exposed to damp or wet conditions.
- It is also required for protection against corrosive or toxic chemicals.
- Safety shoes/boots should always be in sound condition.

Hand Protection

- Gloves are supplied for the protection of your hands and should be worn to prevent injuries.
- Do not use gloves that are badly torn or excessively oily.
- Gloves should be kept clean and in good condition.
- Always carry a pair of gloves to be used when needed.
- Gloves will be used when handling:
    - Timber/Steel sets
    - Vent pipes.
    - Rubbish
    - Broken rock, glass, and other materials.
    - Steel Cables.
    - Sharp and hot objects.
- Worn – out gloves must be returned for immediate replacement.
- Rubber gloves must be used in manual labor.
- Leather gloves will be used in manual labor.
- Gloves must not be left lying and scattered around the floor particularly rubber made gloves.
- Gloves must be worn to prevent further infection of hand injuries.

Respiratory Protection

- In any possible toxic environment, a suitable type of respirator must be worn such as;
    - Toxic and dust atmosphere.
    - Spray paintings.
    - Dusts and fumes.
    - Mists, gases.
    - Organic vapors.
- Wear dust masks in areas where dust is a nuisance.
- Replace worn-out or excessively used cartridges or canisters of respirators for adequate air filtration.
- Use the appropriate type of respirators for a specific environment.

Hearing Protection

- Earplugs/muffs must be worn in the following high noise environment activities or areas:
    - Drilling operation.
    - Power plant operation or inside the powerhouse.
    - Use of power tools.
    - Core cutting operation.
    - Close to generator or compressor operation.
- Earplugs/muffs must be worn in any area where the sound level is more than 65 decibels.
- Keep earplug/muff always clean and in good condition to avoid infection.
- Earplugs should only be inserted into the ears with clean hands.
- Hearing protection must be worn in any area where you must shout to carry-out a conversation.

Fall Body Harness

- Safety body harness must be worn when working in elevated places, near any drop, over an open hold, and whenever the possibility of a fall exists.
- Safety body harness must be worn when working on drill rig towers, platforms, or ladder ways.
- Always check that the safety body harnesses are in good condition before using it.
- Safety body harness must not be removed from fixed locations.
- All worn-out safety body harness must be returned for replacement.
- Make sure that the safety body harness rope is securely anchored.
- Do not depend on an individual to hold your safety body harness rope.
- Always anchor safety body harness rope to fixed objects – never to a moving load or on equipment that may move.
- Shortening of safety body harness by cutting is prohibited.

Self – Rescuer

MSA W – 65 Self Rescuer is provided to all underground employees, services crew, and visitors to escape in case of emergency specifically fire and or explosion underground. This apparatus provides adequate protection for 60 minutes in a 1% concentration of Carbon Monoxide to save a life.

17.5.5.14. Safety/Health Incentives

To develop positive awareness and attitude of workers, a variety of promotional and incentive techniques will be organized to be implemented.

Awards may be in the form of cash prizes or Safety souvenirs at the sole discretion of the VP/Resident Manager. Also, maximum publicity shall be attached to the presentation and a high level of recognition shall be given to the recipients of the awards.

- Zero Lost Time Accident (LTA) Award The VP/Resident Manager will award this to all employees involved in achieving the target milestone man-hours (i.e., 1,000,000, 2,000,000, and up manhours) with No Lost Time Accident. Bonuses and other mementos such as free meal and commemorative items will be given to all workers.
- Safe Worker of the Milestone The workers joining the award scheme shall be nominated by their immediate supervisor and approved by the CSEPC.

  All nominees will be arranged to attend the assessment carried out by the Chairman of CSEPC and Safety Manager, the score will be given to each nominee of the following area and the result will be sent to CSEPC for verification.

  - Using personal protective equipment properly and maintaining it in good condition.
  - Maintaining his / her works area in a safe condition and without risk to health.
  - Making due effort to follow a safe system of work on his job.
  - Promoting Safety to his / her colleagues.
  - No Safety & Health Rules and Regulations violations.
  - No violations of Standard Operating Procedures (SOP).
- Firefighting contest among the departments will be initiated by the Safety to enhance awareness on fire prevention and skill on the use of firefighting equipment and accessories. After the competition the winners will receive cash prizes and trophies. Aside from the awards, the participants will be issued each a certificate of participation.
- The company will participate actively in the safety sponsored by the Philippine Mine Safety and Environment Association (PMSEA) in honoring the —Best among the Best personalities in the mining industry. The main criteria are the contribution of the individual employee to safety. This program of the PMSEA is done annually.

