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TECHNICAL REPORT FOR THE DOLORES PROPERTY, CHIHUAHUA, MEXICO

In accordance with the requirements of National Instrument 43-101 "Standards of Disclosure for Mineral Projects" of the Canadian Securities Administrators

Effective date: June 30, 2022

Prepared By:
M. Wafforn, P.Eng.
C. Emerson, FAusIMM
A. Delgado, P.Eng.

1 SUMMARY

1.1 Introduction

This Technical Report has been prepared by Pan American Silver Corp. (Pan American or PAS), in accordance with the disclosure requirements of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101), to disclose relevant information about the Dolores Property (Property or Dolores). The report is an update to and replaces the “Technical Report for the Dolores Property, Chihuahua, Mexico”, which had an effective date of December 31, 2016, and was prepared by Pan American (the 2016 PAS Technical Report). The main purpose of this report is to provide an update on the Property, the Dolores mine operation and report the current Mineral Resources and Mineral Reserves.

The effective date of this Technical Report is June 30, 2022. The effective date of the Mineral Resource and Mineral Reserve estimates is June 30, 2022. The Mineral Resources and Mineral Reserves were depleted for mining and adjusted for stockpile inventories up to June 30, 2022.

1.2 Property description and ownership

The Property on which the Dolores mine is located is in the state of Chihuahua, Mexico, approximately 250 kilometers (km) west of the city of Chihuahua, at 29°00’ North, 108°32’ West. Pan American has 100% ownership of the Dolores mine and the mining concessions, through its wholly-owned subsidiary Compañía Minera Dolores S.A. de C.V. The Property mineral rights are held under three contiguous mining concessions with a total area of 27,700 hectares (ha).

Ejido Huizopa owns the majority of the surface rights on the Property. Pan American has surface rights agreements with Ejido Huizopa which allows for irrevocable access and the right to carry out exploration and mining activities for a term of 15 years with a right to extend for a further 15 years. The initial 15-year period extends until 2024. Discussions on the terms of the 15-year extension are already in progress

Water for the operations is sourced from wells in the pit, the nearby Tutuaca River, and the Chabacan dam, depending on the year and requirements. Water extraction permits are in place to ensure water requirements are met. A 115 kilovolts (kV), 98 km long power line is connected to the Mexican national grid supplies power to the mine and is sufficient for the current needs of the operation. Back-up power is available on site by six 1,800 kilowatt (kW) Cummins and two 1,200 kW Caterpillar diesel generators. Infrastructure includes the typical components of an operating open pit, including the mine workings, the processing facilities, heap leach pads, medium grade ore stockpiles, waste rock storage facilities, workshops, laboratories, storage facilities, offices, drill core and logging sheds, water and power lines, access roads, a light aircraft landing strip, an employee and construction camp, and recreational facilities.

1.3 Geology and mineralization

The Property is located within the Sierra Madre Occidental volcanic belt, an arc formed by eastward subduction of the Pacific Plate. The Sierra Madre is a metallogenic terrane well known for its epithermal precious metal deposits. The lower part of the arc comprises late Cretaceous to early Tertiary calc-alkaline batholiths and equivalent volcano sedimentary rocks referred to as the ‘Lower Volcanic Series’. They represent magmatic activity about 80 to 40 million years ago and were followed by two periods of major ignimbrite eruption in the early Oligocene and early Miocene. Collectively these constitute the ‘Upper Volcanic Series’.

The most important faults on the Property, from west to east, are the Chupacabras, San Francisco and East Faults. The San Francisco Fault and its footwall host most of the mineralization on the Property. The immediate footwall and hangingwall of the San Francisco Fault form a 500 metre (m) wide northwest-striking corridor of igneous intrusions broadly following the fault.

The principal and most important alteration is silicification, which increases with the presence of mineralization, and ranges from weak to strong, pervasive, massive, residual, and pseudo-vuggy.

Silver and gold mineralization at Dolores is hosted in north-northwest trending hydrothermal breccias and sheeted vein zones in the order of 5 m to 10 m wide. Most high-grade mineralization occurs along three major structures that provided the conduit for metal-bearing fluids. Silver and gold mineralization identified on the surface at Dolores lies over an area 4,000 m long and up to 1,000 m wide. Hydrothermal breccias carry the highest silver and gold grades and pass outward into vein stock works. The veins are thin, rarely over 30 millimetres (mm), and tend to occur as sheeted swarms. Economically mineable grades occur where the veins are sufficiently closely spaced.

Dolores is a low sulphidation epithermal deposit with strong structural control.

1.4 Drilling, sampling, and verification

Since Pan American acquired the Property, staff and consulting structural geologists have carried out near mine surface geological and structural mapping, and surface sampling on the continuity of the San Francisco and Alma Maria structures.

Most of the drilling on the Property centers over the strike length of the currently defined Mineral Resources and Mineral Reserves. A total of 1,820 drillholes for approximately 433,600 m, of which over 359,000 m consists of diamond drilling, have been drilled on the Property. Pan American drilled 693 drillholes (approximately 145,000 m) representing 38% of diamond drilling and 33% of the total drillholes on the Property. All underground drilling (275 diamond drillholes for 43,700 m) has been carried out by Pan American.

Drillhole collar locations for both diamond and reverse circulation (RC) methods are set up by the mine survey department prior or to drilling. Final collar coordinates are surveyed by the mine surveyors using total station methods on completion of the drillhole. Downhole surveys are carried out using a Reflex Multi-shot instrument on average every 25 m down the hole.

Diamond drillholes are logged, photographed, halved, and sampled in a secure core logging facility at the Property. The drill core is cut in half with a diamond bladed saw, and samples are selected with respect to geological features, in 2 m intervals or less.

RC drillhole samples are taken using a rig-mounted automatic cyclone sampling system which ensures a representative sample split for assay. In addition to the sample for assay a chip sample is also taken from each sample interval and stored in a chip box for geological identification and record.

Samples are collected weekly from site by laboratory staff and driven to SGS at Durango or Actlabs at Zacatecas for sample preparation and analysis.

Since acquiring the Property in 2012, Pan American has implemented an industry standard quality assurance / quality control (QA/QC) program which includes the submission of certified reference materials (CRMs), blanks, and duplicate samples to the laboratory. QA/QC results are reviewed regularly to ensure that appropriate and timely action is taken in the event of a failure. The insertion rate for QA/QC samples is 5% each of blanks, CRMs, and duplicate samples.

Data verification is undertaken by the Qualified Persons (QPs) who visit the Property regularly and undertake reviews of the processes and practices in their respective discipline.

1.5 Metallurgical testwork

Following acquisition of the mine in April 2012, Pan American established a metallurgical test program. Pan American selected 521 drill core samples that represented the deposit in terms of grade, ore type (oxidation state), and lithology in the proportions expected to be processed during the life-of-mine (LOM). Test work included cyanidation column leach tests, grinding and comminution studies, filtration tests, compaction and permeability tests. In addition, monthly production composites of the heap leach material and pulp agglomerates are collected, and column leach test are carried out as part of the metallurgical test-work quality control.

1.6 Mineral Resources

Pan American updates Mineral Resources on an annual basis following reviews of metal price trends, operational performance and costs experienced in the previous year, and forecasts of production and costs over the LOM. Infill and near-mine drilling is conducted as required through the year. The drillhole data cut-off date for the commencement of the current geological interpretation was April 30, 2022 and the effective date of the Mineral Resource estimate is June 30, 2022.

The Mineral Resource estimate was prepared by Pan American staff under the supervision of, and reviewed by Christopher Emerson, FAusIMM, Vice President, Business Development and Geology of Pan American, who is a “Qualified Person” as that term is defined by NI 43-101 (QP). They have been estimated in accordance with the CIM Estimation of Mineral Resources and Mineral Reserves, Best Practice Guidelines (2019), and reported according to the CIM Definition Standards (2014).

Table 1.1 tabulates a summary of the total Mineral Resources for the Property as at June 30, 2022. This total includes contributions from the open pit, underground and stockpile locations and are also a sum of direct heap leach and pulp agglomeration material which have different modifying factors discussed in Section 14.11. The cut-off value applied varies according to mining type and process route. These are listed in the footnotes to the table.

There are no known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the potential development of the Mineral Resources. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. Mineral Resources reported here are in addition to Mineral Reserves.

Table 1.1 Summary of Mineral Resources as at June 30, 2022

Classification	Tonnes	Grade		Contained metal	
	Mt	Ag g/t	Au g/t	Ag Moz	Au koz
Measured	2.1	30	0.53	2.1	36.5
Indicated	0.8	57	1.13	1.5	29.7
Measured + Indicated	**3.0**	**38**	**0.70**	**3.6**	**66.2**
Inferred	**2.5**	**29**	**0.92**	**2.4**	**74.4**

Notes:
- CIM Definition Standards (2014) were used for reporting the Mineral Resources.
- Mineral Resources exclude those Mineral Resources converted to Mineral Reserves.
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
- Mineral Resource estimates were prepared under the supervision of or were reviewed by Christopher Emerson, FAusIMM, Vice President, Business Development and Geology of Pan American.
- Cut-off values use a value/tonne calculation. The value/tonne is based on a combination of metal price and individual metal recoveries which are variable throughout the deposit.
- Mineral Resources have been reported using pulp agglomeration and / or heap leaching metal recovery and cost parameters.
- The cut- offs used to report the open pit are a value/tonne of $12.30 for Heap Leach and $26.50 for pulp agglomeration.
- The cut-off used to report the underground area is a value/tonne of $73.5, and all material is assumed to be processed through the pulp agglomeration plant.
- Metal prices used are $22 per ounce of silver and $1,700 per ounce of gold.
- Mineral Resources were constrained by designs and other modifying factors to demonstrate reasonable prospects of economic extraction.
- The drillhole database had a cut off date of April 30, 2022.
- Totals may not add up due to rounding.

1.7 Mineral Reserves

Pan American updates Mineral Reserves annually following reviews of metal price trends, operational performance and costs experienced in the previous year, and forecasts of production and costs over the life of the mine. The Mineral Reserve is based on measured and indicated Mineral Resources estimated as at June 30, 2022. The effective date of the Mineral Reserve estimate is June 30, 2022. No other new material information has become available between the effective date and the signature date given on the certificates of the QPs.

Mineral Reserves were prepared by Pan American staff under the supervision of, and reviewed by Martin Wafforn, Senior Vice President, Technical Services and Process Optimization of Pan American, who is a QP. They have been estimated in accordance with the CIM Estimation of Mineral Resources and Mineral Reserves, Best Practice Guidelines (2019), and reported according to the CIM Definition Standards (2014). The Mineral Reserve estimates conform to CIM Definition Standards referred to in NI 43-101. All design and scheduling have been completed using the Mineral Resource model and estimate described in Section 14.

Mineral Reserve estimates are based on assumptions that include mining, metallurgical, infrastructure, permitting, taxation, and economic parameters. Increasing costs and taxation and lower metal prices will have a negative impact on the quantity of estimated Mineral Reserves. There are no other known factors that may have a material impact on the estimate of Mineral Reserves.

The estimated Proven and Probable open pit Mineral Reserves for the Dolores deposit are summarized in Table 1.2.

Table 1.2 Dolores Mineral Reserves as at June 30, 2022

Location	Category	Tonnes	Grade		Contained metal	
		Mt	Ag g/t	Au g/t	Ag Moz	Au koz
Open pit	Proven	9.2	22	0.70	6.4	205.3
	Probable	4.1	18	0.60	2.4	77.7
	Total	**13.2**	**21**	**0.66**	**8.8**	**283.0**
Stockpiles	Proven	3.7	18	0.25	2.2	30.0
	Probable				-	-
	Total	**3.7**	**18**	**0.25**	**2.2**	**30.0**
Total	Proven	12.9	21	0.57	8.6	235.4
	Probable	4.1	18	0.60	2.4	77.7
	Total Reserves	**17.0**	**20**	**0.57**	**11.0**	**313.1**

Notes:
- CIM Definition Standards (2014) were used for reporting the Mineral Reserves.
- Mineral Reserves are in addition to Mineral Resources.
- Figures in the tables may not compute exactly due to rounding.
- Metal prices used are $19.00 per ounce of silver and $1600 per ounce of gold.
- Mineral Reserves are reported on a 100% ownership basis. Pan American owns 100% of Dolores.
- Cut-off values use a value/tonne calculation. The value/tonne is based on a combination of metal price and individual metal recoveries which are variable throughout the deposit.
- The cut-offs used to report the open pit are a value/tonne of $12.30 for Heap Leach and $26.50 for pulp agglomeration.

1.8 Mining

Mining at Dolores has been ongoing since 2008 using conventional open pit methods with excavators, shovels, loaders, and haul trucks. Ore grade control drilling is carried out using angled RC drilling to provide closer spaced sample data for a grade control estimate, which is used to mark out the ore and waste mining boundaries. The grade control holes are oriented perpendicular to the strike of the deposit on sections spaced every 15 m along strike and every 10 m to 15 m across strike. Drillholes are approximately 43 m long, which results in a nominal vertical span of 30 m, equal to four bench heights. The drillhole pattern is offset with 25% of the holes drilled from each bench to provide full coverage. The RC drillholes are logged for lithology and oxidation and sampled every 2 m.

Ore and waste material is drilled and blasted using 135 mm diameter holes, drilled in a nominal pattern of 8.5 m deep blast holes spaced 4.5 m along strike and 4.5 m across strike. Explosives used are ammonium nitrate fuel oil (ANFO). Ore and waste are usually blasted separately, and a blast movement monitoring system is used to manage ore loss, dilution, and material misclassification.

The underground mine, which was operating concurrently with open pit mining until April 30, 2022 utilizing longhole open stoping, is now in care and maintenance.

1.9 Mineral processing and recovery methods

Run-of-mine (ROM) ore is trucked to a crushing plant and crushed to a particle size of 80% passing (P_{80}) 6.7 to 9.2 mm at a nominal rate of 15,860 tonnes per day (tpd). The crushed ore product is conveyed to the leach pads via an overland conveyor system and placed on the pad using portable grasshopper conveyors and a radial stacking system. Drip and sprayer systems apply sodium cyanide solution to the heap leach pads for precious metal leaching.

ROM high-grade ore is delivered to the pulp agglomeration circuit where it is crushed in a separate two-stage crushing circuit followed by two-stage grinding to P_{80} 425 microns (µm) at an average rate of 5,440 tpd. Pebble lime and sodium cyanide solution are added at the milling circuit to initiate leaching. The milled slurry is filtered and blended with crushed material from the heap leach circuit along with cement before being drum agglomerated and combined with the heap leach material for additional metal recovery at the heap. Filtrate from the filters is clarified and pumped to the Merrill-Crowe plant along with pregnant leach solution from the heap.

The pregnant leach solution containing the dissolved silver and gold is processed through the Merrill-Crowe circuit to precipitate the silver and gold, and then the precipitate is pressed and dried. The dried material is melted in a furnace to form doré bars. The mine operates a closed-circuit processing system without tailings facilities.

1.10 Infrastructure

The mine infrastructure comprises the open pit, processing facilities, heap leach pads, medium grade ore stockpiles, waste storage facilities, conveyor systems, ponds, a power generation plant, a 115 kV power line connection to the national grid, and maintenance shops and warehouses. The pulp agglomeration plant comprises of crushing, grinding, thickening, filtration, mixing, agglomeration, reagent, and auxiliary facilities. The operating mine is mature and site infrastructure including site roads are fully developed to support the existing mine production of 34 million tonnes per annum (Mtpa).

1.11 Environmental

The most significant environmental issues at Dolores include surface disturbance, heap leach pad and waste dump stability, and reclamation liabilities associated with routine mine operations. Issues related to the stability and containment system of heap leach Pad 1, which developed prior to Pan American's acquisition of the Property, have been resolved by re-constructing the pad. The new heap leach Pad 1 was placed into operation in 2021.

An extensive program of community engagement activities is in place, including information sessions, infrastructure works, and educational and training programs for local people that have resulted in the establishment of several small businesses. Unskilled workers are sourced from nearby small villages, and the company has recruiting and training programs in place to develop the mining skills of the local workforce.

There are no known environmental or social issues that could materially impact the mine's ability to extract the Mineral Resources or Mineral Reserves.

1.12 Capital and operating costs

The estimated operating costs are based on experience at the Dolores mine. Sustaining capital expenditures include pre-stripping, equipment replacement and heap leach pad expansions. Further capital may be required if economically justified or if there are substantial increases to the Mineral Reserves. Pan American estimates that sustaining capital expenditures in 2022 will be $28.5 million primarily for pre-stripping of phase 10a and the construction of heap leach pad capacity. Future sustaining capital costs will be dependent on requirements and reserve growth, if any. The cost of constructing heap leach pad capacity is estimated to average $2.62 per tonne over the remainder of the Mineral Reserves. For ROM heap leach ore, the cost of processing is estimated to average $6.20 per tonne plus $3.47 per tonne for General and Administration (G&A). For Pulp agglomeration ore, the cost of processing is estimated to average $20.40 per tonne plus $3.47 per tonne for G&A. Open pit mining costs are estimated to average $2.05 per tonne with some variations due to haulage distances for the different phases and elevations.

1.13 Conclusions and recommendations

There are no known significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the Mineral Resource and Mineral Reserve estimates. Pan American routinely conducts reconciliation of the reserve model to the grade control model and to the heap leach feed conveyor weight meter and sampler to monitor actual mine versus model performance. Reconciliation results are within acceptable tolerance limits for grade, tonnage, and metal.

The mining operations are established with a good understanding of the mining parameters and cost structure.

Overall, modelled recoveries for gold and silver at Dolores are being achieved. Modeled recoveries, monthly quality column composites, and actual production are largely in agreement.

The most significant environmental liabilities include surface disturbance and reclamation liabilities and issues related to the stability and containment system of the heap leach pads. Only a small portion of the waste is potentially acid generating and no specific measures to manage waste or ore deposition are required.

There are no known environmental or social issues that could materially impact the mine's ability to economically extract the Mineral Resources or Mineral Reserves.

In the way of recommendations, Pan American intends to continue with annual drilling programs and updates to the geological interpretation. Reviews of the geological interpretation against grade control drilling will continue to be undertaken on a regular basis to verify the reliability of the Mineral Resource and Mineral Reserve estimate.

Pan American will continue to optimize blasting patterns, and monitoring blast movements and pit slope stability. Recommendations have been made for additional geotechnical work (Walker, 2017), including:

- Operationally minimize the blasting overbreak and continue work to achieve design bench face angles.
- Continually observe the orientation, length, and location of continuous major structures as mining progresses and extend the geological and geotechnical model beyond the ultimate pit crest to understand the behaviour of the overall slopes.

In addition, Pan American plans to:

- Continue monthly composites leaching and load / permeability tests;
- Review higher cyanide consumption from material mined in recent years and impact in long term cost of leaching; and
- Conduct an independent review of the geotechnical performance and designs relating to the heap leach facilities.

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ABBREVIATIONS AND ACRONYMS

Abbreviations & acronyms	Description
$	United States dollar
$/oz	Dollar per ounce
$M	Million dollars
%	Percentage
°	Degree
°C	Degree Celsius
µm	Micron
Actlabs	Actlabs at Zacatecas
AMC	AMC Mining Consultants (Canada) Ltd.; AMC Consultants Pty Ltd
ANFO	Ammonium nitrate fuel oil
AuEq	Gold equivalent
COG	Cut-off grade
cm/s	Cubic meters per second
CRM	Certified reference material
DE	Diatomaceous Earth
DSO	Deswik Stope Optimizer
Echo Bay	Echo Bay Mines
FW	Footwall
g	Gram
g/t	Grams per tonne
G&A	General and Administration
ha	Hectare
ID^2	Inverse distance squared
kg	Kilogram
kg/t	Kilograms per tonne
km	Kilometre
km^2	Squared kilometre
koz	Thousand ounces
kV	Kilovolt
kVA	Kilovolt-ampere
kW	Kilowatt
LLD	Lower limit of analytical detection
LOM	Life-of-mine
m	Metre
m^3	Cubic metre
m^3/h	Cubic meters per hour
mg/L	Milligram per litre
MIA	Environmental Impact Study or Manifestation
Minefinders	Minefinders Corporation Ltd.
MLI	McClelland Laboratories Inc.

Abbreviations & acronyms	Description
mm	Millimetre
Moz	Million ounces
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Megawatt
NI 43-101	National Instrument 43-101
NSR	Net Smelter Return
OK	Ordinary kriging
OP	Open pit
P_{80}	80% Passing
PAS, Pan American	Pan American Silver Corp.
ppm	Parts per million
PROFEPA	Mexican Federal Environmental Protection Authority
Property	Dolores Property
QA/QC	Quality assurance and quality control
QP	Qualified Person
RC	Reverse circulation drilling
ROM	Run-of-mine
RPD	Relative paired difference
RPEEE	Reasonable prospects for eventual economic extraction
RQD	Rock quality designation
SD	Standard deviation
SEMARNAT	Mexican Secretariat of Environment and Natural Resources
SGS	SGS at Durango
SRCE	Standardized Reclamation Cost Estimator
t	Tonne
TMF	Tailings Management Facility
tpd	Tonnes per day
UG	Underground
USA	United States of America

2 INTRODUCTION

2.1 General and terms of reference

This Technical Report has been prepared by Pan American, in accordance with the disclosure requirements of NI 43-101, to disclose relevant information about the Property. The report is an update to and replaces the 2016 PAS Technical Report. The main purpose of this report is to give an update on the Property, the Dolores mine operation and report the current Mineral Resources and Mineral Reserves.

The effective date of this Technical Report is June 30, 2022. The effective date of the Mineral Resource and Mineral Reserve estimates is June 30, 2022. The Mineral Resources and Mineral Reserves were depleted for mining and include updates for stockpile inventories up to June 30, 2022. No new material information has become available between these dates and the signature date given on the certificates of the Qualified Persons (QPs).

2.2 The Issuer

Pan American is a silver mining and exploration company listed on the Toronto (TSX:PAAS) and NASDAQ (NASDAQ:PAAS) stock exchanges. It has a diversified portfolio of mining and exploration assets located throughout the Americas, which include 10 operating mines.

2.3 Report authors

Table 2.1 provides the names, details, and responsibilities of the QPs (as defined by NI 43-101) who prepared this Technical Report. The QPs are not independent of Pan American.

Table 2.1 Responsibilities of each QP

Qualified Persons responsible for the preparation and signing of this Technical Report						
Qualified Person	Position	Employer	Independent of Pan American	Date of last site visit	Professional designation	Sections of report
Martin Wafforn	Senior Vice President, Technical Services and Process Optimization	Pan American Silver Corp.	No	October 19, 2021	P.Eng.	2 - 5, 15, 16, 19, 20, 21, 22, 24, and 1.1, 1.7, 1.8, 1.11, 1.12, 12.2, 25.1, 25.3, 25.4, 26.3
Christopher Emerson	Vice President, Business Development and Geology	Pan American Silver Corp.	No	October 19, 2021	FAusIMM	6 - 11, 14, 23, 27 and 1.2, 1.3, 1.4, 1.6, 1.13, 12.1, 12.4, 26.1,
Americo Delgado	Vice President, Mineral Processing, Tailings & Dams	Pan American Silver Corp.	No	April 26-28,2022	P.Eng.	13, 17, 18, and 1.5, 1.9, 1.10, 12.3, 25.2, 26.2

Those who have assisted the QPs in the preparation of this report are listed in Table 2.2.

Table 2.2 Other experts who have assisted the QPs

Expert	Position	Employer	Independent of Pan American	Visited site	Sections of report
Mo Molavi	Director / Principal Mining Engineer	AMC	Yes	No	All
Mort Shannon	General Manager / Principal Geologist	AMC	Yes	No	2 – 12, 14
James Stoddart	Principal Mining Engineer	AMC	Yes	No	13, 15 - 17
Dante Juarez	Director of Geology, Mexico and Central America	Pan American Silver Corp.	No	Yes	2 – 12, 14
Mathew Andrews	Vice President, Environment	Pan American Silver Corp.	No	Yes	20
Carl Defilippi	Engineering Manager	KCA	Yes	Yes	13, 17
Caleb Cook	Project Engineer/ Project Manager	KCA	Yes	No	13, 17

Note: AMC refers to AMC Mining Consultants (Canada) Ltd. or AMC Consultants Pty Ltd in the case of James Stoddart. KCA refers to Kappes, Cassiday & Associates.

2.4 Sources of information

Unless otherwise stated, information, data, and illustrations contained in this report or used in its preparation have been provided by Pan American for the purpose of this report. The prior Technical Report for the Property is the "Technical Report for the Dolores Property, Chihuahua, Mexico", with an effective date of December 31, 2016, prepared by Pan American (2016 PAS Technical Report).

2.5 Other

Inspections of the Property are carried out regularly by the following QPs.

Mr. Wafforn visits the Property two or three times annually as part of his duties with Pan American. His most recent site visits were on August 13-14, 2021, and October 19, 2021. During these visits, Mr. Wafforn reviewed the operational open pit mine plan, actual mine operation data, the development advance and plans for the underground mine, consultant's geotechnical reports, mine budget plans, reserve to grade control to actual reconciliations, the site layout and logistics for mining and processing, safety protocols and indicators, the environmental layout, and general business performance.

Mr. Emerson most recently visited the Property on August 13-14, 2021, August 23, 2021, and October 19, 2021. During these visits Mr. Emerson reviewed the exploration drilling, sampling, and sample security protocols, drill core and the core cutting and storage facilities, bench and surface mapping, cross sections, the operational mine plan, actual mine operation data, grade control protocols, mining leases, site access, surface rights information, and general business performance.

Mr. Delgado conducts regular visits, and visited the Property on April 26-28, 2022, March 9-11, 2020, and February 28, 2018, and March 1-2, 2018. During those visits, Mr. Delgado inspected the heap leach facilities and water dam, and reviewed stacking plans, irrigation rates, pulp agglomeration performance, agglomerates, permeabilities, Merrill-Crowe production rates, monthly composites, metallurgical balance, inventory, operational data, metallurgical lab testing, and general business performance.

Unless otherwise stated, all units are metric and currencies are expressed in United States dollars. Property data coordinates are in a local coordinate based on a transformation relative to the Mexico 97 geoid.

This report has an effective date of June 30, 2022.

3 RELIANCE ON OTHER EXPERTS

The QPs responsible for this report have relied on the following internal expert within the organization for input to certain sections of this report for which they do not have specific expertise and have taken appropriate steps, in their professional judgement, to ensure that the work, information, or advice that they have relied upon is sound:

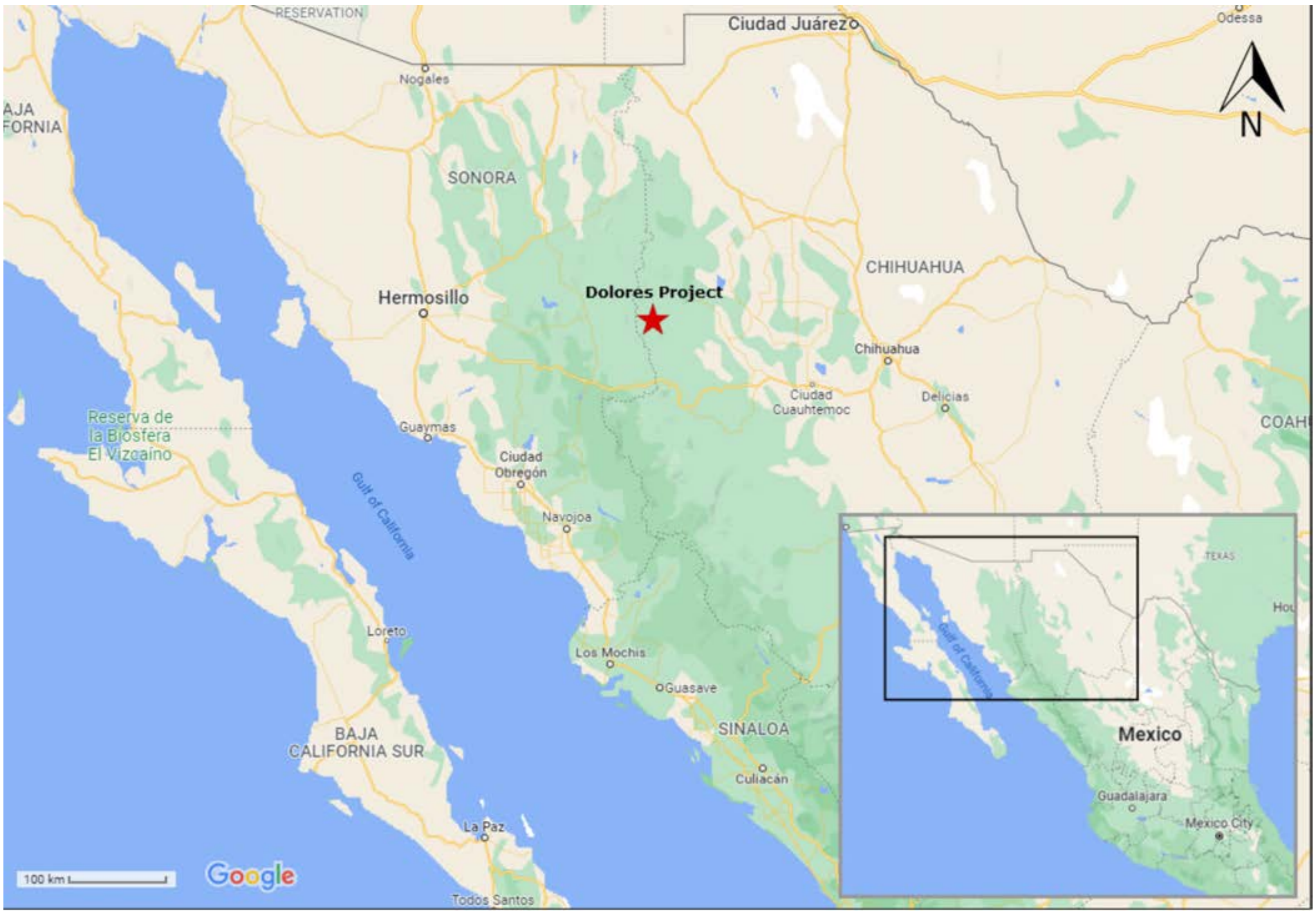
Mathew Andrews, Vice President Environmental, Pan American has contributed to Sections 4.4, 4.5, and 20 by providing information and opinions relating to environmental details that are described in those sections. The information and opinions are believed to be current, accurate and complete as of the effective date of this report.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Property within which the Dolores mine is located is in the state of Chihuahua, Mexico, approximately 250 kilometres (km) west of the city of Chihuahua, at 29°00' North, 108°32' West. Pan American has 100% ownership of the Dolores mine and the mining concessions, through its wholly owned subsidiary, Compañía Minera Dolores S.A. de C.V. A map of the Property location is shown in Figure 4.1.

