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Amended NI 43-101 Technical Report for the La Colorada Property, Zacatecas, Mexico

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Effective date: December 18, 2023
Signature Date: March 22, 2024

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Technical Report (as defined herein) contains or incorporates by reference “forward-looking statements” and “forward-looking information” under applicable Canadian securities legislation and within the meaning of the United States Private Securities Litigation Reform Act of 1995. Forward-looking information includes, but is not limited to: cash flow forecasts; projected capital; operating and exploration expenditures; targeted cost reductions; mine life and production rates; mineral grades; infrastructure, capital, operating and sustaining costs; the future price of gold, silver, zinc and lead; potential mineralization and metal or mineral recoveries; estimates of mineral resources and mineral reserves and the realization of such mineral resources and mineral reserves; the ability to replace mineral reserves; information pertaining to potential improvements to financial and operating performance and mine life at the La Colorada Property (as defined herein) that may result from expansion projects or other initiatives, including but not limited to the Skarn Project (as defined herein); the timing and expected outcomes of optimization projects; maintenance and renewal of permits or mineral tenure; estimates of mine closure obligations; leverage ratios; and information with respect to Pan American’s (as defined herein) strategy, plans or future financial, or operating performance. Forward-looking statements are characterized by words such as “plan,” “expect”, “budget”, “target”, “project”, “intend”, “believe”, “anticipate”, “estimate” and other similar words, or statements that certain events or conditions “may” or “will” occur, including the negative connotations of such terms. Forward-looking statements are statements that are not historical facts and are based on the opinions, assumptions and estimates of Qualified Persons (as defined herein), considered reasonable at the date the statements are made, and are inherently subject to a variety of risks and uncertainties and other known and unknown factors that could cause actual events or results to differ materially from those projected in the forward-looking statements. These factors include, but are not limited to: the impact of general domestic and foreign business, economic and political conditions, including but not limited to the impact of the 2023 Decree (as defined herein); legal proceedings brought against the La Colorada Property or Pan American, including but not limited to the legal proceeding brought before the SEDATU (as defined herein); global liquidity and credit availability on the timing of cash flows and the values of assets and liabilities based on projected future conditions; fluctuating metal and commodity prices (such as gold, silver, zinc, lead, diesel fuel, natural gas and electricity); currency exchange rates (such as the Mexican peso and the Canadian dollar versus the United States dollar); changes in interest rates; possible variations in ore grade or recovery rates; the speculative nature of mineral exploration and development; changes in mineral production performance, exploitation and exploration successes; diminishing quantities or grades of mineral reserves; increased costs, delays, suspensions, and technical challenges associated with the construction of capital projects; operating or technical difficulties in connection with mining or development activities, including disruptions in the maintenance or provision of required infrastructure and information technology systems; damage to Pan American’s or the La Colorada Property’s reputation due to the actual or perceived occurrence of any number of events, including negative publicity with respect to the handling of environmental matters or dealings with community groups, whether true or not; risk of loss due to acts of war, terrorism, sabotage, crime and civil disturbances; risks associated with infectious diseases, including COVID-19; risks associated with nature and climatic conditions; uncertainty regarding whether the La Colorada Property will meet Pan American’s capital allocation objectives; the impact of inflation; changes in national and local government legislation, taxation, controls or regulations and/or changes in the administration of laws, policies and practices, expropriation or nationalization of property in Mexico, including but not limited to the 2023 Decree; failure to comply with environmental and health and safety laws and regulations; timing of receipt of, or failure to comply with, necessary permits and approvals; changes in project parameters as plans continue to be refined; changes in project development, construction, production and commissioning time frames; contests over title to properties or over access to water, power, and other required infrastructure; increased costs and physical risks including extreme weather events and resource shortages related to climate change; availability and increased costs associated with mining inputs and labor; the possibility of project cost overruns or unanticipated costs and expenses, potential impairment charges, higher prices for fuel, steel, power, labour, and other consumables contributing to higher costs; unexpected changes in mine life; final pricing for concentrate sales; unanticipated results of future studies; seasonality and unanticipated weather changes; costs and timing of the development of new deposits; success of exploration activities; risks related to relying on local advisors and consultants in foreign jurisdictions; unanticipated reclamation expenses; limitations on insurance coverage; timing and possible outcome of pending and outstanding litigation and labour disputes, including but not limited to the proceeding brought before the SEDATU; risks related to enforcing legal rights in foreign jurisdictions, vulnerability of information systems and risks related to global financial conditions. In addition, there are risks and hazards associated with the business of mineral exploration, development, and mining, including environmental hazards, industrial accidents, unusual or unexpected formations, pressures, cave-ins, flooding, failure of plant, equipment, or processes to operate as anticipated (and the risk of inadequate insurance, or inability to obtain insurance, to cover these risks), as well as those risk factors discussed or referred to herein and in Pan American's Annual Information Form filed with the securities regulatory authorities in all of the provinces and territories of Canada and available under Pan American's profile at www.sedarplus.ca, and Pan American's Annual Report on Form 40-F filed with the United States Securities and Exchange Commission. Although Pan American has attempted to identify important factors that could cause actual actions, events, or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events, or results not to be anticipated, estimated or intended. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Pan American undertakes no obligation to update forward-looking statements if circumstances or management's estimates, assumptions, or opinions should change, except as required by applicable law. The reader is cautioned not to place undue reliance on forward-looking statements. The forward-looking information contained herein is presented for the purpose of assisting investors in understanding Pan American's expected financial and operational performance and results as at and for the periods ended on the dates presented in Pan American's plans and objectives and may not be appropriate for other purposes.

Cautionary Note to United States Investors Concerning Estimates of Mineral Reserves and Mineral Resources

This technical report has been prepared in accordance with the requirements of the securities laws in effect in Canada, which differ in certain material respects from the disclosure requirements promulgated by the Securities and Exchange Commission (SEC). For example, the terms "Mineral Reserve", "Proven Mineral Reserve", "Probable Mineral Reserve", "Mineral Resource", "Measured Mineral Resource", "Indicated Mineral Resource" and "Inferred Mineral Resource" are Canadian mining terms as defined in accordance with NI 43-101 and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves, May 2014 (the CIM Definition Standards), adopted by the CIM Council, as amended. These definitions differ from the definitions in the disclosure requirements promulgated by the SEC. Accordingly, information contained in this technical report may not be comparable to similar information made public by U.S. companies reporting pursuant to SEC disclosure requirements.

List of Abbreviations

Units of measurement used in this technical report conform to the metric system. All currency in this report is listed in US dollars (US$) unless noted otherwise.