- Giving of the certificate of Merit to employees who are lifesavers, who participate in the suppression of all sorts of unwanted fire, who participate in any Rescue Operations are part also of safety incentives.

17.5.5.15. COMMUNITY CONSULTATION

- The host communities within the mine site, particularly Teresa, Masara, Tagbaros and Mainit, and other outlying areas will be consulted in the preparation of the Safety and Health program so that their concerns will also be included. Likewise they will be updated on the construction progress and mitigating measures used in correcting safety and health risks.
- The above-mentioned communities will also be briefed consulted and will be part of the overall emergency preparedness program of the company.
- Traffic Safety Rules and Regulations of the company shall also be imparted to the communities as part of safety measures during operation wherein company trucks and other vehicles passing the residential areas.

17.5.5.16. Targets and Budgets

See annex ⁼J-6ll.

17.6. Financial Aspects

17.6.1. Total Project Cost Estimates and Assumptions (Hypothetical Mine of 1,800 tpd)

Base Case Assumptions:

- Mine life of 3 years
  - Ore Reserve of 1.915 M tons @ 6.34 g/t Au,
  - replenished as exploration and mine development progresses;
- Mined Ore / Milled Ore over the projected mine life:
  - Stope ore: 701,523 tons @ 5.3g/t
  - Development Ore: 1,157,775 tons @ 5.2 g/t
- Development over the projected mine life of:
  - Off vein Development: 20,237m
  - On vein Development: 41,758m
- Operating Costs of:
  - Mining Cost: $ 30/t (2019 YTD cost of production/tons mined)
  - Milling Cost: $ 16/t (2019 YTD cost of production/tons milled)
  - Development Cost : $ 1,775.8/m (Mine development addition for 2016 / off vein development)

- Overhead Cost: $ 11/t (2019 YTD cost of production/tons milled)
- Environmental/Social Cost (incorporated in OH)
- IP Royalty 1.0% of Gross Revenue

- Taxes:
  - Excise Tax: 2.0% of Gross Revenue
  - Business Tax: 2.2% of Gross Revenue
  - Income Tax: 30.0% of Net Income
- Production data:
  - Dilution Factor (to Ore Reserve Grade): 80 %
  - Mill Recovery: 80 %
  - Gold Price: $ 1,200 / Oz
  - Foreign Exchange: Php 50 / $1.00
  - Payability on Gold Sales: 99 %

17.6.2. List of Capital Equipment and Works

An existing Capitalized Cost schedule prepared by Apex has been partially adapted in this review for the financial and economic assessment. Please refer to Annex ‗K-5'.

Capital Costs represent the addition to the outstanding amount of the assets from the mine, the mill, and other facilities that need to be depreciated. In such cases where the mine is already operating, capital costs are relatively lower compared to operating mines boosting the profitability of the project.

17.6.3. Financial Plan/Sources of Funds

17.6.3.1. Most of the funding will come from the sales proceeds of the product, in the event that there will be a shortage in resources, APEX will seek 3rd parties weather through public offerings or long term bank loans.

17.6.4. Production Cost Estimates and Assumptions

17.6.4.1. Mining Cost

The average total operating cost is US$ 77.00 per ton ore milled (includes mining, milling, maintenance, compliance, mine overhead and admin cost). These costs were based on the actual cost for 2019 labor rates, utility cost, contract services, consumable prices, and other expenses. Proper monitoring of all the individual cost components is being enhanced to further update cost estimates for future use. While the actual cost per tons mined is at US$30.00 based on YTD 2019 cost.

17.6.4.2. Milling Cost

The average milling cost is at US$16.00 per ton. These costs were based on the actual cost for 2019 labor rates, utility cost, contract services, consumable prices, and other expenses.

17.6.4.3. Maintenance Cost

The average maintenance cost is at US$6.00 per ton. These costs were based on the actual cost for 2019 labor rates, utility cost, contract services, consumable prices, and other expenses.