Figure 4.1 Property location map



Source: Google (2021).

4.2 Mineral tenure and title

The Property mineral rights are held under three contiguous mining concessions with a total area of 27,700 hectares (ha) covering the entire Mineral Resources and Mineral Reserves and surface infrastructure of the Dolores mine. Pan American makes the required payments to maintain the mining concessions and has agreements in place granting surface rights and legal access to the mining operations. To Pan American's knowledge, all obligations required for the conduct of mining operations at Dolores are currently in good standing.

Ejido Huizopa owns the majority of the surface rights on the Property. An ejido is an area of communal land registered with the National Agrarian Registry of Mexico and parceled out to community members for

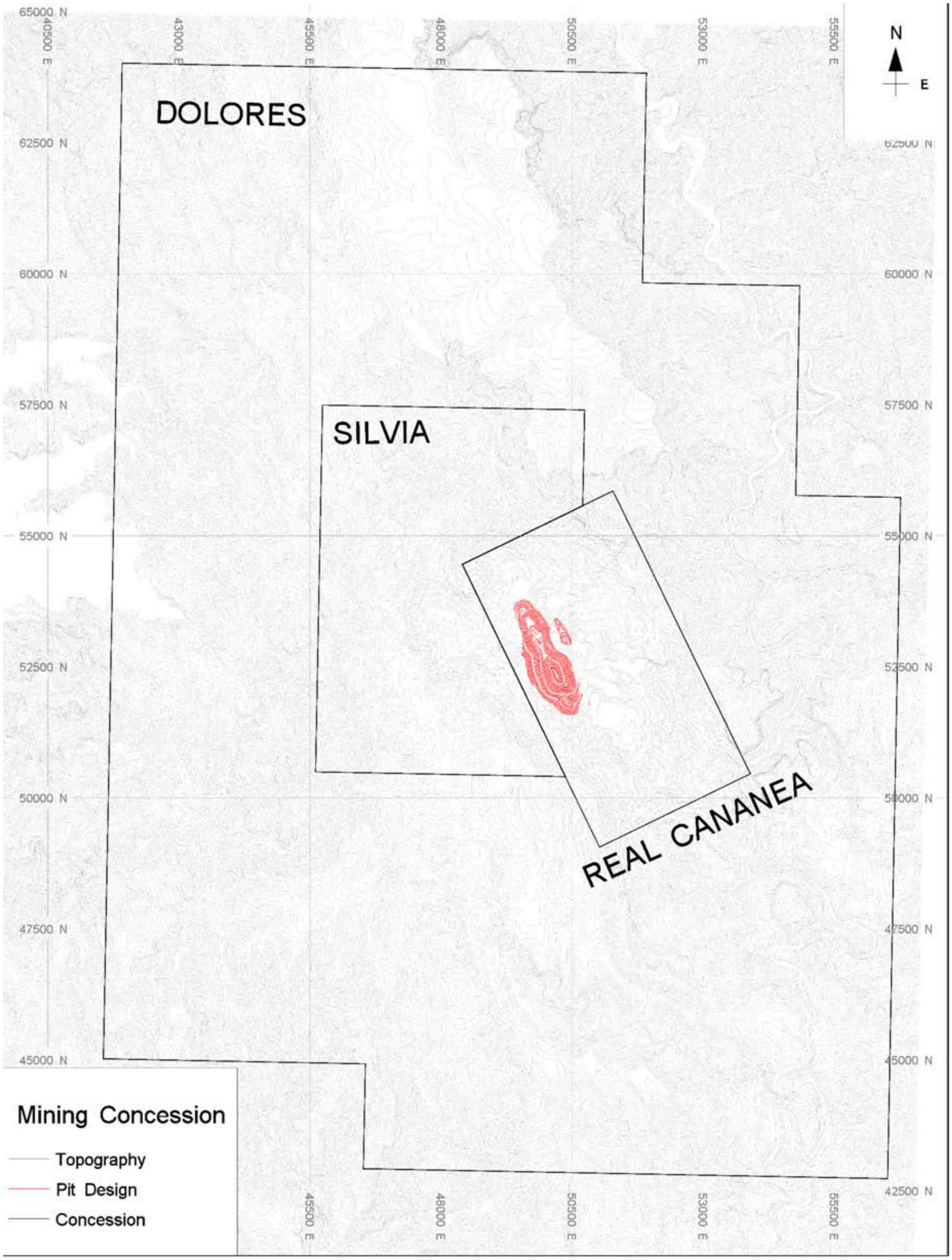
agricultural use. Pan American has surface rights agreements with Ejido Huizopa and with several individual members of the Ejido Huizopa dating from November 2006, which allows for irrevocable access and the right to carry out exploration and mining activities for a term of 15 years with a right to extend for a further 15 years. The agreement was renegotiated in 2009 so the initial 15-year period extends until 2024. Discussions on the terms of the 15-year extension are already in progress.

Details of the mining concessions are shown in Table 4.1. A plan of the mining concessions and surface rights relative to the pit outline at December 31, 2021 is shown in Figure 4.2.

Table 4.1 Mining concession details

Claim name	Claim number	Area (ha)	Expiry date
Silvia	217587	2,866	August 20, 2052
Unificacion Real Cananea	227028	1,920	December 12, 2039
Dolores	221593	22,914	March 3, 2054

Figure 4.2 Mining concessions and surface rights



Source: PAS (2022).

4.3 Royalties, back-in rights, payments, agreements, and encumbrances

A Net Smelter Return (NSR) of 2% on silver production and 3.25% on gold production is payable to RG Mexico Inc. (RG), a subsidiary of Royal Gold Inc. There are no other known back-in rights, payments, agreements, or encumbrances in place.

4.4 Environmental liabilities

The most significant environmental issues at Dolores include surface disturbance, heap leach pad and waste dump stability, and reclamation liabilities associated with routine mine operations. Issues related to the stability and containment system of heap leach Pad 1, which developed prior to Pan American's acquisition of the Property, have been resolved by re-constructing the pad. The new heap leach Pad 1 was placed into operation in 2021.

Pan American has implemented additional contingency measures in and around its three heap leach pads, including installation of well riser type over-liner solution collection systems, additional under drain and leak collection systems, and a network of containment, monitoring, and demonstration wells. Pan American also engages in construction and expansion of the pads after application of rigorous quality control to both the design and construction of the facilities.

The surface disturbance and reclamation liabilities are addressed under Pan American's project reclamation and closure plan, which is discussed in Section 20.9.

4.5 Permits

Pan American holds all necessary environmental and operating permits for the development and operation of the mine and is in compliance with Mexican law in all material aspects.

The Mexican Secretariat of Environment and Natural Resources (SEMARNAT) approved permit applications for the construction and operation of Dolores, including an Environmental Impact Study or Manifestation (MIA), a Technical Justification Study for Change of Land-Use, and an Environmental Risk Study in April 2006. These studies include a full assessment of the environmental and social impacts of the mine and environmental management plans, which describe the ongoing management and environmental monitoring programs. Subsequent permits were obtained for the expansion of Dolores in 2016 and 2017 which include the pulp agglomeration plant, an additional waste dump and underground mine. The MIA permit was updated in April 28, 2022 to cover phase 11 of the pit and the remaining mine life.

Other principal permits include an Accident Prevention Program, a Surface Water Extraction Authorization, an MIA for an underground exploration ramp, and a Waste Management Plan. A permit for the construction and operation of the pulp agglomeration plant was obtained in 2016.

There are some minor boundary differences between the MIA and Change of Land Use permits that occur in various areas of the Dolores site, including the location of the pulp agglomeration plant. The resolution of the boundary differences will be the subject of a "regularization" process that is not anticipated to have a material impact on the operation of the pulp agglomeration plant. A permit valid until 2029 is in place for the operation of the underground mine, however, the operation is currently in care and maintenance. These permits are renewed regularly and as far as Pan American is aware, all of the permits required for the mine and processing operations are in good standing.

Modifications to the existing permits will be necessary to obtain authorization for future activities such as adjustments to the LOM open pit operations, waste rock facilities, and leach pads. Any modification application for these activities will require an updated MIA, Environmental Risk Assessment, and Technical Justification Study for Land Use Change. The required technical baseline studies and impact assessment for these updates would be based on the extensive monitoring database that has been developed and conducted by an independent environmental consultant. Due to the minor changes in footprint and the overall impacts that these changes imply, as well as the current good standing of the existing permits, it is expected that the necessary permit modifications could be completed within standard regulatory timeframes of five to eight months.

4.6 Significant factors and risks

There are no known significant factors or risks that may affect access, title, or the right or ability to conduct mining, processing, and exploration at Dolores.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility, local resources, population centres, and transport

The main road access to the Property is via 92 km of unpaved roads leading north from Federal Highway 16, near Yepachic, Chihuahua. An unpaved landing strip suitable for light aircraft is located about 8 km from the mine and provides access for personnel. The nearest major population centre is the city of Chihuahua, located 250 km to the east. Employees travel to the mine either by road or by light aircraft, while materials come by road.

The local economy is based on logging, ranching, and subsistence farming. The company sources unskilled workers from nearby small villages and has recruiting and training programs in place to develop the local workforce. Much of the mine workforce is sourced from the town of Ciudad Madera located 50 km east of Dolores, the city of Chihuahua, and the city of Hermosillo in the state of Sonora, located 350 km to the west, see Figure 4.1. Both Sonora and Chihuahua states have an established mining culture and provide a pool of experienced workers, as well as vendors and contractors who provide services to the site.

5.2 Physiography and climate

The topography at the mine site is rugged, with elevations ranging from 1,200 m to 2,000 m above sea level. The vegetation ranges from thorn scrub and cactus to oak and pine forests at higher elevations. Average annual temperatures are 18°Celsius (C), with annual lows of -10°C and highs of 45°C. Annual precipitation averages around 250 mm, with much of it occurring between July and September as brief heavy rainstorms. Short-lived snowfall is common in December and January. Mining and exploration work may be carried out year-round.

5.3 Surface rights

Ejido Huizopa owns the majority of the surface rights on the Property. An ejido is an area of communal land registered with the National Agrarian Registry of Mexico and parceled out to community members for agricultural use. Pan American has surface rights agreements with Ejido Huizopa and with several individual members of the Ejido Huizopa dating from November 2006, which allows for irrevocable access and the right to carry out exploration and mining activities for a term of 15 years with a right to extend for a further 15 years. The agreement was renegotiated in 2009 so the initial 15-year period extends until 2024. Discussions on the terms of the 15-year extension are already in progress.

5.4 Power and water

Water for the operations is sourced from wells, the open pit mine, nearby Tutuaca River, and the Chabacan dam. Depending on the year, the water supply from mine dewatering and precipitation on the leach pads and Chabacan Dam catchment is often sufficient for process needs. When additional water is required, it is pumped from the Tutuaca River. The Chabacan dam reservoir has a capacity of 1.2 million cubic metres (m^3) and provides storm water control as well as primary water storage. The permitted water usage from the Tutuaca River is 2.0 million m^3 per annum at a maximum rate of 64 litres per second and the water extraction permit remains in good standing should it be required in the future.

A 115 kV, 98 km long power line connected to the Mexican national grid in 2016 supplies power to the mine and is sufficient for the current needs of the operation. Back-up power is available on site by six 1,800 kW Cummins and two 1,200 kW Caterpillar diesel generators. The total power requirement for the operations including the open pit and processing facilities is approximately 11.5 megawatts (MW).

5.5 Infrastructure

The infrastructure includes the typical components of an operating open pit mine, including the mine workings, the processing facilities, heap leach pads, medium grade ore stockpiles, waste rock storage facilities, surface ventilation fans servicing the underground workings, workshops, laboratories, storage facilities, offices, drill core and logging sheds, water and power lines, access roads, a light aircraft landing strip, an employee and construction camp, and recreational facilities. A plan of the infrastructure on the Property is shown in Section 16.

6 HISTORY

6.1 Ownership

After some earlier work consisting of Placer mining, which began in the region of the Dolores mine in the 1860s, followed by lode mining in 1898, the Property lay idle until Minefinders acquired the Property in 1993.

Pan American acquired the Property from Minefinders at the end of March 2012 and assumed control of open pit mining operations in April 2012. Pan American has operated the mine since then, has built increased heap leach pad capacity, connected the mine to the Chihuahua electrical grid with a power line and constructed a pulp agglomeration plant. In addition, Pan American commenced underground mining in 2016 and after nearly 6 years of mining put the operation in care and maintenance in April 2022.

6.2 Work carried out

After Minefinders acquired the Property in 1993, it began a reconnaissance surface exploration program, assisted by aerial photographs taken in 1995, a 3 m resolution digital topography map sourced from air photographs covering 20 square kilometres (km^2), and satellite imagery. Staff geologists carried out surface mapping and sampling, and contractors completed the geophysical programs.

Four mapping campaigns defining the general structural and geological trends of the mineralized systems were completed, including an initial 1:5000 scale map covering 12 km^2, followed up by more detailed mapping at 1:2000 scale covering 3 km^2, and two structural mapping campaigns covering over 4 km^2 at 1:1000 and 1:500 scales.

Over 13,000 rock samples were taken from surface outcrops, including 9,882 samples taken as 5 m long continuous samples along road cuts or sample lines cut perpendicular to the strike of the deposit. Channel samples were taken in the accessible portions of the underground workings. In workings parallel to the strike of the deposit, samples were selected from across the backs at 5 m intervals at lengths averaging 2 m wide and up to 4 m wide. For other areas of the workings, 2 m long continuous samples were taken along the ribs.

Geophysical surveys undertaken for Minefinders by Quantech Consulting Inc. of Reno, Nevada included 14,900 m of induced polarization / resistivity surveys and total field magnetic surveys, run across the strike of the deposit.

Minefinders commenced drilling in September 1996. In July 1996, Minefinders granted Echo Bay Mines (Echo Bay) an option in the Property, and Echo Bay commenced drilling, sampling, environmental data collection, and metallurgical testing. Minefinders bought back the option, including the information collected by Echo Bay, in October 1997.

The results of the surface exploration work as well as ore microscopy, metal ratio studies, and petrographic analyses were used to identify potential drill targets.

6.3 Historical Mineral Resource and Mineral Reserve estimates

A number of historical Mineral Resource estimates have been prepared for the Property since 1997. In 2003, Minefinders commenced a feasibility study to evaluate various process options and in June 2005 disclosed a Mineral Reserve estimate and the results of a technically and financially feasible operation involving open pit mining operations and heap leaching of silver and gold. Minefinders then undertook detailed engineering and optimization of the mine plan as well as updates to the Mineral Resource and Mineral Reserve estimates. None of these estimates were reported under NI 43-101 and have not been quoted here as they are not relevant to the current operation.

6.4 Production

A power line from the town of Madera was installed in 1915, and a 25 tpd stamp mill began treating the Dolores ore until the mill was destroyed by fire in early 1929. Only sporadic production occurred from 1929 to 1931, after which there are no records of any historical production. Incomplete mining records from between 1922 and 1931 indicate that approximately 372,000 tonnes of ore containing over 116,000 ounces of gold and 6 million ounces (Moz) of silver were produced from several operations, including Dolores.

Construction of the mine by Minefinders began at the end of 2006, with the commissioning period completed in January 2009. The processing facilities included a crushing plant, conveying and stacking facilities, leach pads, solution ponds, and Merrill-Crowe and refining facilities. The first doré was produced in November 2008 and commercial production began in May 2009.

During the 2008 to 2011 period, Minefinders mined 25.5 million tonnes (Mt) and stacked 18.3 Mt of ore on the leach pads, producing 210,660 ounces of gold and 6.2 Moz of silver. The remaining medium grade material is stored in stockpiles for later treatment.

From its acquisition of the Property in 2012 to June 30, 2022, Pan American have stacked 66.6 Mt of ore on the leach pads, producing 1,042.5 koz of gold and 38.8 Moz of silver.

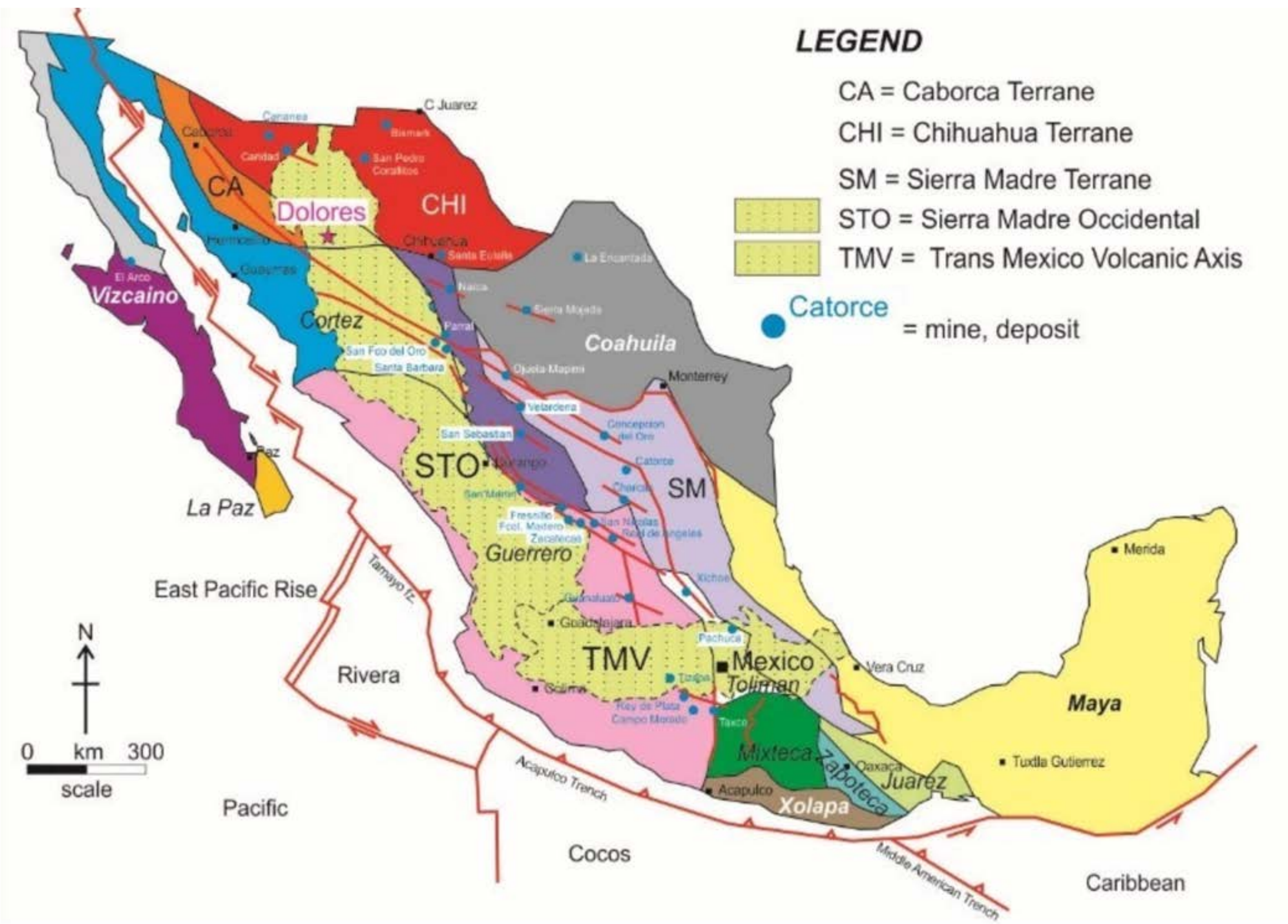
7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional geology

Pre-Tertiary rocks in northern and mid-Mexico comprise a jigsaw of oceanic and island arc terranes (Campa and Coney, 1983). Figure 7.1 shows a regional map of the northwest trending tectono-stratigraphic terranes of Mexico, as redrawn from Campa and Coney (1983). Strike-slip movement played an important role in assembling the terranes and continue to the present day.

The Property is located within the Sierra Madre Occidental volcanic belt, an arc formed by eastward subduction of the Pacific Plate. The Sierra Madre is a metallogenic terrane well known for its epithermal precious metal deposits. The lower part of the arc comprises late Cretaceous to early Tertiary calc-alkaline batholiths and equivalent volcano sedimentary rocks referred to as the 'Lower Volcanic Supergroup' or 'Lower Volcanic Series'. They represent magmatic activity during the Laramide orogeny (about 80 to 40 million years ago) and were followed by two periods of major ignimbrite eruption in the early Oligocene and early Miocene. Collectively these constitute the 'Upper Volcanic Supergroup' or 'Series'. Minor andesite / basalt flows and rhyolitic domes accompanied the ignimbrites. Many Mexican low sulphidation epithermal deposits probably developed during the first ignimbrite phase, in a window between 40 and 27 million years ago (Camprubí et. al., 2003).

Figure 7.1 Tectono-stratigraphic terranes of Mexico



Source: Redrawn from Campa and Coney (1983).

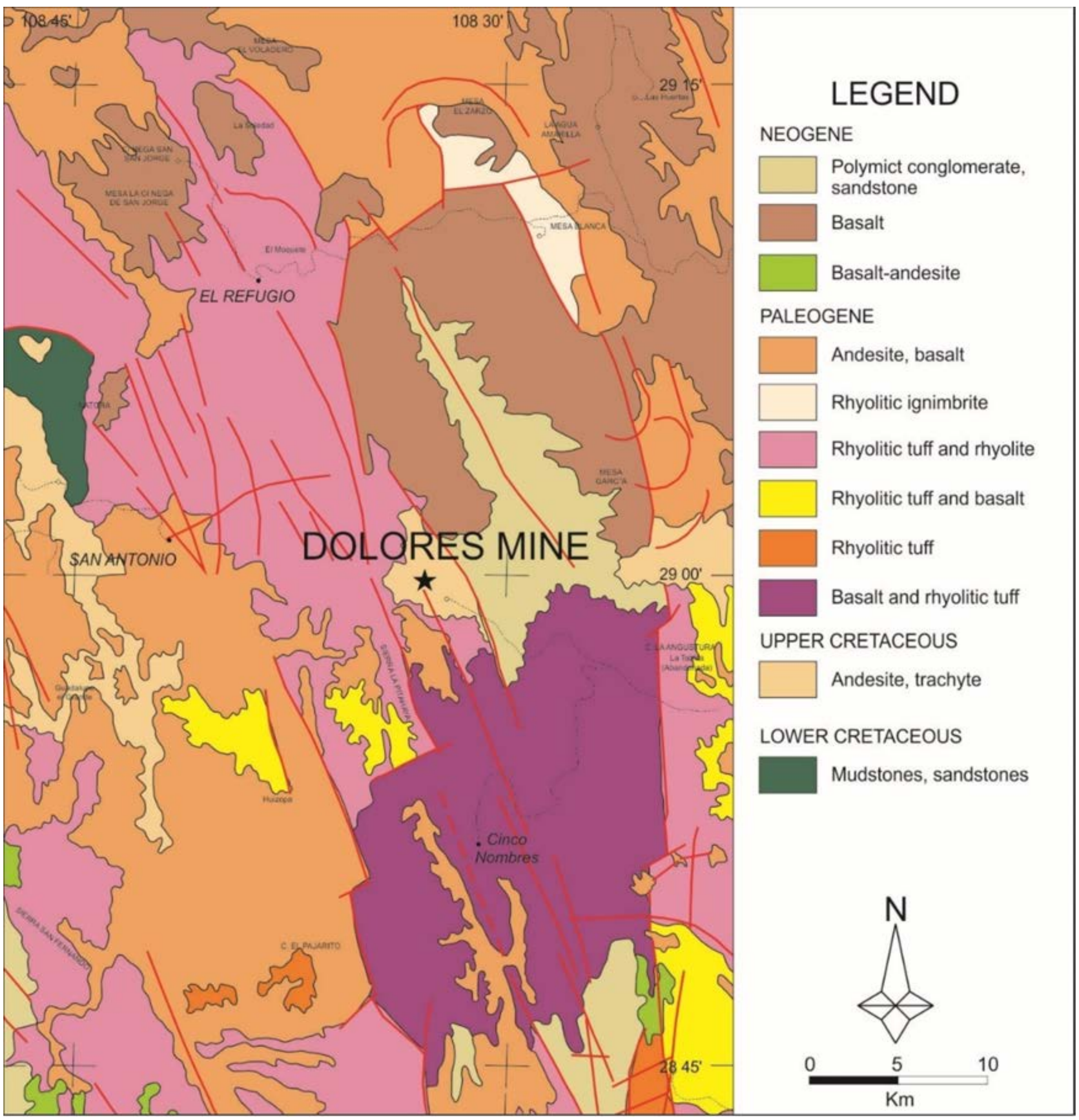
7.2 Local geology

The local geology shown in Figure 7.2 is based on the 1:250,000 Madera (H12-9) and Tecoripa (H12-12) sheets produced by the Servicio Geológico Mexicano.

Bedding dips are mostly sub horizontal and gently undulating. The maps show a strong north-northwest structural grain defined by many faults, some with apparent normal offsets. Some of these regional faults likely had a syn-depositional history, controlling local basins.

Dolores lies about 42 km north-northeast of the Mulatos high sulphidation epithermal gold deposits and 82 km north-northwest of Pinos Altos. Pinos Altos, a low sulphidation epithermal vein system, lies on the northeast rim of the Ocampo Caldera. This 30 km diameter caldera hosts a district of epithermal gold-silver deposits, including the Ocampo mine.

Figure 7.2 Local geology map



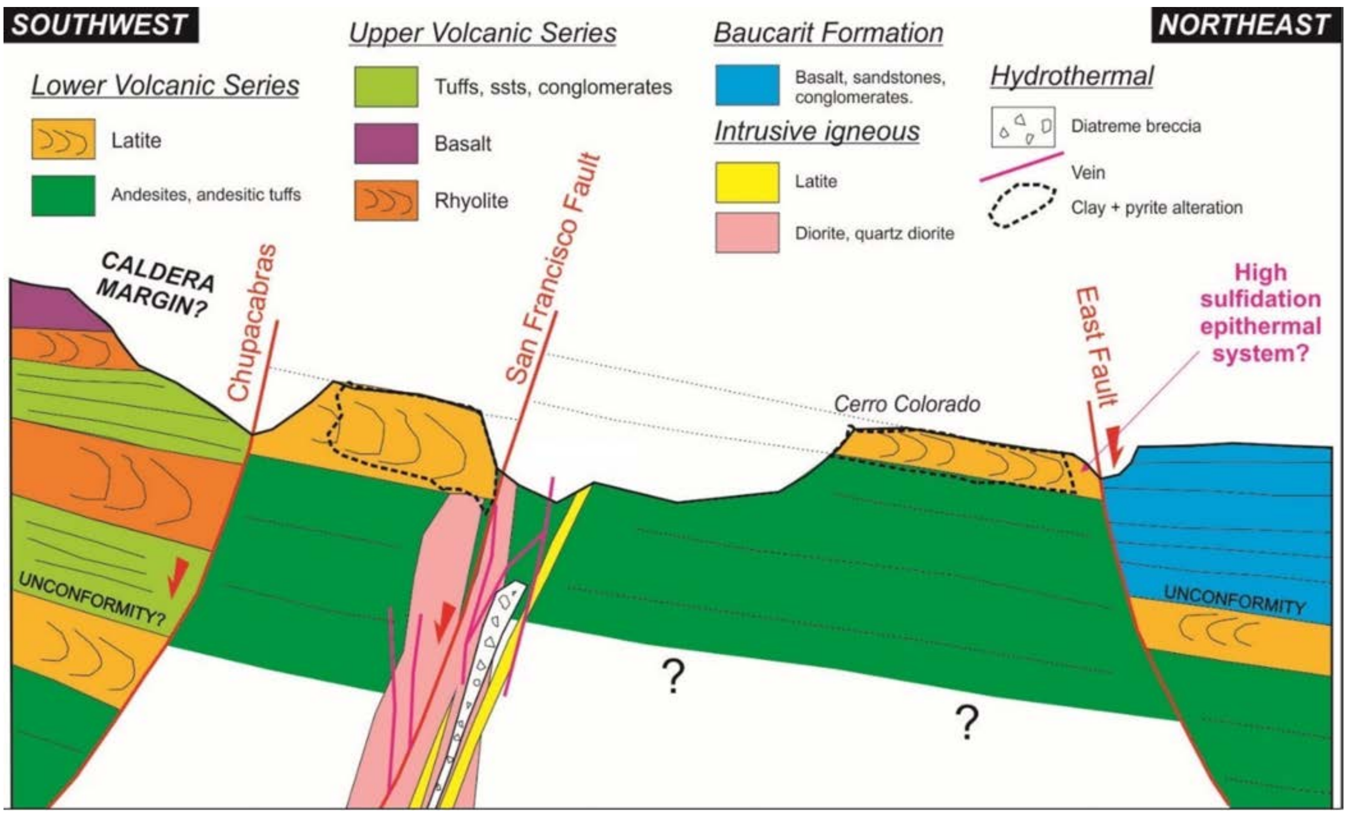
Source: Servicio Geológico Mexicano (2000).

