APEX MINING CO., INC

2021 REPORT ON ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF MACO EPITHERMAL GOLD DEPOSITS
Within MPSA-225-2005-XI
Municipalities of Maco and Mabini, Davao De Oro

May 31, 2021

CP involved

Constancio A. Paye, Jr.
Registered Mining Engineer
Lic. No. 0001292
PMRC CP Reg. No. “EM 0001292-074/18”

2. CERTIFICATE AND CONSENT OF CP

2.1. Certification and Consent

I, **Constancio A. Paye, Jr**, 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 Apex Mining Co. Inc. with an office address at Door 27, JEVA Building, Villa Abrille, Quirino Avenue, Davao City;
- I graduated with a Bachelor of Science degree in Mining Engineering in March 1977 from Cebu Institute of Technology, Cebu City, Philippines with PRC license no. 1292;
- I hold the following Professional Qualifications and has been in good standing with the following professional organizations:
    - Philippine Society of Mining Engineer (PSEM) - Board of Trustee;
    - Mindanao Association of Mining Engineer (MAEM) - President.
- I have worked as a Mining Engineer for a total of 42 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 because 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 "2021 REPORT ON ECONOMIC ASSESSMENT AND ORE RESERVE ESTIMATION OF MACO EPITHERMAL GOLD VEIN DEPOSITS within MPSA-225-2005-XI Municipality of Maco and Mabini, Davao De Oro**"** dated May 31, 2021;
- 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 May 31, 2021, 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

Constancio A. Paye, Jr 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. The objective of this work is to present a PMRC-compliant Reserve Estimation Report in the Philippine Stock Exchange-prescribed format that meets the guidelines set by PMRC.

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

Constancio A. Paye, Jr.
Mining Engineer
License Number 0001292
PMRC Competent Person for Mining
CP Reg. No. EM 0001292-074/18
P.T.R. No. 5230265 C
Issued on: January 22, 2021
Issued at: Davao City

REPUBLIC OF THE PHILIPPINES)
CITY OF TAGUM _____) SS

SUBSCRIBED AND SWORN to before me this 06 JUL 2021 in CITY OF TAGUM, Philippines, affiant personally appeared to me and exhibited his PRC Registered Mining Engineer License No. 1292 as proof of his identity.

Doc. No. 441
Page No 90
Book No. I
Series of 2021

IAN JOSEPH Z. UY
Notary Public
For the City of Tagum
Province of Davao del Norte
Until December 31, 2022
Notarial Commission No. 868
PTR No. 2960529; 02.01.2021; TC
IBP No. 138460; 01.05.2021; PC
MCLE Compliance VI-0009830
Roll No. 51568

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 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. 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., Inc. for the Maco Mines. This report follows on from the declared Mineral Resources of 11,354,000 tonnes at 4.6 g/t Au containing 1,681,000 ounces of gold, estimated at a 1.5 g/t cut-off 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, Darwin Edmund L. Riguer, entitled "2021 Mineral Resource Estimate of the Gold Veins within MPSA-225-2005-XI" dated March 2021.

The total combined proven and probable reserves are 5,748,000 tonnes grading 4.9 g/t gold, accounting for a total of 914,000 in-situ ounces of gold and 731,000 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 reserve 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.

Also, the veins have initially undergone subsurface drilling to probe its down-dip extension which was used as a basis of the potential extension of both resource and reserve, this could be used later on as the target for development expansion to convert additional tons to reserve as the mine progresses.

The economic assessment for the ability to mine the 5.748 M tons – ore reserve economically was done by using the same on a hypothetical mine with a mine life of

ten (10) 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 10 years
  - Ore Reserve of **5.748 M tons @ 4.9 g/t Au**
  - Replenished as exploration and mine development progresses
- Mined Ore / Milled Ore over the projected mine life:
  - Stoped ore: 3,796,304 tons @ 4.38 g/t
  - Development Ore: 1,879,258 tons @ 3.81 g/t
- Development over the projected mine life of:
  - Off vein Development: 35,641m
  - On vein Development: 66,303m
- 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: 4.0% of Gross Revenue
  - Business Tax: 2.2% of Gross Revenue
  - Income Tax: 30.0% of Net Income
- Production data:
  - Dilution is included in tonnage and grade calculation
  - Mill Recovery: 80 %
  - Gold Price: $ 1,500 / 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. Some 573,022 ounces of gold (from 1976 to 1989) and 537,089 ounces of gold (from 2005 to 2020) 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 2005-2020 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 current 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 5.748 million tons at 4.9 g/t Au.

4. TABLE OF 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 submit a PMRC-Compliant report in regards to the economic assessment and ore reserve estimates.

5.3. Scope of Work or Terms of Reference

Apex Mining Company, Inc. has title to several mineral properties located in the municipalities of Maco and Mabini in Davao De Oro Province in southeastern Mindanao and this includes MPSA-225-2005-XI. This scope of work is only concerned with the gold mineralization within the twenty-eight (28) vein systems delimited within MPSA-225-2005-XI and, as yet, does not take into account the porphyry copper deposits identified within the property. Reserve estimates of the vein systems within the adjacent MPSA-234-2007-XI are presented in a separate report.

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 was initiated in October 2020. Following the completion of the the resource block models, the Apex technical team, spearheaded by the Mine Planning Group, went to work to identify and classify the minable reserves, as well as to determine the optimum production schedule resulting from the blocked reserves. After the mining plan was created, the Planning Group held discussions with Geology, Mine Operations, Mill Operations, and Finance to define the relevant factors to be considerd in ore reserve estimation such as the mineral resource models, sampling and assaying practices, overall development methodology, mining methods, auxiliary support systems, capital and operating costs, beneficiation processes, and other support services required. Data from previous development and production reports were also compiled and reviewed. The Apex Technical Team began to compile the Technical Report after all the assumptions have been agreed upon. Other Apex Mining personnel from the Finance, Safety, Environment, and Community Relations departments were also consulted throughout the preparation of the report.

5.5. Members of the technical report preparation team

Josel Retardo	Mine Planning Engineer Manager
Fianza Lab-oyan	Geology Division Manager
Alex Diambrang	Senior Geologist
Isaac Rivera	Resource Geologist
Marivic Ulang	GIS Manager
Jayve Kim Inderez	Autocad Operator

5.6. Host Company Representative

Host company representative is Engr. Josel P. 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 mineral reserve classification as stated in the PMRC.

6. RELIANCE ON OTHER CP

The undersigned has relied on the data provided by the Apex Technical Services Team. The actual estimates of the ore resource blocks were done by the Apex 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 in barangays Teresa and Masara, Maco, Davao de Oro Province. The southern part of the tenement is within the municipality of Mabini.

7.1.2. Coordinate locations as per MGB

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

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"

7.1.3. Number of Claims and Hectares Covered

MPSA-225-2005-XI covers an area of six hundred seventy nine and two hundredths (679.02) hectares located in Barangays Masara and Teresa within the municipality of Maco, province of Davao de Oro . It contains an area of 679.02 hectares.

7.1.4. EP/MPSA/FTAA mode of agreement

The tenement is under a mineral production sharing contract agreement.

7.1.5. Type of permit or agreement with government

Mineral Production Sharing Agreement (MPSA).

7.2. History of mineral rights

The property was originally comprised of contiguous load claims with 75 Declaration of Locations (DOLs) of nine hectares each and a number of 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, silver, copper, and other metallic minerals under the Philippine Bill of 1902. Prior to the approval of the Mineral Production Sharing Agreement Contract, the area was covered by Mining/Lode Lease Contracts (MLCs) Nos. V-83; V-95; V-96, V-97, V-124 and V-125 that were issued to Apex Mining Company, Inc. in 1994. Apex then applied the MLCs for a Mineral Production Sharing Agreement Contract in 1998, denominated as APSA-242-XI. An amendment was later filed for the same APSA in January 2005. The Philippine Government, represented by the Secretary of the Department of Environment and Natural Resources, approved the application on December 15, 2005, denominated as MPSA-225-2005-XI.

7.3. Current owners of mineral rights

Apex Mining Company, Inc. owns 100% of the mineral rights on the basis of MPSA agreements with the Philippine Government.

7.4. Validity of current mineral rights

The Mineral Production Sharing Agreement is valid for a 25-year term, and is renewable for another 25 years. The contract was 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 Company and the Philippine Government.

MPSA No. 225-2005-XI will expire in 2030.

7.5. Agreements with respect to mineral rights

Apex Mining Company, Inc. is a holder of two Mineral Production Sharing Agreements with the government, approved in 2005 and in 2007.

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 MPSA is subject to:

Orign	Royalty	Act
Excise Tax	4%	Mining Act 1995*
MOA with local people	1% plus provision of scholarships, health program, infrastructure and other programs	IRPA 1997
**Increased to 4% due to TRAIN LAW*		

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 contract areas are bounded by longitudes 126° 00' 00" to 126° 03' 21.8" E and latitudes 7° 20' 05.33" to 7° 24' 30' N, about 950 aerial km south-southeast from Manila and about 53 aerial km from northeast of Davao City. The mine site can be accessed from Manila by taking one of the daily commercial flights to Davao City, the by land through the concrete-sealed Pan Philippine (Maharlika) Highway, driving 74 km north-northeast to the town of Mawab, Davao de Oro Province, and then 26 km heading east-southeast through a combination of concrete and gravel-paved road following the Hijo-Masara river valley upstream. The Maco mine site is located within the adjoining barangays of Masara and Teresa in the municipality of Maco, Davao de Oro Province at the upper reaches of Masara River.

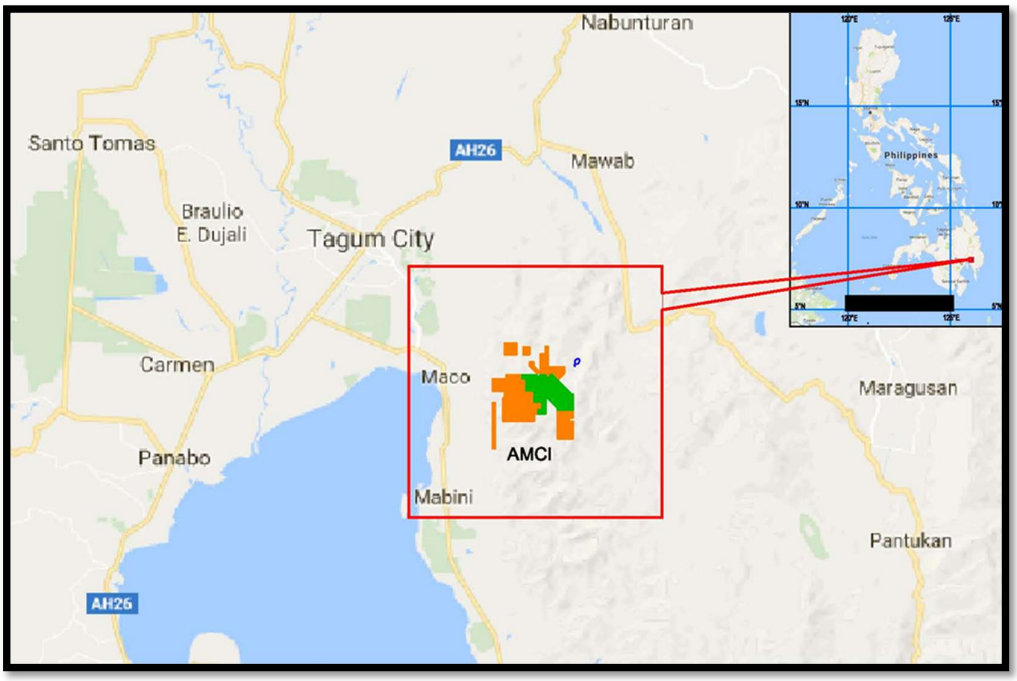

Figure 8.1.1 Tenement location map

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 active mining area is located at the headwater portions of Masara River, the most dominant drainage system in the municipality of Maco.

Commercial timber operations were widespread in the past, with most of the hard wood species now gone. Vegetation cover on the mountain slopes is now characterized predominantly by secondary-growth trees, locally named as "buyo-buyo", along with tropical shrubbery. The indigenous Mansaka tribe, along with

migrants from the lowlands, practice traditional slash and burn farming. These resulted to scattered clearings along the slopes that are planted with rice, corn, coffee, coconut, bananas, and other seasoned crops.

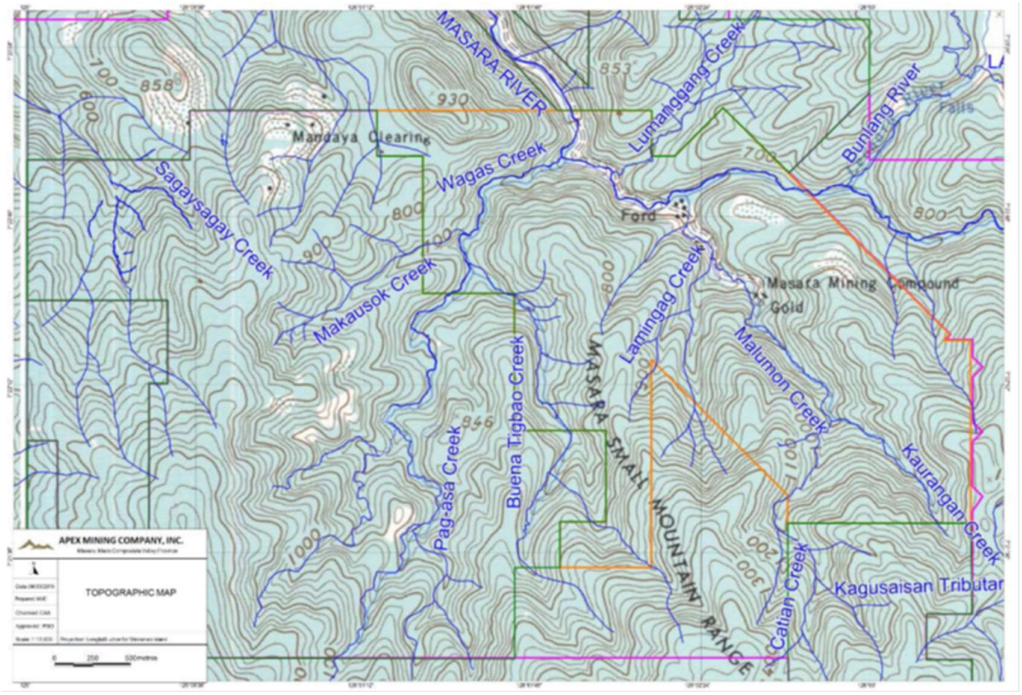

Figure 8.2.1 Topographic map showing the drainage patterns

8.3. Climate, Population

8.3.1. Climate

Davao de Oro is classified as Type IV in the Modified Corona's Classification System used by the Philippine Atmospheric, Geophysical and Astronomical Administration. This type is characterized by no clearly- defined dry season with rains experienced almost throughout the year. The highest rainfall, equivalent to the monsoon season, is usually experienced from November to February, with the rest of the year relatively dry.

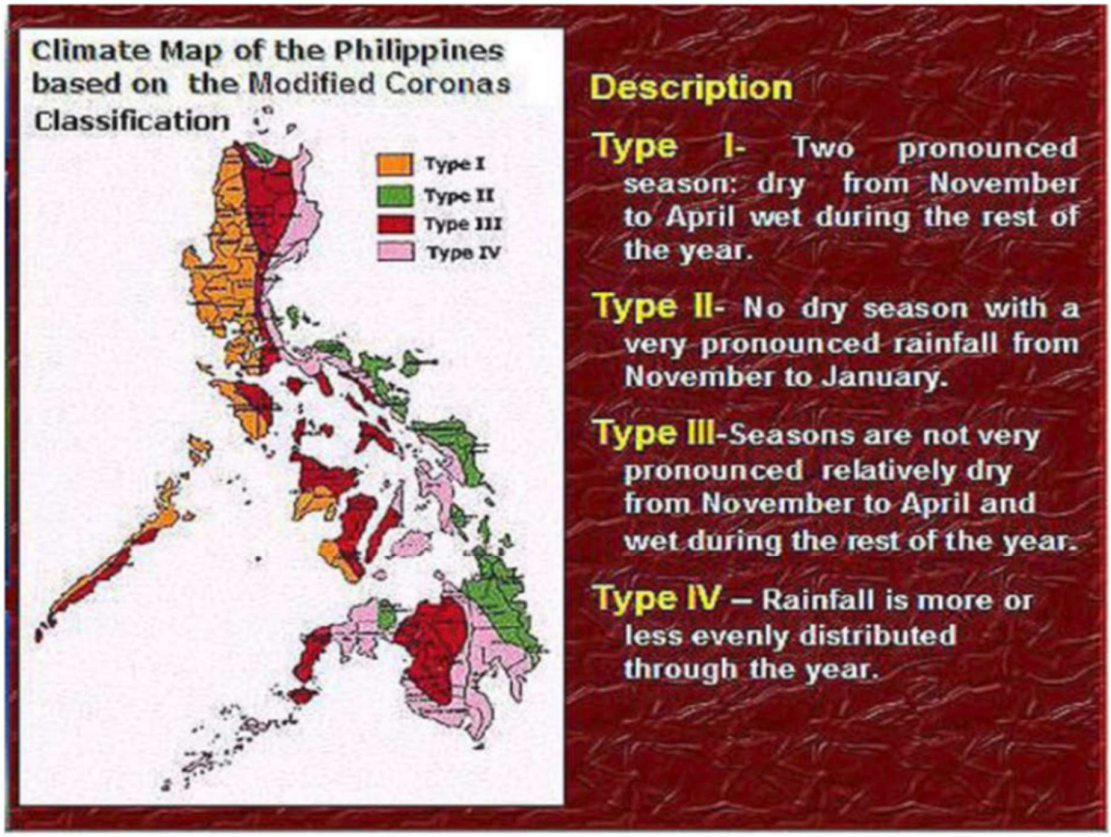

Figure 8.3.1.1 Climate Map of the Philippines (from http://www.pagasa.dost.gov.ph)

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)

Table 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 8.3.2.2.1 Morbidity and Number of Mortality per Cause Municipality of Maco, Compostela Valley 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 municipality of Maco is generally agricultural, with traditional subsistence farming and forest product-gathering being the main source of livelihood of the local inhabitants. Agricultural areas and forestland make up for 84% and 13%, while mining and quarrying only account for 1%.

8.5. Socio-Economic Environment

There are fifteen public schools offering purely primary courses, fifteen public elementary schools, three public secondary schools, and two private schools offering secondary courses. There are no private or public schools offering college courses except for vocational/technical courses on computer offered by the Maco Institute of Technology which is located in the 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 twelve 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 fifteen 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 private clinics (one with a 12-bed capacity) and one private dentist, nine medical practitioners, and nine 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 an inherent geological and geo-morphological feature of the district. The most prominent 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 remains one of the most unique geomorphological/environmental features in the generally rugged landscape that characterize most of the eastern Mindanao Cordillera.

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

9. PREVIOUS WORK

9.1. History of Previous Work

The following is the chronology of previous works over the Masara area:

- 1937 – Discovery of gold deposits in the Masara River area by Davao Gold Mining Company, a subsidiary of Elizalde and Company (Elizalde). Davao Gold expanded its operations in the area until 1941 when the mine closed down with the outbreak of WW II;
- 1946 – After the war, Elizalde and Company transferred successively the Masara project to its other subsidiaries such as Panaminas, Inc. and Masara Consolidated Mining Company until 1951, and Masara Mining Company from 1951 to 1952;
- 1952 – Samar Mining Company (SAMICO), also an Elizalde's subsidiary, took over and continued developing Masara eventually acquiring full mining rights over the property in 1954;
- 1968 – SAMICO stopped mining operations and entered into a Mines Operating Agreement with INCO Mines. INCO, however, had to suspend operations indefinitely in the aftermath of a devastating landslide at the Masara area in 1971;
- 1973 – Apex Mining Company (Apex) acquired the property from SAMICO;
- 1974 – Apex closed down its copper mining operations due to the copper price collapse in the world market and decided to focus its activities on gold exploration and development in the Masara district; gold mining operations thrived until 1989;
- 1990 – Mining operations at Masara were suspended in the face of weak gold prices combined with prolonged labor conflict. Residents began small-scale mining of high-grade sections of the underground workings. Apex leased various parts of the property to small scale sub-contractors in exchange for royalties and rental payments.
- The processing plant was also leased to sub-contractors who utilized parts of the plant for processing ore produced from their small-scale mining activities;
- 1995 – Apex entered into an agreement with Base Metal Mineral Resources Corporation (BMMRC) giving the latter an option to evaluate the property. BMMRC operated the underground mine and the gold mill and equipment which it rented and took over the marketing and selling of the mine produce; BMMRC also pursued exploration efforts in the area;
- 1997 – Apex-BMMRC agreement was terminated when BMMRC decided to withdraw from the property; left on its own, Apex initiated the development of the gold veins including those not previously worked by BMMRC;
- 2000 – Apex stopped operations after incurring continuing losses due to prolonged weakness of the gold market;
- 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 "Dons" veins area. Mintricor, on the other hand, initiated plans to re-work the mill tailings but was not able to advance to the operating stage;

- 2005 – On August 24, 2005, Crew Gold Corporation (Crew Gold) and its local partner Mapula Creek Gold Corporation signed a Definitive Agreement with Apex to purchase the latter's 72.8% shares in the company. The formal transfer of shares and ownership was completed on December 14, 2005. Crew Gold acquired and refurbished the Apex plant and commissioned it on December 2006;
- 2009 – Crew Gold Corporation sold its total shares in Apex to Mindanao Gold, a fully owned subsidiary of ASVI, a Malaysian company.
- October 2013 – a set of "an all Filipino" Board of Directors elected Dr. W. W. Brown as the new Chairman and President of Apex Mining Co., Inc. (AMCI). A new Management Team was then organized to ensure the effective supervision of Apex Mining Co., Inc. (AMCI) operations.