17.6.4.4. Marketing Cost

A payability factor of 99% on the Gross Sales Value is applied to gold marketed to the 3rd party smelter. The 1% is assumed to be sufficient to cover for any marketing expenses, deductions, and / or penalties.

17.6.4.5. Mine Overhead Cost

A Mine Overhead Cost of US$11.00/t is derived from the 2019 actual ytd cost. This cost is perceived to on the high side but was maintained subject to a review by Apex for possible areas of cost reduction.

17.6.4.6. Compliance Cost

The average compliance cost is at US$7.00 per ton. These costs were based on the actual cost for 2019 labor rates, SDMP, utility cost, contract services, consumable prices, and other expenses.

This cost Environmental Protection and Enhancement and Social Development cost components as programmed in their respective plans.

17.6.4.7. General & Admin Cost

The average general and admin cost is at US$6.00 per ton. These costs were based on the actual cost for head office operation for 2019 labor rates, utility cost, contract services, consumable prices, and other expenses.

17.6.4.8. Environmental Cost

Based on the Philippines Mining Act of 1995 or RA 7942, the company has established One Hundred Fifty Thousand (P150, 000.00) Monitoring Trust Fund earmarked purposely for the multi-partite monitoring team. This amount regularly replenished.

A Php5.0M Rehabilitation Cash Fund is also established to cover any emergency repairs or activities that might arise. This amount is, likewise, replenished and maintained. An Annual Environmental Protection and Enhancement Program budget of about US$400,000 annually to cover for the company‘s progressive rehabilitation of the entire tenement area.

All of these costs are part of the Mine Overhead Cost used in the financial and economic assessment.

17.6.4.9. Community Development Cost (SDMP)

A Community Development cost equivalent to 1.0% of the direct mining and milling cost is earmarked to fund the activities that are embodied in the Social Development and Management Program of the company.

17.6.4.10. Excise Tax and Business Tax

An Excise Tax of 2% of gross sales is provided for and made part of the financial and economic assessment. Additionally, a Business Tax of 2% of gross sales, which is being levied by the Local Government Units at the start of the year as a prerequisite for the issuance of the local business permits, likewise, provided.

17.6.4.11. Head Office Cost

Head office cost which is located in Ortigas has overhead which covers salaries and wages, rental of the office building, payments of director‘s fees, utilities, and other miscellaneous expenses. This amount is included in the Mine Overhead Cost used in the financial and economic assessment.

17.6.4.12. Royalty Fee

The area is an Ancestral Domain of the Mansakas of Maco, Apex is required by way of a Memorandum of Agreement with the Indigenous Peoples, in this case, the Mansaka tribe, to pay a royalty of 1% of the gross sales. This is provided for in the financial and economic assessment.

17.6.5. Government Financial Incentives

No government incentives were provided in this financial and economic assessment.

17.6.6. Basis for Revenue Calculation

17.6.6.1. Metallurgical Recovery

For this financial and economic assessment an 80% milling recovery for gold was considered. A 60% milling recovery for silver was also taken into account given the significant silver by-product in the dore accounting for about 1% of the value of the marketed product.

17.6.6.2. Selling Price

The selling price is based on the prevailing London Gold and Silver Fixing date which the management will communicate to Heraeus. But for this assessment, a gold price of US$1,200.00/oz Au was used in this study.

17.6.6.3. Exchange Rate

For purposes of this assessment, 50.0 pesos is pegged against US$1.

17.6.6.4. Smelters/Freight/Treatment Charges

No smelter/freight/treatment charges were used in the study. The payability factor of 99% is the only charge of marketing.

17.6.6.5. Bonuses and Penalties

No bonuses or penalties were used in the study.

17.6.6.6. Percentage of LME Price Payable

A payability factor of 99% is used in this assessment.

17.6.7. Proforma Financial Statements/Feasibility Study

17.6.7.1. Balance Sheet

See Annex_K-1

17.6.7.2. Profit and Loss

Please refer to Annex _K-1‘ for the Profit and Loss Projections.

17.6.7.3. Cash Flow

Please refer to Annex ‗K-1‘ for the Cash Flow Projections.

17.6.8. Financial Analyses

17.6.8.1. Break-Even Analysis

See Annex ‗ K-2‘.