°	degrees
>	greater than
<	less than
%	percent
3D	three-dimensional
Ag	silver
Au	gold
AAS	atomic absorption spectrometry
BC	block caving
BEV	battery electric vehicle
CAF	cut and fill
CFE	Comisión Federal de Electricidad, the national power utility
CFM	cubic foot per minute
cm	centimetre
cm^3	cubic centimetre
CRD	carbon replacement deposits
CRM	certified reference materials
CV	coefficient of variation
d	day
dmt	dry metric tonne
E	east
EIS	environmental impact statement ("EIS")
ELOS	estimated equivalent linear overbreak slough
FS	feasiblity study
FTSF	filtered tailings storage facility
g	gram
g/t	gram per tonne
GCT	Guerrero Composite Terrane
GPM	gallon per minute
GW	Gigawatt (1,000,000,000 (One Billion) Watts)
h	hour
ha	hectare
hp	horsepower
ICP	inductively coupled plasma
ID2	inverse distance squared or to the power of two
IFC	International Finance Corporation
IS	intermediate sulphidation
k	kilo (thousand)
km	kilometre
koz	kilo-ounce
ktpd	kilo-tonne per day
kV	kilovolt
kg	kilogram
LCT	locked cycle test
LHD	load-haul-dump
LHOS	long-hole stoping
LOM	life of mine
LS	low sulphidation
LVC	Lower Volcanic Complex
LWID	length-weighted inverse distance
m	metre
m^3	cubic metre
M	mega, million
Ma	mega annum, millions of years ago
MAC	Mining Association of Canada
masl	metres above sea level
mm	millimetre
Moz	million ounces
MRMR	mining rock mass rating
MSB	Mexican Silver Belt
MSO	mineable shape optimizer
MT	magnetotelluric
N	north
NN	nearest-neighbour
NPV	net present value
NSR	net smelter return
OEM	original equipment manufacturer
OK	ordinary kriging
oz	Troy ounce (31.1035 g)
Pb	lead
PEA	preliminary economic assessment
PF	powder factor
PFS	pre-feasibility study
PGCA	Power Geotechnical Cellular Automata, a Deswik software)
ppm	parts per million
PRC	Production Rate Curves
PS	Performance Standards
QAQC	quality assurance and quality control
QC	quality control
QP	qualified person
RMR	rock mass rating
ROCASIMP	La Colorada simplified logging code
ROM	run of mine
RPD	relative percent difference
RPEE	reasonable prospect of eventual economic extraction
s	second
S	south
SAG	semi-autogenous grinding
SEDATU	Mexico's Federal Secretariat of Agrarian, Territorial, and Urban Development
SLC	sublevel caving
SLS	sublevel long-hole stoping
SMO	Sierra Madre Occidental
SRCE	standard reclamation cost estimator
SSR	single-shot slot raising
t	metric tonne
tpd	tonnes per calendar day
TSF	tailings storage facility
TSM	Towards Sustainable Mining
US$	United States dollar
UVS	Upper Volcanic Supergroup
VOD	ventilation-on-demand
W	west
wmt	wet metric tonne
Zn	zinc

1 Summary

Pan American Silver Corp. (Pan American) holds a 100% interest in the 56 mining concessions (totaling approximately 8,840 hectares) that comprise the La Colorada property (the La Colorada Property) located in Zacatecas, Mexico, through its subsidiary, Plata Panamericana S.A. de C.V. (Plata). A collection of three underground silver-lead-zinc mines named Candelaria, Estrella, and Recompensa (collectively, the La Colorada Vein Mine) are located within the La Colorada Property. Currently, underground mining at the La Colorada Vein Mine is conducted at the Candelaria and Estrella mines, whereas no mining is currently taking place at the Recompensa mine. The La Colorada Property also hosts the large polymetallic skarn exploration project (the Skarn Project) discovered in 2018 through brownfield exploration near the La Colorada Vein Mine.

With nearly 30 years of experience in the Americas, Pan American is a Canadian-based leader in producing precious metals in the region. Pan American operates mines that produce silver and gold in Canada, Mexico, Peru, Bolivia, Argentina, Chile, and Brazil. In addition, Pan American owns the Escobal Mine in Guatemala, which is not currently in operation. Pan American has earned a reputation for excellence in sustainability performance, operational efficiency, and financial prudence.

This technical report was prepared in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101). It presents the mineral resource and mineral reserve estimates for the La Colorada Vein Mine as of June 30, 2023, describes the current mining operation, and summarizes the LOM plan and cost estimates. The technical report also describes the results of the preliminary economic assessment (PEA) of the Skarn Project, disclosed on December 18, 2023, and includes an updated mineral resource estimate for the Skarn Project. The PEA considers a 50,000 tpd sublevel cave mining method and a conventional 50,000 tpd capacity selective zinc and lead flotation processing plant and filtered tailings storage facility. Annual production is estimated to average 17.2 Moz of silver, 427 kt of zinc and 218 kt of lead during the first 10 years of an estimated 17-year mine life.

1.1 Property Description and Ownership

The North American Cordillera hosts the La Colorada Property, which lies within the Sierra Madre Occidental mountains. The area's landscape consists of broad flat valleys and narrow, relatively low mountain ranges and hills with altitudes between 2,100 and 2,550 metres above sea level. The area has a dry to semi-dry climate.

The La Colorada Vein Mine has three underground mines that extract oxide and sulphide ores: Candelaria, Estrella, and Recompensa (no mining is currently taking place at the Recompensa mine). Near the mine, brownfield exploration in 2018 discovered the large polymetallic Skarn Project. The La Colorada Property consists of 56 mining concessions covering about 8,840 hectares, including some exploration concessions outside the mining area. The mining concessions controlled by Pan American contain the mineral reserves, mineral resources, all known mineralized zones, mine workings, processing plant, effluent management and treatment systems, and tailings disposal areas.

The La Colorada Vein Mine workings are covered by about 1,300 ha of surface rights that Pan American owns or has access to. Pan American is buying 2,000 ha of private land and planning to rent another 2,800 ha of ejido land to secure surface rights for the Skarn Project.

The surface infrastructure includes the plant processing facilities, tailings and waste rock storage facilities, offices and workshops, accommodation camps, change houses, warehouses, fuel and lubricant facilities, water and diesel tanks, surface electrical distribution, air compressors, explosive magazine, water treatment plants, sludge settling ponds and piping, surface ventilation fans, mine portals, run-of-mine ore stockpiles, domestic waste landfill, roads, surface grading and drainage, security gates and fencing, and satellite communication equipment.