9.2. Brief Description of the Essential Works Carried-Out by Previous Workers

Since the discovery and operation of the gold-base 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-234-2007-XI. Their open-pit copper before was located near Theresa area which encouraged management to decide to shift to copper mining and production in 1957. The old gold mill was converted into a copper ore processing plant that operated at 1,000tpd capacity. Copper operations 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. Despite the downturn in the copper market, however, 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-base 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, mining operations were 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 estimate 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 of 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 along with ASVITSG carried out verification works to confirm the resources declared by Crew Gold. An extensive exploration program was initiated within the known geological structures in the area to delineate additional resources. The activites led to the identification and discovery of multiple copper deposits along with other gold-bearing structures. The exploration program was resumed by AMCI all filipino team to prove the downward extension of both dons and saints area.

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 and reserve estimates made for the Masara Mines along with the classification systems or codes adopted for each estimate as well as other relevant notes. Citations in the text are listed under the references section, which may include other reports and communications cited elsewhere in this work.

Table 9.3.1 Previous resource estimates, and codes used to classify and methodologies

Year	Author(s)	Reserve or Resource	Mehtodology	Applicable Code used to Classify	Notes
2020	Raul Cezar	Reserve	Ordinary Kriging combined with block filtering	PMRC	
2020	Carlito Ausa	Resource	Ordinary Kriging, Geostatistical	PMRC	
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
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
2009	Tsantos	Resource	Long Section, Polygonal method (Avg Grade per Block)	Categories are based on USGS 1980 code but reports as NI 43-101 compliant by Apex to respective Stock exchange	Very conservative with most of the resource bein readily converted to reserve. Reviewed by TDMalihan, Cp Geology. Not compliant as no report presented
2007	Jensen and Petersen	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 od inferred resources. Report is not
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 (Avg Grade per Block)	USGS 1980	SG 2.5 t/m3

Table 9.3.2 Global Resource Tonnage and Grade reported

	Number of veins included in the resource	**Global Resource Tonnage**	**Grade (g/t Au)**
Carlito Ausa, 2020	18 major and splits	5.9Mt	5.0 g/t
Raul Cezar, 2020	18 major and splits	1.9Mt	6.3 g/t
Rolando Pena, 2017	12 major and splits	2.5Mt	5.4 @ 1.5g/t Cutoff
Raul Cezar, 2017	12 major and splits	1.4Mt	7.10 g/t
Rolando Pena, 2015	12 major and splits	2.5Mt	5.6 @ 1.5g/t Cutoff
Raul Cezar, 2015	12 major and splits	1.2Mt	7.8 g/t
Malihan and Flores, 2012	41 major and splits	6.6Mt	5.9 @ 1.5g/t Cutoff
MacManus, 2011	46 major and splits	7.0Mt	5.0 @ 1.5g/t Cutoff
Malihan, 2010	14 major and splits	3.1Mt	5.9 @ 1.5g/t Cutoff
Apex, 2009	14 major and splits	2.8Mt	5.7 g/t
Crew, 2007	14 major and splits	10.4Mt	6.1 g/t
Snowden, 2006	14 major and splits	5.7Mt	6.3 g/t
MGB, 2004	11 major and splits	6.1Mt	7.8 g/t
Apex, 2002	11 major and splits	5.9Mt	7.1 g/t
Howe, 1995	11 major and splits	2.6Mt	6.2 g/t
LMMCL, 1994	12 major and splits	4.3Mt	5.9 g/t

10. HISTORY OF PRODUCTION

10.1. Production History of Apex Mines

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

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, 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 split, and Sandy.

Since the previous estimate, the company has expanded its development to reach areas with potential for developing additional reserve blocks such as Jessie vein, SDN2, MST2 split, lower extensions of BHWS, and several SDN Splits. This resulted in several tons of ore that were mined outside of the delineated reserve. Although this was unintentional, the opportunity to delineate 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 to be normal ore. The table below shows the tons mined outside reserve since the previous reserve declaration.

Table 10.2.1. Tons Mined Inside and Outside Reserve per Year

	2020			
	Inside		Outside	
Vein	Tons	grade	Tons	grade
BHWS	21,775	4.73	-	-
SDN	136,150	3.81	2,084	3.87
SDN Split	32,328	3.91	-	-
BNZ	758	2.00	-	-
MAS	1,206	2.95	-	-
MST2	6,173	5.06	18	1.17
MST2 Split	10,927	8.06	1,251	3.81
SDN2	44,003	3.71	3,751	1.83
MAI	703	2.68	-	-
MAI Split	-	-	-	-
WGS	246	1.19	-	-
JES	15,675	4.63	14,266	2.83
SDN3	-	-	-	-
SDN4	-	-	243	4.45
Subtotal	**269,946**	**4.12**	**21,613**	**2.83**
% Outside Reserve			***8.01%***	

The tonnage of the ore mined outside the reserve delineation did not exceed 15%, accounting for only 8.01% in 2020. These newly delineated areas will be included in this reserve update. The company will continue to explore and develop replacement ore blocks by delineating new areas identified to have signifant potential to be resource/reserve blocks.

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.

Broken underground ore is hauled by low profile trucks to the surface at the mine yards. Ore is then delivered to the mill where it goes through primary, secondary, and tertiary crushing, followed by grinding using ball mills. The ore then goes through thickeners before being fed to the CIL tanks where gold and silver are recovered through cyanide leaching followed by adsorption onto activated carbon. The loaded carbon then undergoes stripping, depositing the precious metals onto steel wools in

the process. The sludge recovered is then refined by smelting, producing doré, usually containing 14-20% Au, 75-80% Ag, and 1-5% other elements.

10.4. Tonnage Mined and Metals Sold

Table 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	3.80	22.40
2013	289,015	4.78	253,350	542,365	280,451	3.66	22.70
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	3.25	19.00
Total	**4,312,962**	**5.03**	**2,527,755**	**6,830,717**	**4,224,179**	**4.16**	**24.57**

Table 10.4.2 Apex Mill Production

Month / Year	Bullion, Au oz	Bullion, Ag oz
Dec-06	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	64,397	369849
TOTAL	**473,955**	**2,400,275**

11. REGIONAL AND DISTRICT GEOLOGY OF MASARA GOLD DISTRICT

The Mindanao Pacific Cordillera (MPF) is a magmatic terrane with an ophiolitic segment in the north, subdivided into (1) Northern Pacific Cordillera, (2) Central Pacific Cordillera, and (3) Southern Pacific Cordillera (Peña, 2008). The MPF is bounded by two prominent structures, with the Philippine Fault to the west and the Philippine Trench to the east. Intrusive and extrusive igneous rocks are associated with subduction of the Philippine Sea Plate to the east that dates back to Eocene time. Development of a Late Neogene Magmatic arc associated with the reactivation of subduction of the Philippine Sea Plate is indicated by the Pliocene-Holocene volcanic rocks in the north and south of the cordillera.

11.1. Stratigraphy

The project area is in the Southern Pacific Cordillera section of the MPF. The stratigraphy (Figure 11.1.1), is defined by Peña (2008) to be as follows

- Cretaceous – Paleogene Barcelona Formation – consists mainly of andesitic volcanic flows and flow breccias intercalated in places with greywacke, metaclastic rocks and tuff
- Eocene Tagabakid Formation – sedimentary sequence of clastic rocks with local lenses of limestone and intercalations of andesitic flows and tuff
- Early – Middle Miocene Agtuuganon Limestone – limestone that occurs with thin beds of shale, sandstone, and conglomerate
- Miocene Cateel Quartz Diorite – quartz diorite dikes which intrude Cretaceous – Paleogene rocks in the region
- Amacan Volcanic Complex – consists of andesitic to dacitic domes, plugs, flows, and pyroclastic rocks named after the Amacan Mine near Lake Leonard

11.2. Structural Geology

The Philippine Trench, to the east of the MPF, is the trace of the west verging subduction of the Philippine Sea Plate (PSP) during the Neogene. Subduction was induced by the collision of the Philippine Mobile Belt with the Palawan – Mindoro Microcontinental Block during the Late Miocene. To the west lies the Philippine Fault which extends all the way to northern Luzon. NW-SE splays of the Philippine Fault invade sections of the mountain ranges of MPF. Gold mineralization is controlled by strike-slip faults parallel to these structures related to the Philippine Fault. The Masara District appears to be situated in what appears to be a dilational jog within caldera structures.Thus, the present subduction of the PSP is a reactivation of an ancient process as a result of another collision-accretion.

Faults observed in the Masara Mine are all steeply dipping and are categorized into: (1) NNW, (2) NE, (3) E-W, and (4) N-S systems. The first two systems are classified as wrench faults, producing drag folds, slaty cleavage, and cataclasis, while the last two are gravity faults. NE faults are evidently right-lateral and tend to abut against the NNW faults.

Folding in the area involved pre-Tertiary to Miocene rocks with fold axes generally trending NE and N-S. The NE trending folds include the truncated SW plunging anticline and a small SW plunging syncline.

The quartz diorite dikes in the area mostly trend NE, with a few trending NW. On the other hand, most of the andesite porphyry dikes strike NW and only a few trend NE. The two systems, being almost normal to each other, suggest that a set of fractures controlling emplacement.

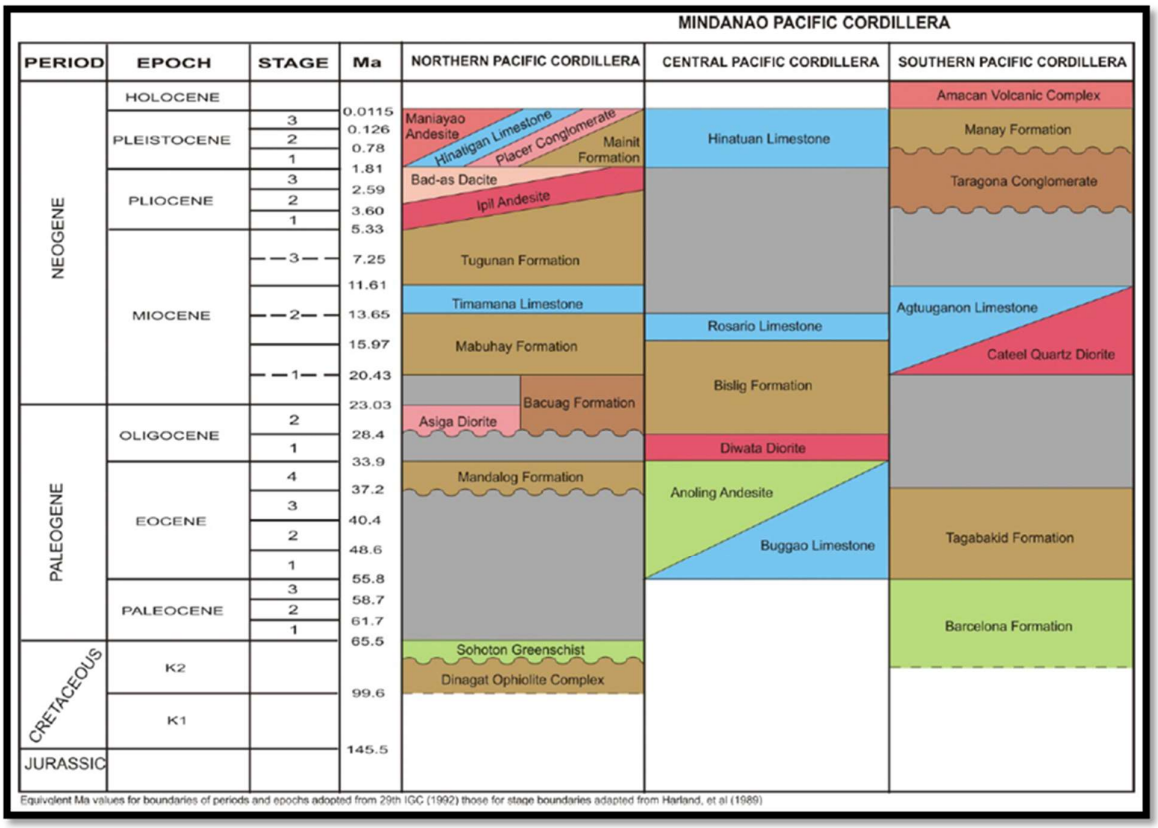

Figure 11.1.1 Stratigraphic Column of the Mindanao Pacific Cordillera adopted from Peña (2008).

12. MINERAL PROPERTY GEOLOGY

12.1. Geological Work is Undertaken by the Company in the Property Including the Scale of Mapping and Laboratory Tests Undertaken for the Samples

In 2005, Apex (under Crew Gold) embarked on an exhaustive exploration campaign, drilling a total of 212 coring holes with an aggregate length of 43,760 meters until December 2007. In late 2009 up to present, another drilling campaign was started, with underground and surface drill rigs to test the extension of known veins at depth and along strike.

Geophysical surveys were also done in the third quarter of 2006. This included Induced Polarization (IP) and magnetic survey. Concurrent with the geophysical survey was grid soil sampling at 25-meter grids along the IP gridline. A 1:2000 scale map was generated from these surveys.

The Company also undertook underground as well as surface mapping within its tenement area. Underground mapping was concentrated in Bonanza-Masara and Sandy veins which were the focus of mining activities while surface mapping was concentrated in other priority vein systems such as the northern extension of Sandy vein and its split/s, Don Calixto and Maria Inez. The underground mapping works were compiled in 1:250 and 1:500 scale maps while the detailed and semi-detailed surface mapping were plotted and compiled in 1:500 and 1:1000 scale maps.

Representative sampling underground was done at more or less regular intervals on the face of an active development drive. Raises and stopes were also sampled at regular intervals. Soil sampling, rock chip sampling, and trenching were practiced in surface sampling.

Samples delivered to the lab were analyzed for gold and silver content using Fire Assay (FA). Atomic absorption spectroscopy (AAS) was primarily used for base metal analysis however, in cases where gold contents could not be detected using FA, AAS was employed.

12.2. Rock Types and their Geological Relationships

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 12.2.1). The multi-phase intrusive suite is comprised 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 basaltic-andesitic composition extensively widespread towards 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 Tagbaros Formation (ML).

The following are descriptions of lithologic units encountered as gleaned from surface mapping:

Masara Formation – Andesite

Andesite is the oldest rock unit known to occur in the area. It is massive in outcrop, basically a fine-grained hornblende andesite, generally aphanitic with embedded small (mm size) hornblende and plagioclase feldspar phenocrysts. It is hard and greyish in color when fresh. Darker coloured units have been observed and may be basaltic andesite in composition. This unit outcrops mostly within the tenement.

Masara Intrusive Complex – Diorite

Diorite is a dominantly fine- to medium-grained equigranular phaneritic, occurring as small (a couple of hundred meters) bodies in outcrop. When unaltered, it is generally greyish in color, becoming darker when propylitized and lighter when argillized. It distinctively contains hornblende crystals unlike feldspar porphyry. Weathered and argillized diorite is generally soft and friable within all prospects. In some areas, mapped dioritic bodies texturally grade into coarser grained hornblende biotite diorite rock type.

Masara Intrusive Complex – Andesite Porphyry

Andesite Porphyry is a textural variant of DIO, and thus both are possibly co-magmatic and co-eval. ANY has more than 30% of these (1 to 5mm in size) light-colored euhedral to subhedral phenocrysts lighter when argillized and greenish when chloritized. The notion that ANY and DIO are co-genetically one intrusion is substantiated by the difficulty in the field to identify which outcrop could be named ANY or DIO because they are visually similar and in some places phenocrystic contents vary slightly in just a few meters. A ballpark estimate is then used when complexities occur on which outcrop is to be named for which rock name. In previous drill cores, however, it is much easier to distinguish between the two but, as with outcrops, phenocrystic contents vary in minor terms. As with AND and DIO, ANY lithologies also exhibit variable intensities of argillization, and are also hosts to veins and mineralized structures in the area.

Amacan Volcanics – Feldspar Porphyry

Feldspar Porphyry is still aphanitic but very distinctively porphyritic, with at least 30% phenocrysts, most of which are large euhedral feldspar crystals (greater than 5mm to as much as 15 mm in size). It may be regarded as another coarser textural variant of ANY, but its distinction in the field lies in the amount of larger feldspar phenocrysts, similar to the Mabuhay Andesite Porphyry or the Birds-Eye Porphyry in the Surigao district. There are a number of evidences that suggests PHY (Feldspar Porphyry) is a disparate and younger intrusive than the co-genetic DIO-ANY (diorite- andesite

porphyry) bodies. Among these are those outcrops having PHY cut veins, lithologies exhibit very weak alteration to fresh rock. PHY is equivalent to “Alipao Andesite” as invoked by RWG-UP-NIGS.

Amacan Volcanics – Dacite Porphyry

Dacite Porphyry appears to have a fine- to medium-grained phaneritic groundmass of hornblende, quartz and feldspar. Phenocryst is mainly euhedral to subhedral feldspar of up to 15 mm in size. Similar to PHY, DAP is quite altered to fresh.

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 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.

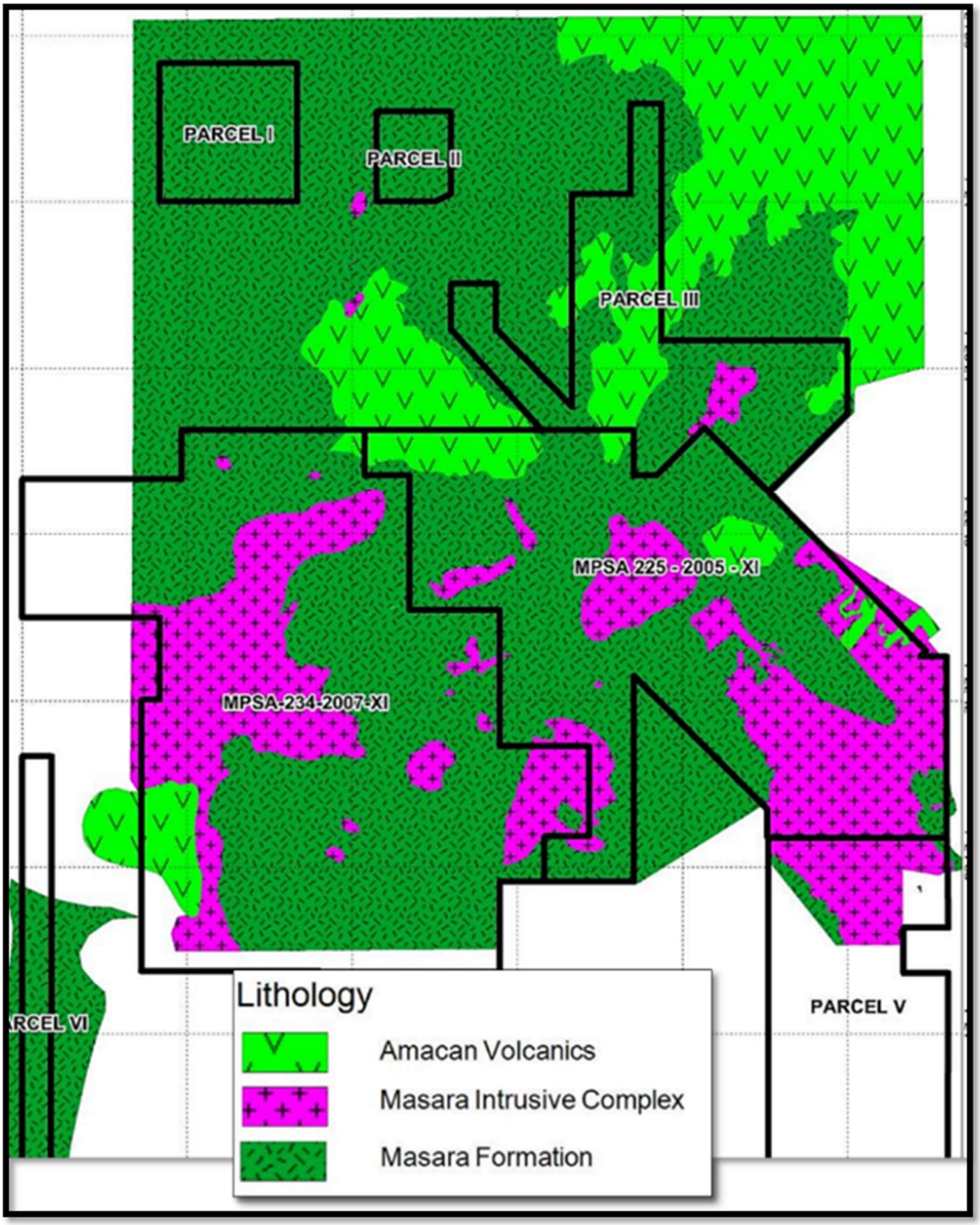

Figure 12.2.1 Geologic Map of the Tenement Area

13. MINERALIZATION IN THE PROPERTY

13.1. Overview of the Mineralization

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

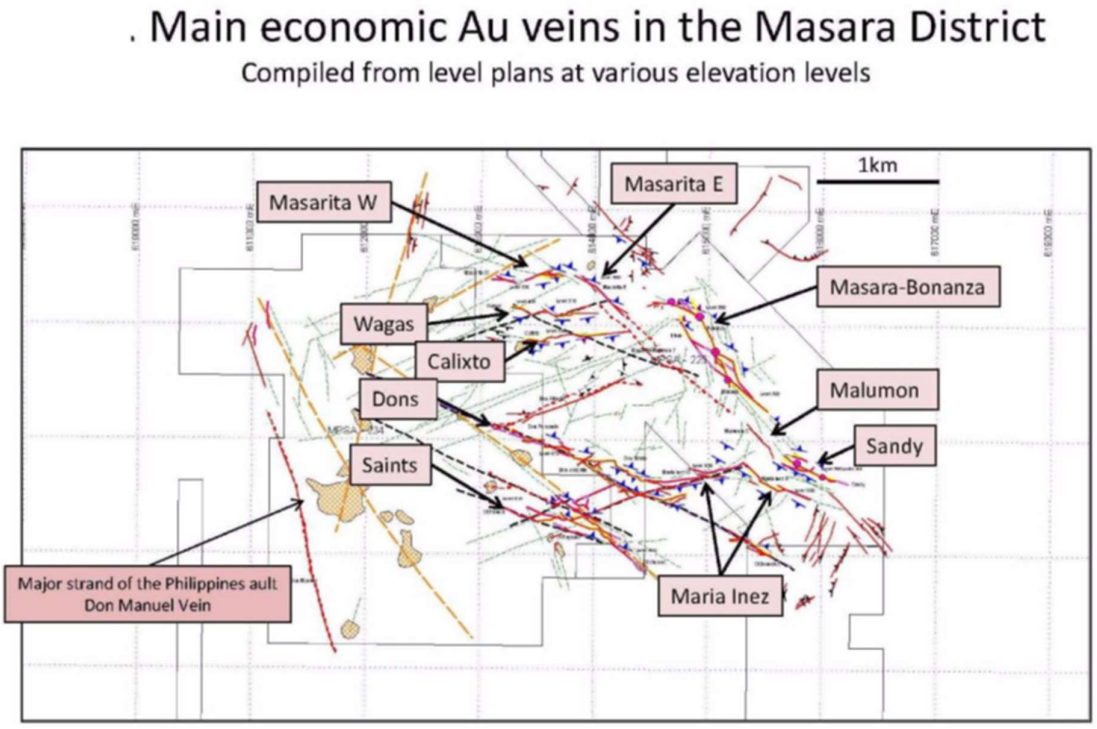

Figure 13.1.1 Map of Masara Showing the Economic Vein Zones (after Coller, 2011)

13.2. Type of Mineralization as Mapped

Au-Ag Base Metal Veins

At least ten of the known vein systems are classified as 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 are characterized by high base metal sulfide contents, at times reaching 30-80% in volume, 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 series of faults interpreted to be 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 kilometres, with vein widths ranging in some high grade portions from 1.0-5.0m.