17.6.8.2. Sensitivity Analysis

See Annex ‗K-3‘.

17.6.8.3. Profitability Analysis

See Annex ‗K-1‘

17.7. Economic Aspects

17.7.1. Employment/management

17.7.1.1. Number, nationality, position, and annual payroll.

See Annex ‗L-1‘ for the Manpower Headcount

17.7.1.2. List of Key Personnel and their Qualification

See Annex ‗L-2‘.

17.7.1.3. Personnel Policies re Pay Scale

See Annex ‗L-3‘.

17.7.1.4. Table of Organization

See Annex ‗L-4‘.

17.7.1.5. Availability of Technical and Skilled Labor

There is a little scarcity on the availability of technical and skilled labor. As observed, this is not only within the region but entire the country. And

this is brought about by many mining and exploration companies springing up in the Philippines. Add to that the "lull" in the mining industry a decade or 2 ago where mining-related professions ventured into other industries. With this scarcity, much as the Company prioritizes employing people from within the region or area of its operations, it is constrained to hire technical people outside Mindanao.

17.7.1.6. Township/Housing

17.7.1.6.1. Company Quarters and Accommodations

The old existing housing and accommodation facilities of the old Apex mining operation were repaired and refurbished to accommodate the technical and managerial employees hired outside of the community. While most of the rank and file employees are residents and are not provided housing accommodations within the camp, service vehicles are provided to shuttle them from mine site to as far as Tagum on a three (3) shift basis.

17.7.1.6.2. Community Residents and Demography

See Annex ‗L-5'.

17.7.1.7. Community Development Plan

See Annex ‗L-6'.

17.7.1.8. Socio-Economic Contributions

See annex ‗L-7'.

18. ORE RESERVE ESTIMATES

18.1. Database Used

The data used in the ore reserve review was based on the historical mine records and latest exploration drilling and drift sampling and mapping results with a cut-off date of September 2019. These are accessible through electronic files supplied by Apex.

18.2. Integrity of Database

The database has suffered somewhat from being stored in several formats and locations. Checking during the preparation of this resource estimate highlighted some issues that were fixed immediately. This has led to a campaign of a total

verification of all data against original data and drill core and stored in a specialized server database to reduce inadvertent error.

18.3. Data verification and validation

The data runs into a series of system checks and file transfers before incorporating it into the database used in estimation. The assay data is encoded in a spreadsheet along with its assay result and sample chapa number. The samples will then be classified as hanging wall, footwall, or main vein sample using a scanned image of the drift‘s face-mapping also included in the spreadsheet. The sample‘s location will be initially based on mapping distance then later reconcile it with the survey department for its final location.

18.4. Ore Reserve Estimation Method Used

Ordinary Kriging was used to estimate the reserve, combined with block filtering to limit the extents of the vein systems. Wireframes were constructed to digitize the vein interpretation of geologists and populate the block model with the percent mineralization variable which indicates how much of each block in terms of volume was mineralized or inside the vein. Variograms for each vein were then created using the face samples/ drill data tagged for the particular vein to take into account the range of influence of data points within a vein. Blocks are then populated with an Au grade using face samples and drill intercepts in the proximity of each block. These blocks are then resized to the SMU for ore reserve calculation.

The smallest mining unit (SMU) is used to facilitate the calculation of the Ore Reserve. This SMU is kept the same as the resource blocks which were 2mx2mx4m with the vertical component as 4m. It must, however, pass the following criteria to be included in the reserve:

- At least 2 other ore blocks in proximity (4m);
- Blocks must be classified in the ore resource.
- Block grade should be above the cut-off grade of 3 g/t Au.
- Blocks must be at least 35m from the nearest development drive

The horizontal dimension is designed to allow for a significant (>50%) of each block within the model to be mineralized. The vertical component represents the selectivity available to the cut and fill mining method.

Kriging assumes that a certain amount of extrapolation is appropriate in estimating reserves as the material below the lowest development level is included in the reserve given the criteria above are met.

All veins included in the reserve estimate had widths exceeding 1.2m which negates the effect of the 1.2m minimum mining width observed in operations.