The La Colorada Property has a long history of mining since 1925. Several mining operations have exploited the area until 1997, when Pan American acquired an option agreement with Minas La Colorada S.A. de C.V. (MLC). The production data before Pan American's involvement are unknown. Pan American began small-scale production in January 2001 from surface stockpiles and underground development headings. Full-scale production commenced in mid-2003. From 2001 to 2023, Pan American has produced more than 98 Moz of silver, 149 kt of zinc, and 78 kt of lead.

There are no known significant environmental liabilities on or related to the La Colorada Property. There are no known environmental issues that could materially impact Pan American's activities on the La Colorada Property. To the best of Pan American and the qualified person's knowledge, all permits and licences required to conduct activities on the La Colorada Property have been obtained and are currently in good standing.

1.2 Geology and Mineralization

The La Colorada Property is located in the Zacatecas mining district, within the Mexican Silver Belt. Many of the major deposits in the silver belt are located within the Sierra Madre Occidental mountains and associated volcanic belt. The region contains epithermal Ag-Pb-Zn ± Au ± Cu vein, and polymetallic skarn, carbon replacement deposits (CRD), and porphyry deposits. Epithermal intermediate-sulphidation Ag-Pb-Zn vein, CRD, and polymetallic skarn mineralization has been identified at the La Colorada Property. The upper portions of the epithermal vein system have been the historical focus of the currently operating La Colorada Vein Mine, while the skarn and CRD mineralization is currently being defined and characterized by ongoing drilling and technical studies at the Skarn Project.

At the La Colorada Vein Mine there are three ENE to E–W-trending principal vein structures which, from NW to SE, are named Recompensa, Amolillo and NC-HW. Each vein has second-order sub-parallel splays and duplexes; there are also several NW- to WNW-trending veins. In general, the principal veins are strongly brecciated, locally oxidized, and often exhibit irregular vein boundaries. Most of the mineralization of economic significance is hosted in quartz veins that average 1 to 2 m wide but that can be significantly wider. The vein fillings consist of quartz, calcite, and locally barite and rhodochrosite. Galena, sphalerite, pyrite, native silver, and silver sulphosalts are present in unoxidized veins. The major mineralized veins are strongly brecciated and locally oxidized. Veta 3 runs parallel to the HW and NC series, strikes for over 900 m towards the northeast, dips 75° to the northwest, and extends for about 400 m down dip. The average vein width is 1.7 m.

At the Skarn Project, faults acted as a conduit for the intrusion of several porphyries and their associated hydrothermal fluids. To date, two intrusive centres with similar characteristics have been identified: the main intrusive centre located between zones 901 and 903 of the Skarn Project; and a second centre north of the Skarn Project's 902 zone. Emplacement of the intrusions fractured the sedimentary rocks, increasing the porosity and permeability of the limestone host rocks which were metamorphosed where in contact with the hot fluids. The evolution of the skarn system begins with contact metamorphism that in its early phase gives rise to the occurrence of marble, calc-silicate hornfels and recrystallized limestone. The final stage of skarn development is a distal phase consisting of CRD replacement bodies and veinlets of carbonate with sulphides.

1.3 Exploration Status

Before Pan American acquired the La Colorada Property, it had been exploited for many years without any systematic exploration work. The main structures were identified by underground mining before Pan American's involvement. Pan American started to systematically test the zones that contain silver, gold, lead, and zinc in 1997 and has continued to drill since then to increase the mineral resource and compensate for the depletion of mineral reserves. MLC, the previous owner, drilled 131 core drill holes for a total of 8,665 m. As of June 2023, more than 757,000 m were drilled at the La Colorada Property in both the La Colorada Vein Mine areas (Recompensa, Estrella, and Candelaria) and the Skarn Project. This includes 342 drill holes (for 282,555 m) that target the Skarn Project, of which 181 drill holes (126,697 m) were directional drilling from existing drill holes to reach the target depths.

1.4 Mineral Resource and Mineral Reserve Estimates

Mineral resource estimates were carried out separately for the La Colorada Vein Mine and the Skarn Project. The La Colorada Vein Mine mineral resource consists of 64 mineralized zones, each estimated separately. Annual updates are carried out on those mineralized zones that have have been mined or drilled significantly since their previous estimate. The Skarn Project is updated when significant additional drilling information becomes available and is herein the focus of a PEA.

The combined mineral resource for the La Colorada Vein Mine and the Skarn Project is tabulated below in Table 1-1. The effective date of the mineral resource is June 30, 2023, for the La Colorada Vein Mine and December 18, 2023, for the Skarn Project. Mineral resources exclude those mineral resources that were converted to mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources will be converted into mineral reserves.

Table 1-1: Mineral resource statement for the combined La Colorada Vein Mine and Skarn Project

Classification	Tonnes (Mt)	Ag Grade (g/t)	Ag Metal (Moz)	Au Grade (g/t)	Au Metal (Moz)	Pb Grade (%)	Pb Metal (Mt)	Zn Grade (%)	Zn Metal (Mt)
La Colorada Vein Mine									
Measured	0.7	153	3.58	0.13	0.00	0.64	0.00	1.18	0.01
Indicated	2.5	182	14.62	0.19	0.02	0.87	0.02	1.41	0.04
M+I	3.2	175	18.19	0.18	0.02	0.82	0.03	1.36	0.04
Inferred	14.7	174	82.23	0.20	0.09	0.94	0.14	1.67	0.25
Skarn Project									
Indicated	173.6	33	183.18	-	-	1.32	2.29	2.79	4.84
Inferred	103.6	35	116.18	-	-	1.03	1.07	2.47	2.56
Total									
Measured	0.7	153	3.58	0.13	0.00	0.64	0.00	1.18	0.01
Indicated	176.1	35	197.80	0.00	0.02	1.31	2.31	2.77	4.88
M+I	176.8	35	201.38	0.00	0.02	1.31	2.31	2.76	4.89
Inferred	118.3	52	198.41	0.02	0.09	1.02	1.21	2.37	2.80

1. *Numbers may not add up due to rounding.*
2. *Mineral resources exclude those mineral resources that were converted to mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.*
3. *Mineral resources were estimated in accordance with the guidelines laid out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practice Guidelines (November 2019) and classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*