7.3 Property geology

7.3.1 Lithostratigraphy

Field observations indicate that the contacts between the Lower and Upper Volcanic Series comprise mostly faults, as shown in Figure 7.3 (not to scale). The most important faults, from west to east, are the Chupacabras, San Francisco and East Faults. The San Francisco Fault and its footwall host most of the mineralization on the Property.

Figure 7.3 Stratigraphic and structural relations cartoon

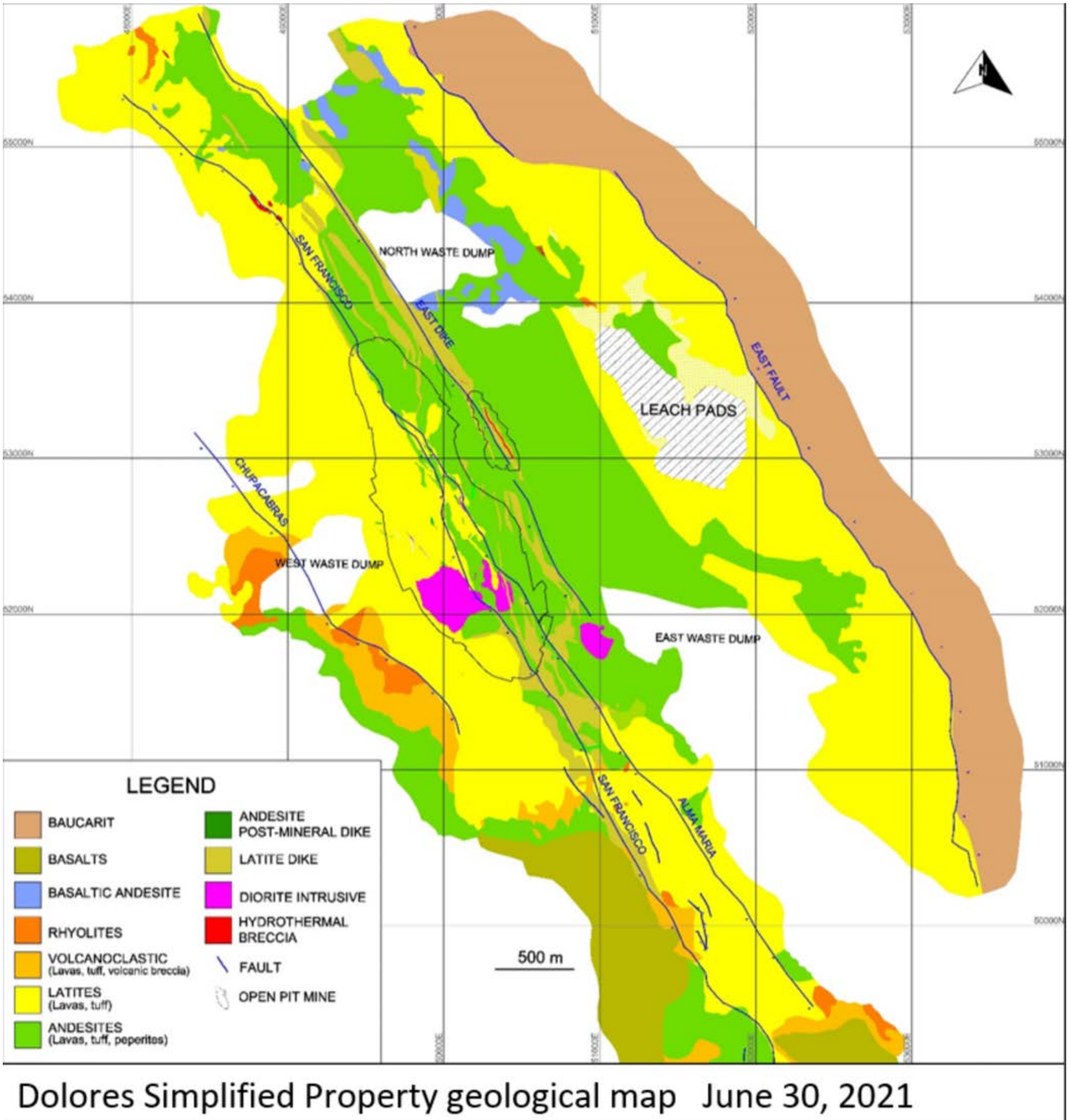


Source: Pratt (2013).

7.3.1.1 Lower Volcanic Series

A simplified geological map of the Property is shown in Figure 7.4. The Lower Volcanic Series consists of a lower andesitic sequence overlain by latites. The main andesitic outcrop forms a wide strip of alternating dark and light green units between the San Francisco and East Faults. It is the main host for mineralization and is cut by a swarm of north-northwest striking dikes. Dark green units comprise massive, porphyritic andesite and basaltic andesite with feldspar and clinopyroxene phenocrysts. The light units are either strongly amygdaloidal andesite or monomict andesitic breccias (autobreccias and transported volcanic breccias). Peperite forms at the bases of some andesite by the interaction of igneous rock and wet sediments. Other rock types in the Lower Volcanic Series include thin acid welded and crystal-rich tuffs, as well as bedded sandstones between andesite lava flows.

Figure 7.4 Simplified Property geological map



Source: PAS (2021).

The andesitic sequence is overlain by several massive porphyritic latites, with minor tuffaceous sediments. Their geometry is tabular and stratiform and likely formed as lava flows and / or sills. The main outcrop forms a wide strip between the Chupacabras and San Francisco Faults. The latites are about 250 m thick and the base is apparently conformable. Latite outcrops extensively around the heap leach pads and forms cliffs at Cerro

Colorado (shown in Figure 7.3). It also occurs widely on the west side of the San Francisco Fault, up to the Chupacabras Fault and forms most of the high west wall of the open pit.

Fresh latite is purplish grey and comprises isolated feldspar phenocrysts within a very fine grained groundmass. The rock is locally flow banded, but to a much lesser extent than the latite dikes. The latites are widely hydrothermally altered and weather like a plutonic rock, with onionskin form, or are friable and crumbly, with a red colour caused by extensive hematite alteration of disseminated pyrite. The source of the latite is unclear. There is no obvious 'root' to indicate a volcanic neck or eruptive center. However, they are texturally identical to the swarm of latite dikes. Overbay et al. (2001) suggests they may have been erupted from a diorite-diatreme complex present in the pit.

7.3.1.2 Upper Volcanic Series

The Upper Volcanic Series comprises a bimodal sequence of rhyolite / obsidian, basalt, pumice-rich lapilli tuffs and volcaniclastic rocks of possible caldera margin origin. It is well exposed on the two main access roads to the mine and is preserved west of the Chupacabras Fault. The tabular or lens-shaped rhyolites show widespread, flat-lying flow banding. Scattered perlitic obsidian layers in the rhyolite contain large spherulites with drusy zeolites, quartz, and minor amethyst.

The amygdaloidal and oxidized basalts are probably thin lava flows, and have peperitic bases. The geological map shown in Figure 7.4 shows all other lithologies as volcaniclastics (labelled “Volc”). These comprise crystal tuffs, green non-welded pumice-rich lapilli tuffs, crystal-rich sandstones, and conglomerates with a mostly sub horizontal orientation.

The topographically, and stratigraphically, highest rocks comprise a thick porphyritic andesite flow (labelled “UAnd” in Figure 7.4), which is overlain by a basalt underlying the Dolores airstrip.

The Baucarit Formation comprises polymict conglomerates, sandstones, and scattered basalts. To the east of the East fault, the formation sits directly on latites of the Lower Volcanic Series, and the Upper Volcanic Series appears to be absent, an indication of the importance of fault control on sedimentation and volcanism at Dolores.

7.3.2 Intrusions

The immediate footwall and hangingwall of the San Francisco Fault form a 500 m wide northwest-striking corridor of igneous intrusions broadly following the fault. However, there is a tendency for dikes to strike slightly clockwise and there are also some splits and north-northeast jogs.

There is a great variety of intrusive types and field relations indicate intrusions occurred both pre- and post-mineralization. There are no isotopic dates, but the intrusions are probably of Eocene to Oligocene age and are broadly contemporaneous with mineralization. The rocks with the most plutonic character occur in the central area of the deposit, where a steep-sided barren microdiorite stock, 500 m in diameter, straddles the San Francisco Fault. Coinciding with high-grade mineralization, it comprises weakly porphyritic diorite and marginal parts comprise porphyritic quartz diorite with potassium feldspar-rich aplitic groundmass. Age relations are not clear, but it appears to be cut by latite dikes. Exposures in the pit walls show very complex intrusive relationships, including diorite chilled against possibly intrusive andesite. Deep drilling shows intrusive types present in this area include porphyritic granodiorite and an unusual amygdaloidal porphyritic andesite. Probable diatreme occurs in drillholes, but does not appear to outcrop. Overbay et al. (2001) suggests that some of the intrusions pass upwards into flow-domes.

The dike swarm at Dolores is dominated by latite. This phase cuts the plutonic and sub volcanic rocks and is clearly younger. It comprises strongly flow-banded rock, with isolated feldspar phenocrysts, oriented parallel to the dike contacts, generally dipping steeply west. The latite dikes are visually indistinguishable from the latite lavas of the Lower Volcanic Series, which is an obstacle to geological interpretation. There were clearly several pulses of intrusion as evidenced by the presence of xenoliths of early latite varieties within later latites. The latite is in turn cut by late andesite dikes with a strong trachytic texture.

7.3.3 Structure

The sequence at Dolores is broadly flat lying and suffered no significant compressional deformation after the Late Cretaceous. The major faults show large post-Pliocene (post-Baucarit) normal offsets. However, complications in the stratigraphic sequence indicate an older history. Subtle changes in dip, internal angular unconformities, wedges, and missing strata all imply that the major faults have controlled sedimentation and volcanism.

The Chupacabras Fault throws down rocks to the west by about 200 m to 400 m while the East Fault drops the Baucarit Formation down to the east by about 350 m. The San Francisco Fault throws down latite lavas by about 300 m to 500 m to the west and is marked by a corridor of dikes and stocks. The overall geometry is therefore horst-like. The Upper Volcanic Series appears much thicker to the west of Chupacabras (Figure 7.3).

Although each major fault has an apparent normal offset, there is also evidence of strike-slip movement. The clockwise orientation of dikes relative to faults, along with north-northeast dike jogs, suggests a component of dextral strike-slip during intrusion and mineralization. All of the principal faults suffered major post-mineral (post-Pliocene) reactivation. The San Francisco Fault shows smectite-rich gouge with milled vein fragments, locally with amethyst. Fabrics within the foliated gouge confirm mostly normal offsets.

7.3.4 Alteration

The andesitic rocks of the Lower Volcanic Series show widespread, locally intense, propylitic alteration (chlorite + epidote + calcite + pyrite). Epidote is locally abundant (>15%), giving rocks a skarn-like appearance. The wide distribution of propylitic alteration suggests it is semi-regional, perhaps due to burial metamorphism. Propylitic alteration also affects the dioritic rocks of the stock-diatreme complex.

In contrast, the low sulphidation system created advanced argillic (pyrite + clay) alteration of the latite lavas of the Lower Volcanic Series. Pyrite commonly replaces original biotite phenocrysts. The suite of clay minerals include montmorillonite, smectite, kaolinite, sericite, and illite. Advanced argillic alteration is directly correlated to the distance of the mineralized structures as a function of structure size, vein widths, and the presence of hydrothermal breccias. The alteration dies out abruptly in the west, probably along a steep front, between the Chupacabras and San Francisco Faults. At deeper levels, light green sericite haloes occur around veins and hydrothermal breccias.

The principal and most important alteration is silicification, which increases with the presence of mineralization, and ranges from weak to strong, pervasive, massive, residual, and pseudo-vuggy.

7.4 Mineralization

Silver and gold mineralization at Dolores is hosted in north-northwest trending hydrothermal breccias and sheeted vein zones in the order of 5 m to 10 m wide. Most high-grade mineralization occurs along three major structures that provided the conduit for metal-bearing hydrothermal fluids. Silver and gold mineralization identified on the surface at Dolores lies over an area 4,000 m long and up to 1,000 m wide, at elevations ranging between 1,100 m to 1,700 m above sea level.

The highest grade mineralization occurs within the San Francisco Breccia, a well-defined and continuous hydrothermal breccia and stockwork zone that occurs in the immediate footwall of the post-mineralization San Francisco Fault. The breccia trends further away from the fault towards the north until it joins a second major breccia zone known as the Alma Maria Breccia. Other high-grade zones split and re-join, forming diamond-shaped structures and steeply pitching mineralization shoots. The San Francisco Fault marks a profound drop in grade and the hangingwall is mostly devoid of silver and gold mineralization.

A sub-vertically pitching mineralization shoot occurs where the San Francisco and Alma Maria Breccias meet, parallel to the intersection. Clearly, this was a site of increased permeability for hydrothermal fluids. High grades also occur in the diorite stock-diatreme complex in the pit. The diorite formed an ideal brittle host for fracture, allowing more extensive brecciation and stock working. It may also have been the main upflow centre for hydrothermal fluids.

Mineralization is generally associated with quartz and may be composed primarily of iron oxides, silver sulphosalts, electrum, and native gold in the oxidized zone and with pyrite, silver sulphides, native silver, visible gold, galena, and sphalerite deeper in the sulphide zone. Local acanthite and visible gold occur in a variety of settings, including hydrothermal crackle breccias and in thin quartz-dominated veins. Hydrothermal breccias carry the highest silver and gold grades and vary from crackle to very milled types. Crackle types were more permeable, and they commonly show coarse quartz + sulphide (pyrite, sphalerite, and galena) + fluorite gangue. They pass outward into vein stock works. Hydrothermal breccias commonly include veins of quartz, quartz-calcite, fluorite, and anhydrite and mostly developed after the sheeted vein swarms. Some diffuse areas of sugary, silicified rock with coarse adularia and high silver and gold grades also occur.

Most veins at Dolores are relatively simple, with only weak crustiform texture. They comprise euhedral comb quartz and commonly show aggregates of very fine-grained drusy quartz. They are thin, rarely over 30 mm, and tend to occur as sheeted swarms. Economically mineable grades occur where the veins are sufficiently closely spaced.

Vein fill progresses from high temperature (>200°C) minerals, such as epidote, to low temperature (150°C to 200°C) minerals such as colloform chalcedony, adularia, amethyst, laumontite, and other zeolites. Geopetal structures occur in some veins and indicate high levels in the epithermal system. The proximity of high and low temperature minerals suggests rapid cooling of fluids, perhaps due to uplift or a rapidly waning hydrothermal system. The presence of zeolites indicates very alkaline fluids.

Base metal sulphides appear to increase at depth, with widespread coarsely crystalline sphalerite, galena, and minor chalcopyrite. Base metal sulphides are particularly abundant in the deeper parts of the stock-diatreme complex in the pit. The most dominant sulphide mineral accompanying the mineralization is pyrite, in concentrations of between 1% and 2%, with intense pyritization of approximately 6% at the lithological contacts.

8 DEPOSIT TYPES

Information in this section is referenced from the 2016 PAS Technical Report where Pratt (2013) is acknowledged. It has been reviewed by the QP and holds true.

Dolores is a low sulphidation epithermal deposit with strong structural control. Northeast-striking faults, perpendicular to the structural grain, locate many mineral deposits in the Sierra Madre Occidental. However, regional controls at Dolores are unclear where mineralized faults are north-northwest striking. There is no transverse structure apparent on geological maps or satellite imagery. The mineralized structures have a typical Sierra Madre, or Laramide, trend, a direction probably inherited from the basement of elongate terranes.

Local structural controls are better understood. Sometime after eruption of the Upper Volcanic Series, there was a northeast-southwest extensional regime, with a component of dextral strike-slip, creating dilation on northwest-striking faults. It also caused local dilational jogs that allowed emplacement of dikes, hydrothermal breccias, and sheeted veins. It is likely that the diorite stock-diatreme complex was the main heat engine that drove the hydrothermal system and provided the source of metals. It may have also been emplaced into a space created by a dilational jog. Geopetal structures and low temperature minerals suggest Dolores developed close to the original surface and has not been strongly eroded.

High silver and gold grades occur over a wide vertical interval at Dolores. This is unusual for most low sulphidation epithermal deposits, which tend to have narrow vertical intervals of high grade.

Lithology was important for localizing high grade. Although the principal control on fluids was semi-regional faults (San Francisco and Alma Maria), some host rocks were ideal for fracturing. Others were ductile and less amenable to mineralization. For example, historic workings in the East Dike targeted a hydrothermal breccia hosted by a latite dike that disappears where the structure passes into country rocks. This, and many other examples, highlights the importance of brittle host rocks. Latite dikes were ideal while the surrounding andesites were a poorer host.

Vein textures, the occurrence of adularia, and the simple sulphide mineralogy confirm Dolores is a low sulphidation epithermal deposit although it lacks the typical complex crustiform banding found in most low sulphidation veins (e.g. Hishikari in Japan and Kupol in Russia). This implies relatively few mineralizing and boiling events in the conduits. Local advanced argillic alteration along the East fault suggests the potential presence of high sulphidation-type mineralization. There are examples of high sulphidation gold deposits in the area, for example, Mulatos, located about 42 km south-southwest (Staude, 2001).

Major post-mineralization offsets of up to 500 m occurred on the principal faults at Dolores. Mineralization effectively sealed the San Francisco structure. Therefore, the focus of post-mineralization movement jumped west by up to 100 m. This resulted in a major fault zone, dominated by milled and foliated smectitic rock.

9 EXPLORATION

Exploration by Minefinders from 1993 to 2012 is discussed in Section 6. Only data from the exploration drilling carried out by Minefinders has been used in the estimation of the current Mineral Resources and Mineral Reserves (no underground drilling information was included in the estimate).

Since Pan American acquired the Property, staff and consulting structural geologists have carried out near mine surface geological and structural mapping, and surface sampling on the continuity of the San Francisco and Alma Maria structures.

Dolores has been an operation for some time and exploration has not been a focus. Mapping and sampling adjacent to the deposit has assisted in demonstrating continuity of the structures and aided in interpretation.

Approximately 33,000 m of drill core has been re-logged by Pan American to better define the controls on mineralization, alteration, and to update the geological interpretation.

Pan American has also completed over 145,000 m in surface and underground diamond drilling focusing on exploration and infill as discussed in Section 10.

10 DRILLING

10.1 Drilling summary and database

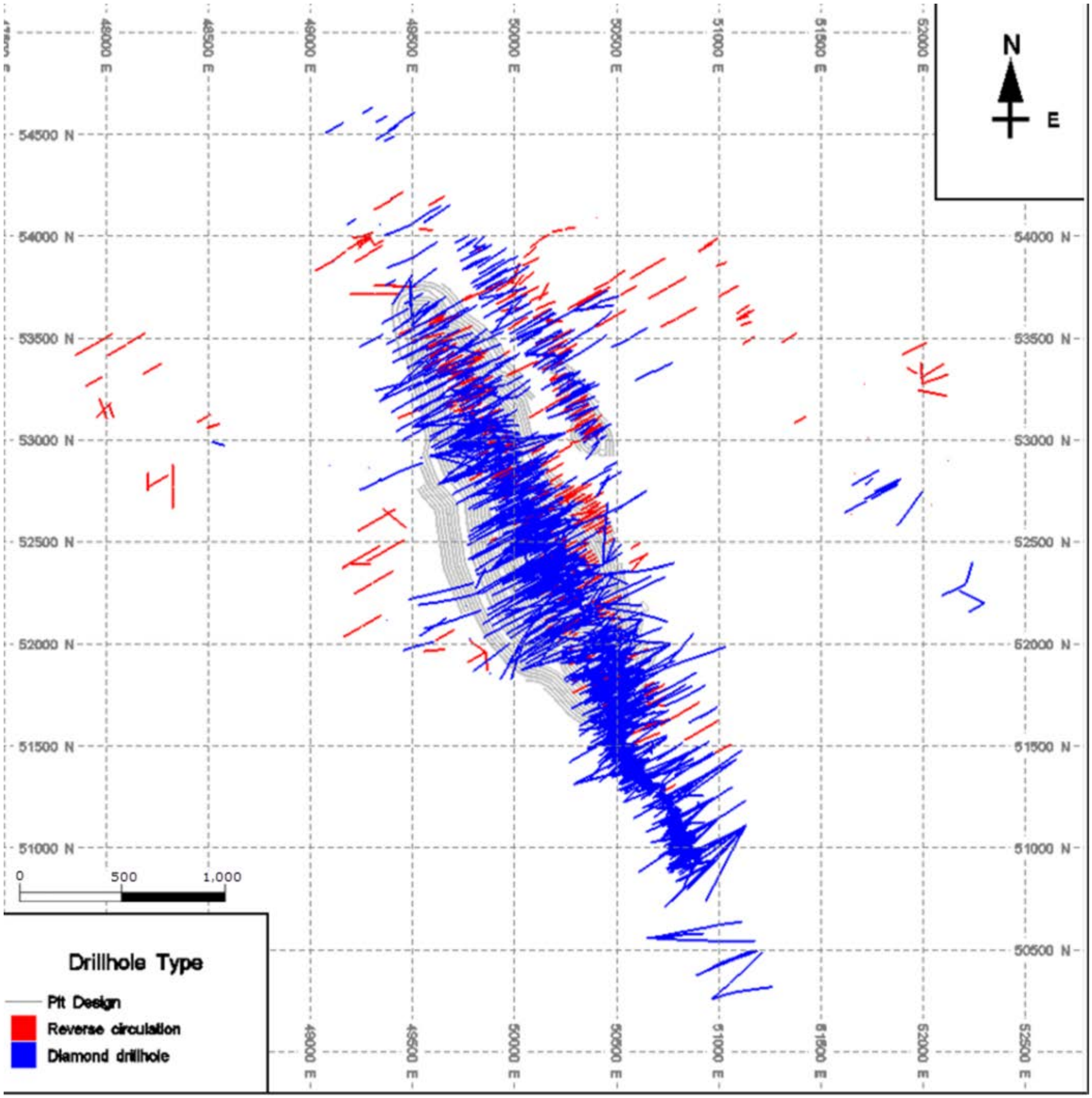
Most of the drilling on the Property centres over the strike length of the currently defined Mineral Resources and Mineral Reserves. A summary of the drillholes completed on the Property by all operators up to June 30, 2022 is shown in Table 10.1. Note that only drilling carried out by Minefinders that was used in the Mineral Resource estimate has been described here.

Table 10.1 Drillhole summary

Year	Company	Diamond Surface		Reverse Circulation		Diamond UG		Total	
		# of holes	Metres	# of holes	Metres	# of holes	Metres	# of holes	Metres
1996	Minefinders	30	6,599					30	6,599
1997	Echo Bay			68	12,949			68	12,949
1997	Minefinders	80	19,382					80	19,382
1998	Minefinders	26	5,997	45	10,301			71	16,298
2000	Minefinders	5	847	34	5,038			39	5,886
2002	Minefinders	59	19,433	33	6,201			92	25,634
2003	Minefinders	101	31,867	31	5,046			132	36,913
2004	Minefinders	67	18,849					67	18,849
2005	Minefinders	51	15,301					51	15,301
2006	Minefinders	58	19,997	94	17,013			152	37,010
2007	Minefinders	19	9,900	54	9,590			73	19,490
2009	Minefinders	11	4,710	29	4,304			40	9,014
2010	Minefinders	49	24,598	8	1,116			57	25,714
2011	Minefinders	68	20,453					68	20,453
2012	Minefinders	30	10,147					30	10,147
2012	PAS	47	19,111					47	19,111
2013	PAS	76	30,879					76	30,879
2014	PAS	57	24,798	60	5,229			117	30,027
2015	PAS	15	4,266	14	1,342			29	5,608
2016	PAS	30	8,466	5	854	57	9,432	92	18,752
2017	PAS	7	6,242			161	25,524	168	31,766
2018	PAS	1	1,119	36	3,008	36	5,852	73	9,979
2019	PAS			5	982	12	1,542	17	2,524
2020	PAS					5	564	5	564
2021	PAS	14	4,284			1	284	15	4,569
2022	PAS	11	3,576	29	1,844	3	549	43	5,969
Total		**1,000**	**315,089**	**545**	**84,817**	**275**	**43,747**	**1,820**	**443,653**

A plan showing the location of the drillholes completed to June 30, 2022, is shown in Figure 10.1. Cross sections showing the relative orientation and spacing of drillholes on a typical section are shown in Figure 14.2 and Figure 14.3.

Figure 10.1 Drillhole location map



Source: PAS (2022).

10.2 Drilling procedures

10.2.1 Drilling by Minefinders from 1996 to 2012

Drilling by Minefinders used a combination of RC and diamond drilling methods, with holes mostly oriented perpendicular to the strike of the deposit and spaced roughly 25 m apart.

The diameter of the diamond drillholes was either HQ or NQ. The diameter of the RC holes was not well documented but appears to be either 4 ½ or 5 ½ inches. The majority of collar surveys were taken with a total station or multi-station GPS survey instrument, while the remaining drillholes were surveyed relative to previously surveyed collars using a tape measure and Brunton compass. Approximately 70% of the drillholes were surveyed down the hole using a Tropari single shot camera tool for RC holes and an Ausmin or Sperry-Sun single shot camera for diamond drillholes, at downhole intervals of around 50 m. The remainder of the drillholes were not surveyed.

10.3 Drilling by Pan American from 2012 to 2016

From 2012 to 2014, Pan American used two Boart Longyear LF90 diamond drill rigs and one hybrid diamond drill rig. Later in 2014 to two Sandvik DE710 diamond drill rigs were introduced. Underground drilling began in 2016 using two Boart Longyear LM-75 machines. The drilling contractor was Rock Drill Mining of Aguascalientes, Mexico. PQ, HQ, and NQ hole diameters were used. Drilling recovery is good, approximately greater than 95%, and additives such as bentonite are used whenever necessary to improve core recovery and to regulate drilling pressure. The RC drilling programs were carried out by CMD drilling.

10.4 Drilling by Pan American from 2016 to 2022

From September 2016, the cut-off date for data for the 2016 PAS Technical Report, until June 2022, Pan American have carried out both surface and underground drilling. In the calendar years 2017 to 2022, as seen from Table 10.1, the majority of the holes were underground diamond drillholes, consisting of 62% of the total metres. Table 10.2 shows the breakdown of the drilling in 2017 to 2022 by type and metres.

Table 10.2 Drillholes by type 2017 - 2022

Year	Diamond surface		RC		Diamond UG		Total	
	# of holes	Metres	# of holes	Metres	# of holes	Metres	# of holes	Metres
2017 - 2022	33	15,221	70	5,834	218	34,315	321	55,370
Split by type	10%	27%	22%	11%	68%	62%	100%	100%

From 2017 to 2022 multiple drilling contractors were used by Pan American, such as Rock Drill Mining, Techmin Services, CMD, and Major Drilling.

For the underground drilling, which was the major activity, two Boart Longyear LM-75 machines and the drilling contractor continued to be Rock Drill Mining of Aguascalientes, Mexico. On surface Boart Longyear LF90 diamond drill rigs and one hybrid diamond drill rig were used, the latter for the RC work. Later in 2014 to two Sandvik DE710 diamond drill rigs were introduced. PQ, HQ, and NQ hole diameters were used. Drilling recovery is good, approximately greater than 95%, and additives such as bentonite are used whenever necessary to improve core recovery and to regulate drilling pressure.

10.5 Field procedures

10.5.1 Diamond drilling

Planned drillhole collar locations are set up in the field prior to drilling by the mine survey department using total station survey equipment or a differential GPS when necessary, and by laying out the front and back sights with stakes and flagging tape. Final collar coordinates are surveyed by the mine surveyors using total station methods, and downhole surveys are taken with a Reflex Multi-shot instrument on average every 25 m down the hole. The bearing and dip at the collar are determined by the mine survey department using total station survey equipment to survey a point at the collar and another point along the drill rod.

10.5.2 Reverse circulation (RC) drilling

The drill set up procedure is similar to the surface diamond drilling. However, the sample is taken and prepared at the rig, after being collected in a rig-mounted automatic cyclone sampler system which ensures a representative sample is collected for assay. No sample is collected in the first two metres where there is broken ground. In addition to the sample for assay a chip sample is also taken from each sample interval and stored in a chip box for geological identification and record. Duplicate samples are taken in the field and blanks and CRMs are inserted at appropriate intervals.

10.6 Material impact on the accuracy and reliability of drilling results

Pan American is aware of a number of potential issues with the drilling protocols for some of the drillholes in the database. These include the use of RC drilling, which may result in a less reliable sample than diamond drillholes, particularly when the sample is wet; the orientation of some of the drillholes down the dip of mineralization; and absent or insufficiently spaced downhole surveys in some of the drillholes.

However, Pan American believes these potential issues are unlikely to have a material impact on the accuracy and reliability of the drilling results and the Mineral Resource and Mineral Reserve estimates. There are a large number of drillholes present over the deposit, and reliable drillholes confirm the results of potentially biased drillholes. There is only a negligible difference in the silver and gold grades and thicknesses of the mineralized zones encountered by RC and diamond drillholes drilled in close proximity to each other. The removal of down dip drillholes from the geological interpretation and the grade estimation technique has mitigated the effect of poorly oriented drillholes, and there appears to be no significant difference in the location of the mineralized zones encountered by surveyed and by un-surveyed drillholes.

Regular reconciliation reviews comparing close spaced grade control drillhole data against the Mineral Resource and Mineral Reserve estimates have reasonably confirmed the location, orientation, and grades of the mineralized zones as defined by the exploration drillholes. These factors relating to the reliability of the sample data have been considered when applying confidence categories to the current Mineral Resource and Mineral Reserve estimates.

Since acquiring the Property, Pan American has undertaken measures to ensure the data used for the estimation of Mineral Resources and Mineral Reserves is reliable and collected using industry best practice. This includes orienting holes perpendicular to mineralization and taking downhole surveys at frequent intervals down every hole.