Porphyry Cu-Au Deposits

A cluster of Cu-Au porphyry prospects are 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 were 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 which encompasses 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

Skarn Mineralization

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

Recent studies identified a total of five skarn zones (Figure 13.2.3.1) observed to be 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 are currently not considered potentially economic Au mineralization targets. Potential and economic viability of skarn mineralization within the AMCI tenement requires further evaluation.

13.3. General Style of Mineralization

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

High Au grade mineralization generally coincides with vein zones primarily composed of massive sulfides and sulfide-quartz breccias ranging from 1 to 3 meters in width. Sulfide content in terms of percent volume for these high grade zones is usually in the range of 30-80%. The sulfide mineral assemblages are comprised of pyrite, chalcopyrite, galena and sphalerite. Visual identification of bornite(?) and covellite(?) in hand specimens will have to be verified through ore microscopy. Gangue minerals are composed of quartz, carbonate and Mn-rich carbonates and silicates.

13.4. 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. Sample 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.

13.5. Geological Structures

The Maligaya-Malumon “trend” is primarily controlled by fault and fractures, which is related to the regional strike-slip faulting /stress field through which, this part of Mindanao had been subjected throughout its tectonic history.

13.6. Localization of the Deposit

Vein deposits generally occur in faults and fractures. Faults usually, but not necessarily, occur on or near a lithologic contact as observed in the Bonanza vein, where the vein has been noted to have developed near or at the contact between volcanics and diorite.

13.7. Length, Width, Depth of Mineralization

The existing NW-WNW trending vein systems in the tenement area have already been developed approximately 1,500m 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 for the Sandy Vein (from Level 900 down to Level 515) and 250m for the Bonanza-BHWS Vein (from Level 725 down to Level 470. Recent exploration drilling campaigns undertaken by the Company have confirmed that economic mineralization persists further below these mining levels, with intercepts at 450 masl and 350 masl in Sandy and Bonanza-BHWS veins, respectively. Mineralization of all identified vein systems within the contract areas remains open at depth.

13.8. Element Grade Levels and Patterns

No recent comprehensive study was done on the grades of other elements and their possible relationship with each other. With regards to 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 clearly established.

13.9. Development of 'Ore Shoots'

Development and exploration have demonstrated the existence of discrete high-grade shoots within the current and historic structures. This is, however, considered typical in most epithermal gold vein deposits where homogeneity of gold mineralization is more of an exception rather than the rule. Nevertheless, each gold vein deposit is unique, and understanding the individual vein characteristics would be invaluable in the success of any exploration for such type of deposits.

13.10. Continuity of Mineralization

Previous geostatistical studies on the Sandy Vein had confirmed the down plunge grade continuity exceeding 70 m (Subong, Arriola & McManus, 2009).

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
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.

14.2.3. Test Pit Sampling

The procedure for test pit sampling is essentially the same as for sampling any continuous geologic exposure as that of the trench.

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. Drilling operations are sustained by the current Apex management using an in-house diamond drill rig fleet for underground holes and by engaging the services of contractors for surface holes. The current drilling program aims to define the lateral and vertical continuity of the veins actively being mined, to test the identified prospects within the tenement areas, and also to confirm mineralization in areas with old mine workings that are now inaccessible.

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 was 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.

Another drilling program was initiated late 2009 with an underground Kempe rig assigned to provide mine operations with advanced information for on-vein development. By January 2011, additional Kempe and LM55 rigs were deployed underground and a 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 this, 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 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) commenced 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 quick logged at the drill site for initial interpretation. Once delivered to the core house, the cores are photographed. The cores are then logged in detail with the lithology, mineralization, alteration, core recovery, and geotechnical characteristics recorded. The core log sheet is encoded together with the assay results and other drill hole data in a database for geological modelling 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 if 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.

Crew Gold carried out a detailed grid soil sampling covering the Maligaya-Malumon area in 2006. Another soil sampling campaign was conducted in the middle of 2010 in MPSA-225-2005-XI wherein 419 soil samples were collected in the area. Additional soil samples were also taken by ASVI in Parcels III and IV of MPSA-234-2007-XI.

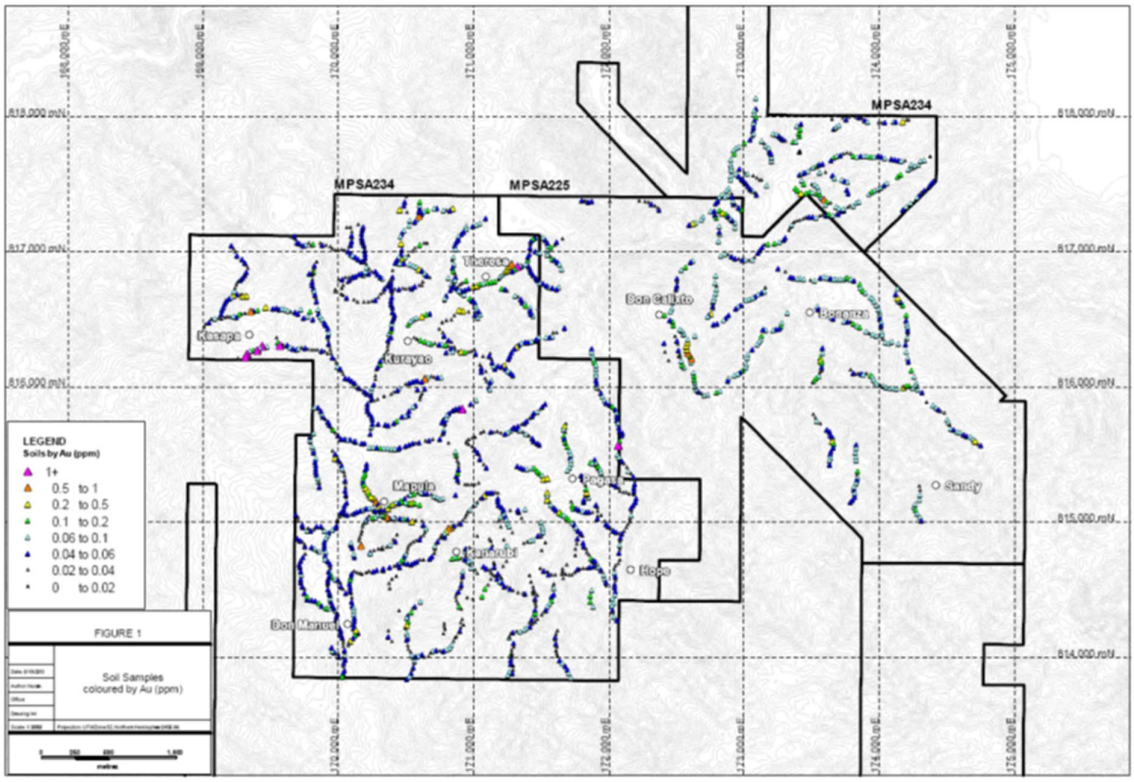

Figure 14.4.1.1 Map showing the ridge and spur sampling points and the Au grade.

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 also test 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 concealed gold-bearing veins or structures. Soil samples were collected at a 25m grid interval along the IP lines. All samples were assayed only for gold using the Fire Assay method. Geochemical results were plotted and compiled in a 1:2000 scale base map.

14.4.3. Definition of Background, Threshold and Anomaly Levels for the Elements Determined

There are no available records to determine 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 (Figure 14.4.1.1).

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. There are no indications if multivariate statistical methods were employed.

14.5. Applied Geophysics

14.5.1. Description of the Geophysical Method Used and Objective of the Survey

Induced polarization (IP) and magnetic methods were 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

The company contracted McPhar Geoservices Philippines Inc. to conduct the limited geophysical survey over the Maligaya-Malumon area in 2006 and then Thomson Aviation Pty Ltd to acquire airborne magnetic and radiometric data over the entire tenement areas in 2010.

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)

The airborne 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 (Figure 14.5.3.1).

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

Figure 14.5.5.1.1Thomson Aviation survey aircraft and base station used for diurnal field monitoring.

14.5.5.2. Survey Coverage

Figure 14.5.5.2.1 Displays the survey flight line coverage over MPSA-225-2005-XI and MPSA-234-2007-XI. North-south oriented flight lines on 60m line spacing, 40m flying height cover the entire MPSA-225-2005-XI and MPSA-234-2007-XI 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.

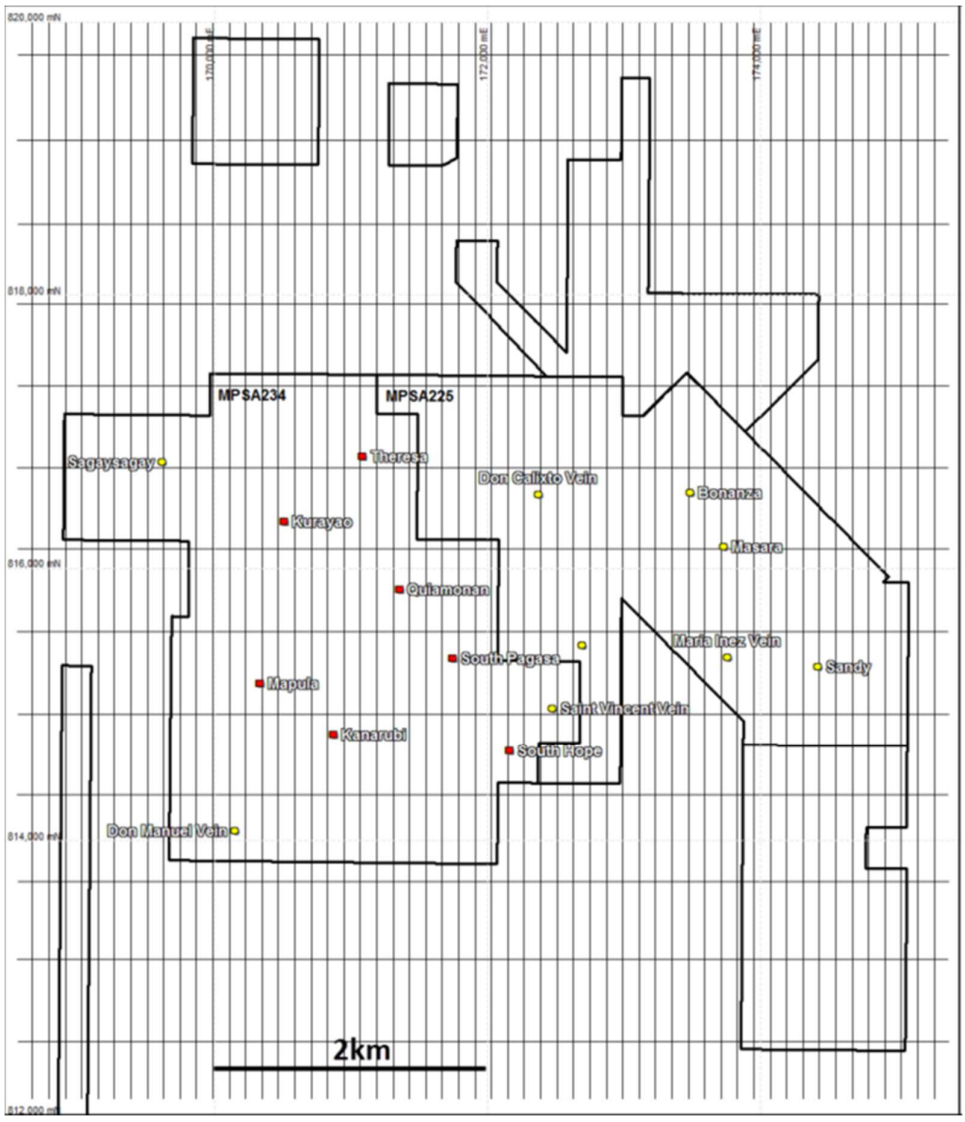

Figure 14.5.5.2.1 Flight line orientation over Apex tenements MPSA-225-2005-XI and MPSA-234-2007-XI. For clarity every second N-S orientated flight line is displayed above, a survey was completed on 60m survey spacing, with east-west tie lines flown on 600m spacing

14.5.5.3. Topographic Elevation Data

A detailed elevation model was generated from the survey recorded radar altimeter and GPS vertical DTM estimation. The airborne survey elevation model has a vertical accuracy of approximately 0.5m and a 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. Lake Leonard lies at the NE corner of the survey area at about 900 meters ASL.

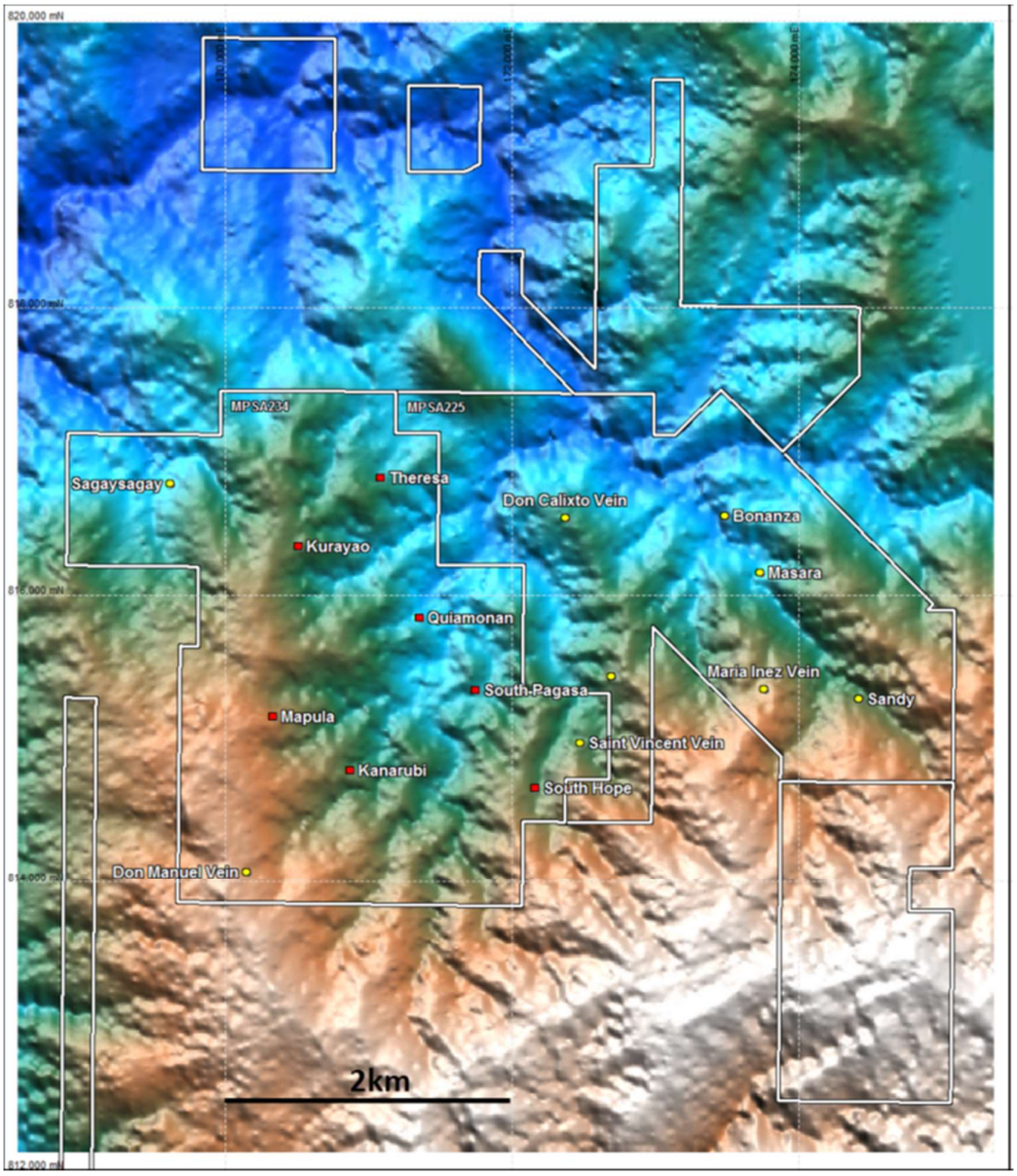

Figure 14.5.5.3.1 Detailed topographic elevation model derived from the airborne survey acquisition.

14.5.5.4. Airborne Magnetic Data

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

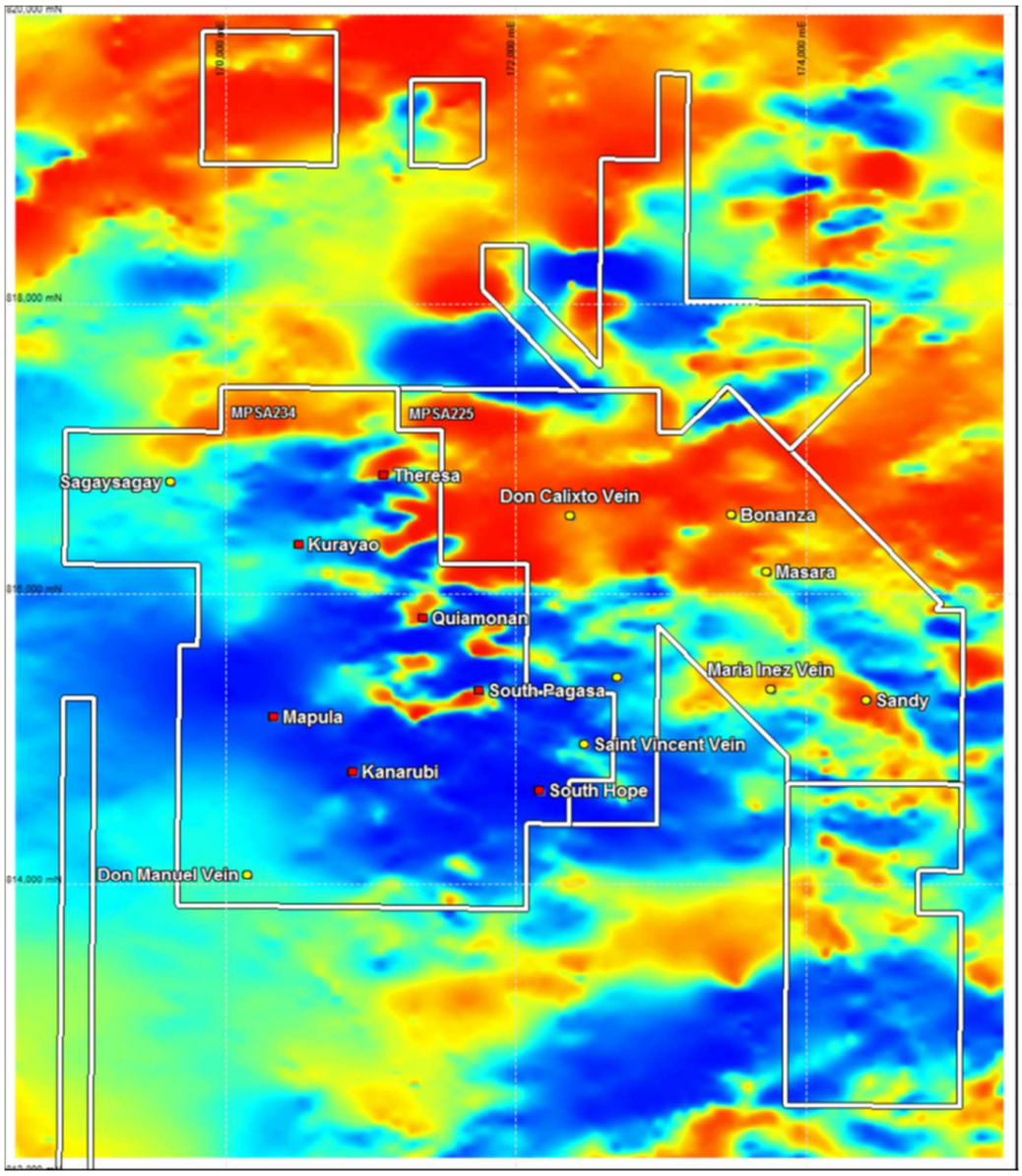

Figure 14.5.5.4.1 TMI (Total Magnetic Intensity) image of the aeromagnetic survey over MPSA-225-2005-XI and MPSA-234-2007-XI

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.