4. *For the La Colorada Vein Mine, the vein, hanging wall and footwall zones were combined into a practical mining width that includes a minimum dilution of 40 cm, or 35 cm of each hanging wall and footwall for cut and fill or long-hole stoping mining methods respectively. A minimum mining width of 2.6 m was used for cut and fill and 2.2 m for long-hole mining areas.*
5. *For the La Colorada Vein Mine, the diluted mining interval was reported above an economic cut-off grade that was calculated using a price of US$19 per ounce of silver US$1,300 per ounce of gold, US$2,600 per tonne of zinc, and US$2,000 per tonne of lead. Economic cut-off grades used for reporting the resource vary for each vein as a function of oxidation, depth, mining method, and geotechnical and processing variables.*
6. *The La Colorada Vein Mine's listed lead and zinc grades are averages for the deposit. However, the only payable base metals are those from concentrates produced from the sulphide ores, not those from the doré produced from the oxide ores.*
7. *The effective date for the mineral resource estimate for the La Colorada Vein Mine is June 30, 2023.*
8. *Prices used to report the Skarn Project mineral resources were: US$22 per ounce of silver, US$2,800 per tonne of zinc, and US$2,200 per tonne of lead.*
9. *For the Skarn Project mineral resource, an estimated NSR (in US$/t) was calculated using metallurgical recoveries, obtained from metallurgical testing, of 87.4% silver, 88% lead and 93% zinc with mineral concentrates containing 67% Pb in the lead concentrate and 60% Zn in the zinc concentrate. Estimates for transport, payability, and refining/selling costs, based on experience and long-term views of the marketing, treatment, and refining of these types of mineral concentrates, were included.*
10. *Reasonable prospects for eventual economic extraction were assessed for the Skarn Project by determining the total in-situ tonnes and metal grades constrained inside volumes that were based on a SLC mining method. To determine the constraining SLC shapes, an initial elevated cut-off value of $50/t NSR was applied. Geotechnical, geometry and caving rules were then applied to ensure that practical mining shapes and sequences were achieved. Each level, each zone was individually tested for overall economics, and then tested as part of the caving sequence. The resulting constraining shapes were then considered as practical mining outlines. The tonnes and grades are inclusive of the must-take low-grade material within the volume. No other mining recovery, ring recovery, dilution, or mineral losses have been applied. Additional material outside the SLC shapes but within the development volumes that is above a cut-off grade of $10/t NSR was included in the resource.*
11. *The effective date of the Skarn Project mineral resources estimate is December 18, 2023. The geological model was completed in December 2022 and results from diamond drilling conducted in 2023 are therefore not included in this estimate.*
12. *The mineral resource estimates for the La Colorada Vein Mine and Skarn Project were prepared under the supervision, or reviewed by Christopher Emerson, FAusIMM, who is a qualified person as that term is defined in NI 43-101.*

Pan American updates mineral reserve estimates on an annual basis following reviews of metal price trends, operational performance and incurred costs for the previous year, the results of diamond drilling and underground channel sampling conducted during the year, and production and cost forecasts over the LOM. The mineral reserve statement of the La Colorada Vein Mine as of June 30, 2023, is presented in Table 1-2.

Table 1-2: Mineral reserve statement for the La Colorada Vein Mine as at June 30, 2023

Category	Tonnes (Mt)	Silver Grade (g/t Ag)	Gold Grade (g/t Au)	Lead Grade (% Pb)	Zinc Grade (% Zn)	Contained Silver (Moz)	Contained Gold (koz)	Contained Lead (kt)	Contained Zinc (kt)
Proven	5.0	296	0.21	1.25	2.15	47.2	33.8	61.9	106.6
Probable	4.2	292	0.19	1.26	2.22	39.1	25.3	52.5	92.7
Total	**9.2**	**294**	**0.20**	**1.25**	**2.18**	**86.3**	**59.2**	**114.5**	**199.3**

1. *Mineral reserves have been estimated by the La Colorada technical services team under the supervision of Martin Wafforn, Senior Vice President, Technical Services and Optimization at Pan American Silver Corp., and a qualified person as defined by National Instrument 43-101. The mineral reserve estimate conforms to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*

2. *Mineral reserves are reported by zone at variable cut-off values ranging from US$97.65/t to US$166.71/t. Metal price assumptions of US$19/oz for silver, US$1,300/oz for gold, US$2,000/t for lead and US$2,600/t for zinc were used in the estimation. Processing recovery assumptions for oxides are of 82.03% for silver and 45.68% for gold. Processing recovery assumptions for sulphides are of 93.10% for silver, 55.11% for gold, 84.62% for lead and 84.46% for zinc. Mine operating cost assumptions vary by zone and range from US$56.15/t to US$102.50/t, depending on the mining method, hauling distances, and lateral development requirements. Processing cost assumptions, including tailings disposal costs, are of US$14.58/t for sulphides and US$43.36/t for oxides, while G&A cost assumption are of US$20.85/t.*
3. *Mineral reserves are stated at a mill feed reference point and account for minimum mining widths, diluting material, and mining losses.*
4. *All selective mining units converted to mineral reserves contain a majority proportion of measured and indicated mineral resources.*
5. *Numbers may not add up due to rounding.*

1.5 Mining and Processing Methods

The Candelaria and Estrella mines are the only active underground operations at the La Colorada Property (the Recompensa mine is currently not in operation). The mining methods vary depending on the local geology and vein inclination. They can be either cut-and-fill (breasting) or sublevel long-hole stoping (SLS). The main access ramps and haulage drifts have a dimension of 3.5 m by 3.5 m and a maximum slope of 15%. Below level 408, they are enlarged to 4.0 m by 4.5 m to allow for bigger equipment and more mechanization at deeper levels. Electric hydraulic jumbo drills and hand-held drills are both used for the development mining to access the ore. Scooptrams are used for tramming ore and backfill to and from stopes, and haul trucks are used for underground haulage. Development waste is hauled to stopes to be utilized as backfill, and ore is hauled to ore passes or to one of the rock-breaker grizzlies at the shaft. Ore is hoisted to surface using a shaft with a capacity in excess of 2,300 tpd and is hauled to the mill crusher stockpile. When required, ore can also be hauled to the surface using the two access ramps present in each mine.

The processing plant has two different circuits for processing sulphide and oxide ores. The sulphide ore goes through a conventional flotation circuit that can process 2,000 tpd. It involves crushing, grinding, and selective lead and zinc froth flotation to produce lead and zinc concentrates. The metallurgical recoveries for the sulphide circuit in 2023 are 93% for silver, 58% for gold, 86% for lead, and 84% for zinc. The oxide ore goes through a conventional cyanide leach process that can process 400 tpd. It involves crushing, grinding, leaching, Merrill-Crowe zinc precipitation, and smelting of the precipitate to produce doré. The metallurgical recoveries for the oxide circuit in 2023 are around 82% for silver and 43% for gold.