10.7 Conclusions and recommendations

There are no known drilling, sampling, or recovery factors that could materially impact the reliability of the drilling results. Pan American will continue to explore the deposit at depth testing the down dip extensions of the currently defined mineralization.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling method

11.1.1 Minefinders (1996 – 2012)

For RC drillholes, Minefinders selected one sample over the interval of each 5-foot drill rod length. For holes drilled under dry conditions, the broken rock fragments were collected in a bucket, divided into two equal sample pairs with a splitter, and bagged. Under wet conditions, the broken rock fragments were divided with a wet splitter into two equal sample pairs in two buckets. Flocculant was added to the buckets and the buckets were placed in tubs to settle the fine material and then bagged. The weight of the dry and wet samples varied from 10 kilograms (kg) to 13 kg.

One sample was sent to the laboratory for analysis and the other pair was retained on site for reference. A portion of the reference sample was stored in plastic chip trays and logged for geological features. The geological logging included codes for lithology, colour, and breccia type. Strength ratings were assigned for brecciation, fractures, vein composition, alteration type, oxidation nature, and oxide and sulphide minerals.

Diamond drillholes were logged, photographed, split in half, and sampled in a secure core logging facility at the Property. The geological log included all the same information as collected for RC holes as well as core recovery, rock quality designation (RQD), and structural features. Core was split in half with a manual core splitter, with one half sent to the laboratory for preparation and analysis and the other half retained in the core tray for reference. The sampling length was frequently 2 m.

11.1.2 Pan American (2012 - present)

Diamond drillholes are logged, photographed, halved, and sampled in a secure core logging facility at the Property. The drill core is cut in half with a diamond bladed saw, and samples are selected with respect to geological features, at 2 m lengths or less.

RC drill samples are collected at the rig and the field procedures are described in Section 10.5.2.

11.2 Sample storage and security

For Minefinders, samples were collected by truck from the Property by the commercial sample preparation laboratory in use at the time, which included Bondar-Clegg (since acquired by ALS) of Chihuahua, Mexico, ALS of Hermosillo, Mexico, or Inspectorate of Hermosillo, Mexico.

For Pan American, the samples were collected weekly from site by the Durango laboratory of SGS until 2019. Currently samples for offsite analysis are collected by Actlabs laboratories located in Zacatecas. This alternates with PAS own internal laboratory. Offsite samples are taken to the laboratory for sample preparation and analysis, and the handover is at the mine site. The core is kept in a secure core storage area where all historical and Pan American core is stored.

All underground and exploration data is stored in the SQL-based DH Logger database. This database contains appropriate internal validations and checks to ensure data security.

11.3 Sample preparation and analysis

11.3.1 Minefinders (1996 – 2012)

Samples were dried and crushed to 70% passing minus 2 mm in either jaw or roll crushers, then reduced to 1 kg weight by splitting in a riffle splitter, then pulverized to 85% passing less than 75 microns (µm). The pulverized material was then split to a 150 gram (g) pulp sample weight.

Between 1996 and 2002, the pulverized samples were sent for geochemical analyses by air to ALS of Vancouver, Canada (ALS) and from 2002 onwards, the period covering the majority of the drillholes in the database, to Inspectorate of Reno, USA (Inspectorate). ALS is an accredited laboratory that conforms to the requirements of CAN-P-1579, CAN-P-4E (ISO/IEC 17025:2005) and Inspectorate conforms to the requirements of ISO-9001:2008. Both ALS and Inspectorate are commercial laboratories and independent of Minefinders.

At the analytical laboratory, a 30 g subset was assayed for gold using fire assay with atomic absorption finish. Any sample with a grade greater than 1 part per million (ppm) gold was re-assayed using fire assay with gravimetric finish.

Prior to 2001, samples were assayed for silver using Aqua Regia digestion with atomic absorption finish, until metallurgical test work at McClelland Laboratories Inc. (MLI) found that the Aqua Regia digestion technique may have been under-reporting silver values, likely because of poor digestion of silver halide minerals. Minefinders implemented a campaign to re-assay approximately 9,000 retained pulps from drillhole and underground channel samples for silver using multi-acid digestion with atomic absorption finish, which resulted in a grade increase of 59% for oxidized samples, 22% in mixed oxide-sulphide samples, and 19% in sulphide samples. The database prioritizes assays by analytical method first by fire assay with gravimetric finish, then fire assay with atomic absorption finish, then multi-acid digest with atomic absorption finish, and finally Aqua Regia digest with atomic absorption finish.

11.3.2 Pan American (2012 – mid 2022)

The laboratories used by Pan American over the 2012 to mid 2022 period are shown in Table 11.1. Note the current lab is Actlabs. Note where 2022 or mid 2022 is referred to, this means up to June 30, 2022.

Table 11.1 Laboratories used by Pan American 2012-mid 2022

Assay Lab	# of samples	% per laboratory	Certification
Actlabs, Zacatecas	19,421	23.5	ISO 9001:2015
Dolores Internal Lab	8,618	10.1	ISO 9001:2015
SGS, Durango	57,348	67.2	ISO/IEC 17025:2017
Total	**85,387**	**100.0**	

Both Actlabs and SGS, Durango are commercial laboratories and independent of Pan American.

As seen in the table the majority of samples were assayed at SGS. Only a small percentage of the samples were assayed at site.

At Actlabs, the samples are crushed to 2 mm in size and split with a riffle splitter to obtain a 250 g sub-sample, then pulverized to 75 µm. Samples are analyzed for gold (Au) using fire assay with atomic absorption finish, and any sample with a grade greater than 10 ppm Au is re-assayed using fire assay with gravimetric finish. Silver (Ag) is assayed using three acid digest with atomic absorption finishing methods, and any sample with a grade greater than 100 ppm Ag is re-assayed by fire assay with gravimetric finish.

11.4 Bulk density

Minefinders measured bulk density using the water immersion method from 296 paraffin sealed drill core samples. Since 2012, Pan American has selected samples from geologically and spatially representative locations. The samples were measured for bulk density by ALS of Vancouver using the water displacement method on wax-coated samples. To date, 1,741 bulk density measurements are available, and the results are discussed in Section 14.

11.5 Quality assurance and quality control (QA/QC)

11.5.1 Minefinders (1996 - 2012)

Minefinders submitted CRMs and blank material to the laboratory to independently test for accuracy and contamination of the assays determined by the laboratory. No duplicates were submitted. CRMs were submitted at a frequency that varied from between one CRM per every two drillholes up to 16 standards per drillhole, for an overall frequency of approximately one CRM per 20 samples.

From 1997, Minefinders submitted three CRMs comprised of mineralized material sourced from the Property, which were prepared and certified for gold by Bondar-Clegg. In 2002, Minefinders used four CRMs comprised of mineralized material from site that were prepared and certified for both silver and gold by Inspectorate.

Blanks, comprised of material believed to be unmineralized and sourced from overburden or the upper parts of drillholes, were submitted in 1997 and from between 2004 and 2009, at a frequency of approximately 1 blank per 80 samples.

The results of the data are problematic to assess, as record keeping and CRM identification numbering on the log sheets was poor, no coherent QA/QC database was maintained, and no regular QA/QC reports are available for review. Pan American's review of the results of the silver and gold CRMs shows unacceptably wide grade variation, likely the result of poor CRMs preparation. Blanks failed in the order of 4% for gold and 3% for silver.

11.5.2 Pan American (2012 - mid 2022)

Since acquiring the Property in 2012, Pan American has implemented an industry standard QA/QC program including the submission of CRMs, blanks, and duplicate samples to the laboratory and reviewing the results regularly to ensure that appropriate and timely action is taken in the event of a QA/QC failure. The insertion rate for QA/QC samples is 5% each of blanks, CRMs, and duplicate samples.

The QA/QC compliance over the 2012 to mid 2022 period is shown in Table 11.2. This is slightly below the accepted norms stated above for the whole period.

Table 11.2 Summary of QA/QC samples 2012 – mid 2022

Year	CRMs	Blanks	Pulp duplicates	Field duplicates	Total QA/QC	Total samples
2012	217	291	-	291	508	8,892
2013	703	728	-	569	1431	16,895
2014	592	607	230	586	2015	17,109
2015	103	126	66	40	335	3,535
2016	340	347	34	23	744	8,274
2017	639	639	-	-	1278	15,499
2018	429	415	164	394	1402	9,378
2019	63	68	147	42	320	1,240
2020	45	49	39	44	177	573
2021	60	74	24	57	244	1,454
2022	41	83	-	91	251	3,279
Total	**3,232**	**3,427**	**704**	**1,568**	**8,705**	**86,128**

Source: PAS (2022).

The compliance or insertion rates for the various streams are shown below based on the total number of samples submitted.

Table 11.3 Summary of QA/QC insertion rates 2012 – mid 2022

Year	CRMs	Blanks	Pulp duplicates	Field duplicates
2012	2.4%	3.3%	-	-
2013	4.2%	4.3%	-	-
2014	3.5%	3.5%	1.3%	3.4%
2015	2.9%	3.6%	1.9%	1.1%
2016	4.1%	4.2%	0.4%	0.3%
2017	4.1%	4.1%	-	-
2018	4.6%	4.4%	1.7%	4.2%
2019	5.1%	5.5%	11.9%	3.4%
2020	7.9%	8.6%	6.8%	7.7%
2021	4.1 %	5.1 %	1.7%	3.9%
2022	1.25%	2.5%	2.8%	7.7%

Source: PAS (2022).

11.5.2.1 Certified Reference Material

CRMs contain standard, predetermined concentrations of material (silver and gold in this case) which are inserted into the sample stream to check the analytical accuracy of the laboratory. CRMs should be monitored on a batch-by-batch basis and remedial action taken immediately if required. For each economic mineral it is recommended the use of at least three CRMs with values:

- At the approximate cut-off grade (COG) of the deposit.
- At the approximate expected grade of the deposit.
- At a higher grade.

Industry best practice is to investigate, and where necessary re-assay batches where two consecutive CRMs in a batch occur outside two standard deviations (warning), or one CRM occurs outside of three standard deviations (fail) of the expected value described on the assay certificate.

From 2012 to end 2022, 3,427 CRMs from 27 different CRMs were submitted to the laboratory with the drill samples. The CRMs have been prepared for Pan American from material obtained from the Dolores project. The CRMs for Dolores have been prepared by SGS and Actlabs where the samples were pulverized and homogenized and sent to five laboratories for determinations each as a round robin exercise. A report is supplied to Pan American with the statistical analysis. The CRMs used in the drilling programs since 2012 and their grades are shown in Table 11.4.

Table 11.4 Summary of CRMs submitted for analysis by PAS 2012 – 2022

CRM	Ag (g/t)		Au (g/t)		CRM	Ag (g/t)		Au (g/t)	
	Grade	Standard deviation	Grade	Standard deviation		Grade	Standard deviation	Grade	Standard deviation
Blanco	0.00	0.30	0.00	0.03	SGS14A-14A	24.90	2.00	0.27	0.02
SGS1-1A	6.35	1.13	0.12	0.02	SGS15A-15A	55.00	3.20	0.68	0.09
SGS2-2A	30.35	3.96	0.51	0.05	SGS16-16A	25.20	2.10	0.41	0.03
SGS3-3A	267.40	16.47	1.74	0.14	SGS17A-17A	56.20	2.84	1.29	0.06
SGS4-4A	36.96	4.35	0.16	0.02	SGS18A-18A	34.10	5.60	0.50	0.02
SGS5-5A	23.64	1.50	0.17	0.02	SGS19A-19A	16.40	1.11	0.26	0.02
SGS6-6A	45.72	2.80	0.35	0.05	SGS20A-20A	9.90	0.96	0.25	0.03
SGS7-7A	12.92	1.00	0.07	0.01	Actlabs 21-21A	91.50	1.11	0.88	0.04
SGS8-8A	92.10	5.40	1.75	0.11	Actlabs 22-22A	104.60	3.18	1.08	0.04
SGS9-9A	101.00	5.70	1.57	0.08	Actlabs 23-23A	89.70	2.62	1.06	0.05
SGS-10-10A	41.20	3.87	0.53	0.04	Actlabs 24-24A	28.30	1.48	0.42	0.02
SGS11-11A	41.10	5.07	0.51	0.03	Actlabs 26-26A	16.30	1.11	0.24	0.02
SGS-12-12A	66.70	6.10	0.81	0.05	SGS27-27A	16.80	1.00	0.77	0.05
SGS-13-13A	26.80	2.40	0.31	0.02	SGS 29-29A	25.00	0.90	1.74	0.12
SGS-31-31A	137.20	3.50	1.27	0.04	Actlabs 33-33A	20.00	1.00	0.44	0.03
SGS-32-32A	31.60	1.20	0.74	0.03					

Source: PAS (2022).

The insertion number by year for each CRM used is shown in Table 11.5. The rates of insertion vary for each CRM, this is due using different CRMs with the same grade ranges at different times during the year. Generally, a reasonable number (five or so), is used every year. This allows for a meaningful number of results for statistical analysis.

Table 11.5 Summary of CRMs submitted by PAS - 2012-2022 categorized by year

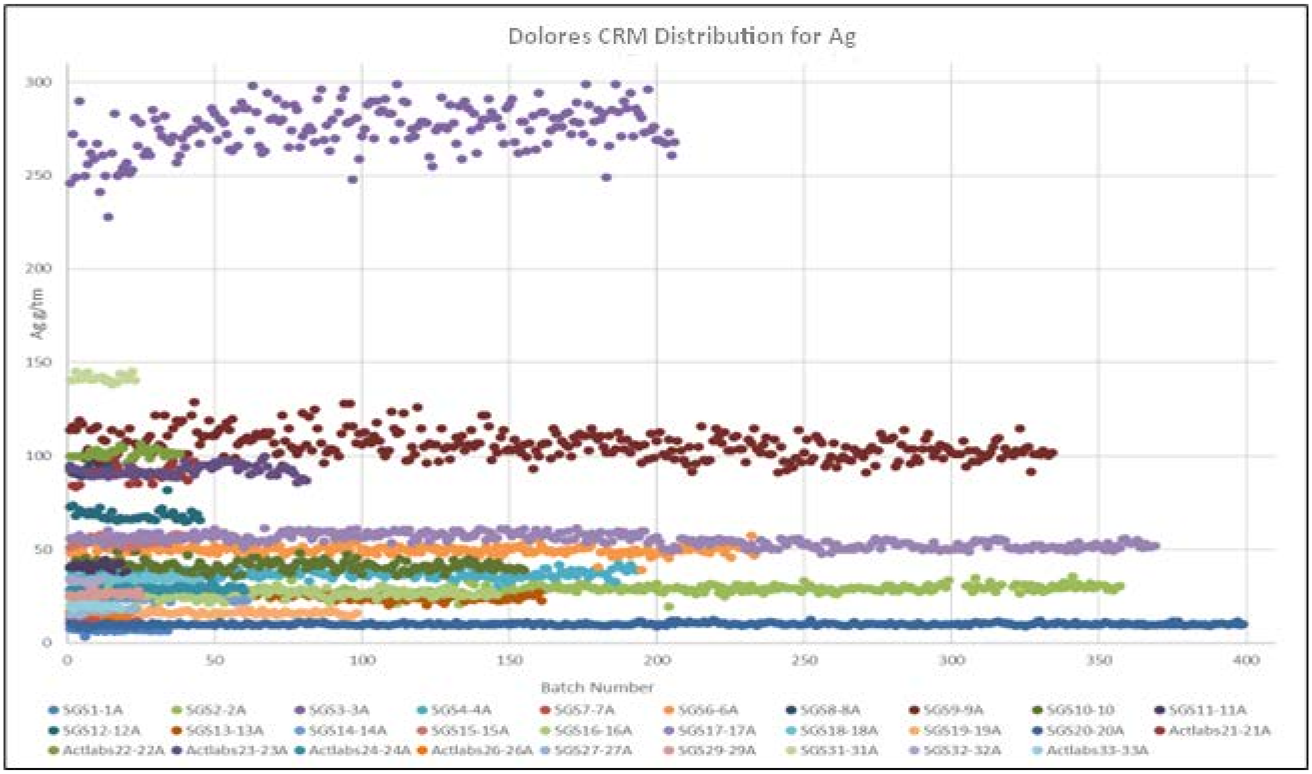
CRM name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Total CRMs	2	4	9	5	8	6	12	5	5	5	3	
SGS1-1A			34									34
SGS2-2A	154	203										357
SGS3-3A		206										206
SGS4-4A	63	120	10									193
SGS6-6A		174	59									233
SGS7-7A			24									24
SGS8-8A			17									17
SGS9-9A			325		9							334
SGS10-10			31		103	14	7					155
SGS11-11			10		10							20
SGS12-12				10		14	21					45
SGS13-13			82	76	3							161
SGS14-14				5		5	51					61
SGS15-15				3	4		37					44
SGS16-16				9	122		14					145
SGS17-17					45	285	39					369
SGS18-18							45					45
SGS19-19						21	71			6		98
SGS20-20					44	300	55					399
Actlabs 21-21							10	10		23		43
Actlabs 22-22							14	9		15		38
Actlabs 23-23							65	12		4		81
Actlabs 24-24								20	12	12		44
Actlabs 26-26								9	12			21
SGS-27-27A									11			11
SGS29-29								3	10			13
SGS 31-31											12	12
SGS 32-32											11	11
Actlabs-33-33 A											18	18
Total inserted	**217**	**703**	**592**	**103**	**340**	**639**	**429**	**63**	**45**	**60**	**41**	**3232**

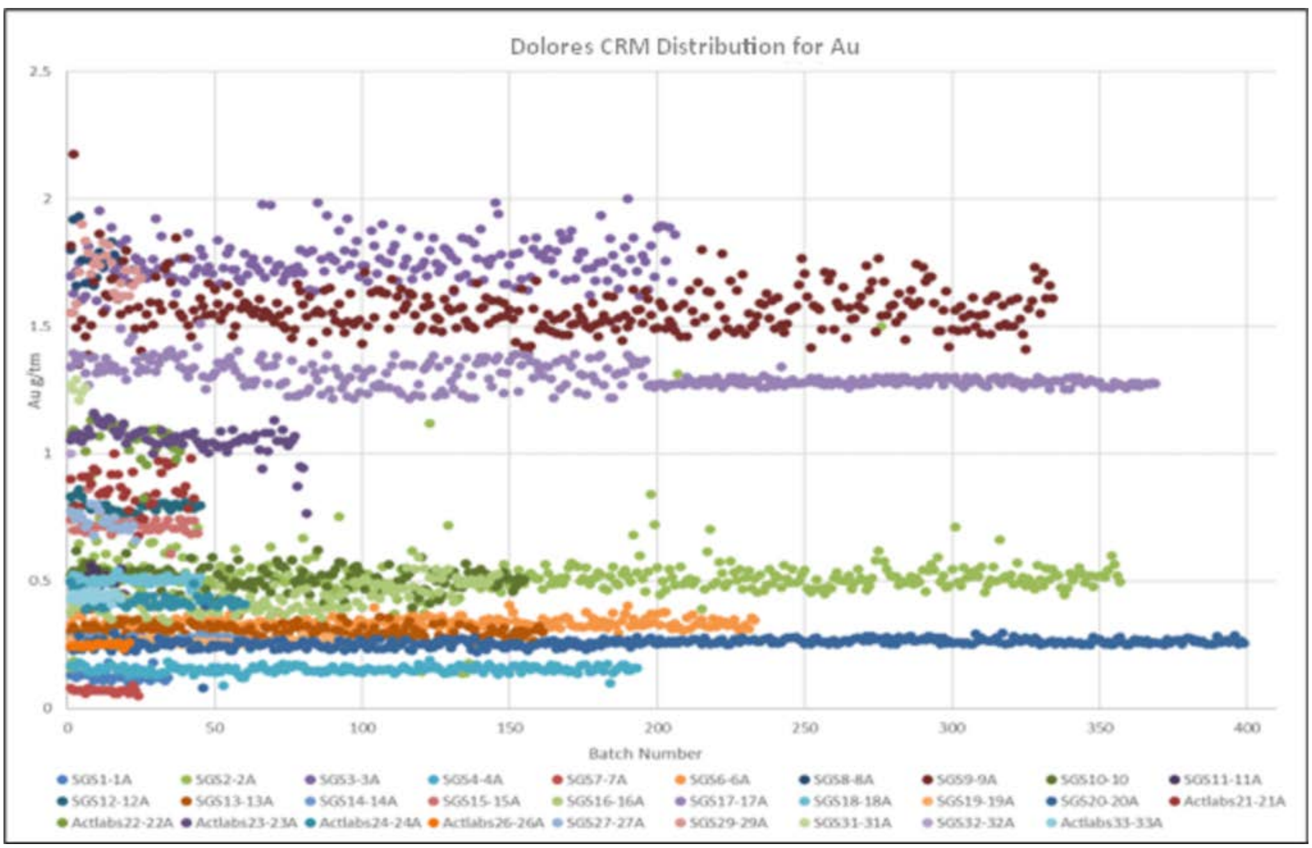
Source: PAS (2022).

Control charts are commonly used to monitor the analytical performance of an individual CRM over time. CRM assay results are plotted in order of analysis along the X-axis. Assay values of the CRM are plotted on the Y axis. Control lines are also plotted on the chart for the expected value of the CRM, two standard deviations above and below the expected value (defining a warning threshold), and three standard deviations above and below the expected value (defining a fail threshold). Control charts show analytical drift, bias, trends, and irregularities occurring at the laboratory over time.

Figure 11.1 shows the performance of all CRMs for both gold and silver. While most of them perform well, significant dispersion on CRMs SGS-3-3A and SGS-9-9A for silver and gold is evident in the plots. All samples associated with the failed standard were sent for re-analysis as part of the QA/QC protocol.

Figure 11.1 Performance for silver and gold CRMs from 2012 - 2022





Source: PAS (2022).

Table 11.6 shows a summary of the CRM performance over the 2012 to 2022 period where failures are determined as being ±3 standard deviations from the expected value.

Table 11.6 Summary of CRM performance from 2012-mid 2022

CRM name	Ag fail	Au fail	Ag % fail	Au % fail
SGS1-1A	0	1	0.00%	2.94%
SGS2-2A	8	27	2.24%	7.56%
SGS3-3A	0	0	0.00%	0.00%
SGS4-4A	0	2	0.00%	1.04%
SGS6-6A	5	0	2.15%	0.00%
SGS7-7A	0	0	0.00%	0.00%
SGS8-8A	0	0	0.00%	0.00%
SGS9-9A	20	4	5.99%	1.20%
SGS10-10	1	2	0.65%	1.29%
SGS11-11	0	0	0.00%	0.00%
SGS12-12	0	0	0.00%	0.00%
SGS13-13	0	1	0.00%	0.62%
SGS14-14	0	0	0.00%	0.00%
SGS15-15	0	0	0.00%	0.00%
SGS16-16	1	22	0.69%	15.17%
SGS17-17	0	2	0.00%	0.54%
SGS18-18	0	0	0.00%	0.00%
SGS19-19	0	0	0.00%	0.00%
SGS20-20	0	2	0.00%	0.50%
Actlabs 21-21	12	3	27.91%	6.98%
Actlabs 22-22	0	1	0.00%	2.63%
Actlabs 23-23	2	2	2.47%	2.47%
Actlabs 24-24	1	1	2.27%	2.27%
Actlabs 26-26	0	0	0.00%	0.00%
SGS-27-27A	1	0	9.09%	0.00%
SGS29-29	2	0	15.38%	0.00%
SGS 31-31	0	0	0.00%	0.00%
SGS 32-32	0	0	0.00%	0.00%
Actlabs-33-33A	0	0	0.00%	0.00%
Total	**53**	**70**	**0.00%**	**0.00%**

Source: PAS (2022).

Overall, the silver CRMs performed better than the gold CRMs. SGS2-2A, SGS-9-9A, SGS16-16, and Actlabs 21-21 displayed some failures. CRM Actlabs 21-21 was analyzed 43 times during the period 2018 - 2021, the silver failures are a mixture of high and low and do not show any bias. The gold failures mostly associated with the higher CRM gold grade. Pan American has implemented a program whereby any failures are noted immediately and re-analyzed where appropriate. Overall, the CRM performance shows acceptable laboratory accuracy.

11.5.2.2 Blanks

Coarse blanks test for contamination during both the sample preparation and assay process. Pulp blanks test for contamination occurring during the analytical process. No pulp blanks have been submitted.

From 2012 to 2022, a total of 3,427 coarse blanks submitted. An upper limit of 5 g/t Ag and 0.1 g/t Au was used to assess failure of blanks, which represents 10 times the lower detection limit, and the performance for silver and gold is shown in Table 11.7.

Table 11.7 Summary of blanks performance

Year	Number blanks	Ag pass rate (%)	Au pass rate (%)
2012	291	100	100
2013	728	100	99.7
2014	607	100	100
2015	126	100	100
2016	347	100	99.7
2017	639	100	100
2018	415	100	100
2019	68	100	100
2020	49	100	100
2021	74	100	100
2022	83	100	100
Total	**3,344**	**100**	**99.9**

Source: PAS (2022).

The performance of the coarse blanks indicates acceptable laboratory hygiene.

11.5.2.3 Duplicates

Duplicate samples should be selected over the entire range of grades seen at the project to ensure that the geological heterogeneity is understood, however, the majority of duplicate samples should be selected from zones of mineralization. Unmineralized or very low-grade samples should not form a significant portion of duplicate sample programs as analytical results approaching the stated limit of lower detection are commonly inaccurate, and do not provide a meaningful assessment of variance.

Duplicate data can be assessed using a variety of approaches. The QP typically assesses duplicate data using scatter plots and relative paired difference (RPD) plots. These plots measure the absolute difference between a sample and its duplicate. For field duplicates it is desirable to achieve 80% to 85% of the pairs having less than 30% RPD between the original assay and check assay and for pulp duplicates 80% to 85% of samples should be less than 10% RPD. In these analyses, pairs with a mean of less than 15 times the lower limit of analytical detection (LLD) are excluded. Removing these low values ensures that there is no undue influence on the RPD plots due to the higher variance of grades expected near the lower detection limit, where precision becomes poorer (Long et al. 1997).

Field duplicates

Field duplicates monitor sampling variance, sample preparation variance, analytical variance, and geological variance. Prior to 2014 these samples were not taken by Pan American. From 2014 to 2022, a total of 2,137 field duplicates comprising the second half of the drill core or half of the RC sample. Table 11.8 and Table 11.9 summarizes the field duplicate performance from 2014 to 2022 for gold and silver. A lower detection limit of 0.01 Au ppm and 0.25 Ag ppm was used. The bias is measured based on the mean grade of the original sample dataset versus the duplicate sample dataset. A positive bias result indicates that overall, the original samples are returning higher values than the duplicate samples. Looking at the results on a yearly basis is inappropriate as for most years there are very few samples recording values greater than 15 times the detection limit. The combined results over the period from 2014 - 2022 shows bias towards the duplicate samples.

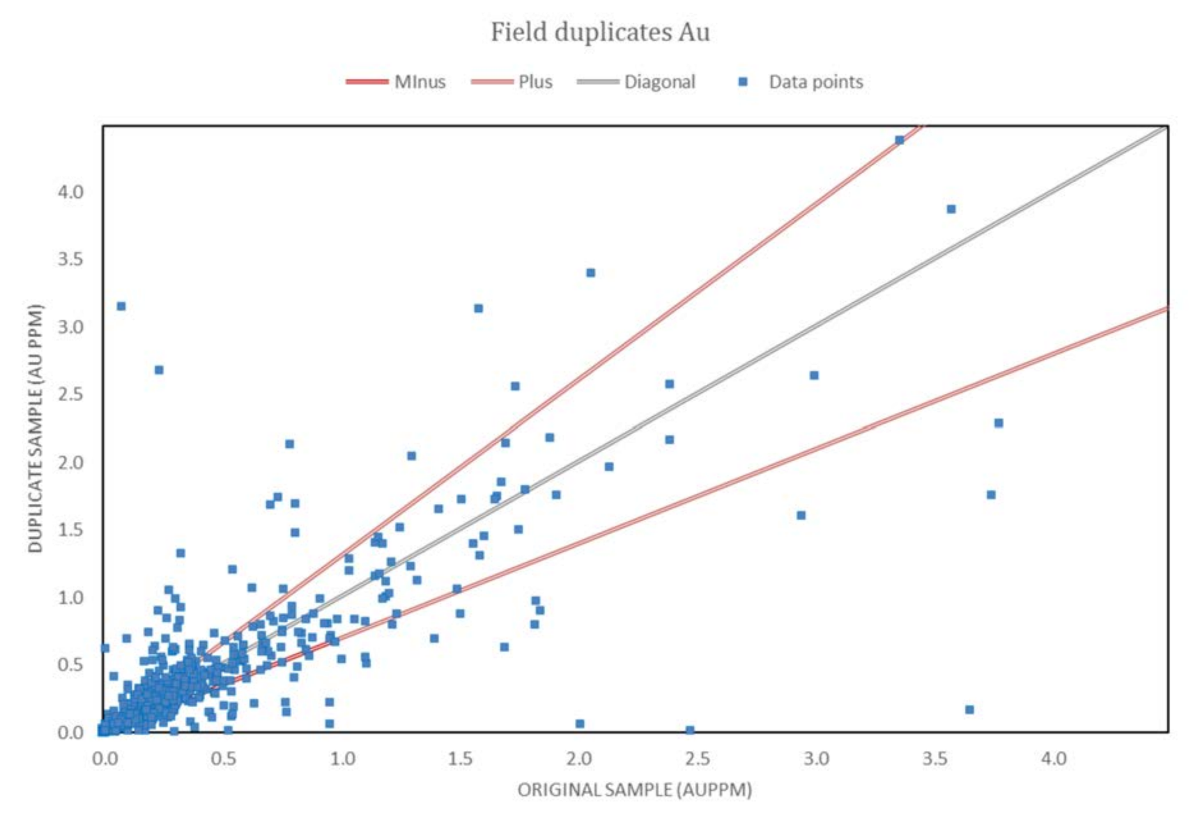
Table 11.8 Summary of field duplicate performance for Au – 2014 - 2022

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2014 - 2022
Field sample pairs (Pairs > 15 x LDL)	586 (193)	40 (1)	23 (3)	0	394 (207)	42 (1)	44 (1)	58 (2)	91(3)	1,278 (411)
Field sample pairs < 30% RPD	74	N/A	N/A	N/A	60	N/A	N/A	N/A	N/A	66
Original Mean (Au ppm)	0.37	0.04	0.17	N/A	0.35	0.06	0.05	0.03	0.17	0.16
Duplicate Mean (Au ppm)	0.32	0.04	0.24	N/A	0.40	0.05	0.04	0.03	0.18	0.163
Bias (%)	13	-7	-37	N/A	-14	18	17	8	19	2.13

Note: Negative bias values = overall higher duplicate grades.
Source: PAS (2022).