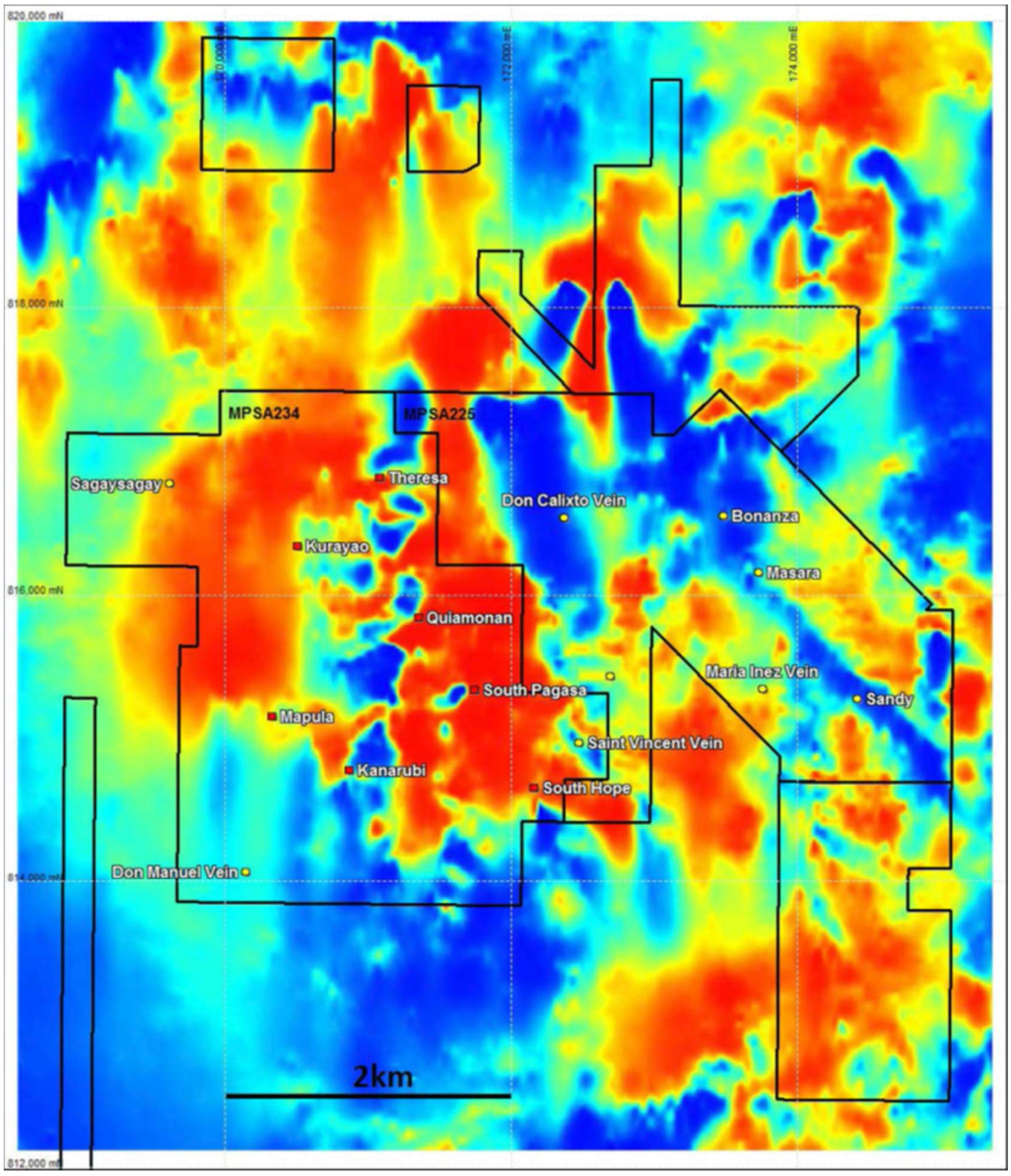

Figure 14.5.5.4.2 RTP (Reduction to Pole) image of the aeromagnetic survey over MPSA-225-2005-XI and MPSA-234-2007-XI

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-to-noise 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 14.5.5.6.1.

Several observations can be made from the potassium data:

- The potassium radiometrics 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

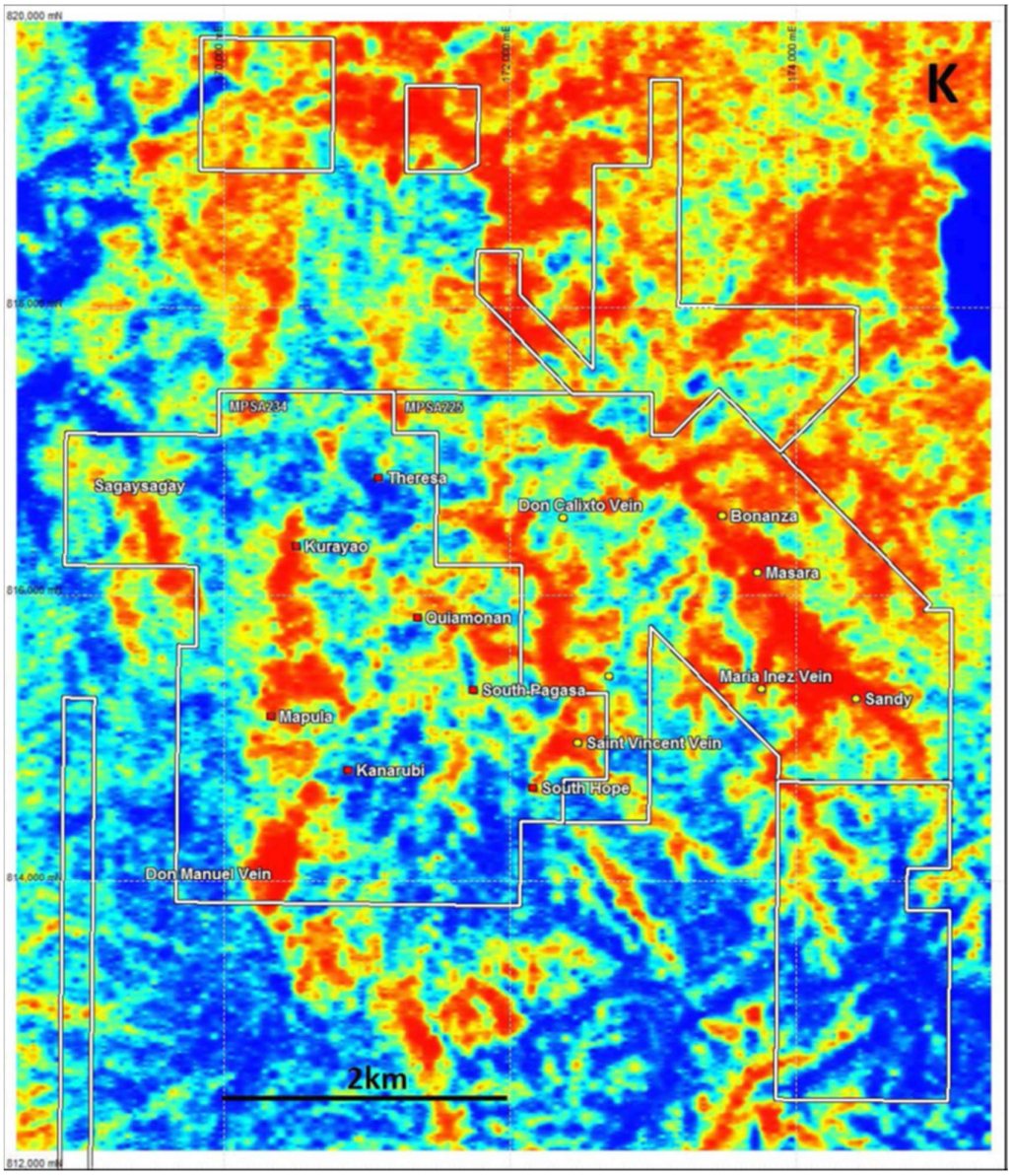

Figure 14.5.5.6.1 Image of potassium spectrometer channel data

14.5.5.7. Uranium Data

An image of the uranium concentration derived from the gamma-ray spectrometer is presented in Figure 14.5.5.7.1.

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.

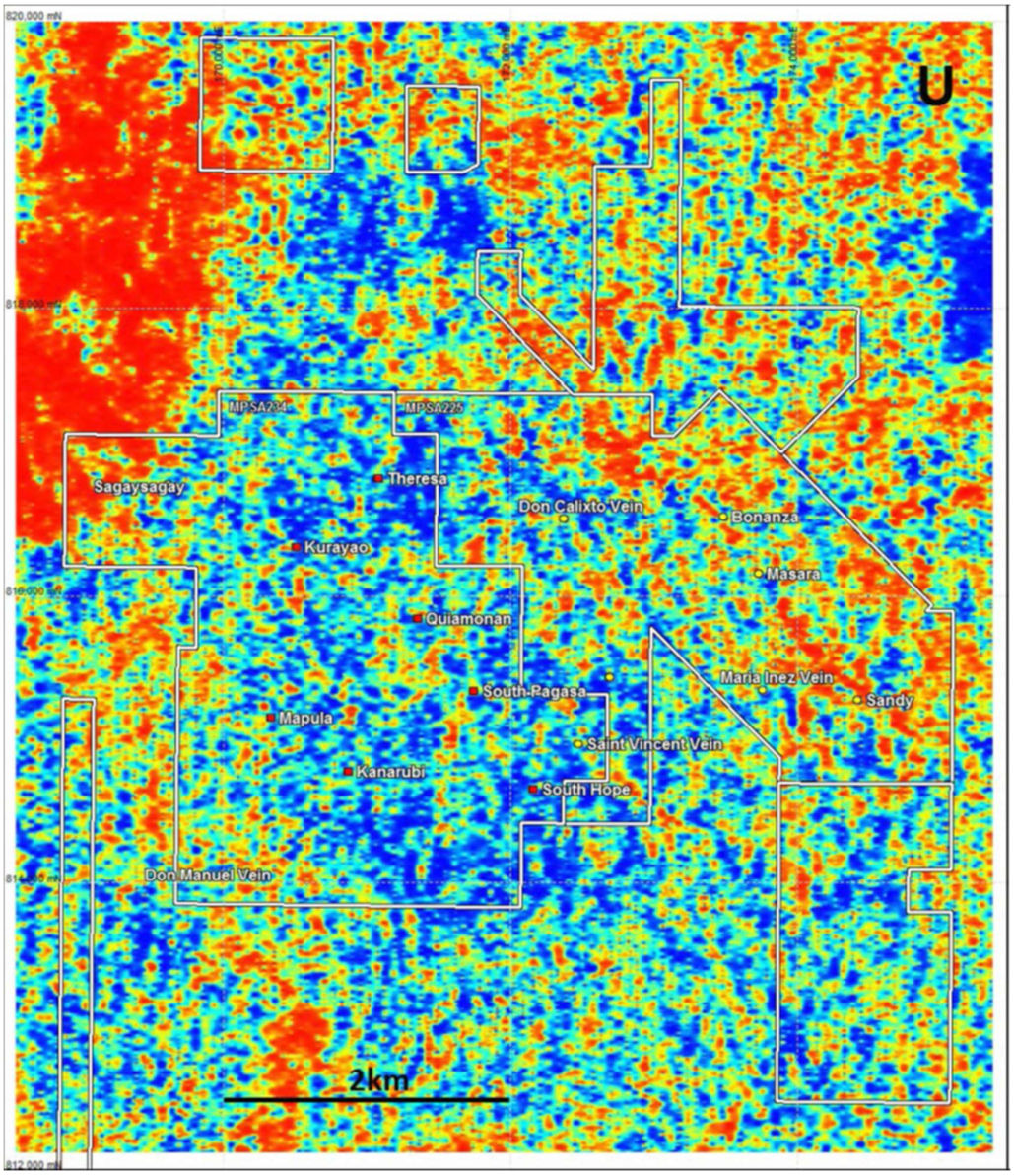

Figure 14.5.5.7.1 Image of uranium spectrometer channel data

14.5.5.8. Thorium Data

An image of the thorium concentration derived from the gamma-ray spectrometer is presented in figure 14.5.5.8.1.

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.
- 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.

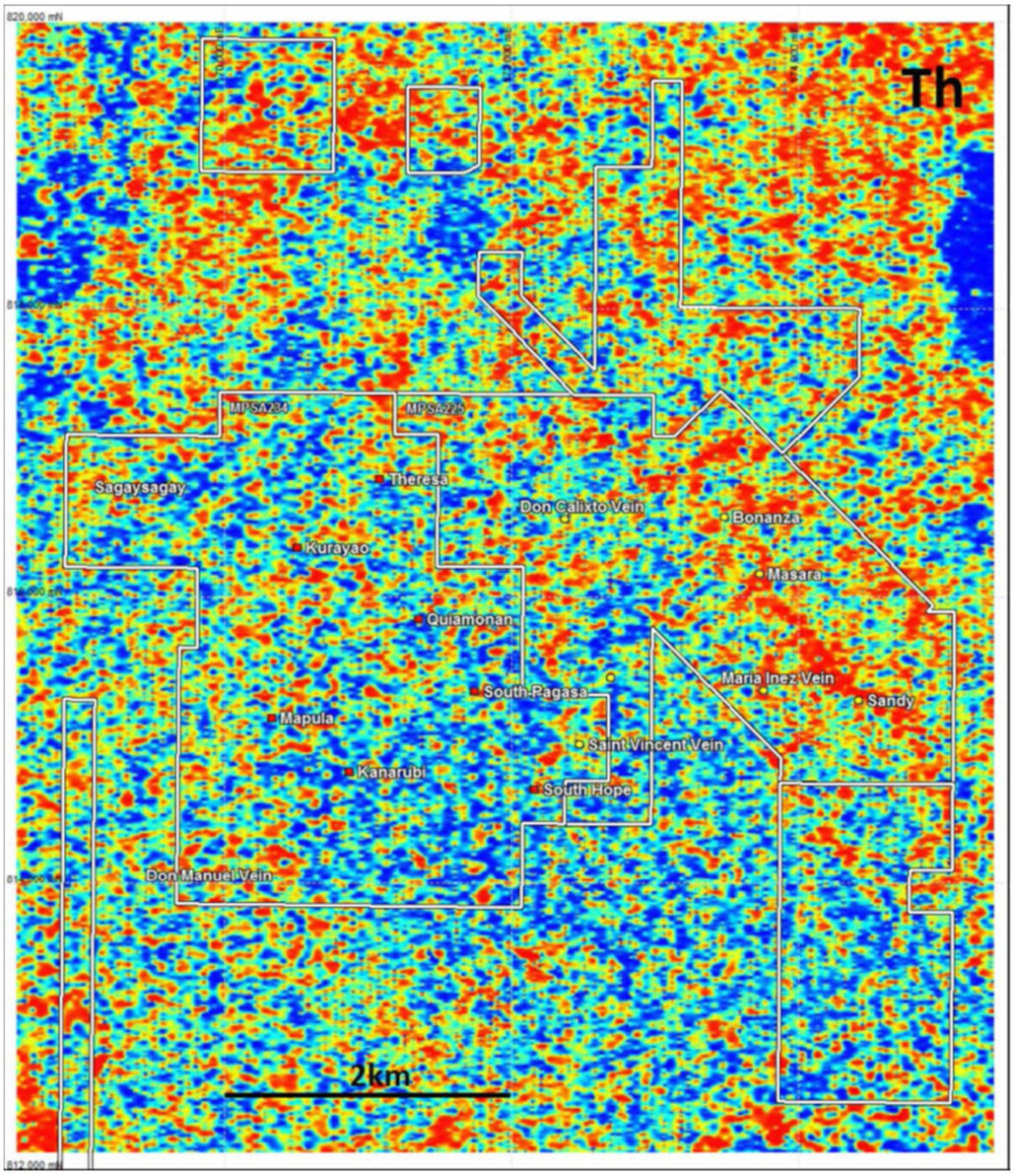

Figure 14.5.5.8.1 Image of thorium spectrometer channel data

14.5.5.9. Total Count Data

An image of the total gamma-ray response for the survey is presented in figure 14.5.5.9.1.

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.

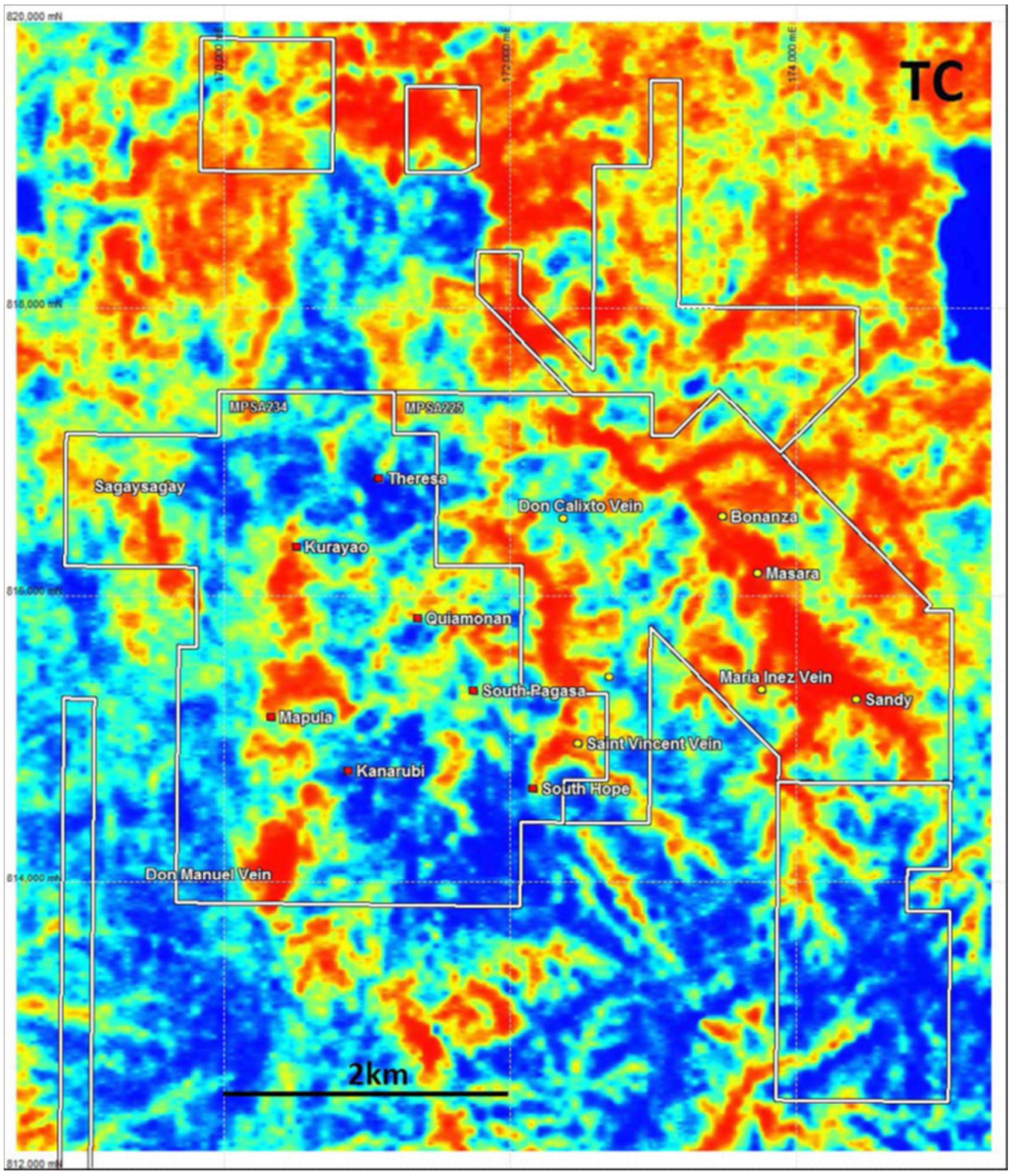

Figure 14.5.5.9.1 Image of total count spectrometer channel data

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 MPSA-234-2007-XI, 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.