The mineral reserve inventory of the La Colorada Vein Mine as of June 30, 2023, forms the basis of the LOM plan. The LOM plan involves an integrated operation where oxide and sulphide ore from the Candelaria and Estrella underground mines are processed at their respective plants, with about 95% of the ore tonnes going to the sulphide ore plant. The LOM plan covers the period from July 2023 to 2035 at target production levels, followed by a gradual decrease in production in 2036, the final year of the plan. To optimize the value of the mineral reserves, lower-grade ore is mined later where feasible, resulting in an average annual silver production of 6.5 Moz from 2024 to 2029 and 5.8 Moz from 2030 to 2035, assuming expected metallurgical recoveries.

1.6 Environmental Studies, Permitting, and Social or Community Impact

An environmental impact statement ("EIS") and a risk assessment of the existing La Colorada Vein Mine on the La Colorada Property were submitted to the Mexican environmental authorities in 1999. The EIS described the impact of proposed development and mining activities and provided conceptual plans for closure and remediation. The EIS was approved by the Mexican authorities in 1999 and an update of the EIS was approved in 2010. In 2013, the Mexican authorities approved a modification to the existing environmental permits to allow the expansion of the La Colorada Vein Mine and process plant to up to 2,000 tpd. A subsequent permit modification application to expand the plant production was approved in early 2015.

The environmental initiatives at the site aim to secure and restore the historical tailings facilities. In the qualified person's opinion, there are no known environmental issues that could materially impact Pan American's ability to extract the mineral resources or mineral reserves.

Pan American's social performance strategy for local communities focuses on building trust and respect for human rights, managing its commitments and impacts, and, above all, improving the social and health conditions of the community while ensuring a safe environment. Pan American is dedicated to creating value by providing essential resources to local communities in a sustainable manner.

A closure cost estimate for the La Colorada Vein Mine is prepared according to the US State of Nevada's approved Standard Reclamation Cost Estimator (SRCE) methodology. It is updated every year for unit costs and discount rates, and every other year for physical disturbance estimates, if necessary. Pan American's current present value estimate of site reclamation costs is approximately US $7.0 million, effective December 31, 2022. No reclamation bond is required under Mexican law.

1.7 Skarn Project Preliminary Economic Assessment

The Skarn Project PEA project proposes to develop a mine that uses a sublevel cave (SLC) mining method with a capacity of 50,000 tpd. The mine at the Skarn Project would be accessed by decline ramps and two ventilation shafts. The development phase would last six years after permit approval. A 50,000 tpd capacity processing plant using selective zinc and lead flotation and a filtered tailings storage facility would produce silver-bearing mineral concentrates at an average rate of 2,003 tpd of zinc concentrate grading 59% zinc and 846 tpd of lead concentrate grading 61% lead.

The average annual production for the first 10 years of operation would be 17.2 Moz of silver, 427 kt of zinc, and 218 kt of lead. The Skarn Project LOM is estimated at 17 years; this estimate does not include the 2023 drill results.

The following metallurgical test work programs have been conducted: mineralogical analysis, detailed comminution, flotation, and thickening and filtration of the tailings. The proposed processing plant is expected to produce high-grade zinc concentrate and a lead concentrate with high silver content, which can both be easily sold to market. The average zinc recovery over the LOM is 93.7% with a concentrate grade of 59% zinc and 97 g/t silver, while the average lead recovery is 84.3% with a concentrate grade of 61% lead and 1,438 g/t silver. The overall silver recovery is 84.8%, with most of it (72.5%) in the lead concentrate.

Over the LOM, the average unit operating cost (which covers mine, mill, and general and administrative costs) is estimated at US$40.88 per tonne.

The Skarn Project requires an initial capital cost of US$2,829 million, which will be spent over six years, most of it during mill construction in the fourth and fifth years. The initial investment is expected to be recovered in 4.3

years. The existing La Colorada Vein Mine's operation will continue during the construction and development phase of the Skarn Project. The total LOM sustaining capital is estimated at US$951 million.

The cumulative after-tax cash flow is estimated at US$5,689 million. The after-tax net present value (NPV) is US$1,087 million at an 8% discount rate with an after-tax internal rate of return (IRR) of 14%, an NPV of US$1,572 million at a 6.5% discount rate, and an NPV of US$2,182 million at a 5% discount rate, using average LOM metal prices of US$2,800 per tonne zinc, US$2,200 per tonne of lead and US$22 per ounce of silver.

The proposed SLC mining method has been identified as a technically viable method of developing the Skarn Project. Future expansion and better definition of the mineralization could complement and expand the initial SLC mining inventory. Expanded SLC and block cave mining methods will be further evaluated in future studies.

Permits would be required to develop the Skarn Project, a new processing facility, a filtered tailings storage facility, and other surface infrastructure. Some current permits for the La Colorada Vein Mine are expected to benefit the Skarn Project in development and operations. The Skarn Project will also likely be subject to additional authorizations, consultations, and agreements in the normal course of business, as well as other risks and uncertainties.

The Skarn Project design will leverage the existing infrastructure at the La Colorada Property whenever feasible. The new facilities and the Skarn Project will be designed with a focus on automation, electrification, energy efficiency, and renewable energy sources to reduce the carbon footprint of the Skarn Project.

The PEA is preliminary in nature, it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

1.8 Conclusions and Recommendations

Pan American conducts infill and near mine exploration drilling at the La Colorada Vein Mine to update the mineral resource and mineral reserve estimates on an annual basis following reviews of metal price trends, treatment and refining charge trends for base metal concentrates, operational performance and costs experienced in the previous year, and forecasts of production and costs over the LOM.

The La Colorada Vein Mine geology and mineralization continues to change as the deposit deepens with the structures housed within the limestone and the mineralogy becoming more base metal rich. The deep drilling shows the epithermal veins becoming less continuous and more sporadic. This change is reflected in the current mineral resource and mineral reserve estimates. Previous drilling on Recompensa and NC2 veins has indicated the extension of mineralization to the east. Continuous infill drilling to test vein grades and thickness' is paramount to support efficient production and enable good reconciliation. Surface exploration and drilling has now defined the vein system over a 1.5 km by 3.0 km area and the potential to find additional new veins and extensions to existing veins remains the focus of the geology team on site.