18.5. Ore Reserve Estimations

18.5.1. Ore Specific Gravity/Density

The Grade Control team conducted a series of rock density test, for in-situ vein materials to determine the minimum density expected in Maco's underground mine. The result declares that 2.6 tonnes per cubic meter (t/m3) as the average density of the in situ rock in the Maco Project. The figure is then used in the tonnage estimation for the ore reserve calculation.

Rock Density Test - In situ				
Trial #	Weight of sample	Equivalent Volume (liters)	Density (tons/cu.m.)	Description
1	30	11.738	2.55	Composite Sample – wet and gougy in nature with rock sizes up to 12 inches in diameter.
2	30	11865	2.528	Gougy in nature, with rock sizes of <15 cm
3	30	10.9726	2.736	Coarser in size >15cm mixed with minute portion of smaller fragments.
4	30	11.278	2.6598	Rock samples of smaller sizes <10cm mixed with fines / gouge
Average	30	11.4634	2.61845	

18.5.2. Mining Plans/Mining Recovery/Dilution Factor and Mining Losses

The actual grade of the material outside the main vein but within the designated mining width was included. The dilution factor of 80% is integrated into the production schedule. The applicable ROM grade used is, therefore, 80% of the ore reserve grade.

A mine call factor of 80% is also used in the financial projections to account for the unexplained grade difference in the ROM and the mill head. The applicable mill head used is therefore 80% of the ROM grade

Moreover, the team has set an 80% mining recovery in the production schedule as some pillars will remain in the stope for stabilization purposes. It will be the decision of the engineering group if these pillars will be recovered or not with respect to various ground conditions.

18.5.3. Relevant Production Cost Considered

Please refer to Financial Aspects (17.6)

18.5.4. Basis of Revenue Calculation

Annual mine revenue is calculated by multiplying the number of gold ounces produced and sold throughout the year by the sales price received per gold ounce.

Factors to consider in calculating the revenue or sales are:

A. Tonnes milled or processed (DMT)

- Tonnes milled refers to the amount of material (in tonnes) being feed to the mill plant, (secondary crushing to ball/rod mill)

B. Mill head (gpt Au or gpt Ag)

- Milled head or grade is the average grade of mill feed.

C. Recovery rates (%)

- The amount of materials recovered in the beneficiation process usually expressed in percent.

D. Conversion of grams to ounce

- Metal prices are usually in US dollars per ounces (USD$/oz). Since mill heads are of in grams per tonnes (gpt), the conversion factor is then utilized. 1troy ounce is equal to 31.1035 grams.

E. Metal sales price

- Metal sales price is defined as the monetary value or equivalent payment of a particular metal. Currently, gold and silver, the Maco project‘s products; its price are controlled by the London Metal Exchange (LME). The LME is a 24-hour market with trading taking place. Each day the LME announces a set of official prices (i.e. gold and silver), which are determined from trading on the LME. This trading is highly liquid and trade and industry have confidence that they properly reflect the current supply/demand situation as well as the market‘s projection of supply and demand in the future.

F. Economic Payability

- Payability is defined as the ability of the said material in percentage, for this instance, the gold, to pay or make a profit.

Revenue can be computed as (letters referenced to the chart above)

Revenue (Gold) = (((A * B * C)/31.1035) * E * F)

Revenue (Silver) = (((A * B * C)/31.1035) * E * F)

18.5.5. Cut-Off Grade Determination

The Economic Cut-Off Grade (ECOG) is the grade at which it is possible to mine and process a block of material at a profit.

Cut-off grade is computed as

$$Cutoff\ Grade\ (CoG) = \frac{Total\ Annual\ Cost}{\frac{(\%\ metal\ recovery * metal\ price)}{Conversion\ Factor} * (1 - excise\ tax) * Tonnes\ milled * Payability}$$

Where:

- Total annual cost = is the cost incurred of the project direct and indirectly related to the operation.
- Metal recovery = the amount of materials recovered in the beneficiation process usually expressed in percent.
- Metal sales price = Metal sales price is defined as the monetary value or equivalent payment of a particular metal
- Conversion Factor = Metal prices are usually in US dollars per ounces (USD$/oz). Since mill heads are of in grams per tonnes (gpt), the conversion factor is then utilized. 1troy ounce is equal to 31.1035 grams
- Excise Tax = Chapter 22 Section 217 of the Implementing Rules and Regulation of the Philippine Mining Act of 1995 states that for gold and chromite metals, a 2% tax based on the actual market value of the gross output is to be paid by the contractor. An excise tax is a tax imposed on goods manufactured or produced in the Philippines for domestic sale or consumption.
- Tonnes milled – refers to the amount of material (in tonnes) being feed to the mill plant, (secondary crushing to ball/rod mill)
- Economic Payability - is defined as the ability of the said material in percentage, for this instance, the gold, to pay or make a profit.