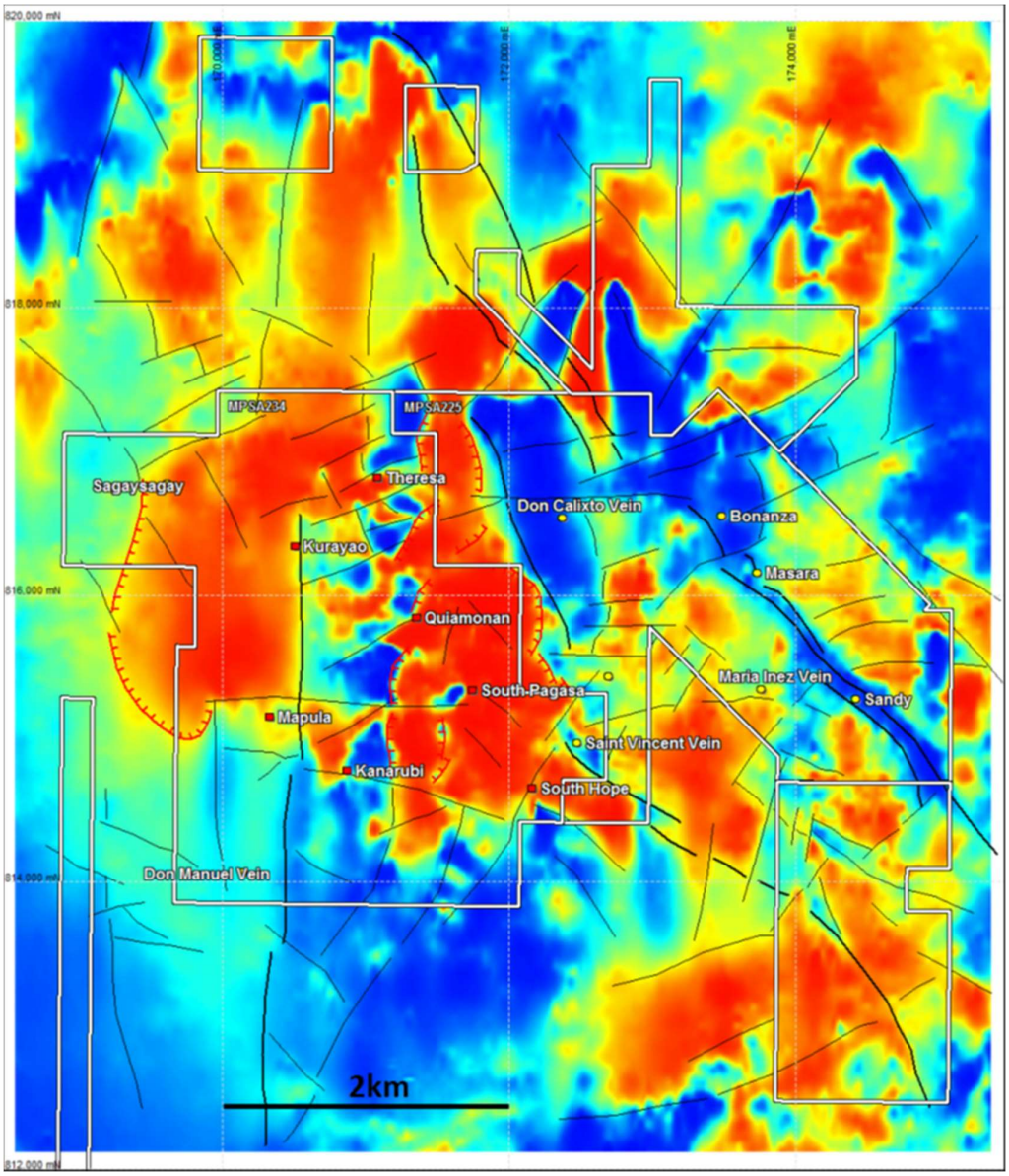

Figure 14.5.5.10.1 Regional structural lineament mapping interpreted from airborne geophysical data. Structure linework is displayed over the RTP magnetic image.

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 MPSA-234-2007-XI are mapped in bold red linework and form circular caldera shaped to arcuate-curvilinear trends.

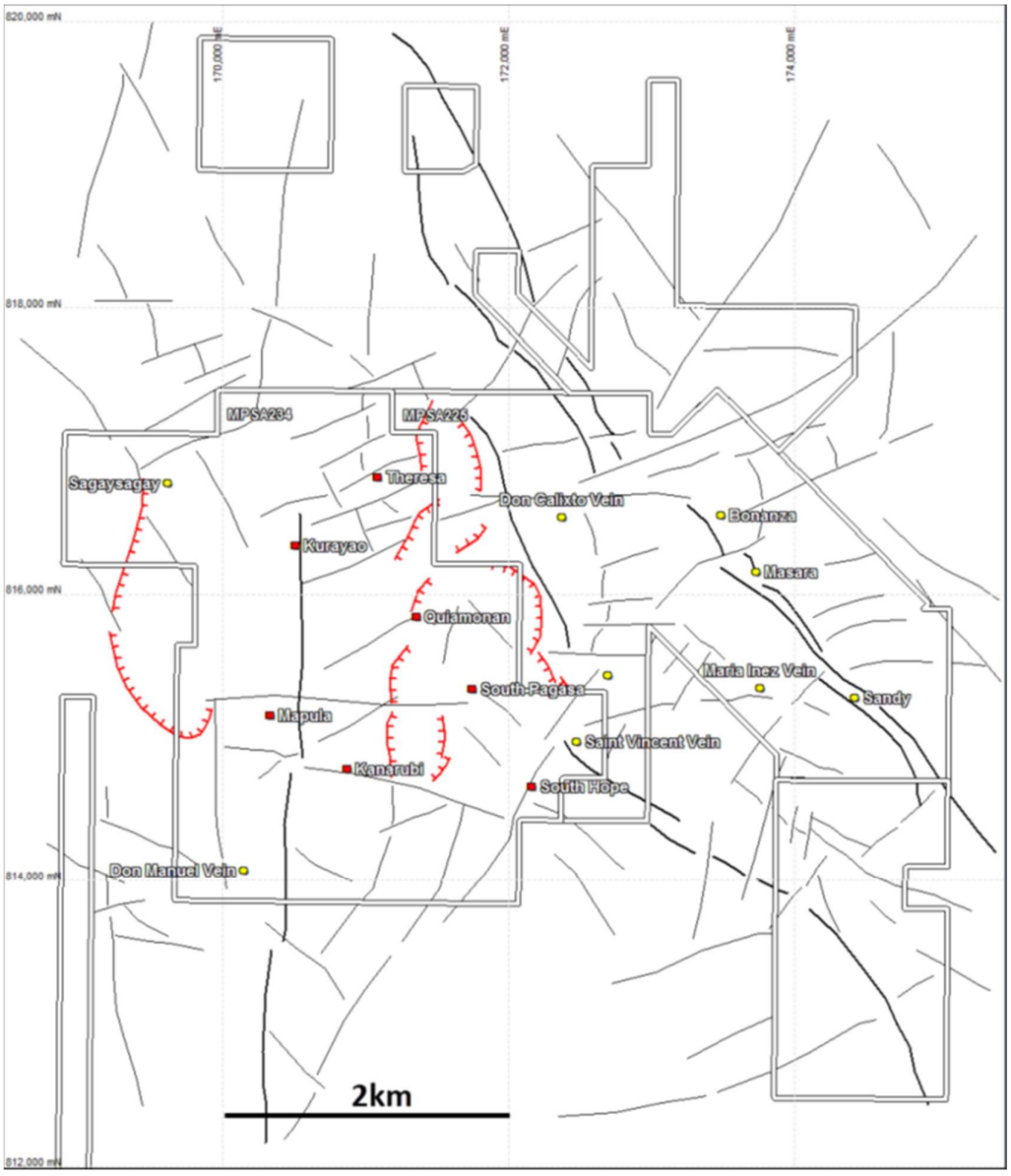

Figure 14.5.5.10.2 Regional structural lineament mapping interpreted from airborne geophysical data.

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 pseudosections 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. From the sampling area, the samples are 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 14.6.1.1 and 14.6.1.2). 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:

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.

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 fed to the top of the crusher.
b) The moving jaw crushes the larger sample fragments into smaller sizes.
c) The crushed sample materials are collected in a tray placed at the bottom of the crusher.
d) The sample in the tray is transferred to the original pan.
e) The crusher and the pan is cleaned using compressed air.

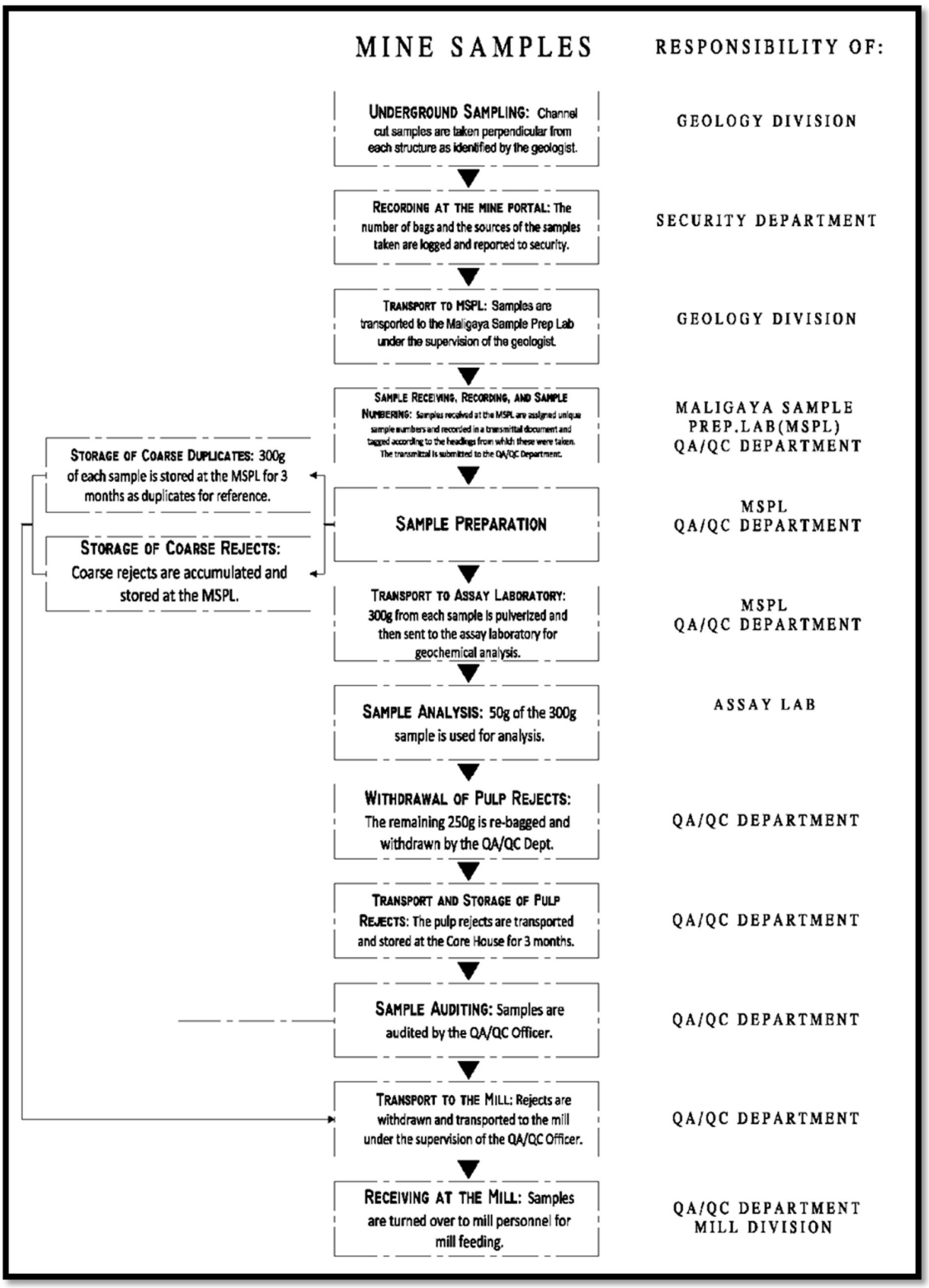

Figure 14.6.1.1 Sample dispatching flowchart for mine samples

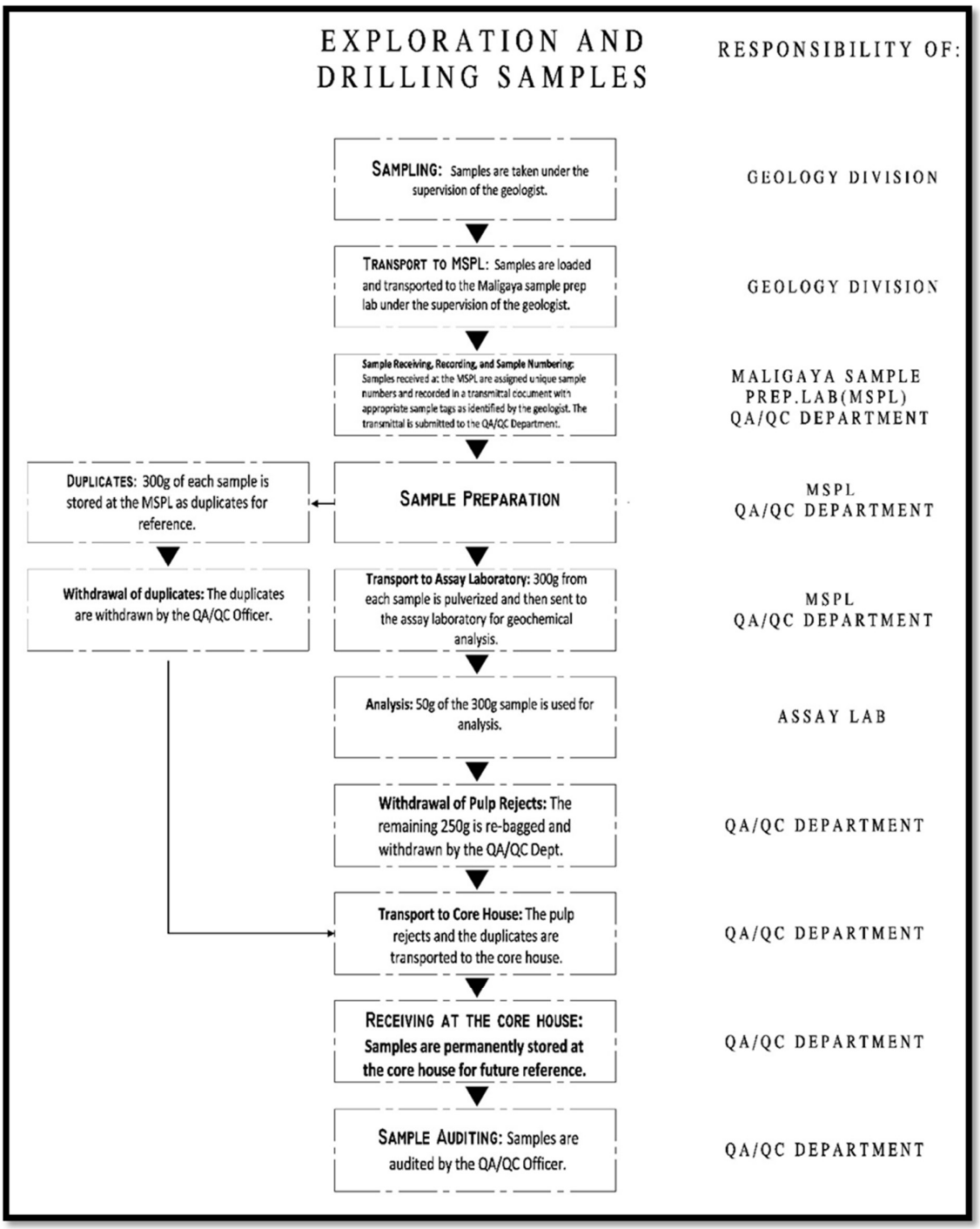

Figure 14.6.1.2 Sample dispatching flowchart for exploration and drilling samples

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.

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 14.6.2.1.1: Sample Preparation Equipment: (A) Drying Oven (B) Jaw Crusher (C) Boyd Crusher (D) Pulverizer

14.6.3. Sample Preparation

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

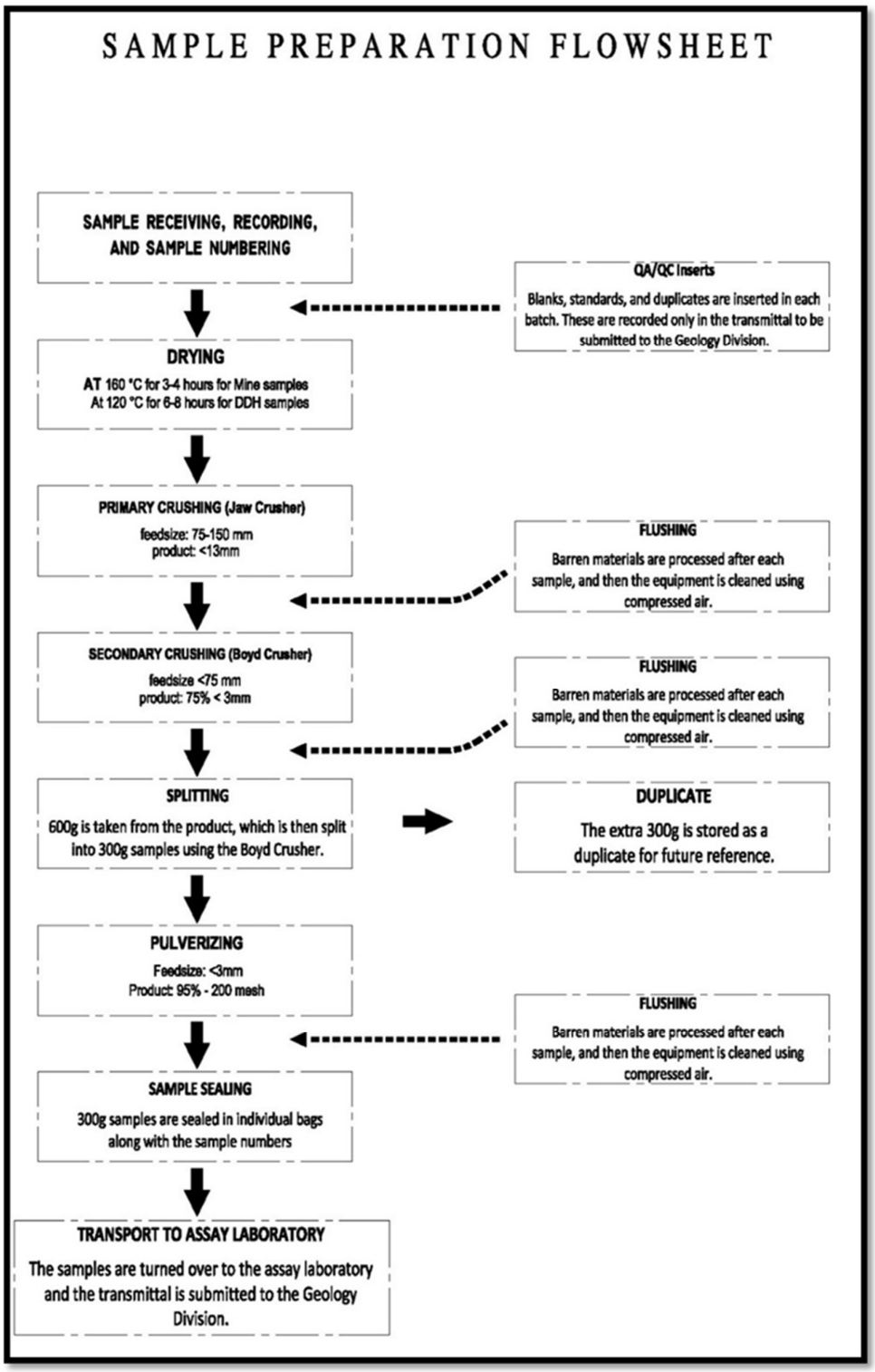

Figure 14.6.3.1 Sample preparation flowchart

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 Figure 14.6.4.1.

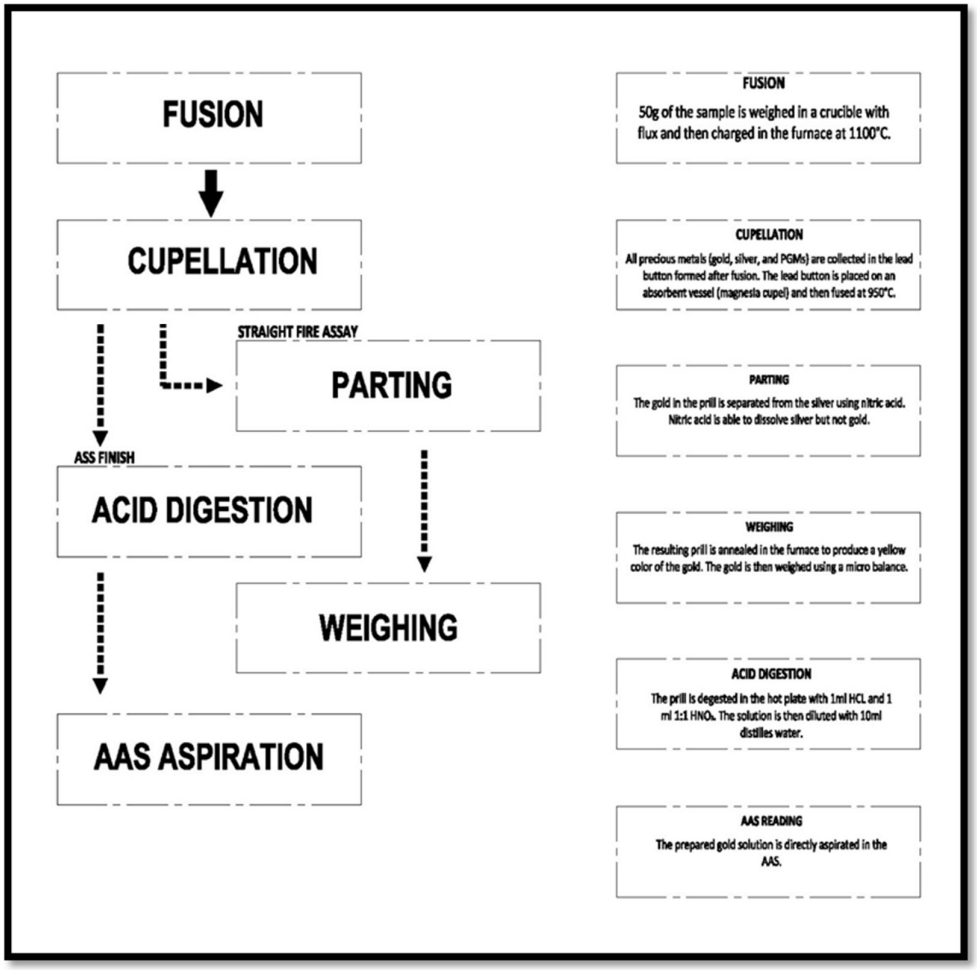

Figure 14.6.4.1 Fire Assaying Method

The various stages in fire assaying are described as follows:

a) 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 treated as waste.
b) 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”.
c) 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.