The mining parameters for the La Colorada Vein Mine are well established over many years of mining and are adjusted from time to time as required based on physical measurements in the mine and reconciliation results. The assumptions made for the La Colorada Vein Mine cut-off grade and for the LOM operating cost are based on an expected return to full capacity within a reasonable period of time following the completion of the Guadalupe ventilation shaft and associated ventilation infrastructure. If the anticipated higher production rate is not met, the unit costs can be expected to be higher than those assumed and lead to a reduction in the mineral reserves.

The metallurgical assumption used for the mineral resources and mineral reserves estimates for the La Colorada Vein Mine are based on operational plant performance and are confirmed by bench-scale testing of representative samples of the planned monthly mine feed. This work has confirmed that the optimum processing method is selective lead/zinc sulphide flotation for sulphide ore and cyanidation for oxide ore.

The deep drilling and discovery of the Skarn Project deposit in 2018 highlighted the potential extent of the hydrothermal system and identified an intrusive porphyry (Cu-Mo-Ag-rich), metamorphic endoskarn and exoskarn mineralized zone. The limestone host rock for subsequent sulphide retrograde emplacement of zinc, in the form of sphalerite accompanied by galena, pyrite, chalcopyrite and minor magnetite. Sulphide textures vary from disseminated and patchy to semi massive and massive. The carbonate replacement style high grade mineralization is seen associated to the distal portions of the system. There appears to be multiple pulses of intrusions and differentiation as the system evolved over time.

The skarn mineralization sits between 700 m and 1,900 m below surface, extending some 1,800 m in a NE-SW direction and 650 m in a NW-SE direction. Skarn geometry is dependent on the shape of the causative intrusion, the composition and orientation of the stratigraphy, and the lithological contacts that generate permeability in the host rock. Skarn mineralization is well developed in the retrograde stages in skarn layers ranging from a few centimeters to tens and hundreds of meters thick.

Continued exploration and studies of the La Colorada Vein Mine and the Skarn Project will increase the footprint and knowledge of the respective deposits. Further understanding of the transition between the skarn-CRD and intermediate sulphidation veins could identify vectors in the epithermal environment which could allow for the identification of future exploration targets.

The PEA has shown the Skarn Project to be potentially economic and indicates it could be successfully mined by sublevel caving methods and the materials processed by standard crushing, grinding and flotation techniques to produce high quality saleable concentrates. The mining method involves a top-down sequence and has the benefit to the NPV by delivering the higher margin materials to processing earlier in the mine life. The PEA is preliminary in nature, it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

The 50 ktpd processing rate, with associated ramp- up and ramp down periods results in a 17-year LOM. 285 Mt of mill feed will be delivered in that 17-year period. Payable quantities of 202 Moz of silver, 5.75 Mt of zinc and 2.64 Mt of lead will be recovered into concentrates. The two main products produced are a zinc concentrate and a silver-rich lead concentrate. The only payable metals are zinc, lead and silver. Although low grades of gold and copper are present in the concentrates, they are not payable at this stage.

The depth and geometry characteristics of the Skarn Project deposit require a six-year pre-production construction and development period to establish the access, ventilation, haulage and processing infrastructure prior to commissioning and establishing steady state operations.

The PEA uses the most recent mineral resource estimate which is based on drilling completed up until November 2022. There are no mineral reserves reported from the Skarn Project at this time, as the current level of studies do not support mineral reserve estimations. A future pre-feasibility study (PFS) would be required (as a minimum) prior to the declaration of any mineral reserve estimates.

The results of the PEA support progressing the exploration to further delineate the lateral and depth extents of the Skarn Project mineral resources. The potential joint venture agreement with respect to certain adjacent mineral concessions would offer an opportunity to incorporate additional materials outside of the current boundaries of the La Colorada Property, and to optimize the PEA mining shapes by expanding the current concession boundaries that constrain and truncate the current geometry.

The LOM plans developed are at a suitable level of detail for a PEA study. The designs and schedules have enabled various trade off studies and scenarios to be analyzed to ensure realistic and appropriate timings and rates were used. The design and schedule scenarios tested the practicality of the mining sequences, production rates, development rates, and highlight the risks and opportunities in areas such as materials handling and ventilation.

Some opportunities exist to optimize the shaft and ramp locations, expand some footprints, and gain more tonnes per vertical metre. There is moderate potential to lower development costs that would be dependent on factors such as ventilation and equipment sizing. Some of the risks highlighted are the quantity of mine lateral development and the required offset from the cave zones, particularly for the ventilation networks. Stress induced from mining, and the associated interaction with the off-footprint development are areas for future studies.

The Skarn Project is in an area with a high geothermal gradient, meaning that the in-situ rock temperatures are high and increase at a steady rate with mining depth. Ventilation and water management processes will need to be adequate to mitigate these conditions and establish a safe working environment.

Based on test work conducted between 2019 and 2023, the Skarn Project is expected to have very good metallurgical performance, producing high-grade zinc and lead concentrates with high metal recoveries. Test samples used in the work programs were representative of the mineralogy and grades of the Skarn Project and the samples used were widely dispersed across the mineralized body. The mineral processing of the materials mined is by standard flotation and there are no known issues with being able to produce saleable concentrates. Zinc and lead concentrates will be the two concentrate products exported from the site and they will contain payable zinc, lead, and silver metal. Tails will be stored in a filtered tailings storage facility adjacent to the processing plant and located entirely on La Colorada Property.

The capital and operating costs are adequate for a PEA level of study. Detailed estimates are required at the next stage of project development. There is opportunity to decrease operating costs with increased mineral resources on each level, however the capital costs are unlikely to have any significant decreases.

The current inflationary climate with respect to costs and the strength of the Mexican Peso are risks and opportunities for the Skarn Project. All costs and revenues for the PEA in Section 24 are expressed in 2023 US dollars, unless expressly stated otherwise. A contingency level of 30% was applied to some areas of the estimate. Other areas, where direct quotes were received, had a lesser contingency applied. Given Pan American's recent history of executing capital projects in Mexico in the past 8 years (two mine shafts, one underground mine, one flotation plant, one agglomeration plant, one refrigeration plant) the capital estimate is considered reasonable for PEA purposes.

Environmental monitoring programs at the current La Colorada Vein Mine provide sound baseline data. Additional baseline studies are being conducted and will evolve as the Skarn Project evolves. The Skarn Project will be developed in accordance with all governmental and regulatory requirements.

The results of the Skarn Project PEA (see Section 24) in this technical report are subject to variations in future development and operational conditions including, but not limited to, the following:

- Assumptions related to commodity prices and foreign exchange rates.
- Unanticipated inflation of capital or operating costs.
- Significant changes in recovery or processing parameters.