Figure 11.2 shows the RPD and scatterplots of the field duplicates for Au from 2014 - 2022.

Figure 11.2 RPD and scatter plot of field duplicates Au – 2014 - 2022



Note: Scatterplot is limited to 5 Au ppm.
Source: PAS (2022).

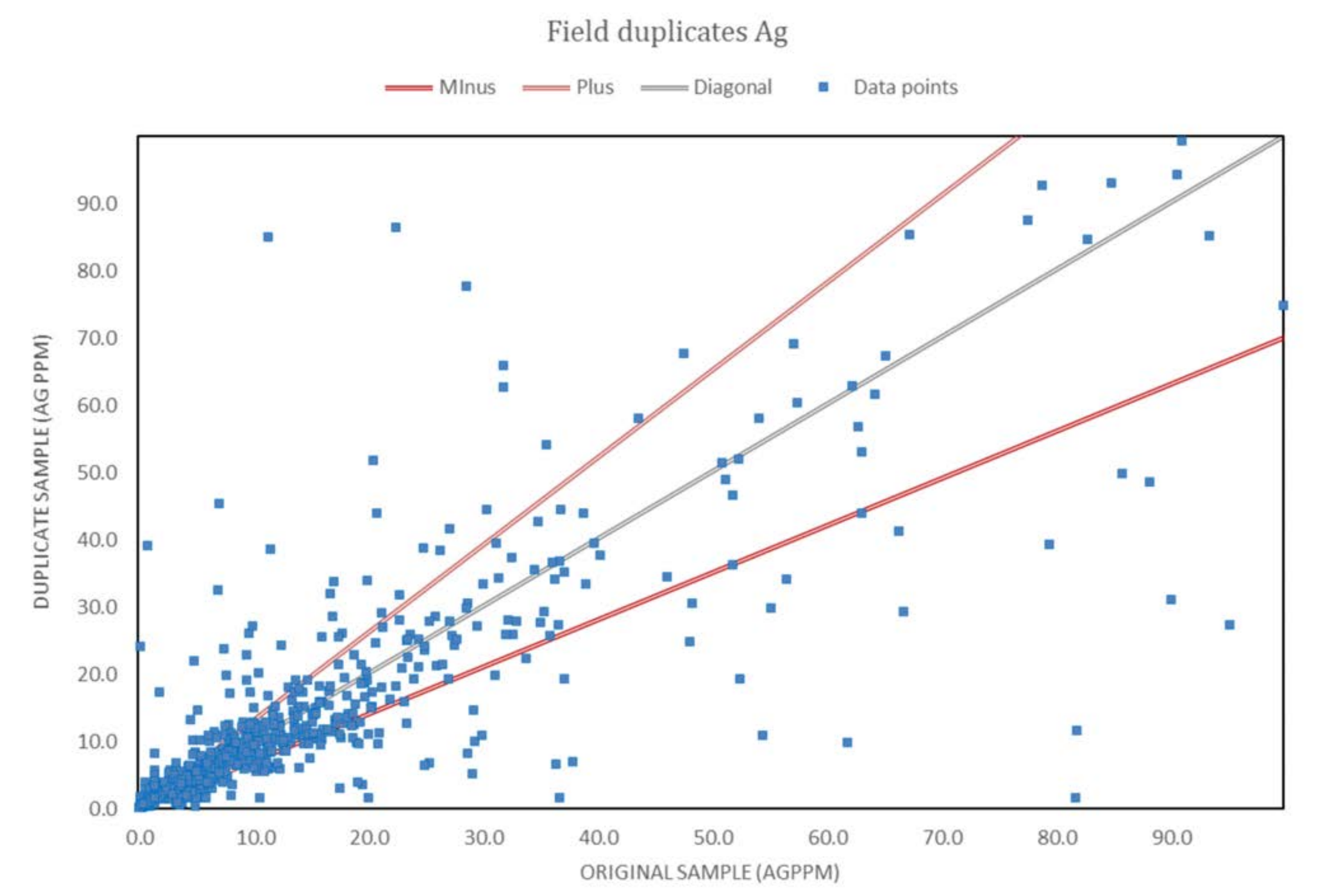
Table 11.9 Summary of field duplicate performance for Ag – 2014 - 2022

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2014 - 2022
Field sample pairs (Pairs > 15 x LDL)	586 (218)	40 (4)	23 (9)	0	394 (231)	42 (4)	44 (5)	58 (2)	91(5)	1,278 (478)
Field sample pairs < 30% RPD	67	N/A	89	N/A	62	N/A	N/A	N/A	N/A	65
Original Mean (Ag ppm)	11.09	2.56	14.03	N/A	17.21	1.69	2.15	0.61	10.15	7.43
Duplicate Mean (Ag ppm)	11.17	2.4	17.08	N/A	18.3	1.64	2.1	0.59	10.14	16.89
Bias (%)	-1	6	-16	N/A	-6	3	2	12	15	1.87

Note: Negative bias values = overall higher duplicate grades.
Source: PAS (2022).

Figure 11.3 shows the RPD and scatterplots of the field duplicates for Ag from 2014 – 2022.

Figure 11.3 RPD and scatter plot of field duplicates Ag – 2014 - 2022



Note: Scatterplot is limited to 100 Ag ppm.
Source: PAS (2022).

The field duplicate performance is reasonable, although lower than the expected results, with Au and Ag performing similarly. The bias for the Ag and Au duplicates is skewed by one extremely high value pair submitted in 2022. The bias varies between favoring the original or the duplicate sample for both Au and Ag. Regardless, the bias is not a significant issue. In general, while laboratory issues may be a potential contributor to lower precision noted in the field duplicate data, the highly variable nature of mineralization is considered to be the main cause.

Coarse duplicates

Coarse reject samples monitor sub-sampling variance, analytical variance, and geological variance. No coarse duplicates were submitted by Pan American between 2012 - 2022.

Pulp duplicates

Pulp duplicates monitor analytical and geological variance. From 2014 to 2022, a total of 891 pulp duplicates were submitted. Table 11.10 and Table 11.11 summarize the pulp duplicate performance from 2014 - 2022, for Au and Ag respectively. A lower detection limit of 0.01 Au ppm and 0.25 Ag ppm was used. The bias is measured based on the mean grade of the original sample dataset versus the duplicate sample dataset. A positive bias result indicates the overall the original samples are returning higher values than the duplicate samples.

Figure 11.4 and Figure 11.5 show the RPD and scatterplots of the pulp duplicates for Au and Ag, respectively, over the period from 2014 - 2022.

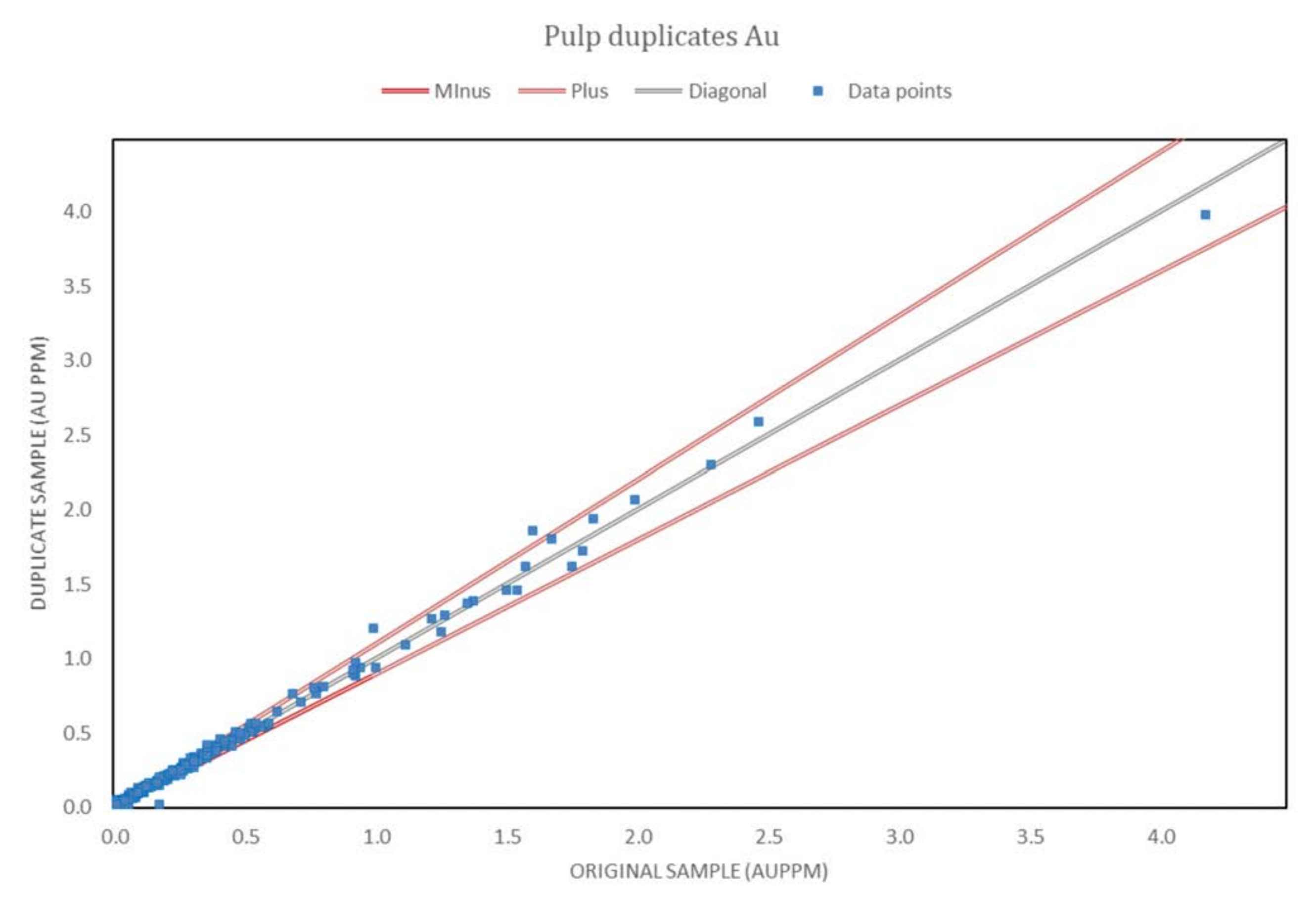
Looking at the results on a yearly basis is inappropriate as for most years there are very few samples recording values greater than 15 times the detection limit. The combined results over the period from 2014 - 2022 shows a small bias towards higher grades in the duplicate samples. The magnitude of this bias is not considered material to the Mineral Resources or Mineral Reserves.

Table 11.10 Summary of pulp duplicate performance for Au – 2014 - 2022

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2014 - 2022
Field sample pairs (Pairs > 15 x LDL)	230 (35)	66 (12)	34 (6)	0	164 (40)	147 (11)	39 (1)	24 (1)	187 (2)	891 (108)
Pulp sample pairs < 10% RPD	94	100	83	N/A	93	82	N/A	N/A	N/A	91
Original Mean (Au ppm)	0.29	0.11	0.34	N/A	0.17	0.06	0.05	0.03	0.22	0.16
Duplicate Mean (Au ppm)	0.27	0.11	0.35	N/A	0.17	0.06	0.05	0.03	0.22	0.16
Bias (%)	4	0	-3	N/A	-1	0	-3	2	3	2

Note: Negative bias values = overall higher duplicate grades.
Source: PAS (2022).

Figure 11.4 RPD and scatter plot of pulp duplicates Au – 2014 - 2022



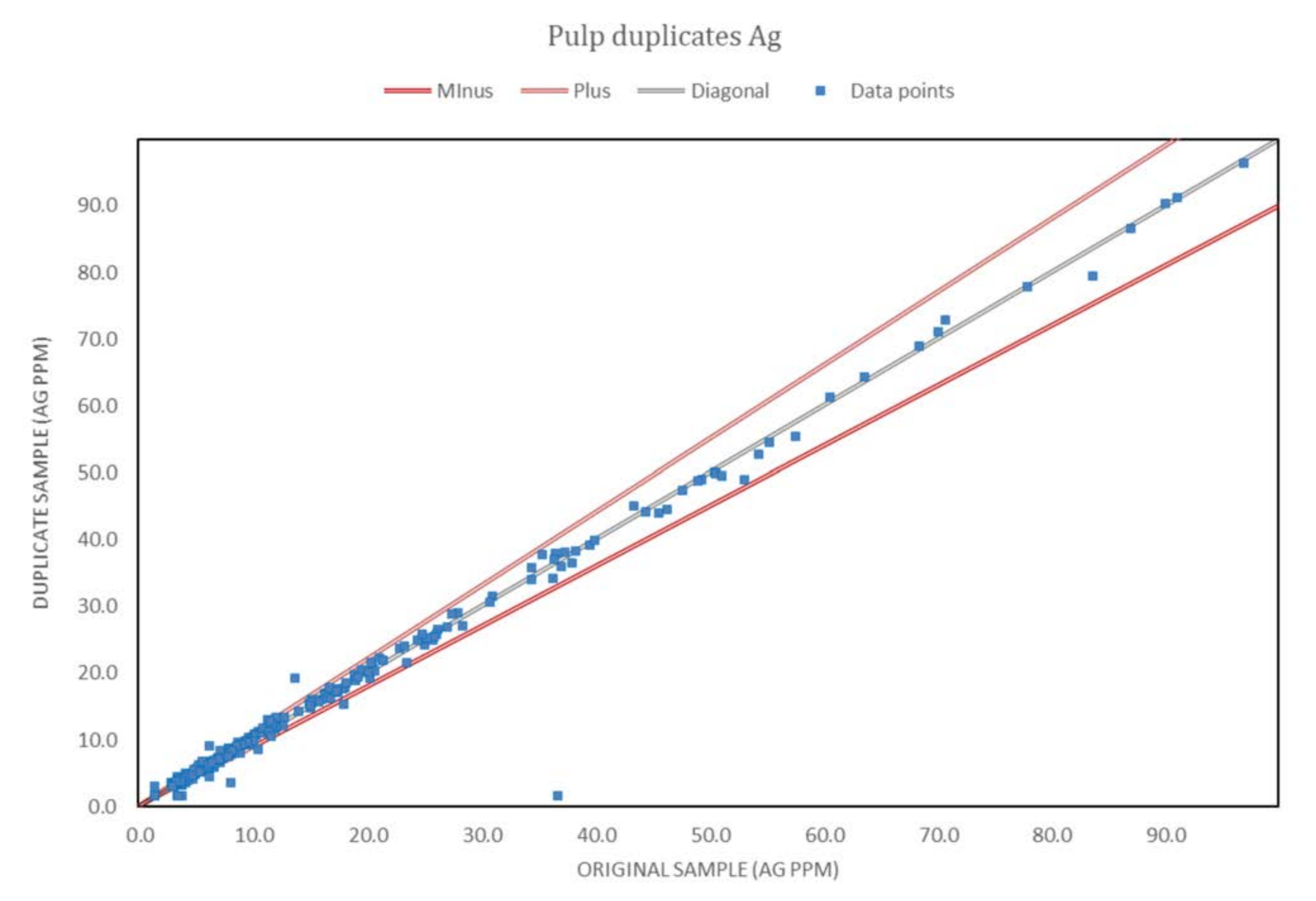
Note: Scatterplot is limited to 5 Au ppm.
Source: PAS (2022).

Table 11.11 Summary of pulp duplicate performance for Ag – 2014 - 2022

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2014 - 2022
Field sample pairs (Pairs > 15 x LDL)	230 (76)	66 (19)	34 (11)	0	164 (61)	147 (19)	39 (8)	24 (1)	187 (1)	891 (196)
Pulp sample pairs < 10% RPD	97	100	73	N/A	86	95	75	N/A	N/A	87
Original Mean (Ag ppm)	10.53	7.12	9.09	N/A	6.16	2.75	2.29	1.7	12.37	6.5
Duplicate Mean (Ag ppm)	10.35	7.08	8.72	N/A	6.12	2.73	2.35	1.7	12.37	6.43
Bias (%)	2	1	4	N/A	0	0	-3	0	2	1

Note: Negative bias values = overall higher duplicate grades.
Source: PAS (2022).

Figure 11.5 RPD and scatter plot of pulp duplicates Ag – 2014 - 2022



Note: Scatterplot is limited to 100 Ag ppm.
Source: PAS (2022).

The pulp duplicate performance is reasonable, with no appreciable bias observed. Pulp duplicates should be selected from material with higher grades, where possible. This will provide a larger database from which to further assess the duplicate performance.

Umpire (check-lab) duplicates

Umpire laboratory duplicates are pulp samples sent to a separate laboratory to assess the accuracy of the primary laboratory (assuming the accuracy of the umpire laboratory). Umpire duplicates measure analytical variance and pulp sub-sampling variance. No umpire duplicates were submitted by Pan American between 2012 - 2022.

11.6 Summary statement and recommendations

Overall, the QA/QC performance is acceptable. The CRM performance indicates reasonable accuracy, and the blank performance indicates good laboratory hygiene. The field duplicates show less than ideal precision, however, this is to be expected given the type of mineralization.

Future QA/QC programs should ensure that duplicate samples are taken in mineralized areas so that there are enough samples above the detection limit to provide meaningful results on assaying precision. Coarse reject duplicates should be inserted to monitor sample preparation and analytical variance.

The QP responsible for this section of the report is of the opinion that the sample preparation, security, and analytical procedures are adequate for the estimation of Mineral Resources and Mineral Reserves at Dolores.

12 DATA VERIFICATION

12.1 Geology data reviews

Prior to and following the acquisition of the Property from Minefinders, Pan American undertook extensive geological data verification reviews. These reviews included compiling the available information and conducting reviews of downhole surveys in the database against the original photographic disks, visual reviews of the drillhole location in mining software, reviews of the drillhole collar coordinates against the surveyed topography, and extensive reviews of the assays in the database. The assay reviews included checking around 2,600 assays in the database against the original assay certificate, with particular attention paid to samples with relatively high silver and gold grades and unusual gold to silver ratios. A minor number of discrepancies were noted and corrected. Since acquiring the Property, Pan American routinely undertakes reviews of the assay and geology database and monitors reconciliation between the Mineral Reserve estimate, the grade control estimate, and mine production data.

In the opinion of the QP, the data used to estimate Mineral Resources and Mineral Reserves are sufficiently reliable for those purposes.

12.2 Mine engineering data reviews

Pan American routinely undertakes reviews of the mine engineering data, including the mining fleet and mine operational and production data, grade control data including dilution and ore loss, geotechnical and hydrological studies, pit wall and underground stability data, waste disposal requirements, environmental and community factors, the heap leach operations and production data, the development of the LOM plan including production and recovery rates, capital and operating costs for the mine and processing facilities, transportation, logistics, power and water consumption and future requirements, taxation and royalties, and the parameters and assumptions used in the economic model.

In the opinion of the QP, the data, assumptions, and parameters used to estimate Mineral Resources and Mineral Reserves are sufficiently reliable for those purposes.

12.3 Metallurgy data reviews

Pan American routinely undertakes reviews of metallurgical test work of monthly composites, operational data and performance, heap leach operations, and production data. In the opinion of the QP, the data and assumptions used to estimate the metallurgical recovery model for the Mineral Resource and Mineral Reserve estimates are sufficiently reliable for those purposes.

12.4 Data adequacy

It is the opinion of the QPs responsible for the preparation of this Technical Report that the data used to support the conclusions presented here are adequate for the purposes of the Mineral Resource and Mineral Reserve estimates.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction and previous work

Between 1996 and 2005, Minefinders completed test work and studies on Dolores ores. Column leach testing on a range of mineralization grades, lithologies, and ore types from the Dolores deposit yielded gold recoveries ranging between 51% and 94%, and silver recoveries between 23% and 74%, at a particle size of P_{80} 6.3 mm. The flowsheet selected included three-stage crushing of ore in closed circuit to produce a final crushed product of P_{80} range of 6.7 to 9.2 mm, with conveyor stacking on the heap leach pad for leaching with sodium cyanide. Recovery of metals from the pregnant leach solution follows the Merrill-Crowe process with precipitation of metal ions using zinc dust followed by the removal of trace amounts of mercury in retort ovens and smelting of the precipitate to produce doré bars.

Following acquisition of the mine in April 2012, Pan American established a metallurgical test program and selected 521 drill core samples that represented the deposit in terms of grade, ore type (oxidation state), and lithology in the proportions expected to be processed during the LOM. Test work included cyanidation leach tests, grinding and comminution studies, filtration tests, compaction and permeability tests, and pilot work as part of an overall pulp agglomeration study.

A summary of historical test work completed on Dolores is summarized in Table 13.1 with select test work programs further discussed based on relevance to the current operation. No new metallurgical test work has been completed on the Property with the exception of ongoing column leach and compaction test work on production composites at site.

Table 13.1 Dolores test work programs summary (1997 - present)

Year	Laboratory	Test work type				
		Comminution	Leaching	Filtration	Permeability	Minerology
1997	McClelland Laboratories		X			
1997	Hazen Research Inc					X
1997	Russell M Honea					X
1997	Small Bear Minerals					X
1999	McClelland Laboratories		X			
2000	McClelland Laboratories		X			
2004	McClelland Laboratories		X			
2004	Pocock Industrial			X		
2008	McClelland Laboratories		X			
2009	SGS	X				
2009	Delkor Solid Solutions			X		
2012	Pocock Industrial			X		
2013	Phillips Enterprises	X				
2013	McClelland Laboratories		X			
2013	Delkor Solid Solutions			X		
2013	Bilfinger Water Technologies			X		
2013	Pocock Industrial			X		
2013	Pocock Industrial			X		
2015	Geo-Logic Associates				X	
2016	McClelland Laboratories		X			

13.2 Pulp agglomeration study

In mid-2012 Pan American completed a study of three alternative process options including pulp agglomeration followed by heap leaching, grinding and leaching in tanks, and flotation / cyanidation. Pulp agglomeration was selected as the most attractive treatment option based on higher metallurgical recoveries, lower capital and operating costs, and the absence of tailings.

Pulp agglomeration is the process of grinding high-grade ore (pulp), combining with cement, and tumbling to form round balls in the order of 12.5 mm to 25 mm in diameter. In this process, the filtered fine ore, crushed material from the heap leach circuit in ratio 1:1 and cement are tumbled together in a drum at a controlled moisture content and feed rate and begin to stick together, forming agglomerates. The cement acts as a binder to hold the particles together and gives the agglomerates strength to prevent them from crumbling under the weight of material stacked on top of them. This is important to prevent the fine material from being washed into the solution collection drains and to maintain good permeability for percolation of cyanide solution down through the heap. The agglomerates remain very porous, and the increased surface area of the ground particles allows for better contact of the cyanide solution on the surface of the precious metal-bearing minerals. This in turn results in increased metallurgical recoveries compared to only coarse crushing and heap leaching. A photograph of the pulp agglomerates is shown in Figure 13.1.

Figure 13.1 Agglomerates at the heap leach pad

Dolores Agglomerates at the heap leach pad

Source: PAS (2021).

13.2.1 Cyanide leaching tests

The 521 samples as well as 15 composite samples prepared for previous metallurgical test work by Minefinders were subjected to cyanide solubility tests and analysis of manganese, lead, zinc, total sulphur, and sulphide sulphur content at McClelland Laboratories Inc in Reno, Nevada, USA. The testing conditions were optimized using the composite samples with the objective of maximizing metal extraction with respect to leach time, cyanide concentration, and solids density. Shake tests were performed to measure the solubility of gold and silver by cyanide, which averaged 72% and 66%, respectively.

Column leach tests were conducted on each high grade and medium grade composite at a P_{80} 6.3 mm feed size to determine baseline recoveries for the heap leach only process and on each high-grade composite representing the high-grade pulp agglomeration feed. For these tests, the high-grade composite was ground to P_{80} 425 µm, pre-leached at 3,000 ppm sodium cyanide for one hour to simulate the cyanide solution contact time in the mills and during filtration, then agglomerated with 20 kilograms per tonne (kg/t) cement and leached at 1,000 ppm sodium cyanide. Column leach testing on the range of mineralization (including oxide and sulphide) from Dolores deposit yielded gold recoveries ranging between 84% and 90% and silver recoveries between 76% and 85% at a particle size of P_{80} 425 µm. The results indicate that the extraction from pulp agglomerated composites relative to the baseline column leach test ranges from 12% to 14% higher in gold recovery and from 16% to 20% higher in silver recovery, and that sodium cyanide consumption of the agglomerated material compared with the baseline is around 50% lower.

13.3 2012 to 2021 quality control test work – production composites

13.3.1 Production composite column leach tests

Monthly composite column leach tests on samples collected from the heap leach feed conveyor 503 have been conducted since 2012, with additional monthly composite column leach tests on partially leached pulp agglomerated material from the agglomeration drum discharge combined with the rest of the heap leach being conducted since 2017. Average annual column leach tests results for the production composites are summarized Table 13.2 and Table 13.3.

Table 13.2 Monthly composite leach test summary

Heap leach material monthly composites column leach tests				
Year	Au (% Rec)	Ag (% Rec)	NaCN (kg/t)	P_{80} (mm)
2012	78	48	2.1	6.7
2013	79	53	3.8	7.9
2014	77	57	5.6	9.2
2015	76	56	5.5	8.4
2016	69	53	5.7	9.1
2017	69	53	6.6	8.7
2018	68	56	7.6	8.7
2019	68	58	9.0	8.4
2020	72	65	13.7	8.5
2021[1]	73	61	15.0	8.1
Overall	**73**	**56**	**7.5**	**8.3**

Note: [1] Results available until September 2021. CLT leaching time 350 days.

Table 13.3 Monthly composite partially leached pulp agglomerated and heap leach material – leach test summary

Year	CLT[1] Au (% Ext)	CLT[1] Ag (%Ext)	High grade- direct extraction[2] Au (%Ext)	High grade direct extraction[2] Ag (%Ext)	High grade Au Rec[3], %	High grade Ag Rec[3], %	NaCN (kg/t)	P_{80} (mm)
2017	72	58	55	37	92	86	9.8	8.4
2018	71	59	51	35	90	81	11.0	8.3
2019	74	67	44	31	89	85	9.1	8.1
2020	75	68	47	33	91	84	15.3	8.2
2021[4]	76	67	48	32	89	89	16.5	7.3
Overall	**74**	**64**	**49**	**33**	**90**	**84**	**12.3**	**8.0**

Notes:
[1] Partially leached high grade material + crushed ore from heap leach material.
[2] Direct Extraction from high grade material at Pulp Agglomeration Plant (grind, filter feed tank and filtration) from Filtrate solution.
[3] Back calculated recovery of high-grade material.
[4] Results available until September 2021. CLT leaching time 350 days.

Average recoveries for heap leach feed material ranged between 68% and 79% with an overall average recovery of 73% for gold and between 48% and 65% with an overall average of 56% for silver. Average recoveries for partially leached pulp agglomerated material with heap leach feed material ranged between 71% and 76% with an overall average of 74% for gold and between 58% and 68% for silver with an overall average of 64%. Average direct extractions for high grade material at the pulp agglomeration plant ranged between 44% and 55% with an overall average of 49% for gold and between 31% and 37% for silver with an overall average of 33%. Average back calculated recoveries for high grade material ranged between 89% and 92% with an overall average of 90% for gold and between 81% and 89% for silver with an overall average of 84%. The monthly composite column leach test results for both the heap and pulp agglomerated material are in very good agreement with projected recoveries from the recovery model. Sodium cyanide consumption from the column leach tests averaged 7.5 kg/t for heap composites and 12.3 kg/t for partially leached pulp agglomerated material combined with the heap leach material, which is significantly higher than the actual LOM cyanide consumption of 0.86 kg/t.

13.3.2 Production compacted permeability tests

Compacted permeability tests are conducted regularly on samples collected from the pulp agglomeration circuit. Each production sample is tested at staged ultimate heap heights and evaluated based on the hydraulic conductivity of the sample under load. Average compacted permeability test results by year are summarized in Table 13.4.

Table 13.4 Compacted Permeability Test Summary

Year	Simulated heap height	Number of times application rate	Dry density	High grade P_{80} (um)	Low grade P_{80} (mm)	Conductivity (cm/s)	Ratio of low to high grade	Cement addition (kg/t)
2017	34	190	1.95	362	7.9	4.062	3.4	19
	100	90	1.99	337	7.9	2.034		
2018	35	61	1.88	438	8.3	1.348	3.3	19
	100	31	2.01	435	8.4	0.696		
2019	34	48	1.90	415	8.5	1.072	3.3	19
	90	47	1.98	442	8.2	1.045		
2020	35	85	1.82	477	8.4	1.911	3.2	19
	83	59	1.92	477	8.4	1.308		
2021	35	119	1.84	468	7.7	2.646	3.2	18
	84	86	1.93	468	7.7	1.902		
2022	36	43	1.81	472	7.7	0.962	3.2	18
	84	24	1.93	472	7.7	0.545		

From the test work, the overall average pass rate for permeability tests is higher than the irrigation rate. In light of this, significant permeability issues are not expected.