18.6. Ore Reserve Classification Used

Mining blocks are classified according to the PMRC (Philippine Mineral Resource Code) classification. Blocks are classified either as Proven reserves or Probable reserves.

The mineral resource classified by the Apex Geology Team directly correlates with the ore reserve computed by the TS group.

The Proven Reserves are derived solely from the Measured Resource as delineated by the Competent Person for Geology. The fact that the vein is already being developed and being mined at different levels gives more confidence for such a classification.

The Probable Reserves are derived as either extension blocks of the Proven Reserves within the Measured Resource or projected under the same procedures from the Indicated Resource.

18.7. Ore Reserve Estimates

Reserve estimates are tabulated in the tables found below, a cutoff of 3.0 g/t Au was used to compute for the reserve as used in the production schedule to match the actual grade cutoff at the mine.

PROBABLE

ROCKGROUP	Tonnage	AU	AU_P
	T x 1000	Au g/t	Ounces
MAI	80.000	5.65	15,000.0
MAIHWS	81.000	5.76	15,000.0
SDN2	129.000	6.51	27,000.0
SDY	84.000	5.94	16,000.0
WGS	47.000	4.68	7,000.0
DNC	124.000	5.51	22,000.0
BBK	34.000	6.47	7,000.0
BHWS	115.000	6.71	25,000.0
BNZ	59.000	4.82	9,000.0
MAS	110.000	6.78	24,000.0
MST2	107.000	8.53	29,000.0
SDY	614.000	5.92	117,000.0
JES	45.000	10.32	15,000.0

PROVED

ROCKGROUP	Tonnage	AU	AU_P
	T x 1000	Au g/t	Ounces
MAI	3.000	5.75	1,000.0
MAIHWS	15.000	6.34	3,000.0
SDN2	19.000	7.77	5,000.0
SDY	29.000	6.39	6,000.0
WGS	4.000	5.51	1,000.0
DNC	3.000	4.24	0.0
BBK	11.000	7.89	3,000.0
BHWS	6.000	7.09	1,000.0
BNZ	18.000	5.68	3,000.0
MAS	21.000	7.44	5,000.0
MST2	30.000	9.38	9,000.0
SDY	127.000	6.37	26,000.0
JES	0.000	0.00	0.0

TOTAL RESERVE

PROBABLE	1,629.000	6.26	328,000.0
PROVED	286.000	6.85	63,000.0
Total	**1,915.000**	**6.34**	**391,000.000**

The total combined proven and probable reserves are 1,915,000 tonnes grading 6.34 g/t gold, accounting for a total of 391,000 in-situ ounces of gold

and 312,800 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

19. INTERPRETATION AND CONCLUSION

19.1. Synthesis of all data

This Technical Report ("2019 Report for economic assessment and ore reserve estimation of the gold vein deposits of Maco Mines") shows the Project is financially viable. The associated risks are manageable. The Project exhibits robust economics with the assumed metal price, production schedule, marketability, relevant costs, relevant taxes, and other variables used in the assessment process.

METAL PRICE

Due to the overwhelming size of the gold market compared to the amount of gold produced at the Maco mine, APEX Mining Inc. has no control over the gold price and is only able to sell gold at the market price. Given the difficulty in forecasting the gold price, a static price of $1,200/ oz Au is assumed for this study.

RESOURCE / RESERVE

The estimated ore reserve was based on a cut-off grade of 3 g/t Au which is derived from the current cost of operations. The resource, on the other hand, is based off a cut-off of 1.5 g/t Au which is derived from the potential optimization of the operating costs from factors such as ramping up the tonnage from 1,800 tpd to 3,000tpd

As Apex firms up its operating costs, the cut-off grade may be adjusted to optimize its ore resource utilization.