- Geological and structural modelling and interpretation of the mineralization.
- Geotechnical assumptions, stress, seismicity, inrush and cavability of the mining zones.
- Inventory dilution or loss, and flow model calibration.
- Throughput and recovery rate assumptions.
- Changes in regulatory requirements that may affect the development, operation, tails disposal or future closure plans.
- Changes in closure plan costs.
- Changes in permitting or approvals requirements.
- Changes in downstream treatment and smelter charges and costs.
- Criminal and organized crime activity in some regions of Mexico.

The PEA economic analysis for the Skarn Project has estimated a positive cash flow, and a positive NPV(8%) after taking into account the operating, capital, and taxation costs. The metals prices used were US$2800/t for zinc, US$2200/t for lead and US$22.00/oz for silver.

In the opinion of the qualified persons, and considering the preliminary nature of the Skarn Project PEA, there are no known or reasonably foreseen issues, risks or impediments that would prevent the Skarn Project from advancing to a PFS study once the mineral resources are further delineated and a new mineral resource model is prepared.

Based on the information presented in this technical report, the qualified persons recommend the following action items.

Exploration

Ongoing exploration drilling is of paramount importance to the replacement of mineral resources and mineral reserves and generating new mineral resources. In 2024, Pan American plans to invest between US$10 and US$11 million on drilling between 40,000 m and 50,000 m of drilling on the La Colorada Vein Mine and the Skarn Project. The drilling of the epithermal veins should focus on the extensions east of the current underground La Colorada Vein Mine as well as splay and down dip extensions of known veins within the Estrella and Candelaria mines. The infill and exploration drilling of the Skarn Project should concentrate on the mineralization zones 902, 903, and west-northwest portion of 902 respectively.

The study of mineralization within the limestone lithology units at the Skarn Project above the current mineral resource estimate is required. The geological modeling of the interlayered skarn within the limestone means that logged skarn units are included in the limestone unit. The geological misclassifications are a concern in unmineralized or poorly mineralized lithologies because the geologically misclassified material tends to be associated with significantly higher grades than those typically found in the logging unit assigned to that material (correctly classified). The presence of epithermal veins, which are associated with high grades and cut through all lithologies, also pose modelling challenges. Due to their small size and the unlikelihood of confidently linking intercepts between drill holes. Including these geological misclassifications and vein intercepts without control could potentially result in overestimation of the grade for the unmineralized units. Therefore, additional sampling and modeling of the limestone and the effect of any mineralized material present is required to better understand and develop a modeling strategy which more accurately represents the grade distribution.

The La Colorada Vein Mine

For the La Colorada Vein Mine, it is recommended that once the Guadalupe ventilation shaft is commissioned, and proper ventilation and refrigeration conditions in the deep east zone of the Candelaria mine are restored, production is gradually increased at the La Colorada Vein Mine to design rates.

Once production has been stabilized at sustainable rates and the deeper levels of the Candelaria mine are accessed, the La Colorada Vein Mine cost model and cut-off grade calculations should be updated. This should consider new operational conditions and requirements such as haulage cycles, ground support, ventilation and dewatering; and revenue and cost drivers such metal prices, consumable prices, and salary rates.

Finally, the mineral resources and mineral reserves should be updated considering the new cut-off grades. This will likely impact the reported inventories. However, it will also allow to support a new mine plan that optimizes the La Colorada Vein Mine production strategy for the new operating conditions.

The Skarn Project

Sublevel caving was selected as the mining method at a rate of 50,000 tpd. It is recommended to consider sublevel caving and block caving in the next scenarios when an updated mineral resource model is next completed.

A potential joint venture on the properties not controlled by Pan American offers opportunities to expand the current footprint of the La Colorada Property. Finalization and further development of such a joint venture is recommended to practically unlock more mineable areas.

Drilling programs should focus on delineation of the extents of the mineralized zones to achieve a broader area of inferred or indicated mineral resources classification within an updated mineral resource estimate. Detailed drilling and conversion to a measured mineral resource classification is not recommended or necessary at this stage, primarily due to the nature of the bulk mining methods employed. The focus should be on defining the broader extents of the mineralized zones of the Skarn Project, and this will assist in locating LOM infrastructure and surface facilities.

Mineral resource, structural, hydrology, geotechnical, and cost models should be updated before commencing the next round of mine method selection and optimisation studies.

It is recommended to prepare various trade-off studies in parallel with the preparation of the mineral resource models, including but not limited to mining methods, materials handling, automation, ventilation and key surface infrastructure locations.

Additional metallurgical test work and a trade-off study include pressure filtration testing of additional tailings samples to determine variability, and a future trade-off to study the option of a SAG mill for mineral processing for the Skarn Project are recommended. Concentrate transport options should be studied to include options for rail transport, and options for site road accesses from the main highways.

It is recommended to advance environmental and social baseline and permitting for additional development infrastructure to support feasibility studies and access to the Skarn Project. It is also recommended to continue to implement longer term permitting strategy for the Skarn Project, process plant, filtered tailings storage facility, and associated infrastructure.

It is recommended that Pan American undertakes a PFS once all relevant data is available. The timing of a PFS will depend on the availability of the updated mineral resource model, and the above-mentioned associated trade-off studies. Study costs, including G&A, of US$60M are included in the capital estimates to advance the project to a PFS level of detail and into any potential construction phase.

2 Introduction

The La Colorada mine (the La Colorada Vein Mine) is a collection of three underground silver-lead-zinc mines located in Zacatecas, Mexico, approximately 100 km south of the city of Durango and 155 km northwest of the city of Zacatecas. Pan American Silver Corp. (Pan American) holds a 100% interest in the 56 mining concessions (totaling approximately 8,840 hectares) that comprise the La Colorada property (the La Colorada Property) through its subsidiary, Plata Panamericana S.A. de C.V. (Plata). La Colorada Property currently operates the La Colorada Vein Mine which is comprised of two underground operating mines (Candelaria, Estrella) and one non-operational mine (Recompensa). The La Colorada Property also hosts the large polymetallic skarn exploration project (the Skarn Project) discovered in 2018 through brownfield exploration near the La Colorada Vein Mine.

Pan American is a Canadian-based leading producer of precious metals in the Americas that operates silver and gold mines in Canada, Mexico, Peru, Bolivia, Argentina, Chile, and Brazil. Pan American also owns the Escobal Mine in Guatemala, which is not currently in operation. Pan American has been operating in the Americas for nearly three decades, earning an industry-leading reputation for sustainability performance, operational excellence, and prudent financial management.