13.4 Metallurgical recovery models

Metallurgical recovery models used for the June 30, 2022 Mineral Resource and Mineral Reserve estimates are shown in Table 13.5 and Table 13.6 for the heap leach and pulp agglomeration circuits, respectively. The heap leach recovery model was developed using test work results of at a particle size of 6.3 mm and cyanide concentrations of 1.0 g of sodium cyanide per litre. The pulp agglomeration recovery model for the oxides was calculated by adding the difference in recoveries of the leach test results at 425 µm and the results of the same sample at 6.3 mm to the heap leach recovery model. The pulp agglomeration recovery model for the mixed and sulphides was updated based on the monthly composites column leach test results, the direct extraction at the pulp agglomeration plant and the back calculation.

Table 13.5 Heap leach metallurgical recovery model

Ore type	Gold recovery (%)	Silver recovery (%)	Tonnage distribution
Oxide	77.9	42.1	4%
Mixed and sulphide	67.6	54.9	96%
Weighted Avg.	**68.0**	**54.4**	**100%**

Table 13.6 Pulp agglomeration metallurgical recovery model

Ore type	Gold recovery (%)	Silver recovery (%)	Tonnage distribution
Oxide	90.0	58.7	2%
Mixed and sulphide	89.8	83.3	98%
Weighted Avg.	**89.8**	**82.7**	**100**

The metallurgical recovery models are supplemented with a silver and gold leaching kinetics model for both the heap leach and pulp agglomeration circuits which have been developed initially from the kinetics of column leach tests, the ratio of ore placed on the heap leach pad relative to the added solution, and metal recoveries. Based on the topography of the heap leach pads, the current treatment rate, the quantity of solution applied to heap leaching, and considering the actual metal production, a solid to liquid time schedule was estimated for use in the kinetic model equation. The kinetic models are shown in Table 13.7 and Table 13.8 for the heap leach and pulp agglomeration circuits, respectively.

Table 13.7 Heap leach metallurgical recovery kinetic model

Year	Oxide, mixed and sulphide combined	
	Au recovery (%)	Ag recovery (%)
1	86.87	57.25
2	13.08	20.72
3	0.05	7.49
4		5.09
5		3.86
6		2.70
7		2.56
8		0.33
Total	**100.0**	**100**

Table 13.8 Pulp agglomeration metallurgical recovery kinetic model

Year	Oxide, mixed and sulphide combined	
	Au recovery (%)	Ag recovery (%)
1	79.11	52.85
2	14.26	12.05
3	5.61	4.80
4	1.02	3.92
5		2.58
6		2.53
7		2.53
8		2.46
9		2.41
10		2.36
11		2.49
12		2.48
13		2.24
14		1.00
Total	**100**	**100**

13.5 Material issues and deleterious elements

There are no known material issues, and the operation is not subject to any negative impact of deleterious elements. The mine operates a closed-circuit processing system without tailings facilities and produces a doré product.

14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

Pan American updates Mineral Resources on an annual basis following reviews of metal price trends, operational performance and costs experienced in the previous year, and forecasts of production and costs over the LOM. Infill and near-mine drilling is conducted as required through the year. The drillhole data cut-off date for the commencement of the current geological interpretation was April 30, 2022 and the effective date of the Mineral Resource estimate is June 30, 2022.

Mineral Resources for the Dolores deposit were prepared by Pan American staff under the supervision of, and reviewed by Christopher Emerson, FAusIMM, Vice President, Business Development and Geology of Pan American, who is a QP. They have been estimated in accordance with the CIM Estimation of Mineral Resources and Mineral Reserves, Best Practice Guidelines (2019), and reported according to the CIM Definition Standards (2014).

Table 14.1 tabulates a summary of the total Mineral Resources for the Property as at June 30, 2022. This total includes contributions from the open pit, underground and stockpile locations and are also a sum of direct heap leach and pulp agglomeration material which have different modifying factors discussed in Section 14.11. The cut-off value applied varies according to mining type and process route. These are listed in the footnotes to Table 14.1.

Table 14.1 Summary of Mineral Resources at June 30, 2022

Classification	Tonnes	Grade		Contained metal	
	Mt	Ag g/t	Au g/t	Ag Moz	Au koz
Measured	2.1	30	0.53	2.1	36.5
Indicated	0.8	57	1.13	1.5	29.7
Measured + Indicated	**3.0**	**38**	**0.70**	**3.6**	**66.2**
Inferred	**2.5**	**29**	**0.92**	**2.4**	**74.4**

Notes:

- CIM Definition Standards (2014) were used for reporting the Mineral Resources.
- Mineral Resources exclude those Mineral Resources converted to Mineral Reserves.
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
- Mineral Resource estimates were prepared under the supervision of or were reviewed by Christopher Emerson, FAusIMM, Vice President, Business Development and Geology of Pan American.
- Cut-off values use a value/tonne calculation. The value/tonne is based on a combination of metal price and individual metal recoveries which are variable throughout the deposit.
- Mineral Resources have been reported using pulp agglomeration and / or heap leaching metal recovery and cost parameters.
- The cut- offs used to report the open pit are a value/tonne of $12.30 for Heap Leach and $26.50 for pulp agglomeration.
- The cut-off used to report the underground area is a value/tonne of $73.5, and all material is assumed to be processed through the pulp agglomeration plant.
- Metal prices used are $22 per ounce of silver and $1,700 per ounce of gold.
- Mineral Resources were constrained by designs and other modifying factors to demonstrate reasonable prospects of economic extraction.
- The drillhole database had a cut off date of April 30, 2022.
- Totals may not add up due to rounding.

There are no known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the potential development of the Mineral Resources. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. Mineral Resources reported here are in addition to Mineral Reserves.

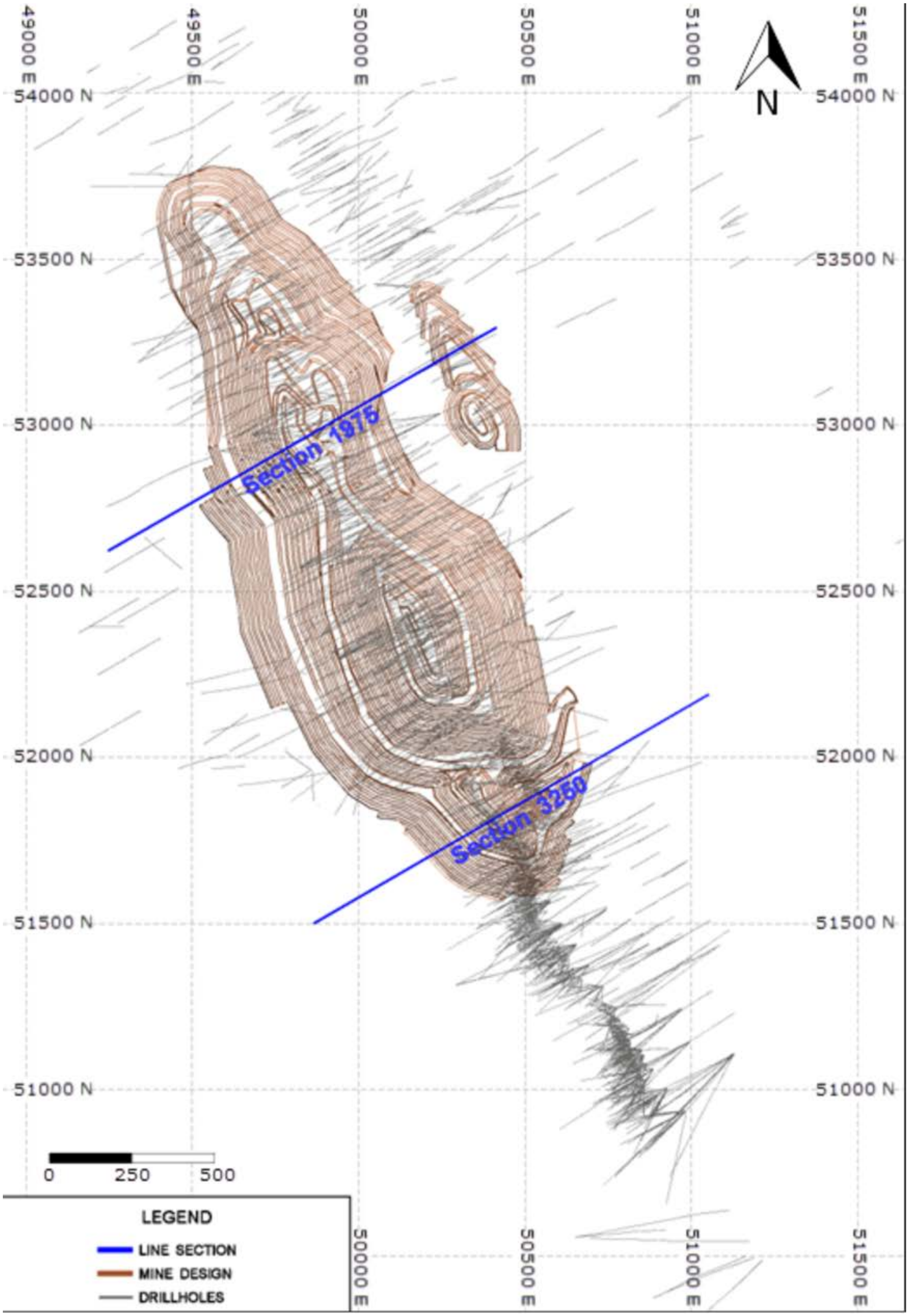
14.2 Available data, preparation, and validation

The available drillhole data includes collar coordinates, downhole survey information, silver and gold assays, multi-element assays for a subset of the drillholes, and codes for lithology, structural features, alteration, mineralization, and oxidation, all in Microsoft Excel format exported from the SQL-based DH Logger sampling database. This data was imported into Datamine™ software and desurveyed into three dimensional drillhole traces. The drillhole data was reviewed and corrected as necessary for any errors.

Some of Minefinders' drillholes were drilled down the dip of the mineralized trends, which provides unreliable grade and intersection width information. Pan American removed the majority of these drillholes from the geological interpretation and the estimation of Mineral Resources and Mineral Reserves. Most of the early-stage RCs drillholes were also removed from the geological database and were not used in the geological interpretation or the estimation of the Mineral Resource and Mineral Reserves. This applies for both underground and open pit models.

A reference plan with section lines overlain on the open pit outline is shown in Figure 14.1. The typical intersection angle to the mineralization and drillhole spacing is shown in cross section in Figure 14.2 and Figure 14.3.

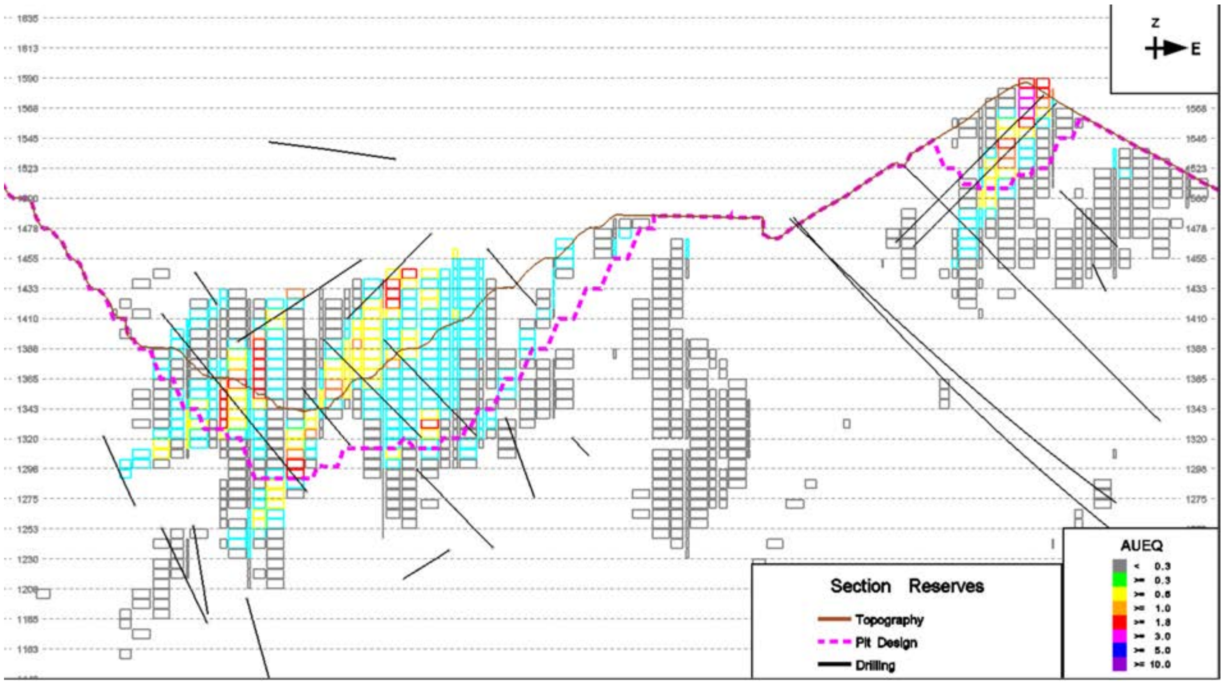
Figure 14.1 Reference plan showing section lines overlain on the open pit outline



Source: PAS (2022).

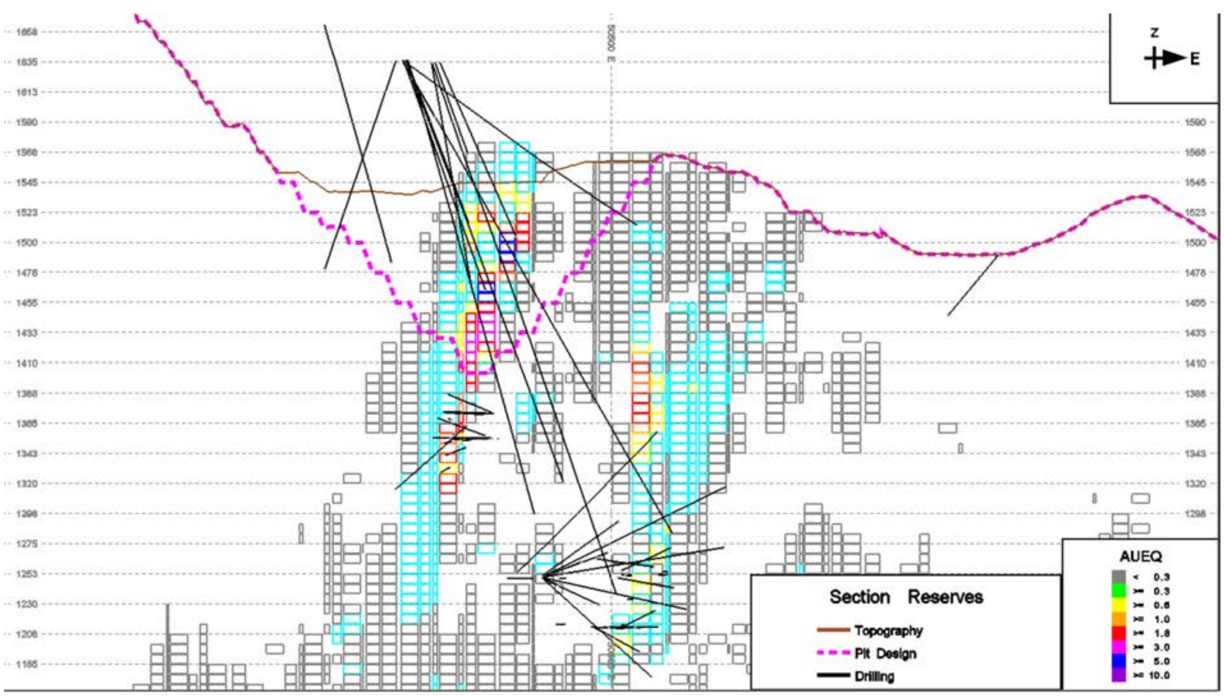
Figure 14.2 shows Section 1975, located at the north end of the open pit and Figure 14.3 is a section located at the south end of the open pit and also shows the underground drilling. Both figures show current topography, design reserve pit, block model, and drillholes.

Figure 14.2 Section 1975



Source: PAS (2022).

Figure 14.3 Section 3250



Source: PAS (2022).

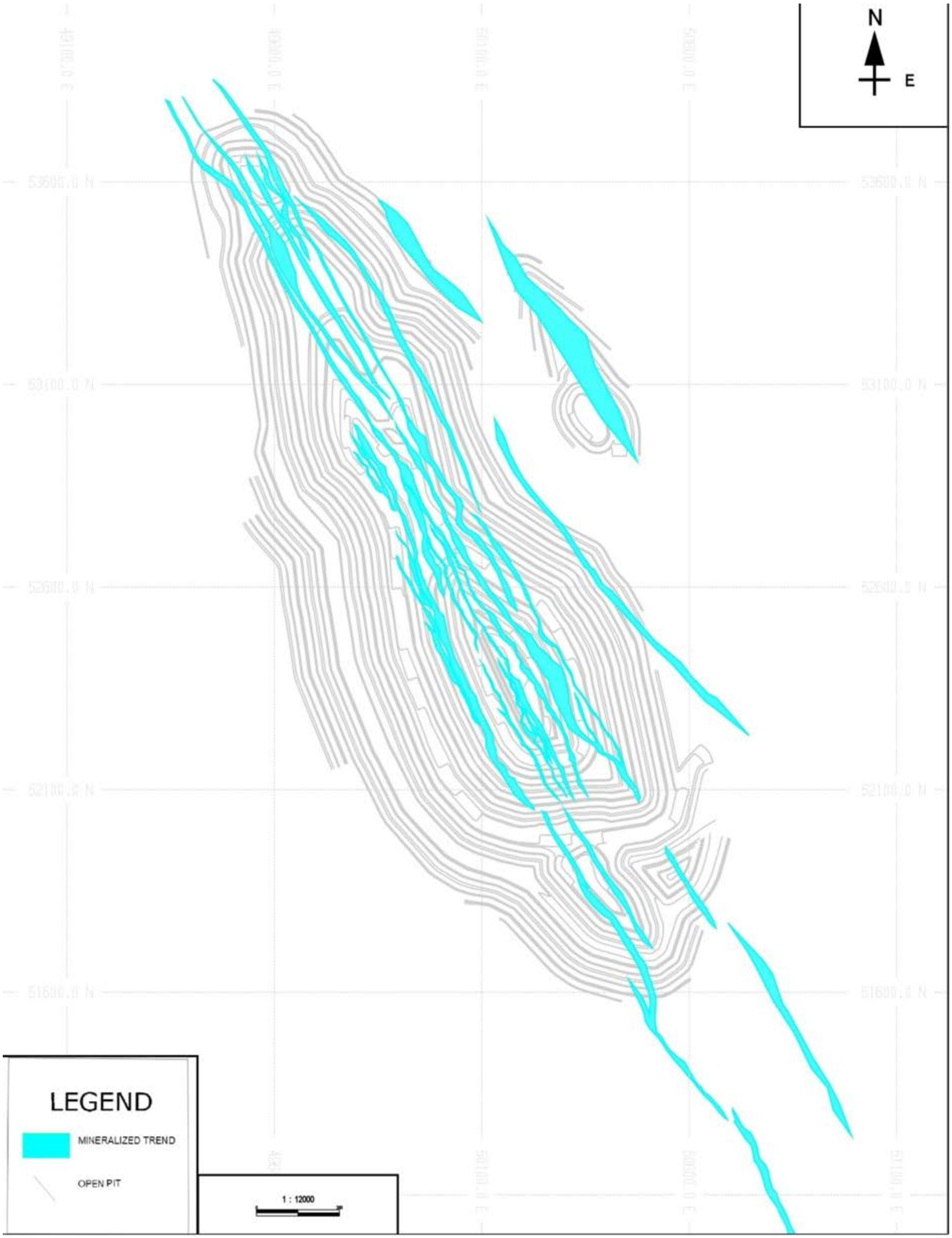
14.3 Geological interpretation and modelling

Three-dimensional interpretations were made of the lithology and oxidation codes on the drillholes. These interpretations were wireframed and used to code the drillhole data and the block model for the respective features. Mineralization at the Property occurs in numerous structurally controlled parallel trends oriented to the northwest and mostly dipping steeply to the southwest.

Three dimensional mineralized envelopes for open pit Mineral Resources and Mineral Reserves were prepared around spatially continuous trends of composite samples greater than 0.30 g/t gold equivalent (AuEq), using a gold to silver ratio of 1:70. This resulted in the creation of 28 spatially distinct mineralized trends at four specific areas referred to as San Francisco, Alma Maria, Mid Zone, and the East Dike. These interpretations were wireframed and used to back-code the drillhole data and the block model for these mineralized grade estimation domains, as well as the surrounding unmineralized domain. A plan of the interpreted mineralized trends at the 1,400 m elevation is shown in Figure 14.4. The widths of the narrower zones are in the order of 5 m wide, while the wider zones are in the order of 25 m wide.

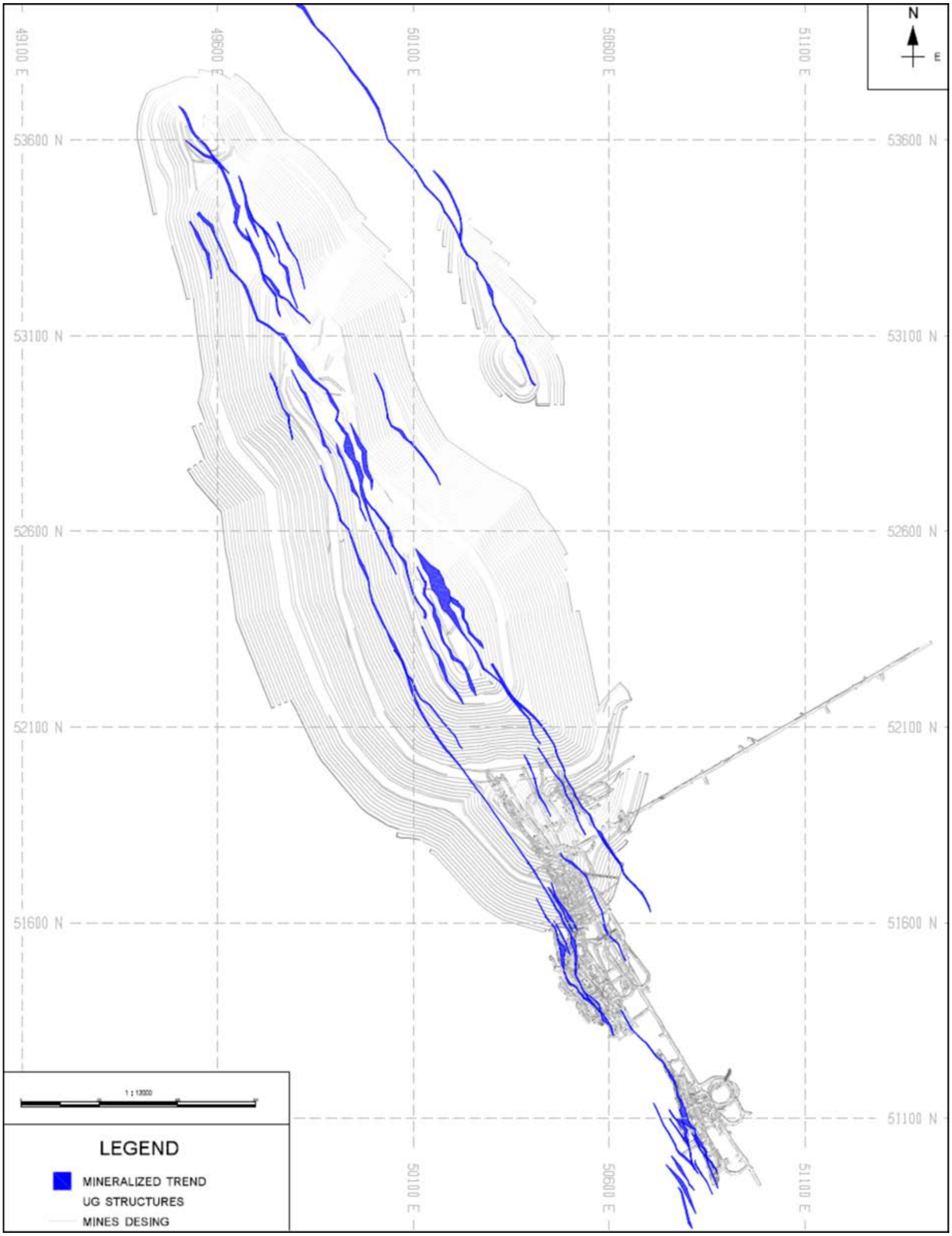
Three dimensional mineralized envelopes for the underground Mineral Resources were prepared around spatially continuous trends of mineralization based on composite samples greater than 1.25 g/t AuEq, using a gold to silver ratio of 1:70. This resulted in the creation of 38 spatially distinct mineralized trends at three specific areas referred to as San Francisco, Alma Maria, and the East Dike. These interpretations were wireframed and used to back-code the drillhole data in the same manner as for the open pit. A plan of the interpreted mineralized trends at the 1,400 m elevation is shown in Figure 14.5. The widths of the narrower zones are in the order of 2 - 3 m wide, while the wider zones are in the order of 25 m wide.

Figure 14.4 Plan of open pit mineralized domains trends



Source: PAS (2022).

Figure 14.5 Plan of underground mineralized domains trends



Source: PAS (2022).

14.4 Geostatistics

As the majority of the samples within the mineralized domains were selected at intervals of, or less than 2 m, all samples were composited to 2 m intervals to ensure equal weighting of sample grades during the grade estimate.

Mean composited grades within the 29 open pit estimation domains range from 0.22 g/t Au to 0.99 g/t Au, and from 7.09 g/t Ag to 53.31 g/t Ag. The mean composited grade of all composites in all domains is 0.68 g/t Au and 32.65 g/t Ag. San Francisco (SF100), Alma Maria (AM200), and Middle Structure (Mid 300) are the three volumetrically largest estimation domains and comprise 80% of the Mineral Resource.

Multiple indicator kriging was selected as the grade interpolation method for those three domains which have with sufficient numbers of sample composites to support the creation of multiple variograms at various grade bins. For all the other 19 domains ordinary kriging (OK) was selected and used as the estimation method.

Mean composited grades within the 30 underground estimation domains range from 0.1 g/t Au to 3.95 g/t Au, and from 3.95 g/t Ag to 154.57 g/t Ag. The mean of all composites in all domains is 0.863 g/t Au and 28.05 g/t Ag. Top cuts of extreme silver and gold grades were reviewed by domain, with respect to the log histogram, gold and silver scatter plots, and the spatial location of the extreme grades relative to neighbouring grades. Top cuts were applied where necessary to reduce the influence of high-grade values unsupported by similar surrounding sample grades.

14.5 Variograms and grade interpolation

14.5.1 Open pit

Experimental variograms were calculated on each grade estimation domain to assess whether sufficient drillhole intersections were present to produce reasonable multiple indicator variograms. In the open pit data set, reasonable multiple indicator variograms were obtained in the largest of the mineralized domains which are San Francisco, Alma Maria, and the Mid Zone. For the remainder of the mineralized domains, a single variogram for all samples in the largest of the domains in each trend was calculated and applied to the remainder of the domains in each trend planned for OK estimates. A single variogram was calculated and applied to the OK estimate in the waste domain.

The 12 indicator variograms parameters for silver and gold were applied to the multiple indicator kriging estimate for the three multiple indicator kriged grade estimation domains, and the ordinary kriged variogram parameters for silver and gold were applied to the remaining mineralized domains and the waste domain. Variogram models were oriented according to the strike and dip of each domain. The range and direction of continuity obtained from the 70th percentile Au indicator bin was used to define the search ellipse. Three searches were applied using a minimum of eight and a maximum of 24 composites to return an estimate to the parent block.

14.5.2 Underground

Inverse distance squared (ID^2) and OK was used to estimate grades for all the 30 underground domains. The largest domains are associated with San Francisco trend and most of the mineralization is next to, or south of the actual pit design. The estimation has been made individually for each domain considering a 5 m additional skin for the hanging wall and footwall of each structure. There is no lithological domaining applied to the interpretation of structures or grade interpolation as the structures lie in the same lithology or in the contact between two lithologies.

14.6 Block model

14.6.1 Open pit

An initial block size of 12.5 m x 12.5 m x 7.5 m was chosen with respect to the average drillhole spacing and bench height, using sub-cells of 1.25 m x 1.25 m x 0.75 m to obtain a suitable volumetric fit within the wireframes. The model was coded using the interpretation wireframes for lithology, grade estimation domain, and oxidation. The model then was regularized using 12.5 m x 12.5 m x 7.5 m block size with no subcells to count for internal dilution. The resulting block model was depleted for previous open pit mining as of June 30, 2022, as well as estimated volumes of historically mined underground material.

14.6.2 Underground

A parent block size of 10.0 m x 10.0 m x 10.0 m was chosen with respect to the average drillhole spacing, using sub-cells of 0.25 m x 0.25 m x 0.50 m to obtain a suitable volumetric fit within the wireframes. The model was coded using the interpretation wireframes for lithology, grade estimation domain, and oxidation. The resulting block model was depleted for underground mining as of June 30, 2022.

14.7 Bulk density

Bulk density values measured from the 1,741 samples range from 1.97 to 4.13 g/cm^3 and have a mean of 2.55 g/cm^3. The variability of the bulk density values is relatively low and there is no meaningful correlation between bulk density and any geological or spatial features, except for base metal content. Bulk density was applied to the block model using a nearest neighbour estimate to honour the local bulk density variability. The same bulk density database applied for open pit and underground models.

14.8 Estimation validation

The estimates for both block models were validated by domain by comparing the global declustered mean composite grades with the mean of the estimated grades, and by comparing the local composite grade trends with estimated grade trends on slice or “swath” plots. These reviews show the estimated grades reasonably reflect the variability of the composite grades. Only a few small domains with few input sample grades showed poor comparisons, and this was considered in the classification.