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

14.7. QUALITY ASSURANCE/ QUALITY CONTROL

14.7.1. 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 Senior Geologists in-charge of Exploration and Mine Geology.

14.7.2. Quality Control Procedures

1. Certified Reference Materials (CRM) – CRMs 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 ore samples being analyzed. One CRM is inserted in every batch. 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 are pulverized, homogenized, and then split and sealed into 300g samples. One batch of 25 samples is 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 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 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 – In order 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:
    a. Weigh 100g of dry pulp.
    b. Wet sieve the pulp through the 200 mesh screen.
    c. Dry the oversize.
    d. Weigh the oversize.
    e. Calculate the weight of the undersize by subtracting the weight of the oversize from the total.
    f. 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.

14.7.3. Presentation and Analysis of Quality Control Data

The QA/QC results are statistically and graphically analyzed daily in order 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.

Certified Reference Materials – 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.

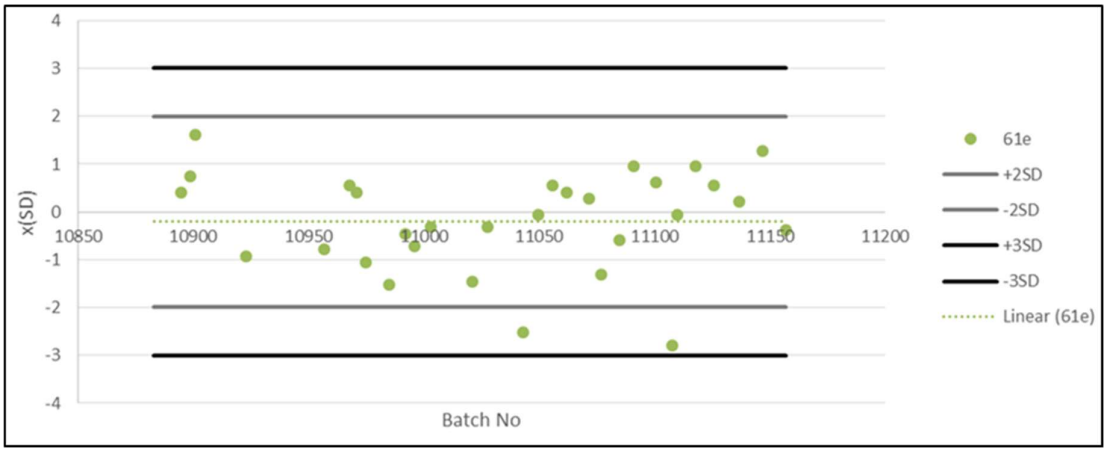

Figure 15.3.1: Scatterplot Used for the Analysis of CRM Assay Results

- 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.

Blanks – 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.

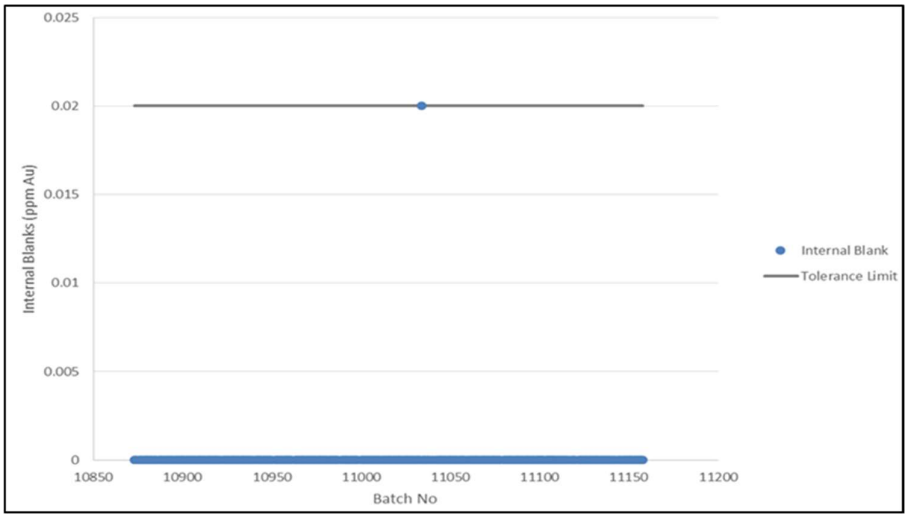

Figure 15.3.2: Scatterplot Used for the Analysis of Blank Inserts

Duplicates – 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 is set at 30% MPRD for mine samples and 10% for exploration samples.

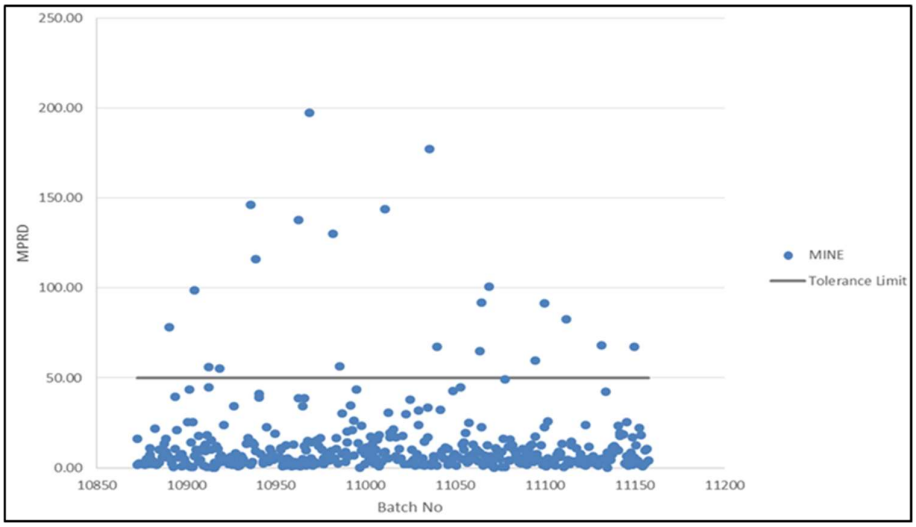

Figure 15.3.3: Scatterplot Used for the Analysis of Duplicate Pairs

14.7.4. Statement of the CPs on the Quality of Sample Security, Preparation and Analysis

The Company has demonstrated industry standard practices in safeguarding the quality of samples, preparation, and analysis, to come up with a valid and verifiable database appropriate for mineral resource estimation.

15. DECLARED MINERAL RESOURCES

15.1. Mineral Resources Estimates

The table below contains the mineral resource estimate lifted from "2021 Mineral Resource Estimate of the Gold Veins within MPSA-225-2005-XI of the Maco Mine". At a cut-off grade of 1.5 g/t Au, the estimated mineral resource within MPSA-225-2005-XI as of October 2020 is 1.681 Moz of Au (11,354,000 tons at 4.6 g/t Au), comprised of:

MINERAL RESOURCE (1.5 g/t Au cut-off)			
CLASSIFICATION	**TONS (000 t)**	**GRADE (g/t)**	**OUNCES Au**
Measured	3,195	4.8	493,000
Indicated	5,399	4.5	781,000
SUB-TOTAL	**8,594**	**4.6**	**1,274,000**
Inferred	2,760	4.5	407,000
TOTAL	**11,354**	**4.6**	**1,681,000**

Using a higher cut-off grade of 2.0 g/t Au the estimated resource is:

MINERAL RESOURCE (2.0 g/t Au cut-off)			
CLASSIFICATION	**TONS (000 t)**	**GRADE (g/t)**	**OUNCES Au**
Measured	2,859	5.2	471,000
Indicated	4,629	5	734,000
SUB-TOTAL	**7,488**	**5.1**	**1,205,000**
Inferred	2,310	5.1	379,000
TOTAL	**9,798**	**5.1**	**1,584,000**

16. ECONOMIC ASSESSMENT OF THE MINING PROJECT

16.1. Description of Mineral Resources Estimates Used as the Basis for Conversion to Ore Reserves

16.1.1. Database Used in the Estimation of Resources

The database includes:

- Development drives 3D projections stored as survey data
- Drill hole data stored in 3 excel spreadsheets (headers, survey, assay)
- Face sample data stored in 3 excel spreadsheets (header, survey, assay)
- Vertical section plans stored in Autocad drawing format that include the projected positions of drill data and face samples, existing mine development, and structures
- Hard copies and digitized files of cross-sections and level development plans
- Hard copies of the geologic face mapping forms
- Interpreted 3D wireframes of each vein and the corresponding hanging wall and footwall stored as dxf files
- Modelled wireframes representing the voids or mined out areas within each vein stored as dxf files

16.1.2. 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.

16.1.3. Data Verification and Validation (Limitations)

The database used in this report consists of drilling data acquired in recent campaigns and a subset of the database compiled for the 2012 resource estimate that covered both claims (Malihan and Flores, 2012), particularly underground samples from the following veins: Don Fernando, Don Joaquin, Saint Francis, and Saint Vincent.

The database used in 2012 includes historical data from the inactive gold-veins in the Dons and Saints vein systems which were among the main ore sources from the mid-1970s to 1980s, when Apex was reportedly able to extract 573,022 ounces of Au from 3.5 million tons of ore. Malihan and Flores (2012) reported that manual verification of all historical data was carried out over a three-month period in 2010-2011. The same report further stated that data verification and validation has been run using validation methods (automatic) and by printing sections. Verification has been run by referring to original certificates or data and against printed reports. Errors found are immediately rectified and updated in the database.

The compiled database includes all drilling data gathered starting from the drilling campaign initiated by Crew Gold in 2005 up to the drilling campaigns that were still active at the designated cut-off date for the report. The Maco Geology and Technical Services Group under the current Apex management initiated database reconstruction in August of 2014. The detailed review and validation of existing drill hole and

underground sample data took six months to complete. The database, which consists of drill hole data and underground sample data, was then validated and physically verified by CP-Geologist R. E. Peña, and then eventually used to generate a PMRC-compliant resource estimate (Peña, 2015). The Maco Geology Team continues to maintain this database, whose updated versions were used in later resource declarations (Peña, 2017; Ausa, 2020). All data entries are manually verified by the mine and exploration geologists using the face mapping forms and sample ledgers.

16.1.4. Cut-off Grades Used in the Estimations

Based on the Company's 2019 reports, cash operating costs at 2,000 tpd totaled PhP 3,793 per ton, mill recovery averaged to 85%, while the average realized metal price and exchange rate were USD 1,393/oz Au and 51.71 Php/USD. Using these parameters and a 4% excise tax, the cut-off grade was calculated to be 2.11 g/t Au. Considering the recent metal price movements, with spot Au prices around USD 1,700 per oz at the time of writing, and 3-year and 5-year averages at USD 1,505 per oz and USD 1,410 per oz, respectively (Figure 15.5.1), a sensitivity analysis of the cut-off grade to the gold price and foreign exchange rate was generated (Table 15.5.1). Based on these results, resource estimates were reported at 2.0 g/t Au and 1.5 g/t Au cut-off grades. The higher cut-off represents the current operating parameters assuming a gold price of USD 1,500 per oz Au, while the lower cut-off considers the long term mine plan to increase production rate to 3,000 tpd which will potentially lower operating costs on a per ton basis due to a larger divisor for fixed costs.

16.1.5. Mineral Resource Estimation Method Used

The grades were estimated per block using ordinary kriging. In this method, the average grade is calculated using weights that are determined in such a way that the minimum estimation variance is obtained. The vein grade of each block was estimated in three passes, with different search restrictions. The search ellipse parameters are based on the range of the modelled semivariograms, with the search distances roughly corresponding to one-third, two-thirds, and the full variogram range. In the first pass, only blocks with samples from at least four different directions within 20m were estimated. Blocks that were not estimated in the first pass but with at least two samples within 40m were estimated in the second pass. The last pass estimated the vein grade of blocks not covered by the first two passes with at least two samples within 60m. The grades of the HW and FW of each block were then estimated separately from the wall rock samples in the database, with a single pass for each, using ordinary kriging.

The mineralized and mined out volumes within each block were calculated using the modelled solids of the main vein, hanging wall, foot wall, and mined out volumes. The mineralized volumes of each block inside the vein, hanging wall, and foot wall solids were estimated individually using the software. These values were then adjusted to account for the voids by subtracting the volume of the mined out solids. The total mineralized volume of each block was taken as the sum of the remaining vein, hanging wall, and foot wall volumes. The total remaining mineralized volumes were then multiplied by the specific gravity of 2.6 to come up with the tonnage estimate for each block, while the final block grades were estimated as the weighted average of the

kriged vein grade, hanging wall grade, and foot wall grade, using the corresponding remaining volumes as weights.

16.1.6. Mineral Resource Categories Used (PMRC/JORC)

The resource blocks were classified following the categories outlined in the Philippine Mineral Reporting Code. Blocks were classified into measured, indicated, and inferred depending on which kriging pass estimated the MV grade.

- Measured – For blocks surrounded by samples from at least four different directions or octants around the block within one-third of the range of the modeled variogram
- Indicated – For blocks with at least two samples within two-thirds of the range of the modeled variogram
- Inferred – For blocks with at least two samples within the full range of the modeled variogram

Grades and tonnages of interpreted vein projections or blocks beyond the variogram range of the farthest samples were still estimated for internal purposes, but were not included in the resource estimate.

16.2. Type and Level of Feasibility Study

A Feasibility Study was undertaken and completed in April 2019. The study demonstrated that the conversion of Mineral Resource to Ore Reserves is technically achievable and economically viable, and that all modifying factors have been considered.

16.3. Brief Description of the Project

16.3.1. 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.

16.3.2. Mining Method and Capacity

The planned mining methods described below were considered to guide ore reserve estimation, which is discussed 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 at and proximal to the vein, safety considerations within the stopes, and the capability to keep mining activities predictable, such that excavation is kept under control
- Flexibility to be able follow sinuous veins and vein splays
- Ability to access and develop narrow veins with complex geometries

The main mining methods planned for operations are:

- Mechanized cut and fill in 2.5m cuts, with overhand sequencing;
- Long-hole stoping retreat mining with delayed backfill
- Shrink stoping with delayed backfill

Backfill materials will consist of a mix of development waste rock and surface quarried waste rock. A combination of these mining methods is employed across various working areas to be able to produce the daily tonnage requirement of the mill.

16.3.3. Processing Method and Capacity

The milling process involves three-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 then 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 in the fine ore bin before being fed to 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. All of the cyclone overflow materials are fed to the thickener, where some of the water is removed from the slurry to increase the percentage of solids.

The thickened slurry containing 45% to 50% solids is 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 carbon is then added in the last seven tanks of the CIP circuit to collect the dissolved gold and silver.

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 then placed in the elution columns. The gold is then stripped from the carbon under high temperature (110^{o}C) and pressure (>60 psi) using a caustic soda and cyanide solution. The solution then continuously passes through an electrowinning circuit to recover the gold and silver. Finally, the electrowinning sludge containing gold and silver is smelted to produce gold/silver bullion.

The final product is then sold to Heraeus Precious Metals, 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.

16.3.4. Ore to be Mined / Product to be Produced

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

16.3.5. Prospective Markets or Buyers

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

16.3.6. Estimated Mine Life

A hypothetical estimated mine life of ten years is considered 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.

16.3.7. Total Project Cost/Financing

See Annex ‗K-1'.

16.3.8. Production Cost / Production Schedule

See Annex ‗K-1'.

16.4. Marketing Aspects

16.4.1. World Supply and Demand Situation

Gold had a positive performance for 2020, opening at USD 1,520.55 per oz, going to as high as USD 2,058.40 per oz, before closing the year at a price of USD 1,895.10 per oz for an annual change of +24.43%. The catalyst behind this rally was the economic uncertainty and the increases in government spending amidst the coronavirus pandemic. This increased the demand for both gold and silver as these precious metals considered safe haven assets.

Heraeus precious metals forecasts gold to trade within the range of USD 1,760 per oz to USD 2,120 per oz for 2021. This is due to economic uncertainty remaining significant with the second wave of the pandemic and the re-imposition of lockdowns in many countries. Inflation expectations caused by the disruptions in global supply chains, causing rising food and commodity prices, are also supportive of a higher gold price. On the supply side, a repeat of the mine closures experienced during the previous year due to the pandemic remains possible, although less likely. Overall, the pandemic-induced downside risks to growth should keep investors interested in gold as a safe haven.

16.4.2. Prospective Markets or Buyers

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

16.4.3. 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.

16.4.4. 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.

16.4.5. Sales Contract

See Annex _A'.

16.5. Technical Aspects

16.5.1. Mining Plans

16.5.1.1. Mining Methods Considered

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

Bench & Fill

This method is applied to veins and surrounding walls with high rock quality index values that can hold large openings for a short span of time. This method creates a larger stope opening as the entire pillar in-between levels, 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 where drill holes tend to bend, which could eventually result in bootlegs and hang-ups.

ANFO is used as the primary charge along with two 1kg primers 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 is based on the modified Avoca which originated from Avoca Mines, Ireland. This mining method is suitable for GOOD to FAIR ground conditions such as in the Masara and Bonanza vein system.

Mini - Bench & Fill

This is just a variation of the bench-and-fill method. The only difference is the entire sublevel height is split in 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 carried out by a long hole machine. ANFO is used as the primary explosive charge. This method has the advantages of minimizing hole deviation, reducing blasting vibration due to a lower charge density, and minimizing ore and waste dilution. This productivity of this method however is lower compared to the bench and fill method as it requires more time to be spent on fixed activities in the

mining cycle (*e.g.*, equipment movements, preparations in drilling and charging, re-entry time, etc.).

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

Longhole Open Stoping (Bench & Fill) with Delayed Backfill

This method applies the same principle in the bench-and-fill method. This method, however, is more applicable in veins and wall rocks with higher rock quality index values, an indication that the area can hold a larger stope opening for a longer span of time. Backfilling is done only 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 activities are not yet completed in the lower level.

Modified Longhole Shrinkage Method

Modified Shrinkage Method can be applied onto steeply dipping veins (dip greater than 70^{o}) with regular ore boundaries that are stable enough to be self-supporting. Mining is limited to vein widths less than 2.5m. In this method, the ore is mined on vertical slices from the drift to the upper elevation, blasted using longholes. The broken ore will be temporarily stored in the stope to serve as a support on walls.

Comprehensive studies with respect to the caving abilities of ore and wall rock characteristics shall be undertaken before this method can be chosen. Compacted ore could result to pack ups which 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 by waste materials. The decision of leaving the stope with or without 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 rock contacts. In areas where the rock surrounding the ore zone is too weak for long hole stoping, or if the sides of the ore-zone are irregular and drilling long holes would create too much dilution, then the cut and fill method 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 to different vein conditions; mechanized cut and fill is used in wide veins while handheld cut and fill is used for narrow veins.

Mechanized Cut and fill is used in wide veins, particularly in Bonanza and Bonanza HWS. The method utilizes jumbo drills to drill and blast horizontal slices along the entire stope length. For veins less than 2.5m wide, handheld cut and fill is used to be able to create smaller openings, thereby minimizing ore-and waste dilution while maximizing ore recovery. Handheld breast stoping employs the same techniques as with the mechanized breast stope method. The only difference is that the handheld method uses a handheld drill instead of a jumbo drill.

Chosen Mining Methods

Based on the available reviews of the characteristics of the vein systems, two possible methods were considered, with variations applited to fit the limitations of each stope.

- Longhole Open Stoping with Backfill (ModifiedAvoca)
- Horizontal Cut and Fill

These options were chosen on the basis of the observed ore geometry, vein and wall rock competence, and safety considerations of both the 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 five hours in an eight-hour shift. Three hours are allotted for 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 – inspections by Geology and Survey, re-support, scaling, pipe and electrical cable installation, etc.

Blocks of 15meters maximum length are mined before backfilling.

Drilling and Blasting: For drilling, an average of 2.5m stope width was considered, with a burden equal to half of the stope width. Each row will have 3 holes (11m in 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 blasting and the water spraying the ore, mucking takes place. A loader (LHD) with a 5-ton 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 break through the mucking level, and due to ventilation problems at the drilling level brought about by the LHD exhaust.

After entire length of the stope has been mucked out (the stope length considered was 15 meters), backfilling is undertaken. All the waste available in the surrounding areas can be transported 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

The estimated volume required to backfill a stope with a length of 15 meters is 652.5 cubic meters. It was considered that hydraulic fill be used to minimize production stoppage, since ore blasting has to stop until the backfilling 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. At an advance rate of 60 meters per month and 3 operating drifts per mining panel, a total of 200 tpd can be achieved per area.

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 five hours in an eight-hour shift. Three hours are allotted for shift change, transport to and back from the mine, resting time, access to the stope, equipment checks, and re-fuelling.

Drilling and Blasting: For drilling, an average 2.5m width was considered with a drift height of 2.46m. Each row will have 18 holes (1.7 m in 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 blasting, mucking takes place. A loader (LHD) with a calculated 4.25-ton 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 surrounding areas can be transported into the stope. The estimated backfill volume requirement is 24 tons per day.

Ore Development

Parallel to the stope production, there is the normal ore development on the sub-levels. At an advance rate of 45 meters per month, a total of 23 tpd can be achieved per area.

Mechanized

Working Hours: The available hours to work per shift underground was estimated at a maximum of five hours in an eight-hour shift. Three hours are allotted for shift change, transport to and back from the mine, resting time, access to the stope, equipment checks, and re-fuelling.

Drilling and Blasting: For 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, water spraying, repair vent pipe, retreat pipes, and electrical cable, survey, geology, etc.), a 0.5 shift per blast was considered.

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

16.5.1.2. Mine Design/Mining Parameters/Geotechnical Parameters

Each vein system was analyzed by the Rock Mechanics Section of the Mine Geology Department to determine the rock mass rating (RMR) based on different factors such as rock 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. The corrected rock mass rating (CRMR) is used to classify ground condition, from good to bad, and to assess the minimum required ground support to safely mine an area.

Support Requirement Evaluation

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

Support Requirements – Production

Support design of production heading is mostly based on the 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 to prevent mass dilation and raveling of rocks. Before shotcrete application, 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 Section.