Ore Reserve Estimate Parameters

- The methodology used to estimate grade is ordinary kriging
- No dilution included in tonnage and grade calculation;
- SMU horizontal dimension is 2 meters
- SMU vertical dimension is 4 meters
- Specific Gravity is 2.6
- Grade average calculation is by weighted average.

MINING PERMITS

The relevant mining leases have been granted (MPSA-225-2005-X1, MPSA-234-2007-X1, ECC-0612-015-2110) and the processing plant and tailings dam have been built and approved for operations. The political risk factors of being able to obtain permission to mine are therefore regarded as zero for this study.

HISTORICAL GOLD PRODUCTION

Some 573,022 ounces of gold (from 1976 to 1989) and 472,028 ounces of gold (from 2005 to 2019) have already been produced from typical ore bodies using

the existing plant facilities. Mining and milling over a twenty-nine (29) year period from 1976-1989 and again from 2005-2014 on a commercial basis formally under a government monitoring system indicates essential production parameters, i.e. economic mining method and metallurgical process, are present.

CURRENT PROJECT STATUS

The Maco gold mine is an operating mine with a Mining Permit and an ECC. All infrastructures required of a commercial mine are present, i.e. a developed mine, a mill capable of converting ore into economically marketable products (rated at 1,800 tpd), a tailings storage facility (current capacity till the end of 2020 with production at 1,800 tpd), power (138kV from the NGCP substation in Nabunturan and a mine site power generated system that can support the mine and mill operations), water systems and other necessary ancillary facilities.

MARKET

Marketing risk factors are also regarded as being close to zero. It is expected that all gold produced can be sold at the prevailing world market prices world. Apex plans to export its produced gold through Heraeus. Competition amongst gold miners is also considered to be non-existent thus increasing gold output will not hinder its marketability.

MINING METHOD

- The mine plan presents two (2) applicable mining methods – The Cut and Fill Method and Long Hole Stoping with Delayed Backfill Method. The latter is a trackless mining operation utilizing LHDs and LPTs of nominal 13-ton capacity. Material haulage is on a decline of 3.5m.x 3.0m section on a 7% gradient. Mining sub-levels are driven with a minimum mining width of 1.2 m. and a vertical distance of 15 m.
- The major parameters used in this study include:
    - Mining Block Recovery of 97%,
    - Pillar Block Recovery of 85%,
    - minimum mining width of 1.2 meters,
    - dilution of 20% and
    - milling recovery of 80%.

ENVIRONMENTAL / SOCIAL

- The mines have an engineered tailings dam constructed in 2007. The present dam with crest elevation at 623masl can accommodate 154,915 cu.m. (or about 201,390 tons at a specific gravity of 1.3) of mill tailings which is good for a little more than a year‘s production. The dam is designed by EDCOP.
- A proposed Tailings Management Facility is in the works and can eventually contain as much as 9Mt of tailings.
- Environmental Protection and Enhancement Plans as well as a Final Mine Rehabilitation Plan are already in place. Costs have been incorporated in the economic assessment.
- A Social Development and Management Plan is already in place and, likewise, incorporated in the economic assessment.

POLITICAL

Davao, as a whole is considered a mining province and had always been hospitable to large and small scale mining operations. The past fifty years of the mining industry in the Philippines will show the province‘s open policy for mining balanced with its reform for an environmentally friendly mining operation.

SECURITY

Mines are generally located in remote areas. All mines have their share of security problems especially for those mining for gold. These problems are however contained in the present operation.

DEVELOPMENT SCHEDULE

Phase 1 development at a milling capacity of 1,800 tpd simulated by the hypothetical mine. Potential to increase to 3,000 tpd is shown however this CP review is limited to the mining and recovery of gold and silver at a mill capacity of 1,800 tpd.

FUTURE UPSIDE

The highlight for future upside is the planned ramp-up to 3,000tpd. The ramp-up is supported by the extensive planning already done to install the 3,000tpd SAG mill and the planned expansion of the mine to new work areas. Such a ramp-up in tonnage will increase fixed cost efficiency and lower the overall cost per ton of the operation.

PRODUCTION COSTS

The primary advantage of being an operating mine is having reliable historic data that can be used as assumptions for future projections with a high level of confidence.