Reconciliation of the Mineral Resource estimate to mine production is carried out monthly. This has been compiled for the open pit since 2012 when Pan American acquired the Property. Reconciliation of the underground mine production to the resource estimate commenced in 2018 as that was when significant production started. Mill to mine reconciliation is also recorded since 2012 and includes both Heap leach and agglomeration process. This is shown in Table 14.2 where the Mine to Reserve reconciliation is -5% difference in silver and -8% in in gold grades, and 4% less in tonnes overall. While underground tonnes are up, there is a deficit in the gold grade. Mine to process reconciliation is very much in line at around 1% to 2% difference.

Reconciliation for the period July 2020 to June 2022 with the differences for the various reconciliations are shown in Table 14.2.

Table 14.2 Reconciliation results 2020 – 2022

Year	Comparison	% Difference				
		Tonnes	Silver grade	Gold grade	Silver metal	Gold metal
2012-2022	Open pit (Mine – Reserves)	-4%	-5%	-7%	-9%	-11%
2018-2022	Underground (Mine – Reserves)	20%	-10%	-29%	8%	-14%
2012-2022	**Total**	**-4%**	**-5%**	**-8%**	**-9%**	**-11%**
2012-2022	Mine - Process	0%	-1%	-2%	-1%	-2%

Notes:
- Mine represented by the grade control models.
- Reserve represented by the reserve block model.
- Process is crusher feed from metallurgical balance.

14.9 Classification

The estimate was classified into spatially continuous Measured, Indicated, and Inferred categories by preparing three-dimensional interpretation wireframes around the drillhole patterns and coding the estimate for classification category using the wireframes. Measured Mineral Resources were assigned at the central and upper zones of the deposit where drillhole spacing is in the order of 25 m or less, surrounded by Indicated Mineral Resources where drillholes are more widely spaced at the lower and outer regions of the deposit, in the order of 50 m or less, with Inferred Mineral Resources at depth and in regions with wide but regularly spaced drillholes demonstrating continuity. The interpretation of the mineralized zones is restricted to regions with drillhole data and with little projection of the interpretation beyond data.

14.10 Planned dilution and loss

To address reasonable prospects for eventual economic extraction (RPEEE) as required in CIM Definition Standards (2014) certain adjustments and constraints were applied to both models.

For the open pit block model, the sub-celled model was re-blocked to 12.5 m x 12.5 m x 7.5 m using a process that eliminates sub-cells formed at the boundaries of the wireframe interpretation and incorporates the grade of sub-cells on the boundaries into the grade of the re-blocked cell. On the contact of the economically mineralized zones with the surrounding uneconomic material, this process dilutes the grades of any cells with a majority of the volume lying within the economic interpretation, by incorporating the estimated grade of the neighbouring uneconomic material into the re-blocked cell. The quantity of dilution added in this process is dependent upon the width and orientation of the mineralized zone relative to the block, and on average, resulted in the application of around 30% dilution. No ore loss was accounted for prior to the reserve pit design.

For the underground block model, a 3 m minimum mining width was assumed, and additional planned dilution of 0.25 m was applied to each of the hangingwall and footwall, using the estimated grade of the waste material. In stopes greater than 5 m wide, additional dilution was added to ensure a minimum total external dilution of 10%. Mining recovery of 92% was assumed to account for expected losses incurred during mining.

14.11 Value estimates and mining constraints

For open pit Mineral Resources, a block value per tonne was applied to each block based on grade, metallurgical recovery, Mineral Resource metal prices, and costs including processing, refining, transportation, royalties, G&A, and leach pad sustaining capital. Processing costs and metallurgical recoveries were estimated using the combined heap leach / pulp agglomeration treatment process. Open pit Mineral Resources are reported inside the design pit considering anything below that limit as part of the underground Mineral Resources. The parameters applied are shown in Table 14.3 to Table 14.5.

For underground Mineral Resources, a block value was calculated for each block using the same assumptions used for the open pit. All underground material is assumed to be processed through the pulp agglomeration plant. Potentially mineable stope shapes were generated using Deswik stope optimizer (DSO) software based on geometrical, geotechnical, and economic cut-off value constraints.

The metallurgical recoveries used are shown in Table 14.3, the economic parameters for silver and gold are shown in Table 14.4, and the cost parameters are shown in Table 14.5.

Table 14.3 Metallurgical recoveries by material type and process route

Process route	Ore type	Gold recovery (%)	Silver recovery (%)
Heap leach	Oxide	77.9	42.1
	Sulphide	67.6	54.9
Pulp agglomeration	Oxide	90.0	58.7
	Sulphide	89.8	83.3

Table 14.4 Economic parameters

Item	Units	Silver	Gold
Mineral Resource sale price	$ per ounce	22.00	1,700
Refining cost	$ per ounce	0.25	0.50
Transportation cost	$ per ounce	0.15	0.15
Refining recovery	%	99.825	99.825
Royalty to RG and Mexico	%	2.50	3.75

Table 14.5 Cost parameters

Item	Units	Cost
Processing heap leach	$ per tonne ore	6.20
Processing pulp agglomeration	$ per tonne ore	20.40
Site G&A	$ per tonne ore processed (heap or pulp)	3.47
Leach pad sustaining capital	$ per tonne ore processed (heap or pulp)	2.62
Open pit mining cost	$ per tonne mined	1.60[1]
Underground mining cost	$ per tonne mined	47.00

Note: [1]Average mining cost. Costs vary for each block / bench in the pit by elevation and distance from the process plant.

The cut-off values applied to the reporting of the Mineral Resources are shown in Table 14.6. These are rounded from the totals in Table 14.3, Table 14.4, and Table 14.5.

Table 14.6 Cut-off values

Process	Item	Units	Value
Heap leach	cut-off value	$ per tonne ore	12.30
Pulp agglomeration	cut-off value	$ per tonne ore	26.50
Pulp agglomeration	Underground cut-off value	$ per tonne ore	73.50

14.12 Mineral Resource tabulation

Mineral Resources for Dolores as at June 30, 2022, are shown in Table 14.7. This tabulation includes insitu and potentially economic stockpiled material at metal prices of $22 per ounce of silver and $1,700 per ounce of gold, classified as Measured, Indicated, and Inferred Mineral Resources. Mineral Resources are reported inside the Mineral Reserve pit design.

The underground Mineral Resources below the design pit have been assessed for mineability and constrained within stope designs.

The total Mineral Resources include previously mined low grade stockpiled material. The stockpile material is annually tested for its economics and the insitu Mineral Resources have been depleted for mining as of June 30, 2022. Stockpiles have been inventoried and tested for economic robustness also as of the same date. Hence there is stockpile material in the Mineral Resource which does not demonstrate positive economics using the Mineral Reserve modifying factors, while stockpile material in the Mineral Reserves does.

There are no known mining, metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other factors or risks that the QP is aware of that could materially affect the potential development of the Mineral Resources. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. Mineral Resources reported here are in addition to Mineral Reserves.

Table 14.7 Dolores Mineral Resources as at June 30, 2022

Location	Classification	Tonnes	Grade		Contained metal	
		Mt	Ag g/t	Au g/t	Ag Moz	Au koz
Open pit	Measured	0.5	9	0.27	0.1	4.1
	Indicated	0.2	9	0.27	0.1	1.9
	Measured + Indicated	**0.7**	**9**	**0.27**	**0.2**	**6.0**
	Inferred	**1.7**	**17**	**0.55**	**0.9**	**30.4**
Underground	Measured	0.5	89	1.60	1.3	23.6
	Indicated	0.6	74	1.44	1.4	27.8
	Measured + Indicated	**1.1**	**81**	**1.51**	**2.7**	**51.4**
	Inferred	**0.8**	**56**	**1.72**	**1.4**	**44.0**
Stockpiles	Measured	1.2	16	0.23	0.6	8.8
	Indicated	-	-	-	-	-
	Measured + Indicated	**1.2**	**16**	**0.23**	**0.6**	**8.8**
	Inferred	**-**	**-**	**-**	**-**	**-**
Total	Measured	2.1	30	0.53	2.1	36.5
	Indicated	0.8	57	1.13	1.5	29.7
	Measured + Indicated	**3.0**	**38**	**0.70**	**3.6**	**66.2**
	Inferred	**2.5**	**29**	**0.92**	**2.4**	**74.4**

Note: Footnotes beneath Table 14.1 apply.

14.13 Recommendations

No significant recommendations are made to improve the quality of the Mineral Resource estimate methodology. Pan American intends to continue with annual diamond drilling programs as required and to continue ongoing infill drilling, to collect closer spaced drillhole information. The geological interpretation and Mineral Resource estimate will continue to be updated annually to include additional resource definition drilling undertaken during the year and to deplete for the previous years' mining. Reviews of the geological interpretation against grade control drilling will continue to be undertaken on a regular basis to verify the reliability of the resource estimate.

15 MINERAL RESERVE ESTIMATES

15.1 Disclosure

The Mineral Reserve estimates conform to CIM Definition Standards (2014) referred to in NI 43-101. All design and scheduling have been completed using the Mineral Resource model and estimate described in Section 14.

Pan American updates Mineral Reserves annually following reviews of metal price trends, operational performance and costs experienced in the previous year, and forecasts of production and costs over the life of the mine. The Mineral Reserve is based on measured and indicated Mineral Resources estimated as at June 30, 2022. The effective date of the Mineral Reserve estimate is June 30, 2022. No other new material information has become available between the effective date and the signature date given on the certificates of the QPs.

Mineral Reserve estimates are based on assumptions that include mining, metallurgical, infrastructure, permitting, taxation, and economic parameters. Increasing costs and taxation and lower metal prices will have a negative impact on the quantity of estimated Mineral Reserves. There are no other known factors that may have a material impact on the estimate of Mineral Reserves.

The estimated Proven and Probable open pit Mineral Reserves for the Dolores deposit are summarized in Table 15.1.

Table 15.1 Dolores Mineral Reserves as at June 30, 2022

Location	Category	Tonnes	Grade		Contained metal	
		Mt	Ag g/t	Au g/t	Ag Moz	Au koz
Open pit	Proven	9.2	22	0.70	6.4	205.3
	Probable	4.1	18	0.60	2.4	77.7
	Total	**13.2**	**21**	**0.66**	**8.8**	**283.0**
Stockpiles	Proven	3.7	18	0.25	2.2	30.0
	Probable				-	-
	Total	**3.7**	**18**	**0.25**	**2.2**	**30.0**
Total	Proven	12.9	21	0.57	8.6	235.4
	Probable	4.1	18	0.60	2.4	77.7
	Total Reserves (Proven and Probable)	**17.0**	**20**	**0.57**	**11.0**	**313.1**

Notes:
- CIM Definition Standards (2014) were used for reporting the Mineral Reserves.
- Mineral Reserves are in addition to Mineral Resources.
- Figures in the tables may not compute exactly due to rounding.
- Metal prices used are $19.00 per ounce of silver and $1600 per ounce of gold.
- Mineral Reserves are reported on a 100% ownership basis. Pan American owns 100% of Dolores.
- Cut-off values use a value/tonne calculation. The value/tonne is based on a combination of metal price and individual metal recoveries which are variable throughout the deposit. The cut- offs used to report the open pit are a value/tonne of $12.30 for Heap Leach and $26.50 for pulp agglomeration.

15.2 Dilution and ore loss

Planned dilution and loss were considered as described in Section 14.10.

15.3 Value estimates

A dollar value per tonne was assigned to each block in the model based on grade, metallurgical recovery, Mineral Reserve metal prices, transport cost, refining costs and selling costs. G&A and leach pad sustaining capital were also included. Processing costs and metallurgical recoveries were assigned using the heap leach or pulp agglomeration treatment destinations. The metallurgical recoveries are shown in Table 14.3, the economic parameters for silver and gold are shown in Table 14.4, and the cost parameters are shown in Table 14.5.

15.4 Geotechnical parameters

Golder Associates Inc. of Tucson, Arizona, USA, provided recommendations for the geotechnical parameters for the open pit design based on a review of the available data and the rock conditions (Golder, 2013b). This review is discussed in more detail in Section 16.1.2.

Surface weathering and / or intense argillic alteration occurs to a depth of around 30 m below surface. Following Golder's recommendation, benches in the weathered zone were designed with production bench heights of 7.5 m with a 6.2 m wide catch benches. The bench face angle is 60° resulting in an inter-ramp angle of 35°. Below the weathered zone, the final walls are excavated with a triple bench (22.5 m total height) and 9.1 m wide catch berms. Production benches are mined 7.5 m high within the pit limits.

A 24 m wide catch berm has been included in the design of the high west wall to mitigate the risk of failure. This results in an inter-ramp angle of the final pit wall and for the internal phases of 52°. Presplit blasting is used for final walls. Mine staff are monitoring the stability of the pit walls routinely with assistance from a geotechnical engineer. A laser scanner is continuously monitoring the northwest wall to manage any geotechnical risks in this area of the operation.

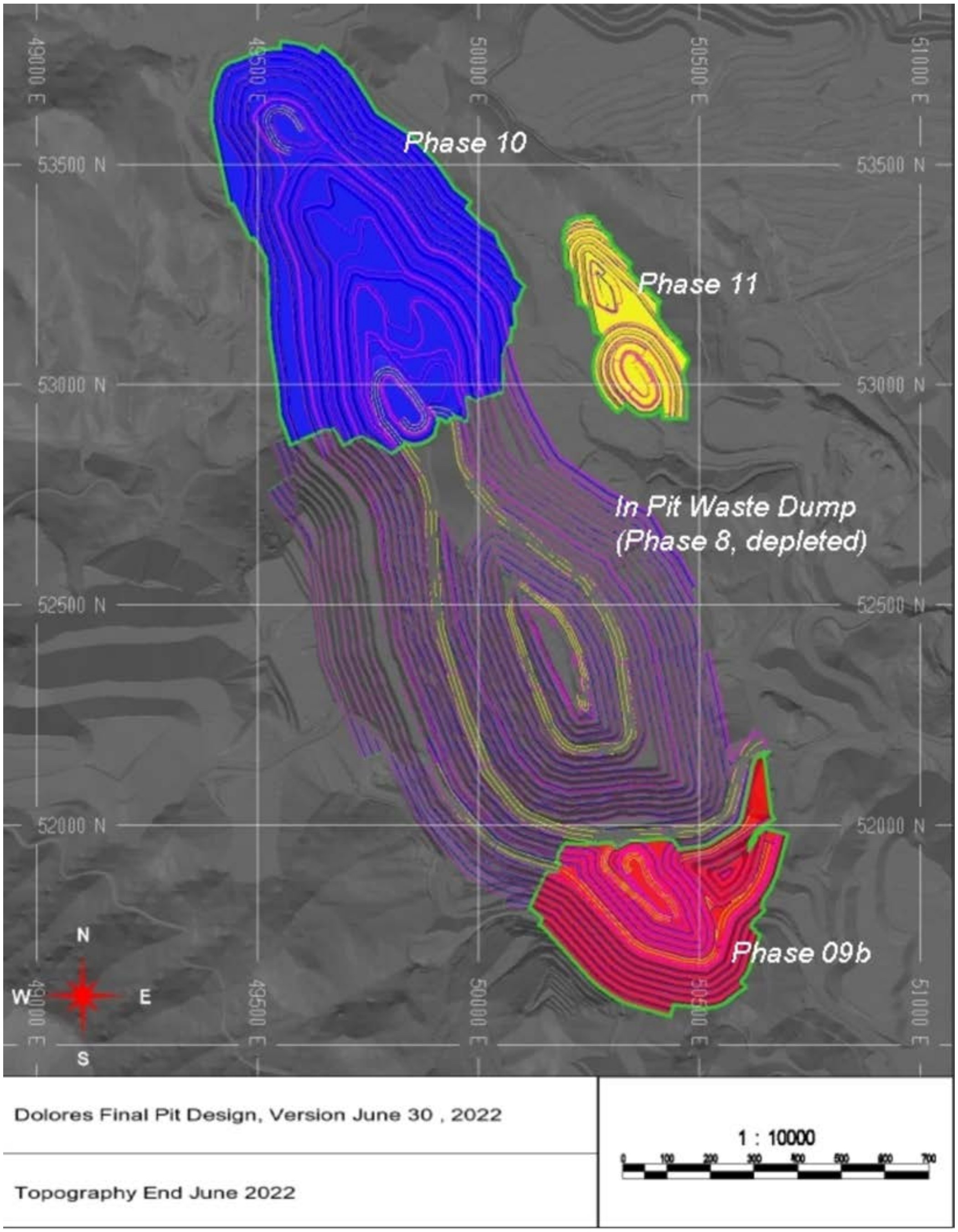
15.5 Pit design and schedule

An optimized pit shell was selected after using Whittle software to generate a series of nested pits using the Measured and Indicated class only blocks in the Mineral Resource model. Inferred and waste class blocks were assigned no value. Using the selected pit shell as a basis, MineSight software was used to add in ramps, phases, and practical access to complete a pit design. The final pit design develops in a series of phased outward expansions using the geotechnical parameters described in Section 15.4.

The pit extends around 2,420 m in length trending to the northwest and is about 800 m wide. The deepest part of the pit was depleted in June 2021 and is now used as an in-pit waste dump. Remaining phases at end of June 2022 are at the North, South and East which contain the Mineral Reserves as at end June 30, 2022. A plan view of the ultimate pit is shown in Figure 15.1.

A mining schedule was prepared to detail the total materials movement for the LOM and to confirm that there was adequate capacity for stacking on the heap leach pads, and capacity for waste dumping for the LOM. The schedule also considered various options for stockpiling and phasing to maximize the value of the mining sequence.

Figure 15.1 Reserve pit design



Source: PAS (2022).

15.6 Equipment and labour

The QP has reviewed the equipment and labour numbers and, taking into account the Management initiatives, considers the projected increase in equipment and productivity to be reasonable and supports the selected cut-off value to meet the steady-state target production of 21,200 tpd. In addition, sustaining capital to access the Mineral Reserves through development as well as equipment maintenance and rebuilds has been considered and the provision is considered to be reasonable for the targeted production rate.

16 MINING METHODS

16.1 Open pit operations

16.1.1 Mining methods

Mining at Dolores has been ongoing since 2008 using conventional open pit methods with excavators, shovels, loaders, and haul trucks. Ore grade control drilling is carried out using angled RC drilling to provide closer spaced sample data for a grade control estimate, which is used to mark out the ore and waste mining boundaries. The grade control holes are oriented perpendicular to the strike of the deposit on sections spaced every 15 m along strike and every 10 m to 15 m across strike. Drillholes are approximately 43 m long, which results in a nominal vertical span of 30 m, equal to four bench heights. The drillhole pattern is offset with 25% of the holes drilled from each bench to provide full coverage. The RC drillholes are logged for lithology and oxidation and sampled every 2 m.

Ore and waste material is drilled and blasted using 135 mm diameter holes, using a nominal pattern of 8.5 m deep blast holes spaced 4.5 m along strike and 4.5 m across strike. Explosives used are ANFO. Ore and waste are usually blasted separately, and a blast movement monitoring system is used to manage ore loss, dilution, and material misclassification.

16.1.2 Geotechnical and hydrological parameters

Golder Associates Inc. of Arizona, USA, made recommendations for the geotechnical parameters for the open pit design, following their review of the rock conditions at site (Golder, 2013a). Golder supervised the drilling of three oriented diamond drillholes to extend the geotechnical database in the north and south of the southwest wall. This was later updated by geotechnical work done by Walker, in 2017.

Golder classified the rocks present in the mining area into two major lithology types including a latite group consisting of non-welded latite tuff, breccias, flows, dikes, and sills, and an andesitic group consisting of andesite volcanics, porphyry intrusives, and diorite intrusives. The structural model consists of a dominant structural fabric striking 330° and dipping steeply to the west that pre-dates mineralization and cuts through both major lithology groups. Faults following this trend typically comprise normal faults dipping to the southwest. Conjugate normal faults and reverse faults dipping to the northeast are also present. A weak orthogonal system of normal and wrench faults striking east-west are also part of the major structural model. Minor structures including joints and veins typically follow the major structural trends, and a joint set dipping to the northeast at a shallower angle than the overall fabric is present within the pit.

The geomechanical model includes the data collected from nine oriented diamond drillholes, 30 unconfined compression tests, six disk tension tests, 11 triaxial compression tests, 43 uniaxial compressive strength tests, and four direct shear tests of saw cut joints in the drill core. The tests on the drill core indicate good to very good rock quality. The structural conditions are generally favourable for the development of steep inter-ramp slopes in all sectors of the pit except within the upper weathered zone near surface (top 30 m) and other surface areas affected by intense argillic weathering.

Hydrogeological studies indicate generally low permeability of the rock mass with very steep groundwater gradients towards the steep sided drainage valleys, likely following faults, fractures, and other geological boundaries. The groundwater elevation varies from 1,400 m to 1,575 m above mean sea level.

Golder recommended bench heights of 7.5 m with 7.5 m wide catch benches located after each bench for mining areas within 30 m of the surface, and catch benches located each third bench or each 22.5 m vertically for mining areas below 30 m. For pre-split and trim mining, the recommended catch bench width is 9.1 m, with a bench face angle of 70° and an inter-ramp angle of 52°.

The mine conducts routine geotechnical monitoring and geological pit mapping, and has completed a program of oriented geotechnical drillholes targeted at the ultimate pit walls. A geotechnical consultant, W. K. Walker, P.E. of Tucson, Arizona, USA, undertook geological pit mapping and a review of bench and inter-ramp slope stability in 2015, which confirmed Golder's findings.

16.1.3 Production and process rates and expected mine life

The open pit LOM plan is based on the open pit Mineral Reserves presented in Section 15 at a nominal rate of 21,200 tpd. The material will follow either the pulp agglomeration process route or the heap leach only process route depending on ore grade and mining schedules. In the LOM plan, the annual total material mining rate is 34 Mt of ore and waste in 2022. The total material moved then decreases, with mining completed in 2024.

The pulp agglomeration plant started operating in the second half of 2017 and ramped up to its full capacity of 5,500 tpd by the end of that year. Stacking of crushed ore on the heap leach pads will be completed in 2024.

The open pit has three remaining phases. In 2022, the North phase is providing most of the ore for the heap and agglomeration processes. The schedule requires reduced waste movement over the final years, with excess production trucking capacity to be gradually transitioned to waste dumps rehabilitation and closure activities.

16.1.4 Waste mining

Open pit waste mining averages 24.8 Mtpa through 2022, then declines until completed in 2024. Waste mining in the LOM plan totals 31.2 Mt from July 2022, for a strip ratio of 1 ore to 2.0 waste. The mining sequence will prioritize the higher-grade material in the north phases and therefore the waste in this area will be the priority also. All waste material will be dumped in the mined-out phases of the pit or used for rehabilitation, reshaping of dumps and other closure activities.

16.1.5 Mining fleet and machinery

The mining fleet is comprised of nominal 90 t diesel haul trucks which are matched to hydraulic excavators and front-end loaders. Production drills bore 135 mm production blast holes. Wall control drilling is carried out by smaller rigs that drill up to 89 mm holes. Ancillary equipment consists of Dozers, graders, water carts, and lighting towers to support hauling, dumping, and other mine operations. Table 16.1 summarizes the fleet size.

Table 16.1 Open pit mining fleet

Open Pit unit	2022
Haul trucks	17
Shovels	2
Loaders	5
Drills	7
Dozers	5
Water trucks	2
Motor grader	2
Total	**40**

In 2022 the mine is operated exclusively by Pan American and the mine schedule accounts for a reduction in equipment and capacity over the remaining mine life, and the current fleet will be sufficient to meet the production requirements.

16.1.6 Recommendations

Pan American will continue to optimize blasting patterns, and monitoring blast movements and pit slope stability. Recommendations have been made for additional geotechnical work (Walker, 2017), including:

- Operationally minimize the blasting overbreak and continue work to achieve design bench face angles.
- Continually observe the orientation, length, and location of continuous major structures as mining progresses and extend the geological and geotechnical model beyond the ultimate pit crest to understand the behaviour of the overall slopes.

16.2 Underground operations

The underground mine ended operations in April 2022.

17 RECOVERY METHODS

The current operation considers a three-stage conventional crushed heap leach circuit operated in parallel with a pulp agglomeration circuit with a combined throughput of approximately 21,300 tpd. Ore for the heap leach is crushed to P_{80} 6.7 to 9.2 mm at an average rate of 15,860 tpd. Pebble lime (CaO) is added to the crushed ore for pH control before being conveyor stacked onto a multiple-lift, single use leach pad and leached with a dilute sodium cyanide solution. Pregnant leach solution from the heap flows by gravity to a pregnant solution pond and is pumped to the Merrill-Crowe plant, where the pregnant leach solution is clarified, deaerated, and gold and silver values recovered by zinc cementation. The resulting precious metal sludge is filtered and treated in a mercury retort prior to smelting to produce the final doré product.

High-grade ore is delivered to the pulp agglomeration circuit where it is crushed in a separate two stage crushing circuit followed by two-stage grinding to P_{80} 425 µm at an average rate of 5,440 tpd. Pebble lime and sodium cyanide solution are added at the milling circuit to initiate leaching. Milled pulp from the grinding circuit is filtered and blended with crushed material from the heap leach circuit along with cement before being drum agglomerated and combined with the heap leach material for additional metal recovery at the heap. Filtrate from the filters is clarified and pumped to the Merrill-Crowe plant along with pregnant leach solution from the heap. The mine operates a closed-circuit processing system without tailings facilities.

17.1 Heap leach crushing and conveyor stacking

ROM ore is trucked to the crushing plant and crushed to a particle size of P_{80} range of 6.7 to 9.2 mm in a three-stage crushing circuit at an average rate of 15,860 tpd. The crushed ore is sampled at regular intervals by a sample tower, conveyed to the leach pads via an overland conveyor system, and placed on the pads using portable grasshopper conveyors and a radial stacking system; approximately 5,440 tonnes of crushed ore is scalped from the heap leach circuit prior to stacking for agglomeration with filtered high grade from the pulp agglomeration circuit. Pebble lime is added to the crushed product for pH control. Sodium cyanide solution is prepared in the Merrill-Crowe plant, pumped to the leach pads, and applied using drip and sprayer systems.

Metal recoveries are a function of solution flow rates, cyanide concentration, and time, and the metal leaching period can cover years, continuing as subsequent lifts are placed on the pads. Gravity collectors and / or vertical perforated steel pipes (well risers) fitted with internal pumps transfer the pregnant leach solution containing the dissolved silver and gold from the bottom of the leach piles to the pregnant solution pond and the Merrill-Crowe plant.

17.2 Pulp agglomeration

A pulp agglomeration circuit was constructed at Dolores and has been operating successfully since commissioning in 2017. The pulp agglomeration plant operates in an integrated fashion with the heap leach processing facilities. High grade ore is stockpiled on the ROM pad, separated from the heap leach ore. The high-grade feed is reclaimed using front-end loaders at a rate of 5,440 tpd and fed to the primary crushing feed bin. The feed is recovered from the bin by a vibrating grizzly feeder and delivered to a primary jaw crusher with the crusher discharge being conveyed to a vibrating screen. Screen oversize passes through a secondary cone crusher in a closed circuit to produce a rod mill feed with a P_{80} size of 12.8 mm. The screen undersize is stockpiled using a radial stacker where it is reclaimed by feeders and a reclaim tunnel conveyor system to feed the rod mill.

The rod mill discharge is pumped in closed circuit to a Vertimill / vibrating wet screen circuit with the screen oversize being recycled back to the Vertimill and the screen undersize being pumped to a surge tank for feed to the pressure filters to produce a P_{80} 0.425 mm (35 mesh) ground product. Cyanide and lime are fed into the rod mill to start the metals recovery process. Pregnant solution from the heap leach is used as process water for the rod mill and the entire area from the rod mill forward is on concrete pads for chemical and spill containment.

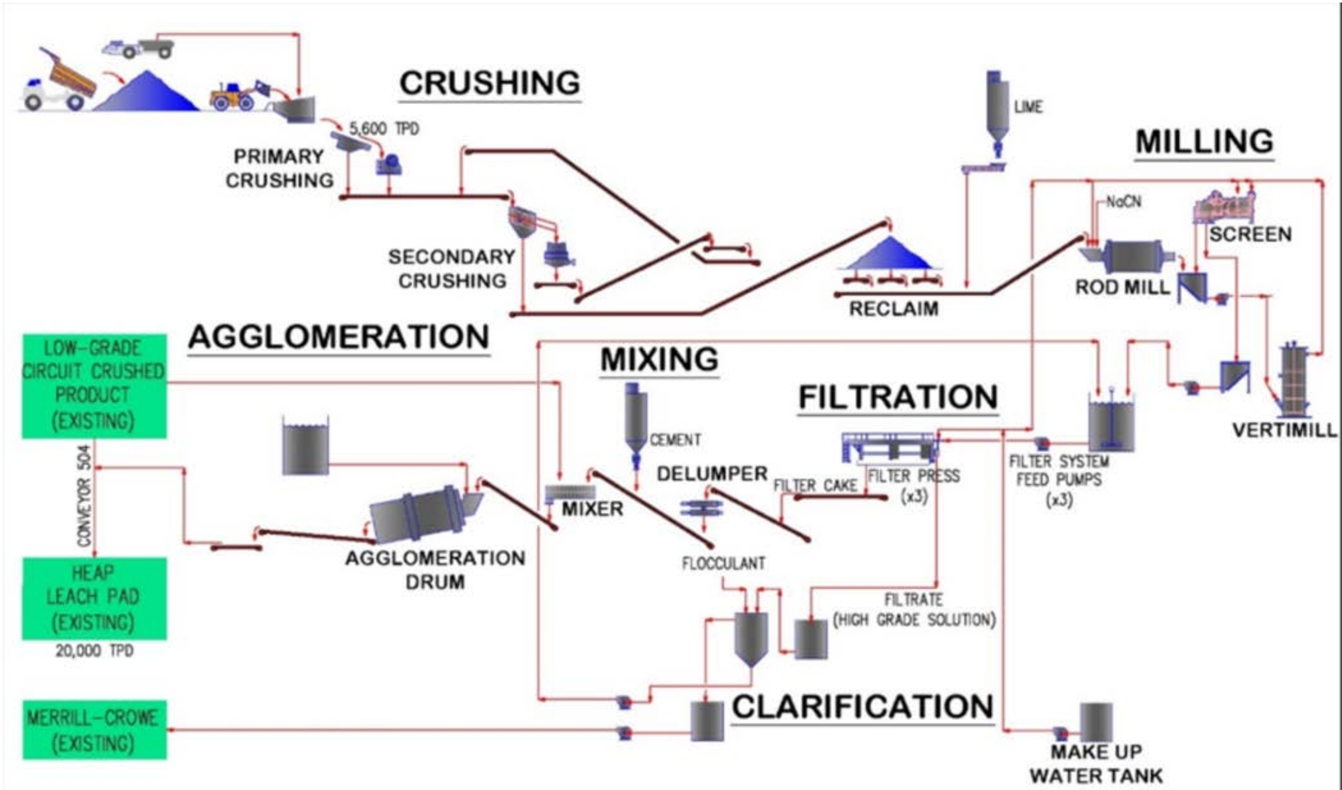
The milled slurry is pumped to a filter feed tank and then pumped to one of three horizontal pressure filters equipped with vertical plates, air blowers, and a membrane squeeze to produce a filter cake with approximately 15% moisture. The recovered filtrate solution is pumped to a pregnant solution holding tank; a pinned bed clarifier is used to remove suspended solids from the pregnant filtrate before eventual metal recovery in the Merrill-Crowe plant.