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 drifts at upper elevations. Materials are hauled from the muck bay and placed in the open stope to provide support and stabilize the walls, and to also serve as a platform for mining the next level.

Fill Requirement

Most of the materials used for backfilling come from development headings.

Fill parameter and assumptions

- Volume for ore is given by the tonnage divided by 2.6 (specific gravity)
- 80% of the voids should be filled = fill requirement x 0.8
- Volume for waste is given by the tonnage divided by 2.6 (specific gravity)
- The assumed bulk density of waste materials is 1.8tons/cu.m
- The volume that can be filled by broken tons of waste (available fill in terms of volume) is estimated as the waste tonnage divided by the bulk density

16.5.1.3. 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 ramps is 4.0m x 4.5m in 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 at a 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 to explore the possible existence of sub-parallel veins on the hanging wall.

From the cross cuts, 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 of 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-meter drives are excavated to the side of the crosscut for re-muck bays. Similarly, ventilation raise access is excavated from the cross-cut, where a 3.0 x 3.5 m raise is bored by raise climbers to connect to the next ventilation raise access at the upper level. These raises will be developed every level and will necessarily be holed out to the surface for secondary access and also to serve as the 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 is 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 reduced 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. This will 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 a surface where crushers are installed.

At 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 pump 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.

16.5.1.4. 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 a 10% loss of tonnage.

16.5.1.5. 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 in 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. The overall mining schedule is 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.

16.5.1.6. Working Schedule

See Annex _B-8'.

16.5.1.7. List of Mining Equipment and Auxiliary Machinery/Mine Infrastructure

See Annex _B-9'.

16.5.1.8. Mine Development Plans and Schedule

16.5.2. Processing Plans

See Annex _C'.

16.5.3. Mine Support Services

16.5.3.1. Power Source/Power Generation Plant

16.5.3.1.1. Requirements

The APEX Mining Co., Inc. Underground Mining and Mill Plant operation's power requirement is currently supplied by 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 the National Power Corporation (NGCP) 138kV Transmission Line from Tindalo, Nabunturan Substation with an estimated distance of 22.0km from the Mine Site.

On the 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 the Mill Plant and the Mine Operations Active Areas Distribution Lines (4.16kV) then further stepped down to 480V level to cater the electric motor and other loads. (Table 16.5.3.1.1.1)

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 16.5.3.1.1.1 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		

16.5.3.1.2. 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 more flexibility/reliability on the external/internal power

supplies (SCADA/RTU are already installed with on-going wiring/hardware and communication works are on the process for NGCP to AMCI).

To further increase the internal power generating capacity, there is a proposal to build a bigger capacity unit of 3.5MW/5.0MW (Bunker Fired) to cope with the increasing Mine/Mill Operations requirement and to build up capability for "Total Blackout/138kV Transmission Line Breakdown" and likewise in preparation for the company's projection to increase Mine and Mill production up to 4500TPD.

16.5.3.2. Mechanical Shop/Mine Services

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

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

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

16.5.3.3. Assay Laboratory

Please refer to TR-03.

16.5.3.4. 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.

Table 16.5.3.4.1 Water usage breakdown

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**

16.5.3.5. Availability of Alternative Sources of Mine Support Services

16.5.3.5.1. 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 range 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 L530 in Maligaya, and both Ramp 1 and Ramp 2. Another drain tunnel is currently being developed at Level 380 to dewater levels between 530 and 380 elevation. The advisability of such drainage tunnels is a matter of the economic cost of the adit. Together with the capital cost and interest charges, the total should be lower than the perpetual cost of pumping.

16.5.3.6. Mine Ventilation

See Annex _G'.

16.5.4. Environmental Protection and Management Plan

16.5.4.1. Environmental Impacts and Control

16.5.4.1.1. Land Resources

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

16.5.4.1.1.1. For Underground Mining Operations

The development and mining of the ore reserves blocked in the different vein structures that are prioritized for development and stoping will be through 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. Mine development requires around 7500 meters of ore level development, about 4000 meters of ramps/decline, and about 600 meters of development raises and winzes to develop the vein system.

Backfill Method

Due to the fact that the veins in Maco are sub-vertical, the use of waste materials for backfilling the voids left out by ore extraction is imminent. This is done to stabilize the hanging wall contact and provide a working floor for mining the next ore blocks above. Stope backfilling activities will utilize all the waste materials generated from underground development, using loaders and low profile trucks to transport the waste into the stopes.

Potential contaminants in underground mining operations, which have to be controlled, 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 areas.
- Nitrogen compounds from blasting materials – this could be considered to be in relatively small amounts but nitrate residues will contribute to eutrophication of waterways draining the mining area. Explosives are necessary in mining operations for breaking the ore and the host rock to more manageable sizes for handling and hauling onto the 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.

16.5.4.1.1.2. 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 a new Tailings Storage Dam are some of the project facilities that will have to be constructed. Contaminants related to the construction of these infrastructures and facilities include 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 metals can be harmful to fish and other aquatic lives, impair the function of the reproductive system of these aquatic animals and when humans eat the fishes, the heavy metals that could have accumulated in the tissues of fishes can cause health impairments to humans and other land-based animals. The health effects may be acute or chronic. One potential source of contaminants is the material impounded 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 are needed.

16.5.4.1.1.3. Others

The company may have to stockpile excess development waste 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.

16.5.4.1.1.4. Control Strategies

The company will employ the most common and effective control technologies used to address environmental concerns arising in the 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.

16.5.4.1.1.4.1. Progressive Rehabilitation

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

16.5.4.1.1.4.2. 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.

16.5.4.1.1.4.3. Rehabilitation Methods

Rehabilitation in underground mines usually involves mined out underground workings that, for safety and environmental concerns, have to be filled up with either development waste rock 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 aggregates in slurry form will be pumped into the mined-out areas, to 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. 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.

16.5.4.1.2. Water Resources

16.5.4.1.2.1. Acceptable Impacts Associated with the Potential Source(s) of Water Contamination

There is only minimal sedimentation coming from underground workings. 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 be silt build up in the mill facility, but this can be relatively easy to control or contain.

16.5.4.1.2.2. Mine Dewatering or Drainage Including Utilization for Road Watering, Processing, Disposal by Evaporation

16.5.4.1.2.2.1. 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.

16.5.4.1.2.2.2. 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 for gold values that could indicate the efficiency of the milling operation or lack of it.

16.5.4.1.2.2.3. 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 machineries and regulates the ways of fuel and oil disposed of or handled by installing oil & water separator at the motor pool.

16.5.4.1.2.2.4. 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.

16.5.4.1.2.2.5. 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.

16.5.4.1.2.2.6. 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.

16.5.4.1.2.3. Control Strategies

16.5.4.1.2.3.1. 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 elev. 620. 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.

The on-going construction of the dam is in elevation 663 masl and the next raise is the Final Maximum Dam Raise to Elevation 670 masl. 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.

16.5.4.1.2.3.2. 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 constructed. 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.

16.5.4.1.2.3.3. Freshwater Dams

The company has no plans 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 with a barbed-wire enclosure and is restricted-entry for unauthorized personnel. To monitor possible contamination, the water will be sampled periodically and analyzed in a laboratory in Davao City

16.5.4.1.2.3.4. Treatment of Residual Voids or Worked-out Underground Mine

Mechanized mining using the Decline Method will be the mining technique employed. Waste rock materials produced from underground development activities will be used for backfilling mined-out stopes within the vein. No pillars will be left. Instead, concrete pillars that will be put up. 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 finding its way into the waterways draining the area. Concrete pillars could also be used in sealing off the source of harmful gases which are quite common in some of the known veins in Masara.

16.5.4.1.2.3.5. Diversion Banks

Depending on surface disturbance or on the effects of day-to-day mine activity, diversion banks will be constructed if deemed necessary to contain any pollutant and induce or control water flow, especially as the area is traversed by several creeks or waterways.

16.5.4.1.2.3.6. Sedimentation Control Dam or Silting Pond

This will depend on the observations made during the development and mining operations. 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 operations.

16.5.4.1.2.3.7. Groundwater

Protecting groundwater necessitates good understanding and education of 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 communities’. As part of the control, all regulations and guidelines such as ways of containing or preventing contaminants from finding their way into waterways and eventually into groundwater should be well-understood and appreciated by everybody. Regular water sampling is conducted to ensure that water quality is within the standards.

16.5.4.1.2.3.8. Sewage and Others

Infrastructures and domiciles constructed by the company are already provided with sewerage systems, the least of which are septic tanks. Additional infrastructures that will be put up by the company will be similarly provided with proper sewerage systems. This is to ensure that solid wastes and all forms of contaminants will not be allowed to find a 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 for employees and the residents that will discourage pollution of waterways and the groundwater would also be promoted.

16.5.4.1.2.4. Noise

16.5.4.1.2.4.1. Acceptable Levels Emanating from Potential Source(s) of Noise

16.5.4.1.2.4.1.1. Service Vehicles, Including Off-highway Trucks

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

16.5.4.1.2.4.1.2. Explosives

Use of explosives in underground blasting definitely can affect miners if no proper Personal Protection Equipment (PPE) and adequate training in handling explosives are provided. Rules and advances in the techniques in explosives use are already standardized to minimize its ill effects and ensure the safety of miners. More important are 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 a structural effect. At 140 g cubic cm air pressure, concrete plaster cracks begin to form, and, at higher pressures, masonry cracks may become evident. Ground vibration velocity at 230 will cause serious cracking of masonry structure.

16.5.4.1.2.4.1.3. 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 the noise will affect their health if continously exposed beyond the normal level. For a concentrator with a capacity of 7,500 tons per day, the noise levels at 90 meters distance could are about 70 decibels. The Jaw Crusher generates 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 1,000 tons per day. Workers assigned in these working places will be provided with proper earplugs or mufflers to suppress the noise decibels to which they will be exposed daily in their jobs.

16.5.4.1.2.4.1.4. Earthmoving Plant

The earthmoving equipment fleet underground is limited to the LHDs and LPTs which have noise levels of 74 to 109 decibels, equivalent to a diesel engine, 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.

16.5.4.1.2.4.1.5. Powerhouse and Others

Since the powerhouse operates only occasionally as a backup during power outages or blackouts, the operators and the community residents residing nearby will be exposed to noise pollution only over limited time durations and so, within tolerable levels. The noise could equal that of a diesel engine with noise levels at 74-109 decibels. Operations of hauling equipment for transporting ore and waste material from the mine to the beneficiation plant or to stockpile areas are also potentialnoise generators due to running engines and ground vibrations caused by the sheer size and heavy load.

16.5.4.1.2.5. Control Strategies

16.5.4.1.2.5.1. Restriction of Hours of Activity

In underground operations, blasting hours will be scheduled and announced to avoid startling the residents. As much as possible, blasting at night, during weekends, or on holidays, shall be avoided. The effect of the blast and blasting vibrations 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 a low energy rather than a high energy detonating fuse
- Blasting shall be done by experts and all people involved in this operation will be provided with adequate safety apparels such as sound mufflers, etc.
- The numbers of vehicles and their respective routes will be planned properly to keep noise levels as low as possible in populated areas

16.5.4.1.2.5.2. Permanent or Temporary Relocation of Residence Affected

If necessary, people living near the mine site 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 can not 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.

16.5.4.1.2.5.3. 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, such as the following:

- The plant must be located as far away as possible from existing residential areas or townsites.
- The compressor house must be constructed of concrete blocks with soundproof doors rather than corrugated sheeting.
- The 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 always observed to reduce noise from worn parts.
- The use of silencers and mufflers will be considered.

16.5.4.1.2.5.4. 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

16.5.4.1.2.5.5. 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 regulations, the company shall always observe noise levels as specified as follows: 85 dB (A) for daily exposure level with no peak sound pressure exceeding 140 dB (A).

16.5.4.1.3. Air Quality

16.5.4.1.3.1. Acceptable Level of Air Quality

Potential environment contaminants in the atmosphere generated by mining activities 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 policy, 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 will be conducted.

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. Hydrocarbons emmited by internal combustion engines can be carcinogenic.

16.5.4.1.3.2. 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.

16.5.4.1.3.3. Dust from Plant Processing Area

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

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

Dust 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.

16.5.4.1.3.4. 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.

16.5.4.1.3.5. 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.

16.5.4.1.3.6. 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 by 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.

16.5.4.1.3.7. 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, rock cuttings 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 of most exploration operations, however, is the surface disturbance resulting from road and drill pad construction and the operation of drilling and support equipment like bulldozers and service vehicles.

16.5.4.1.4. Control Strategies

16.5.4.1.4.1. 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 the 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.

16.5.4.1.5. Conservation Values

16.5.4.1.5.1. Nature Issues

16.5.4.1.5.1.1. Acceptable Levels of Impacts

Potential impacts on the environment have to be especially studied by experts commissioned for this type of research as the project area is remotely situated. Environment specialists would be consulted 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.

16.5.4.1.5.1.2. Control Strategies

The control strategies appropriate for this issue would be that mining and the ancillary activities must be limited only in certain zones 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 on these natural species in particular, and to the environment in general.

16.5.4.1.5.2. Visual Aesthetics

16.5.4.1.5.2.1. 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 are unsightly during mine operations, and after mine closure.

16.5.4.1.5.2.2. Control Strategies

It would be the policy of the company to certain 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 identified.

The buildings and plant facilities will be demolished and usable materials salvaged 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.

16.5.4.1.5.3. Recreation and Education

16.5.4.1.5.3.1. Acceptable Levels of Impacts

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

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 Philippines for example, we have the underground mines of Benguet Corporation in the Baguio District that has been converted into a tourist attraction, a water reservoir, and an educational attraction.

Other mines were developed 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.

16.5.4.1.5.3.2. 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.

16.5.4.1.5.4. Heritage and Cultural Values

16.5.4.1.5.4.1. Acceptable Levels of Impact

As stated in previous sections, the views of development planners as well as the indigenous people in Compostela Valley Province where the contract area is situated may hold possible conflicts in regards to the present administration of land areas or in regards to defining the 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 impact on the development program of the company.

16.5.4.1.5.4.2. Control Strategies

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

16.5.4.1.5.5. Social Issues

16.5.4.1.5.5.1. 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.

16.5.4.1.5.5.2. Control Strategies

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

- 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

16.5.4.1.5.6. Approach and Scope of Environmental Monitoring Program

16.5.4.1.5.6.1. Significant Impact to be Monitored

Apex employs the trackless underground Decline Mining Method and the CIL (Carbon-In-Leach) method for processing gold ore. Environmental monitoring shall start during the development stage and will be intensified during the exploration stage when environmental impacts are anticipated. Among the significant impacts to be strictly monitored by the company include the following:

- Generation of dust along haulage and transport routes during development
- 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

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 gold ore will produce a large volume of mill tailings whose proper disposal will be a paramount concern.

16.5.4.1.5.6.2. Sources of Impacts

16.5.4.1.5.6.2.1. Mining Activities/Infrastructure

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

- Definition of objectives: 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

16.5.4.1.5.6.2.2. Noise

To determine the extent of workers' exposure to noise, measurements will be made and results will be compared against the adopted standards. Exposure time will likewise be observed. The company will select among the following instruments for noise measurement according to the compatibility with the actual situation in the mine:

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

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

16.5.4.1.5.6.2.3. Air Quality

The presence of air contaminants in the workplace can be assessed through air sampling and analysis. The concentration of airborne contaminants in the workplace varies concerning time and location. The company must therefore 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 of the mined materials 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.

16.5.4.1.5.6.2.4. Conservation Values

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

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 it is not being utilized.

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

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

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

16.5.4.1.5.6.2.5. Heritage and Cultural Values

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

Parameters to be monitored: underground activities may not encounter any historical value 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 conducting mining operations.

Purpose of monitoring: identification of possible incursions or interactions with native values and historical past.

Monitoring method: actual observation and interactions with community leaders.

Monitoring locations: within the claimed area and nearby community.

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

16.5.4.1.5.6.2.6. Social Issues

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

Parameters to be monitored: these may include the socio-economic and environmental records of the community before and during mining and milling operations. These would allow the assessment of the increase or decrease of specific parameters with regards to the growth of the community.

Purpose of monitoring: this would provide the company with better management approaches on issues raised or activities that are requested to be carried out.

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

Monitoring locations: Host and Adjacent Barangays.

Monitoring frequency: Quarterly or Semi-annual.

16.5.4.2. Mine Closure Plan

16.5.4.2.1. Closure Objective

Mining operations 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 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 the 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 mining operations to enhance flora growth and faunal habitations
    - restoring and enhancing the natural feature of the places
    - addressing impacts of floods, siltation, and landslides
    - stabilizing the land surfaces affected by the mine
    - finalizing 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 well-being of the impacted Barangays after cessation of operations

16.5.4.2.2. 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. The provisions stated in the mining regulations that rehabilitation should be started five (5) years before the expected closure of the mine were followed by the company, and progressive rehabilitation of mined-out areas is now being practiced. Mitigating measures are in place in order to protect 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 by mining activities are the planned rehabilitation efforts for restoring the contract area. Mined out stopes will be backfilled and tunnel portals 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.

16.5.4.2.3. Implication of Mine Closure and Final Land Use for Each Mine Component

Implication for mine closure and a 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 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.

16.5.4.2.3.1. Portal and Underground Tunnel

Implication for Closure

The portal/underground tunnel is a shallow opening on the ground. The portal/underground size is 4m X 4.5m 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 portals 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.

16.5.4.2.3.2. Tailings Dam

Implications for Closure

It will contaminate the existing river systems and surrounding flora and fauna will also be affected. 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 confirm with DENR Standards. Application of sodium metabisulfite will reduce the cyanide content levels of the water at the dam and cyanide compounds can be easily degraded by ultraviolet rays. The 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

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

16.5.4.2.3.3. 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 materials that are being used for surface road maintenance.

After Use of Waste Dump

For slope stabilization of the area, 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 for rest and recreation for people in the surrounding community.

16.5.4.2.3.4. 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 or general purposes of the community.

Rehabilitation or Final Land Use of the Area.

As 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.

16.5.4.2.4. Objective of Mine Closure and how these Relate to the Mine and its Environmental and Social Settings

Mining operations have 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 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 operations

16.5.4.2.5. Results/Lessons Learned from Progressive Rehabilitation Already Completed

Mining site rehabilitation and reclamation activities are continuously carried out by the company. Having experienced reclamation and rehabilitation, the following are the inferred advantages and limitations:

- For areas subjected to 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, 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

16.5.4.2.6. Stakeholder Involvement

Objective: To ensure that the concerns and interests of all stakeholders are considered after mine closure and the implementation of FMRDP Stakeholders:

- the host communities from the barangays of Teresa, Masara, and Mainit all of Maco, ComVal 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

16.5.4.2.7. Risk Assessment

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

16.5.4.2.7.2. Summary of Mine Rehabilitation Scenarios, Uncertainties and Assumptions

- MPSA-225-2005-XI and MPSA-234-2007-XI will be completely exhausted of their mineral reserves by the year 2031. 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 early closure of mining operations due to the unexpected decrease of the reserves and the corresponding grades. The price of gold will also play a vital parameter in the closure of the mine.

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

16.5.4.2.8.1. Final Land Use of the Area

- Areas vacated by workshops and plant facilities will be converted to forests or farm lots.
- Other areas will be devoted to tree planting, orchard, and cropland.
- The forest nursery and agroforestry farm will serve as a demo farm for educational purposes.
- Conversion to residential areas is another option given the population growth of the community.
- 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.

16.5.4.2.8.2. Mine Closure Criteria and Performance Standards for all Identified Mine Components

See Annex _I-2'.

16.5.4.2.9. Details of Decommissioning Plan

16.5.4.2.9.1. List of Areas and Equipment that Require Decommissioning

- Portals, Ventilation raised, and underground tunnels covered by MPSA-225-2005-XI and MPSA-234-2007-XI due to mineral exhaustion by 2031
- Tailings Dam
- Mineral Waste Dump
- Crushers, motors, buildings, conveyor lines and facilities
- Motor pool shop, facilities, explosives magazines, and office buildings
- Various heavy equipment

16.5.4.2.9.2. Description of Decommissioning Strategy, Timing, and Techniques Chosen for each Mine Component Including Mitigating Measures to Minimize Potential Adverse Environmental Impacts

16.5.4.2.9.2.1. Decommissioning and Rehabilitation of Portal and Underground Tunnels

16.5.4.2.9.2.1.1. Objectives

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

16.5.4.2.9.2.1.2. Decommissioning and Rehabilitation Strategy

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

16.5.4.2.9.2.1.3. 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

16.5.4.2.9.2.1.4. 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

16.5.4.2.9.2.2. Decommissioning and Rehabilitation of the Tailings Dam

16.5.4.2.9.2.2.1. 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

16.5.4.2.9.2.2.2. Decommissioning and Rehabilitation Strategy

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

16.5.4.2.9.2.2.3. 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

16.5.4.2.9.2.2.4. Criteria of Measuring Against Objectives

16.5.4.2.9.2.3. Decommissioning and Rehabilitation of Mine Waste Dumps

16.5.4.2.9.2.3.1. Objectives

- To stabilize all Mine Waste Dumps 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

16.5.4.2.9.2.3.2. Decommissioning and Rehabilitation

- Backfilling 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

16.5.4.2.9.2.3.3. Active Passive Care

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

16.5.4.2.9.2.3.4. 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

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

16.5.4.2.9.2.4.1. Objectives

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

16.5.4.2.9.2.4.2. Decommissioning and Rehabilitation Strategy

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

16.5.4.2.9.2.4.3. 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 properly
- Establish and maintain fences

16.5.4.2.9.2.4.4. Criteria of Measuring Against Objectives

- Pictures from fixed points in the area updated at year-end
- The survival rate of planted trees
- Number of buildings removed and retained for community use.