ECONOMIC ASSESSMENT / FINANCIAL / P & L

Most, if not all, of the data used in the economic assessment, have been derived from Apex‘s operation either from their latest actual 2019 costs or from their 2020 budget.

The various risk factors impacting on tonnage, grade and gold price estimates were examined and reviewed using a sensitivity analysis and were found to be within acceptable ranges

Base Case Assumptions:

- Mine life of 10 years
    - Ore Reserve of 1.915 M tons @ 6.34 g/t Au,
    - replenished as exploration and mine development progresses;
- Mined Ore / Milled Ore over the projected mine life:
    - Stope ore: 701,523 tons @ 5.3g/t
    - Development Ore: 1,157,775 tons @ 5.2 g/t
- Development over the projected mine life of:
    - Off vein Development: 20,237m
    - On vein Development: 41,758m

- Operating Costs of:
    - Mining Cost: $ 30.0/t (2019 YTD cost of production / tons mined)
    - Milling Cost: $ 16.0/t (2019 YTD cost of production / tons milled)
    - Development Cost : $ 1,775.8/m (Mine development addition for 2016 / off vein development)
    - Overhead Cost: $ 11.0/t (2019 YTD cost of production / tons milled)
    - Environmental/Social Cost (incorporated in OH)
    - IP Royalty 1.0% of Gross Revenue
- Taxes:
    - Excise Tax: 2.0% of Gross Revenue
    - Business Tax: 2.2% of Gross Revenue
    - Income Tax: 30.0% of Net Income
- Production data:
    - Dilution Factor (to Ore Reserve Grade): 80 %
    - Mill Recovery: 80 %
    - Gold Price: $ 1,200 / Oz
    - Foreign Exchange: Php 50 / $1.00
    - Payability on Gold Sales: 99 %

19.2. Discuss the adequacy of data, overall data integrity, and areas of Uncertainty

The CP believes all factors considered in the report are valid and within the reasonable level for an Existing Mine. Given these circumstances, the majority of the data is taken from actual tests and experiences from the Apex operation.

The CP believes that the final suitability of the long-hole mining method is of paramount importance. However, even if there is a partial commitment to some infrastructure favoring the trackless LH method, the search should also consider other methods or combinations thereof.

19.3. Overall conclusions by the CP

The Mining CP concludes that based on the economic analysis made, tempered by all modifying factors and considerations required by the PMRC on a PFS level, the Ore Reserve of 1.915 million tons at 6.34 g of Au / t is economically minable.

19.4. The CP must discuss whether the completed project met the objectives set forth

The objective of the project to declare an Ore Reserve economically minable through the criteria set forth by the PMRC had been met. In full compliance of the detailed technical guidelines of the PMRC and particularly considering all the modifying factors affecting the minability of the ore reserve, i.e. legal, marketing, political, social, environmental, and government regulations, the CP using generally accepted economic hurdles in a financial run, had shown that the initial Ore Reserve of 1.915 million tons at 6.34 g Au /t with provision for a sustained

exploration and development of additional resource/reserve can carry a viable mining and milling operation of a 3-year mine-life. The ore reserve of 1.915 million tons at 6.34 g Au/t is therefore economically minable.

20. RECOMMENDATIONS

20.1. Based on the Summary and Conclusions, a series of recommendations are made to guide management on the course of action to take. Be it positive or negative, there must be adequate reason for such recommendations

- The data gathering and data analysis procedures at the mine site should aim for optimizing ways in capturing pertinent/ relevant data. The company has already taken steps to standardize the face sampling and assaying procedures. Another thing to look at is the regular analysis and QAQC of the data gathered aimed at improving protocols.

- The resource/ reserve team should be upgraded by training new/existing personnel. Mine planning and geological interpretations of the vein system would benefit greatly from a perpetually updating resource/ reserve. Such a team would also allow the company to fully utilize its GEMCOM software.

- The cutoff grade should be revisited at regular intervals as the gold price changes and the mine operations continue to evolve and change

- Establishment of a dedicated Geotechnical section to guide operations and validate current mine opening support system, optimize the cost of mine underground development support, pillar recovery, selection of appropriate mining methods, mine dewatering, over-all mine access development, and design parameters.

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