The dewatered filter cake discharges from the filter presses onto a belt conveyor. The filter cake is combined with cement at around 19 kg of cement per tonne of filter cake along with coarse medium grade ore in a mixer prior to being fed into the rotating agglomeration drum. Additional solution is sprayed onto the mixture within the drum as it tumbles in order to control the moisture content and formation of the agglomerate balls. The agglomerate balls are discharged from the drum and conveyed to the heap leach pad feed conveyor where they are combined with crushed medium grade heap ore to be stacked onto the heap leach pads.

Most of the pulp agglomeration process make-up water is sourced by diverting a portion of the pregnant solution flow from the heap leach pads on its way to the Merrill-Crowe plant. Additional cyanide solution is sourced from the sodium cyanide solution make-up plant in the Merrill Crowe plant. The heap leach pads, ponds, and cyanide circuit remain contained within a closed circuit and there is no tailings stream or release to the environment.

A flowsheet for the pulp agglomeration plant is presented in Figure 17.1. The general layout is presented in the photo in Figure 17.2.

Figure 17.1 Pulp agglomeration flow sheet



Dolores Pulp agglomeration flow sheet

Source: KCA (2021).

Figure 17.2 Pulp agglomeration plant

Dolores Pulp agglomeration plant

Source: PAS (2017).

17.3 Merrill-Crowe recovery plant and refinery

The Merrill-Crowe recovery plant at Dolores is designed to recover gold and silver values from pregnant solution from the heap leach and pulp agglomeration circuits by zinc cementation. Pregnant solution at the nominal rate of 1,300 cubic meters per hour (m^3/h) is clarified using pressure leaf type clarification filters which remove suspended solids down to levels of less than 1 mg/L before removal of oxygen in the deaeration tower. Diatomaceous Earth (DE) is used to pre-coat the clarification filters and is also metered into the pregnant solution.

The clear pregnant solution from the clarification circuit is sent to the deaeration tower for removal of oxygen. Clear pregnant solution then flows into the deaeration tower and passes through a bed of high surface area packing material. Liquid seal ring vacuum pumps provide sufficient degassing capacity to maintain oxygen levels in solution of less than 1 ppm.

Deaerated clarified pregnant solution then discharges from the tower and is pumped to the precipitate filter presses. Ultra-fine zinc is added at the press feed pump suction to precipitate gold and silver from the deaerated pregnant solution. Zinc cementation is performed at ambient temperatures. Precipitated gold and silver from the ultra-fine zinc is collected in the precipitate filter presses and the resulting solution discharging from the filter presses is returned to the leach system as barren leach solution.

Precipitate from the filter presses is treated in a mercury retort to remove trace amounts of mercury and is then smelted to produce doré. The doré bars typically contain between 6% and 9% gold and 91% to 94% silver, with generally less than 1% impurities.

17.4 Power and water

Water for the operations is sourced from wells, pit, and underground dewatering activities, the nearby Tutuaca River, and from the Chabacan dam. Depending on the year, the water supply from mine dewatering and precipitation on the leach pads and Chabacan Dam catchment is often sufficient for process needs, when additional water is required, it is pumped from the Tutuaca River. The Chabacan dam reservoir has a capacity of 1.2 million m^3 and provides storm water control as well as primary water storage. The permitted water usage from the Tutuaca River is 2.0 million m^3 per annum at a maximum rate of 64 liters per second and the water extraction permit remains in good standing should it be required in the future.

A 115 kV, 98 km long power line connected to the Mexican national grid in 2016 supplies power to the mine and is sufficient for the current needs of the operation. Backup power is available on site by six 1,800 kW Cummins and two 1,200 kW Caterpillar diesel generators. The total power requirements of the operations including the open pit and processing facilities is estimated at 11.5 MW.

18 PROJECT INFRASTRUCTURE

The Dolores mine is an open pit silver-gold mine located in Chihuahua state, Mexico, approximately 250 km west of the city of Chihuahua.

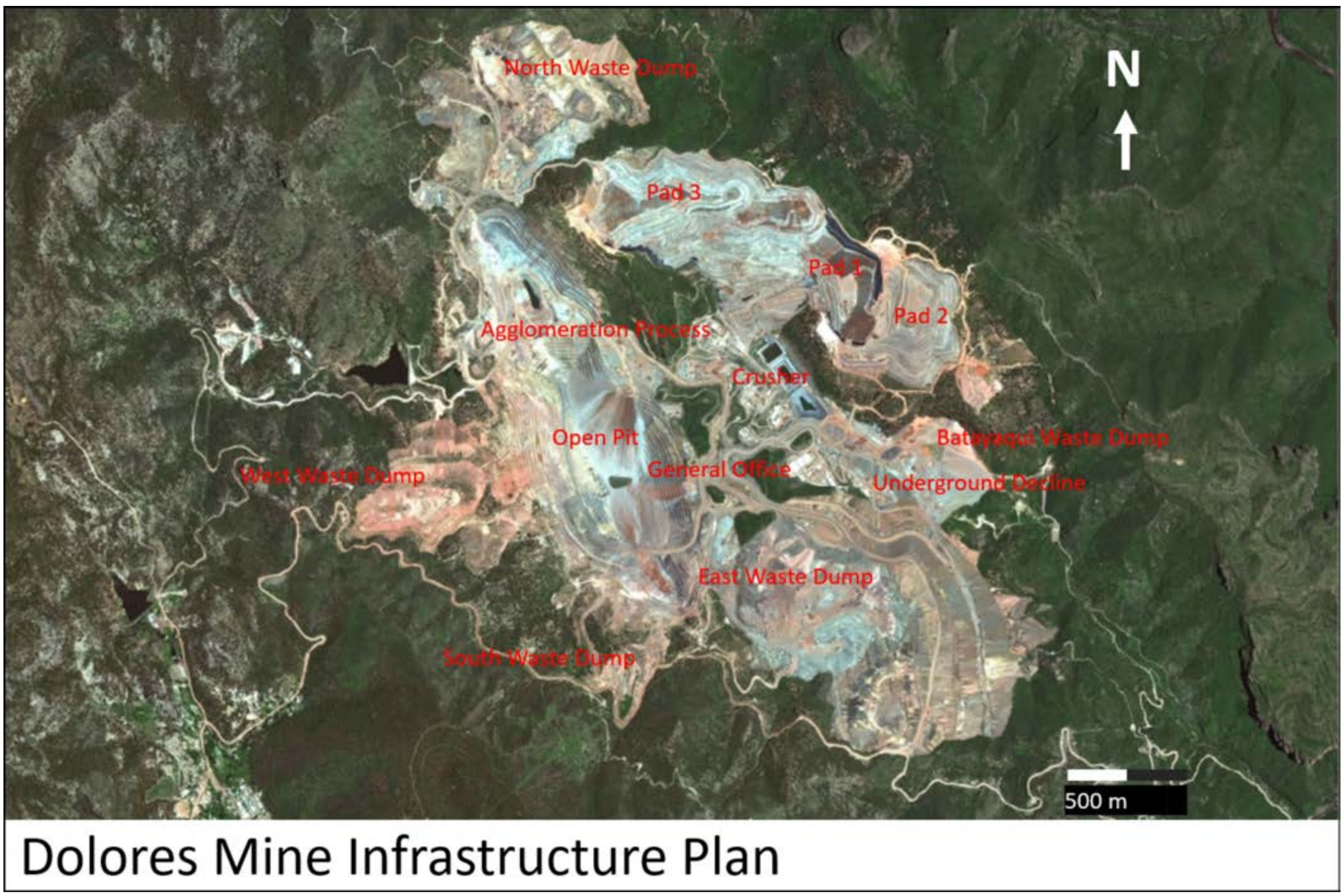
The mine infrastructure comprises the open pit and processing facilities, heap leach pads, medium grade ore stockpiles, waste storage facilities, conveyor systems, ponds, a power generation plant, a 115 kV power line connection to the national grid, and maintenance shops and warehouses.

The pulp agglomeration plant comprises of crushing, grinding, thickening, filtration, mixing, agglomeration, reagent, and auxiliary facilities.

The operating mine is mature and site infrastructure including site roads are fully developed to support the existing mine production of 34 Mtpa.

A plan of the current site facilities is shown in the photograph in Figure 18.1.

Figure 18.1 Mine infrastructure plan



Source: PAS (2022).

18.1 Transportation and logistics

The main road access to the Property is via 92 km of unpaved roads leading north from Federal Highway 16, near Yepachic, Chihuahua. Access for personnel is provided by an unpaved landing strip suitable for light aircraft, located about 8 km from the mine.

18.2 Processing facilities

The crushing facilities include ROM stockpiles of material awaiting crushing and a three-stage crushing plant. Crushing facilities at the pulp agglomeration plant include a ROM ore pad, a vibrating grizzly feeder, a primary jaw crusher, a secondary screen and a secondary cone crusher, a sample tower, belt conveyors, a dust suppression system, a tramp iron magnet, and feeders discharging to the crushed ore stockpile.

The infrastructure for the grinding area includes a stockpile reclaim and rod mill feed belt conveyor, a rod mill, a scalping screen, a Vertimill, mill discharge and associated pumps, a metal detector and magnet, piping, instrumentation, platforms and support structures, and control room.

The infrastructure for the filtration facilities includes a filter feed surge tank and agitator, filter feed pumps, three filter presses, filter cake conveyors, filtrate tank, automatic samplers, pinned bed clarifier, filtrate pump, piping, instrumentation, and platforms and support structures.

The infrastructure for the mixing facilities includes a mixer, cement silo, conveyors, instrumentation, platforms, a sampler, and support structures. The infrastructure for the agglomeration facilities includes an agglomeration drum, process solution sprayers, instrumentation, platforms, support structures, and conveyors.

A series of fixed and portable conveyor belts transport the crushed material to heap leach pads. An expanded pumping system is under construction to optimize the use of sodium cyanide.

The Merrill-Crowe plant includes clarifier filters, two vacuum towers, a zinc cone, filter presses, cyanide preparation area, cyanide storage area, pumps, piping, instrumentation, platforms, and support structures including control room, kitchenette, changing rooms, and washrooms. The smelting facility includes a retort, a furnace, ventilation system, security system, platforms, and support structures.

The infrastructure for the reagent facilities includes tanks, mixers, pumps, metering pumps, piping, instrumentation, platforms and support structures, storage facilities, two overhead travelling cranes, and splitters. The facilities have the capacity to store a two-day supply of cement and a one-month supply of lime and sodium cyanide.

18.3 Auxiliary facilities

A power generation plant is located to the west of the ponds and maintenance shops and warehouses are located near the mine offices. A 115 kV, 98 km long power line connected to the Mexican national grid in 2016 supplies power to the mine and is sufficient for the current needs of the operation. Backup power is available on site by six 1,800 kW Cummins and two 1,200 kW Caterpillar diesel generators. The facilities also include compressed air, power supply, and process solution and water management systems.

18.4 Waste storage and stockpile facilities

Four waste storage facilities are located to the north, west, south and East of the open pit mine workings. Approximately a five stockpiles of medium grade ore and four high grades stockpiles are located around the mine workings to allow for the preferential crushing and stacking of higher grade ore for heap and agglomeration process.

18.5 Power supply

The electrical power is supplied via a 3,000 kilovolt-ampere (kVA) substation located outside the mine near the portal. Total Dolores site wide consumption is approximately 11.5 MW including the open pit and processing facilities.

18.6 Water supply

The main source of water in the pit is from old phase 1. Approximately 490 m^3 of water is provided per day for controlling dust, increasing visibility, and reducing the risk of accidents. A Komatsu water truck with a capacity of 74 m^3 is utilized in the pit for dust control and for rotary drills consumption.

18.7 Mine communication system

A standard radio communications system is used at Dolores. There is a control tower regulating the entry of small vehicles into the pit.

18.8 Explosive’s magazines

The main explosives magazine is located at the west side of the open pit. Explosives are delivered by a contractor (Hanka) using a special truck.

18.9 Tailings management facilities (TMF)

There is no tailings management facility as this is a heap leach operation.

19 MARKET STUDIES AND CONTRACTS

19.1 Contracts and marketing

Pan American has contracts in place with Asahi Refining USA Inc. of Salt Lake City, Utah, Republic Metals Corporation of Miami, Florida, and Met-Mex Peñoles S.A. de C.V. of Torreon, Mexico, for refining the doré produced on site. The doré is transported to these facilities where it is refined to the London Good Delivery specification, which is defined as a minimum of 995.0 parts per thousand of fine gold and a minimum of 999.0 parts per thousand of silver. Once refined, the good delivery gold and silver is sold on the international market to bullion banks, financial institutions, and traders. To date, no issues have been encountered in securing the sale of the refined metal from Dolores or for the doré produced at Pan American's other two mines operating in Mexico. No forward sales or hedging takes place at this time.

In the opinion of the QP the contracts in place conform to industry norms.

19.2 Review by the QP

Martin Wafforn, the QP responsible for this section of the technical report, has reviewed the contract terms, rates, and charges for the production and sale of the silver and gold produced at Dolores, and consider them sufficient to support the assumptions made in this technical report.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental factors

The most significant environmental issues at Dolores include surface disturbance, heap leach pad and waste dump stability, and reclamation liabilities associated with routine mine operations. Issues related to the stability and containment system of heap leach Pad 1, which developed prior to Pan American's acquisition of the Property, have been resolved by re-constructing the pad. The new heap leach Pad 1 was placed into operation in 2021.

Pan American has implemented additional contingency measures in and around the three heap leach pads, including the installation of well riser type over-liner solution collection systems, additional under drain and leak collection systems, and a network of containment, monitoring, and demonstration wells. Pan American also engages in construction and expansions to the pads after application of rigorous quality control to both the design and construction of the facilities.

The surface disturbance and reclamation liabilities are addressed under Pan American's project reclamation and closure plan, which is discussed in Section 20.9.

20.2 Environmental studies

A full suite of environmental baseline studies was completed by Minefinders as part of its original and subsequent permit applications for the construction of the mine and expansion. Pan American has continued routine environmental monitoring in and around the mine in accordance with the site environmental management plan and corporate standards. Pan American participates in the Mining Association of Canada's "Towards Sustainable Mining" program and has achieved Level A on environmental protocols.

20.3 Permitting factors

Pan American holds all necessary environmental and operating permits for the development and operation of the mine and is in compliance with Mexican law in all material aspects.

The SEMARNAT approved permit applications for the construction and operation of Dolores, including a MIA, a Technical Justification Study for Change of Land-Use, and an Environmental Risk Study in April 2006. These studies include a full assessment of the environmental and social impacts of the mine and environmental management plans, which describe the ongoing management and environmental monitoring programs. Subsequent permits were obtained for the expansion of Dolores in 2016 and 2017 which include the pulp agglomeration plant, an additional waste dump, and underground mine. The MIA permit was updated on April 28, 2022 to cover the phase 11 of the pit and the remaining mine life.

Other principal permits include an Accident Prevention Program, a Surface Water Extraction Authorization and a Waste Management Plan.

20.4 Waste disposal

Mine waste is deposited in five constructed waste rock facilities located around the pit, one of which has reached full capacity. In-pit deposition of waste rock commenced in 2021.

The mine operates a closed circuit heap leach pad processing system without tailings facilities.

20.5 Site monitoring

The mine operates an extensive monitoring program that includes surface and groundwater, waste, air quality, noise, flora and fauna, and socio-economics. There has been no material effect on the cost of any modifications to the existing, future, or post-closure monitoring programs as a result of the expanded operations.

20.6 Water management

Water for the operations is sourced from wells, pit, and underground dewatering activities, the nearby Tutuaca River, and from the Chabacan dam. In recent years, the water supply from mine dewatering and precipitation on the leach pads and Chabacan Dam catchment has been generally sufficient for process needs without requiring any extraction from the Tutuaca River. The Chabacan dam reservoir has a capacity of 1.2 million m^3 and provides storm water control as well as primary water storage. The permitted water usage from the Tutuaca River is 2.0 million m^3 per annum at a maximum rate of 64 litres per second, and the water extraction permit remains in good standing should it be required in the future. No modification to the permits is anticipated to supply any mining and processing expansions. Process water is recycled, and the mine has essentially no discharge except for effluent from domestic waste water treatment plants servicing the offices and camp.

20.7 Environmental certification

The Dolores mine voluntarily participates in the Mexican Federal Environmental Protection Authority's (PROFEPA) Clean Industry Program that involves independent verification of compliance with all environmental permits and the implementation of good practice environmental management procedures and practices.

20.8 Social and community factors

The majority of the surface rights on the Property are owned by Ejido Huizopa. An ejido is an area of communal land registered with the National Agrarian Registry of Mexico and parceled out to community members for agricultural use. The Dolores mine has surface rights agreements with Ejido Huizopa and with several individual members of the ejido dating from November 2006 which allows for irrevocable access and the right to carry out exploration and mining activities for a term of 15 years with a right to extend for a further 15 years. These surface rights provide sufficient access to the mining operations, waste storage areas, heap leach pad areas, and other facilities. The agreement provided for relocation of the old village of Dolores, which formerly occupied an area directly over the southern end of the deposit. Construction of the new town and relocation of all families from within the Property area was completed by the end of 2009.

The Dolores community relations team implements an extensive program of community engagement activities including information sessions, infrastructure works, and educational and training programs for the local people that have resulted in the establishment of several small businesses. Unskilled workers are sourced from nearby small villages, and Pan American has recruiting and training programs in place to develop the mining skills of the local workforce. Dolores is recognized as a Socially Responsible Enterprise by the Mexican Center for Philanthropy.

Pan American, through its Corporate Social Responsibility Policy, has committed to operating all of its mines in harmony with the communities where they are located, and to continually improve standards of social responsibility and to make a positive difference in the surrounding communities by fostering sustainable development.

20.9 Project reclamation and closure

A closure cost estimate for Dolores was prepared in 2012 according to Pan American's standard methodology, which employs the State of Nevada approved Standardized Reclamation Cost Estimator (SRCE) model. This estimate includes consideration of all surface disturbance and reclamation liability at the site and is updated on an annual basis. The Dolores current SRCE model includes demolition of all site infrastructure, re-grading of waste rock facilities, rinsing and covering leach pads, and complete re-vegetation of the site. The current SRCE model estimates the undiscounted value of reclamation costs or environmental liability for the Property to be approximately $64.1 million. Reclamation bonds are not currently a legal requirement in Mexico.

20.10 Expected material environmental issues

There are no known environmental or social issues that could materially impact the mine's ability to extract the Mineral Resources or Mineral Reserves.

21 CAPITAL AND OPERATING COSTS

The estimated operating costs are based on experience at the Dolores mine. Sustaining capital expenditures include pre-stripping, equipment replacement and heap leach pad expansions. Further capital may be required if economically justified or if there are substantial increases to the Mineral Reserves.

21.1 Capital costs

Pan American estimates that sustaining capital expenditures in 2022 will be $33.4 million primarily for pre-stripping of phase 10a and the construction of heap leach pad capacity. Future sustaining capital costs will be dependent on requirements and reserve growth if any. The cost of constructing heap leach pad capacity is estimated to average $2.62 per tonne over the remainder of the Mineral Reserves.

21.2 Operating costs

For ROM heap leach ore, the cost of processing is estimated to average $6.20 per tonne plus $3.47 per tonne for G&A.

For Pulp agglomeration ore, the cost of processing is estimated to average $20.40 per tonne plus $3.47 per tonne for G&A.

Open pit mining costs are estimated to average $2.05 per tonne with some variations due to haulage distances for the different phases and elevations.

Costs are further detailed in Table 14.4 and Table 14.5.

22 ECONOMIC ANALYSIS

An economic analysis has been excluded from this Technical Report as Dolores is currently in production and this Technical Report does not include a material expansion of current production.

23 ADJACENT PROPERTIES

There is no relevant information on adjacent properties to report.

24 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 INTERPRETATION AND CONCLUSIONS

Pan American acquired the Dolores mine in 2012 as part of the acquisition of Minefinders. Pan American has operated the mine since then and has engaged in investments including building heap leach pad capacity, connecting the mine to the Chihuahua electrical grid with a power line, the underground mine and building of the pulp agglomeration plant.

25.1 Mineral Resources and Mineral Reserves

There are no known drilling, sampling, or recovery factors that could materially impact the reliability of the drilling results used to estimate Mineral Resources and Mineral Reserves.

There are no known significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the Mineral Resource and Mineral Reserve estimates. Pan American routinely conducts reconciliation of the reserve model to the grade control model and to the heap leach feed conveyor weight meter and sampler in order to monitor actual mine versus model performance.

25.2 Mineral processing, metallurgical testing, and recovery methods

Overall, modelled recoveries for gold and silver at Dolores have been achieved. Modeled recoveries, monthly quality column composites, and actual production are largely in agreement. The metallurgical recovery model created for the Mineral Resource and Mineral Reserve estimate assumes heap leach gold recoveries of 77.9% for oxide and 67.6% for mixed and sulphide ores, and silver recoveries of 42.1% for oxide and 54.9% for mixed and sulphide ores. The metallurgical recovery model for pulp agglomeration assumes gold recoveries of 90.0% for oxides and 89.8% for mixed and sulphides with, and silver recoveries of 58.7% for oxides and 83.3% for mixed and sulphides.

25.3 Mining and financial

The mining operations are established with a good understanding of the mining parameters and cost structure.

25.4 Environment and community

The most significant environmental liabilities include surface disturbance and reclamation liabilities and issues related to the stability and containment system of the heap leach pads. Only a small portion of the waste is potentially acid generating and no specific measures to manage waste or ore deposition are required.

There are no known environmental or social issues that could materially impact the mine’s ability to economically extract the Mineral Resources or Mineral Reserves.

26 RECOMMENDATIONS

26.1 Mineral Resources and Mineral Reserves

Pan American intends to continue with annual diamond drilling programs and to continue ongoing infill drilling, to collect closer spaced drillhole information. Exploration diamond drilling is expected to be concentrated on defining the southern strike extent of the deposit and in improving the confidence in the estimate at depth. The geological interpretation will continue to be updated annually to include additional diamond drilling undertaken during the year. Reviews of the geological interpretation against grade control drilling will continue to be undertaken on a regular basis to verify the reliability of the Mineral Resource and Mineral Reserve estimate.

26.2 Mineral processing, metallurgical testing, and recovery methods

Pan American will:

- Continue monthly composites leaching and load / permeability tests.
- Review higher cyanide consumption from material mined in recent years and impact in long term cost of leaching.
- Continue monthly reviews of the geotechnical performance and designs relating to the heap leach facilities by Golder.

26.3 Mining and financial

Pan American will continue to optimize blasting patterns, and monitoring blast movements and pit slope stability. Recommendations have been made for additional geotechnical work (Walker, 2017), including:

- Operationally minimize the blasting overbreak and continue work to achieve design bench face angles.
- Continually observe the orientation, length, and location of continuous major structures as mining progresses and extend the geological and geotechnical model beyond the ultimate pit crest to understand the behaviour of the overall slopes.

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28 QP CERTIFICATES

CERTIFICATE of QUALIFIED PERSON

I, Martin Wafforn, Senior Vice President, Technical Services and Process Optimization of Pan American Silver Corp., 1500-625 Howe St, Vancouver, BC, V6C 2T6, Canada do hereby certify that:

1. I am the co-author of the technical report titled "Technical Report for the Dolores Property, Chihuahua, Mexico", with an effective date of June 30, 2022 (the "Technical Report").
2. I graduated with a Bachelor of Science in Mining degree from the Camborne School of Mines in Cornwall, England in 1980. I am a Professional Engineer in good standing with The Association of Professional Engineers and Geoscientists of the Province of British Columbia. I am also a Chartered Engineer in good standing in the United Kingdom. My experience is primarily in the areas of mining engineering, and I have worked as an engineer in the mining industry for a total of 40 years since my graduation from the Camborne School of Mines.
3. I have read the definition of 'qualified person' set out in National Instrument 43-101 (the "Instrument") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements of a 'qualified person' for the purposes of the Instrument.
4. I have visited the Property on October 19, 2021.
5. I am responsible for Sections 2 - 5, 15, 16, 19, 20, 21, 22, 24, and 1.1, 1.7, 1.8, 1.11, 1.12, 12.2, 21, 25.1, 25.3, 25.4, 26.3 of the Technical Report.
6. I am currently employed as the Senior Vice President, Technical Services and Process Optimization for Pan American Silver Corp., the owner of the Property, and by reason of my employment, I am not considered independent of the issuer as described in Section 1.5 of the Instrument.
7. I have had prior involvement with the Property that is the subject of the Technical Report; I am an employee of Pan American Silver Corp. and have conducted site visits to the Property, including as described in Section 2 – Introduction of the Technical Report.
8. I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with the Instrument and that form.
9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, British Columbia, this 2nd day of December, 2022.

"signed and sealed"

Martin Wafforn, P.Eng.

CERTIFICATE of QUALIFIED PERSON

I, Christopher Emerson, Vice President, Business Development and Geology of Pan American Silver Corp., 1500-625 Howe St, Vancouver, BC, V6C 2T6, Canada do hereby certify that:

1. I am the co-author of the technical report titled "Technical Report for the Dolores Property, Chihuahua, Mexico", with an effective date of June 30, 2022 (the "Technical Report").
2. I graduated with a Bachelor of Engineering in Industrial Geology from Camborne School of Mines, Exeter University, England, in 1998 and earned my Master of Science in Mineral Exploration from Leicester University in 2000. I am a Fellow of the Australasian Institute of Mining and Metallurgy (FAusIMM) and a Fellow of the Geological Society of London (FGS). I have worked as a geologist in both mining and exploration for the past 22 years since my graduation from Leicester University.
3. I have read the definition of 'Qualified Person' set out in National Instrument 43-101 (the "Instrument") and certify that by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfil the requirements of a 'Qualified Person' for the purposes of the Instrument.
4. I have visited the Property on October 19, 2021.
5. I am responsible for Sections 6 - 11, 14, 23, 27 and 1.2, 1.3, 1.4, 1.6, 1.13, 12.1, 12.4, 26.1 of the Technical Report.
6. I am currently employed as the Vice President, Business Development and Geology for Pan American Silver Corp., the owner of the Property, and by reason of my employment, I am not considered independent of the issuer as described in Section 1.5 of the Instrument.
7. I have had prior involvement with the Property that is the subject of the Technical Report; I am an employee of Pan American Silver Corp. and have conducted site visits to the Property, including as described in Section 2 – Introduction of the Technical Report.
8. I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with the Instrument and that form.
9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, British Columbia, this 2nd day of December, 2022.

"signed and sealed"

Christopher Emerson, FAusIMM

CERTIFICATE of QUALIFIED PERSON

I, Americo Delgado, Vice President, Mineral Processing, Tailings and Dams of Pan American Silver Corp., 1500-625 Howe St, Vancouver, BC, V6C 2T6, Canada, do hereby certify that:

1. I am the co-author of the technical report titled "Technical Report for the Dolores Property, Chihuahua, Mexico", with an effective date of June 30, 2022 (the "Technical Report").
2. I graduated with a Master of Science in Metallurgical and Material Engineering from the Colorado School of Mines in Golden, Colorado, in 2007, and with a Bachelor of Science in Metallurgical Engineering degree from the Universidad Nacional de Ingenieria, Lima, Peru, in 2000. I am a Professional Engineer in good standing with the Association of Professional Engineers and Geoscientists of the Province of British Columbia. My experience is primarily in the areas of metallurgy, mineral processing engineering, and tailings management and I have worked as a metallurgist and engineer in the mining industry for a total of 22 years since my graduation from the Universidad Nacional de Ingenieria.
3. I have read the definition of 'qualified person' set out in National Instrument 43-101 (the "Instrument") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements of a 'qualified person' for the purposes of the Instrument.
4. I have visited the Property on April 26-28, 2022.
5. I am responsible for Sections 13, 17, 18, and 1.5, 1.9, 1.10, 12.3, 25.2 – 26.2 of the Technical Report.
6. I am currently employed as the Vice President, Mineral Processing, Tailings and Dams for Pan American Silver Corp., the owner of the Property, and by reason of my employment, I am not considered independent of the issuer as describe in Section 1.5 of the Instrument.
7. I have had prior involvement with the Property that is the subject of the Technical Report; I am an employee of Pan American Silver Corp. and have conducted site visits to the Property, including as described in Section 2 – Introduction of the Technical Report.
8. I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with the Instrument and that form.
9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, British Columbia, this 2nd day of December, 2022.

"signed and sealed"

Americo Delgado, P.Eng.