16.5.4.2.9.2.5. Socio-Economic Activities

16.5.4.2.9.2.5.1. Objectives

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

16.5.4.2.9.2.5.2. Livelihood Programs

- Community-based forest management project
- Train the residents in handicraft 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

16.5.4.2.9.2.5.3. Sustainability Measures

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

16.5.4.2.9.2.5.4. Criteria for Measuring Against Objectives

- Pictures of livelihood activities, including community produced
- The survival rate of planted trees

- Socio-economic impact planting analysis

16.5.4.2.9.3. Details of Mine Rehabilitation Plan

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

16.5.4.2.9.3.1.1. Topography

The MPSA Contract Areas of Apex Mining Company, Inc. are situated in a generally 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.

16.5.4.2.9.3.1.2. 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.

16.5.4.2.9.3.1.3. Biological Information

16.5.4.2.9.3.1.3.1. 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 a 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.

16.5.4.2.9.3.1.3.2. 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.

16.5.4.2.9.3.2. Topography and Biological Work Completed Each Year

Rehabilitation and re-vegetation activities are continuously being carried out by the company on the areas disturbed by mining operations. The total area planted in the 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.

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

By the time the reserves in the deposit is 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 continue 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.

16.5.4.2.9.3.4. 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 the rehabilitation strategy and technology for degraded and disturbed upland areas within APEX Mines – Masara, Maco, ComVal 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.

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

Please see Annex ‗I-5'.

16.5.4.2.10. Details of Social Plan

16.5.4.2.10.1. Retrenchment Package

The company is committing to provide to affected employees when the company ceases operation, a retrenchment package in accordance with existing laws as follows:

- Separation pay in accordance with 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.

16.5.4.2.10.2. 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.

16.5.4.2.10.3. Transfer of Social Assets and Services

There are already present facilities and assets extended to the public, and these were turned over to 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, Pipelines, 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 well-being 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.

16.5.5. Mine Safety and Health Plan

16.5.5.1. Safety Table of Organization

Please see Annex ‗J-1'.

16.5.5.2. 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 Engineers/Officers
- Medical Doctors/Nurses
- One (1) representative from each contractor

- Four (4) Rank & File Employee Representatives from Underground, Mill, and Services Departments and other Company staff as deemed appropriate.

16.5.5.3. Safety Responsibility and Accountability

Please see Annex ‗J-2'

16.5.5.4. 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:

16.5.5.4.1. 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

16.5.5.4.2. 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

16.5.5.4.3. Company General Safety Rules and Regulations

Please see Annex ‗J-3'

16.5.5.5. 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.

16.5.5.6. 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 for middle management positions were selected based on their experiences and trainings previously attended.

Reference manuals available to guide 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

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.

16.5.5.7. 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 an 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 ventilate findings and formulate mitigating measures.

16.5.5.8. 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.

16.5.5.9. 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.

16.5.5.10. 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.

16.5.5.11. Emergency Preparedness

See Annex ‗J-5‘ for the Emergency Response Procedures.

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

16.5.5.13. 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 of 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

- The wearing of safety shoes/boots are 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.

16.5.5.14. 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.

16.5.5.15. 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.

16.5.5.16. Targets and Budgets

See annex ―J-6‖.

16.6. Financial Aspects

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

Base Case Assumptions:

- Mine life of 10 years
  - Ore Reserve of 5.748 M tons @ 4.9 g/t Au
  - Replenished as exploration and mine development progresses
- Mined Ore / Milled Ore over the projected mine life
  - Stoped ore: 3,796,304 tons @ 4.38 g/t
  - Development Ore: 1,879,258 tons @ 3.81 g/t
- Development over the projected mine life of:
  - Off vein Development: 35,641m
  - On vein Development: 66,303m
- 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: 4.0% of Gross Revenue
    - Business Tax: 2.2% of Gross Revenue
    - Income Tax: 30.0% of Net Income
- Production data:
    - Dilution is included in tonnage and grade calculation
    - Mill Recovery: 80 %
    - Gold Price: $ 1,500 / Oz
    - Foreign Exchange: Php 50 / $1.00
    - Payability on Gold Sales: 99 %

16.6.2. 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.

16.6.3. Financial Plan/Sources of Funds

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 whether through public offerings or long term bank loans.

16.6.4. Production Cost Estimates and Assumptions

16.6.4.1. 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.

16.6.4.2. 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.

16.6.4.3. 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.

16.6.4.4. 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.

16.6.4.5. 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.

16.6.4.6. 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.

16.6.4.7. 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.

16.6.4.8. 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 is regularly replenished.

A Php 5.0M 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 is also allocated 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.

16.6.4.9. Community Development Cost (SDMP)

A Community Development cost equivalent to 1.5% 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.

16.6.4.10. Excise Tax and Business Tax

An Excise Tax of 4% 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, is likewise provided.

16.6.4.11. Head Office Cost

Head office cost which is located in Ortigas has overhead which covers salaries and wages, rental of an 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.

16.6.4.12. Royalty

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.

16.6.5. Government Financial Incentives

No government incentives were provided in this financial and economic assessment.

16.6.6. Basis for Revenue Calculation

16.6.6.1. 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.

16.6.6.2. 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$1,500.00/oz Au was used.

16.6.6.3. Exchange Rate

For purposes of this assessment, 50.0 pesos is pegged against US$1.

16.6.6.4. Smelters/Freight/Treatment Charges

No smelter/freight/treatment charges were used in the study. The payability factor of 99% already considers the expected marketing charges.

16.6.6.5. Bonuses and Penalties

No bonuses or penalties were used in the study.

16.6.6.6. Percentage of LME Price Payable

A payability factor of 99% is used in this assessment.

16.6.7. Proforma Financial Statements/Feasibility Study

16.6.7.1. Balance Sheet

See Annex_K-1b

16.6.7.2. Profit and Loss

Please refer to Annex _K-1c‘ for the Profit and Loss Projections.

16.6.7.3. Cash Flow

Please refer to Annex ‗K-1d' for the Cash Flow Projections.

16.6.8. Financial Analyses

16.6.8.1. Break-Even Analysis

See Annex ‗ K-2'.

16.6.8.2. Sensitivity Analysis

See Annex ‗K-3'.

16.6.8.3. Profitability Analysis

See Annex ‗K-1f'

16.7. Economic Aspects

16.7.1. Employment/management

16.7.1.1. Number, Nationality, Position, and Annual Payroll

See Annex ‗L-1' for the Manpower Headcount

16.7.1.2. List of Key Personnel and their Qualifications

See Annex ‗L-2'.

16.7.1.3. Personnel Policies re Pay Scale

The personnel pay scale is defined by the following aspects

- Executive management team – President, Chief Financial Officer, Project Development, Corporate Administration, Geology and Exploration, Corporate Secretary, Legal
- Functional management team – Community Relations, Environment, Security, Supply Chain Management, Finance, Legal Compliance & Risk, Human Resources, Information Technology, Safety and Health, Medical, General Services, Civil Works, Power Maintenance & Electrical Services, Mine Maintenance, Mill Division, Mine Division, Geology and Exploration.
- Professional Staff, Support Staff, Operators, Supervisors, and Rank and File

16.7.1.4. Table of Organization

See Annex ‗L-4'.

16.7.1.5. 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 in the entire the country. This is brought about by many mining and exploration companies springing up in the Philippines. Add to that the "lull" in the mining industry one or two decades ago where mining-related professions ventured into other industries. With this scarcity, as much as the Company prioritizes employing people from within the region or area of its operations, it is constrained to hire technical people outside of Mindanao.

16.7.1.6. Township/Housing

16.7.1.6.1. Company Quarters and Accommodations

The old existing housing and accommodation facilities of the old Apex mining operations 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.

16.7.1.6.2. Community Residents and Demography

See Annex ‗L-5'.

16.7.1.7. Community Development Plan

See Annex ‗L-6'.

16.7.1.8. Socio-Economic Contributions

See annex ‗L-7'.

17. ORE RESERVE ESTIMATES

17.1. Database Used

The data used for ore reserve estimation consists of historical mine records and information obtained from recent exploration drilling, underground drift sampling and mapping, mine surveys, and the updated mineral resource models. These were accessed as electronic files provided by Apex. These sources are described below:

a) Production and Development Records
b) Face samples/channel rock chip samples taken across an ore drive face, regularly assayed for Au, Ag, Cu, Pb, and Zn
c) Diamond drill holes of either HQ or NQ drilling (usually half core) and of variable recoveries, with Au, Ag, Cu, Pb, and Zn assays
d) Surveyed underground drive centerlines and dimensions using a total station
e) Plan maps, sections, and VLPs showing the interpreted and/or surveyed mined out areas

The 2021 updated mineral resource model includes 28 veins delinated within MPSA-235-2005-XI. These are:

Bonanza MV	Sandy 60S Split	SDN2 Split	Don Calixto MV
BHWS MV	Sandy 90S Split	Jessie MV	Don Calixto HWS
BHWS Split	Sandy 107S Split	SDN3 MV	Masarita 2 MV
Masara MV	Sandy 110S Split	SDN4 MV	Masarita 2 FWS
Masara HWS	Sandy 120S Split	Maria Inez MV	Don Fernando MV
Bibak MV	Sandy 132S Split	Maria Inez HWS	Don Joaquin MV
Sandy MV	SDN2 MV	Wagas MV	Don Mario MV

3D wireframes for these veins and the adjacent low grade mineralized hanging wall and foot wall (limited to a uniform thickness of 0.5m) were generated by the Apex Technical Team using underground sampling and drilling data to come up with the mineral resource estimate. Variograms along different directions were also modelled for each vein prior to block modelling. The final resource block models consist of 10m (along strike) by 15m (vertical) by 5m blocks, with the vein grade, hanging wall grade, foot wall grade, and vein width interpolated for each block using Ordinary Kriging, a linear geostatistical estimation method that assigns weights such that the minimum estimation variance is obtained. The mined out and mineralized volumes (main vein, hanging wall, and foot wall) of each block were also estimated based on the volume of the modelled 3D wireframes inside each block.

17.2. 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. Manual verification of all historical data was carried out over 3 months in 2010-2011.

17.3. Data Verification and Validation

All data entries are subjected to a series of system checks and file transfers before these are incorporated into the final database to be used in estimation. Assay results are encoded in a spreadsheet along with its assay result and sample chapa number. The samples are then classified as hanging wall, footwall, or main vein based on the geologic face-mapping results. Sample locations are initially based on compass and tape mapping, but are then later reconciled with the survey department to obtain the final locations.

17.4. Ore Reserve Estimation Method Used

Ore reserve estimation was carried out on the same resource block models generated to come up with the 2021 resource estimates. After modelling 3D wireframes for the veins and the adjacent low-grade mineralized wall rocks using underground face sample and drilling data, these were used to identify the mineralized blocks in the model. A block size of 10m (along strike) by 15m (vertical) by 5m (across strike) was used, following the stoping block dimensions guiding current mining operations. This was done to ensure that the grade variability and hence the level of selectivity in the model would reflect the same level as that in actual operations. While entire blocks are selected, only the volumes of the mineralized material in each are considered during estimation. The mineralized volume within each block is determined based on the proportion of the block inside the modelled main vein, hanging wall, and foot wall wireframes. Mined out volumes are estimated in a similar manner, using the wireframe models for the mined out portions. The vein grade, hanging wall grade, foot wall grade, and vein width per block are then individually interpolated from the sample data using the geostatistical estimation method known as ordinary kriging. The geostatistical approach was selected as it gives an objective basis for establishing the estimation parameters. One of these is the the search ellipse radius, which effectively sets the area of influence of each sample. Further, ordinary kriging considers the anisotropy or the modelled continuity along various directions (e.g., continuity along strike vs down dip) in assigning weights to the samples, and also effectively declusters any closely-spaced positions. The mined out volume is then subtracted from the sum of the vein, hanging wall, and foot wall volumes to obtain the remaining mineralized volume for each block. The block grade is then taken to be the weighted average of the kriged vein grade, hanging wall grade, and foot wall grade using the remaining volumes of each component as weighting factors.

Reserve estimation adopted the same block dimensions used in resource modelling as these are considered to adequately reflect the degree of selectivity of the mining methods practiced by operations. For a block to be converted into reserves, it must meet the following parameters:

- Classified as either measured or indicated
- Grade must be above the cut-off
- Within 30m of an existing development drive

17.5. Ore Reserve Estimations

17.5.1. Ore Specific Gravity/Density

Previous estimates were reported using a uniform specific gravity of 2.6. This uniform value was also adopted in this report. Specific gravity measurements taken by the in-house laboratory gave an average of 2.76 across the 28,388 samples in the master database, with vein samples averaging a bit higher at 2.79 compared to wall rock samples which averaged to 2.73, likely due to the abundance of sulfides in the vein material. The global average is 6% higher and hence indicates that the assumed specific gravity is a conservative value.

17.5.2. Mining Plans/Mining Recovery/Dilution Factor and Mining Losses

The veins considered in the study typically have vein widths between 1 to 2m. Considering that the designated mining widths are around 2 to 3m, the actual material mined includes material from the adjacent wall rocks, hence, the grade of each block has to be diluted. Given that there are enough samples in the database to define the mineralization and grade of the immediate wall rocks, instead of assuming that the diluting materials are barren, the kriged hanging wall and foot wall grades were used to come up with the block grade. The volumes from the modelled HW and FW wireframes, both modelled at a uniform 0.5m width, during resource estimation were taken as representative of the volume of diluting material. The diluted grade of each block is then estimated as follows:

$$Grade = \frac{(Grade_{MV} * Vol_{MV}) + (Grade_{HW} * Vol_{HW}) + (Grade_{FW} * Vol_{FW})}{Vol_{MV} + Vol_{HW} + Vol_{FW}}$$

The diluted tonnage is then given by:

$$Tonnage = (Vol_{MV} + Vol_{HW} + Vol_{FW}) * 2.6$$

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.

17.5.3. Relevant Production Cost Considered

Please refer to Financial Aspects (17.6)

17.5.4. 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 fed 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 the mill feed.
C. Recovery rates (%) – The amount of metals recovered in the beneficiation process, usually expressed in percent.
D. Conversion of grams to ounces – Metal prices are usually expressed in US dollars per ounce (USD/oz) while mill heads reported are n grams per tonne (gpt); the conversion factor of 1 troy ounce is to 31.1035 grams is therefore utilized for calculations.
E. Metal sales price – Metal sales price is defined as the monetary value or equivalent payment for a particular amount of metal. Currently, gold and silver, are produced by the Maco project. Prices of the two metals are controlled by the London Metal Exchange (LME), a 24-hour market where trading of these metals takes place. Each day the LME announces a set of official prices (*i.e.*, for gold and silver). Trading at the LME is highly liquid and the metals industry has confidence that the prices properly reflect the current supply/demand situation as well as the market‘s projections of future supply and demand.
F. Economic Payability – Payability, which is usually expressed in percent, is defined as the ability of the said material in percentage, for this instance, the gold, to turn a profit.

Revenue can be calculated as follows (in reference to the parameters above):

Revenue (Gold) = (((A * B * C)/31.1035) * E * F)

Revenue (Silver) = (((A * B * C)/31.1035) * E * F)

17.5.5. 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 = the cost incurred of the project directly and indirectly related to operations
- Metal recovery = the amount of materials recovered in the beneficiation process, usually expressed in percent
- Metal sales price = defined as the monetary value or equivalent payment of a particular metal
- Conversion Factor = used to convert the mill heads which are usually reported in grams per tonne (gpt) into ounces, the units in which metal prices are usually declared; 1 troy ounce is equal to 31.1035 grams

- Excise Tax = tax imposed on goods manufactured or produced in the Philippines for domestic sale or consumption, currently set at 4% of the value of mineral production
- Tonnes milled = refers to the amount of material (in tonnes) being fed to the mill plant, (secondary crushing to ball/rod mill)
- Economic Payability - defined as the ability of the said material in percentage, for this instance, the gold, to turn a profit

17.6. Ore Reserve Classification Used

Mining blocks are classified according to the reporting guidelines in the 2007 version of the PMRC (Philippine Mineral Reporting Code). Identified resrve blocks are classified either as Proven or Probable depending on the resource classification.

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.

Probable Reserves are derived as either extension blocks of the Proven Reserves within the Measured Resource or from the Indicated Resource.

17.7. Ore Reserve Estimates

Reserve estimates are tabulated in the tables found below, a cutoff of 2.0 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

TOTAL RESERVE

At 2.0 gpt Au Cut-off	Probable		
Vein	Tonnage	Grade	Ounces
Probable	2,976,000	4.8	454,595
Proved	2,772,000	5.1	458,971
TOTAL	**5,748,000**	**4.9**	**913,566**

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PROBABLE

At 2.0 gpt Au Cut-off	Probable		
Vein	Tonnage	Grade	Ounces
BHWS	292,000	5.7	53,500
BHWS Split	24,000	5.0	3,900
Bibak	53,000	4.7	8,000
Bonanza MV	78,000	3.9	9,800
Don Calixto MV	152,000	6.0	29,300
Don Calixto Split	5,000	5.7	900
Don Fernando MV	98,000	6.9	21,700
Don Joaquin MV	196,000	5.7	35,900
Don Mario MV	108,000	5.2	18,100
Jessie MV	121,000	5.8	22,600
Maria Inez HWS	123,000	3.1	12,300
Maria Inez MV	158,000	3.6	18,300
Masara HWS	1,000	3.5	100
Masara MV	115,000	5.0	18,500
Masarita2 FWS	36,000	6.0	6,900
Masarita2 MV	134,000	3.8	16,400
Sandy-Sandy North MV	524,000	4.2	70,800
SDN 107S Split	26,000	3.2	2,700
SDN 110S Split	69,000	5.3	11,800
SDN 120S Split	36,000	4.1	4,700
SDN 132S Split	50,000	6.1	9,800
SDN 60S Split	36,000	7.6	8,800
SDN 90S Split	6,000	3.9	800
SDN2	285,000	4.6	42,100
SDN2 Split	44,000	3.4	4,800
SDN3	33,000	2.7	2,900
SDN4	38,000	3.4	4,200
Wagas MV	135,000	3.5	15,200
TOTAL	**2,976,000**	**4.8**	**455,000**

PROVED

At 2.0 gpt Au Cut-off	Proved		
Vein	Tonnage	Grade	Ounces
BHWS	216,000	6.4	44,400
BHWS Split	16,000	5.4	2,800
Bibak	49,000	5.0	7,900
Bonanza MV	217,000	5.1	35,600
Don Calixto MV	146,000	6.4	30,000
Don Calixto Split	7,000	5.1	1,100
Don Fernando MV	89,000	7.1	20,300
Don Joaquin MV	140,000	5.4	24,300
Don Mario MV	98,000	5.9	18,600
Jessie MV	54,000	6.7	11,600
Maria Inez HWS	102,000	3.8	12,500
Maria Inez MV	102,000	3.8	12,500
Masara HWS	16,000	6.2	3,200
Masara MV	106,000	5.6	19,100
Masarita2 FWS	11,000	6.5	2,300
Masarita2 MV	120,000	4.2	16,200
Sandy-Sandy North MV	607,000	4.6	89,800
SDN 107S Split	19,000	4.0	2,400
SDN 110S Split	104,000	6.0	20,100
SDN 120S Split	78,000	3.8	9,500
SDN 132S Split	85,000	6.1	16,700
SDN 60S Split	30,000	7.2	6,900
SDN 90S Split	28,000	4.5	4,100
SDN2	229,000	4.7	34,600
SDN2 Split	26,000	3.9	3,300
SDN3	6,000	2.3	400
SDN4	13,000	3.6	1,500
Wagas MV	58,000	3.9	7,300
TOTAL	**2,772,000**	**5.1**	**459,000**

The total combined proven and probable reserves is 5,748,000 tonnes grading 4.9 g/t gold, accounting for a total of 914,000 in-situ ounces of gold and 731,000 recoverable ounces of gold. The ore reserve is derived from, and not additional to, the declared Mineral Resource.

18. INTERPRETATION AND CONCLUSION

Synthesis of all Data

The level of accuracy used herein is sufficient to consider this "**2021 Report On Economic Assessment And Ore Reserve Estimation Of Maco Epithermal Gold Deposits Within MPSA-225-2005-XI"** technically feasible as well as economically justifiable.

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 $1,500/ oz Au is assumed for this study.

RESOURCE / RESERVE

The estimated ore reserve was based on a cut-off grade of 2 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
- Dilution is included in tonnage and grade calculation
- SMU horizontal dimension is 10 meters
- SMU vertical dimension is 15 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-XI, MPSA-234-2007-XI, 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 537,089 ounces of gold (from 2005 to 2020) 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 2005-2020 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. 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 4.5m.x 4.0m 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
- Waste rock dilution at zero-grade based on the vein width
- milling recovery of 80%

ENVIRONMENTAL / SOCIAL

- The mine has 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 is 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 5.748 M tons @ 4.9 g/t Au
    - Replenished as exploration and mine development progresses
- Mined Ore / Milled Ore over the projected mine life
    - Stoped ore: 3,796,304 tons @ 4.38 g/t
    - Development Ore: 1,879,258 tons @ 3.81 g/t
- Development over the projected mine life of:
    - Off vein Development: 35,641m
    - On vein Development: 66,303m
- 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: 4.0% of Gross Revenue
    - Business Tax: 2.2% of Gross Revenue
    - Income Tax: 30.0% of Net Income
- Production data:
    - Dilution is included in tonnage and grade calculation
    - Mill Recovery: 80 %
    - Gold Price: $ 1,500 / Oz
    - Foreign Exchange: Php 50 / $1.00
    - Payability on Gold Sales: 99 %

18.1. 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.

18.2. 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 5.748 million tons at 4.9 g of Au / t is economically minable.

18.3. 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 5.748 million tons at 4.9 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 5-year mine-life. The ore reserve of 5.748 million tons at 4.9 g Au/t is therefore economically minable.

19. RECOMMENDATIONS

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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