Pan American's assets also include the following operations:

- 100% ownership of the Jacobina underground gold mine in the state of Bahia of northeastern Brazil.
- 100% ownership of the El Peñón underground gold-silver mine near Antofagasta in northern Chile.
- 100% ownership of the Timmins operation in northeastern Ontario, consisting of two underground gold mines—the Timmins West Mine and the Bell Creek Mine—which both feed the Bell Creek mill.
- 100% ownership of the Shahuindo open-pit gold mine in Cajamarca, Peru.
- 100% ownership of the La Arena open-pit gold mine in La Libertad, Peru.
- 100% ownership of the Huaron underground silver-zinc-copper-lead mine in Pasco, Peru.
- 100% ownership of the Cerro Moro underground and open-pit gold-silver mine located in Santa Cruz Province, Argentina.
- 100% ownership of the Minera Florida underground gold-silver mine located south of Santiago, Chile.
- 95% ownership of the San Vicente underground silver-zinc-copper-lead mine in Potosí, Bolivia.
- 100% ownership of the Escobal silver-gold-lead-zinc underground mine, in Santa Rosa, Guatemala. The operation is currently on care and maintenance pending completion of an ILO 169 consultation.

This technical report was prepared in accordance with NI 43-101; it documents the mineral resource and mineral reserve estimates for the La Colorada Vein Mine as of June 30, 2023. This technical report also describes the results of the preliminary economic assessment (PEA) of the Skarn Project, disclosed on December 18, 2023, and includes an updated mineral resource estimate for the Skarn Project. The PEA considers a 50,000 tpd sublevel cave mining method and a conventional 50,000 tpd capacity selective zinc and lead flotation processing plant and filtered tailings storage facility. Annual production is estimated to average 17.2 Moz of silver, 427 kt of zinc and 218 kt of lead during the first 10 years of an estimated 17-year mine life.

This technical report was prepared by Pan American following the guidelines of NI 43-101 and Form 43-101F1. The mineral resource and mineral reserve estimates reported herein were prepared in conformity with generally accepted standards set out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines

(November 2019) and were classified according to CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014).

2.1 Sources of Information

The qualified persons, as such term is defined in NI 43-101, for this technical report are Martin Wafforn, P.Eng.; Christopher Emerson, FAusIMM; Peter Mollison, P.Eng, Americo Delgado, P.Eng.; and Matthew Andrews, FAusIMM, all full-time employees of Pan American. Table 2-1 lists the qualified persons, their responsibilities, and personal inspections on the La Colorada Property.

Table 2-1: Qualified persons and personal inspections

Qualified Persons
Martin Wafforn, P.Eng., Senior Vice President, Technical Services and Process Optimization
Responsible for Sections: 4: Property Description and Location; 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography; 15: Mineral Reserve Estimates; 16: Mining Methods; 18: Project Infrastructure (excluding 18.2); 19: Market Studies and Contracts; 21: Capital and Operating Costs; 22: Economic Analysis
Personal Inspection: Visited the La Colorada Property on numerous occasions including most recently between September 11 and 12, 2023.
Christopher Emerson, FAusIMM, Vice President, Exploration and Geology
Responsible for Sections: 6: History; 7: Geological Setting and Mineralization; 8: Deposit Types, 9: Exploration; 10: Drilling; 11: Sample Preparation, Analyzes and Security; 14: Mineral Resource Estimates; 23: Adjacent Properties.
Personal Inspection: Visited the La Colorada Property on numerous occasions including most recently between February 8 and 11, 2023.
Peter Mollison, P.Eng., Senior Director, Mine Engineering
Responsible for Sections: 24: Other relevant data and information (Skarn Project PEA excluding 24.1.1.5, 24.1.3, 24.1.4, and 24.1.5).
Personal Inspection: Visited the La Colorada Property on multiple occasions since 2017, and most recently between February 7 and 10, 2023
Americo Delgado, P.Eng., Vice President, Mineral Processing, Tailings, and Dams
Responsible for Sections: 13: Mineral Processing and Metallurgical Testing; 17: Recovery Methods; 18.2: Mine, Processing and Tailings Facilities; 24.1.1.5 Skarn Project PEA Surface Facilities; 24.1.3 Skarn Project PEA Project Surface Infrastructure; 24.1.4 Skarn Project PEA Recovery Method.
Personal Inspection: Visited the La Colorada Property on multiple occasions since 2012 and most recently between March 11 and 13, 2020.
Matthew Andrews, FAusIMM, Vice President, Environment
Responsible for Sections: 20: Environmental Studies, Permitting and Social or Community Impact; 24.1.5 Skarn Project PEA Environmental Studies, Permitting and Social or Community Impact
Personal Inspection: Visited the La Colorada Property on multiple occasions since 2011 and most recently between September 23 and 24, 2022.
Shared Responsibility by all Qualified Persons for Related Disclosure in Sections: 1: Summary; 2: Introduction; 3: Reliance on Other Experts; 12: Data Verification; 25: Interpretation and Conclusions; 26: Recommendations; 27: References.

In preparation of this technical report, the qualified persons reviewed technical documents and reports on the La Colorada Property supplied by on-site personnel and consultants. The documentation reviewed, and other sources of information, are listed at the end of this technical report in Section 27- References.

The most recent technical report on the La Colorada Property was compiled by Pan American with an effective date of December 31, 2019 (Wafforn et al., 2019). This 2019 Pan American report served as the foundation for this current technical report which updates the information as of an effective date of December 18, 2023.

3 Reliance on Other Experts

The qualified persons have relied on information derived from Pan American's internal records for information regarding legal matters related to land title and tenure information, and taxes (including royalties and other government levies or interests) applicable to revenue or income from the La Colorada Property, as described in Sections 4, 16, 19, 21, 22, and 24.

The qualified persons have not performed an independent verification of the land title and tenure information, as summarized in Section 4 of this technical report, nor have they verified the legality of any underlying agreement(s) that may exist concerning the permits or other agreement(s) between third parties, as summarized in Section 4 of this technical report. For these matters, the qualified persons of this technical report have relied on information provided by Pan American.

Except for the purposes legislated under applicable securities laws, any use of this technical report by any third party is at that party's sole risk.

4 Property Description and Location

4.1 Location

The La Colorada Property is located in the Chalchihuites district of Zacatecas State, Mexico (Figure 4-1). It is approximately 100 km southeast of the city of Durango and 155 km northwest of the city of Zacatecas. The centre of the La Colorada Property is located at approximately 23° 22′ N lat. and 103° 45′ W long.

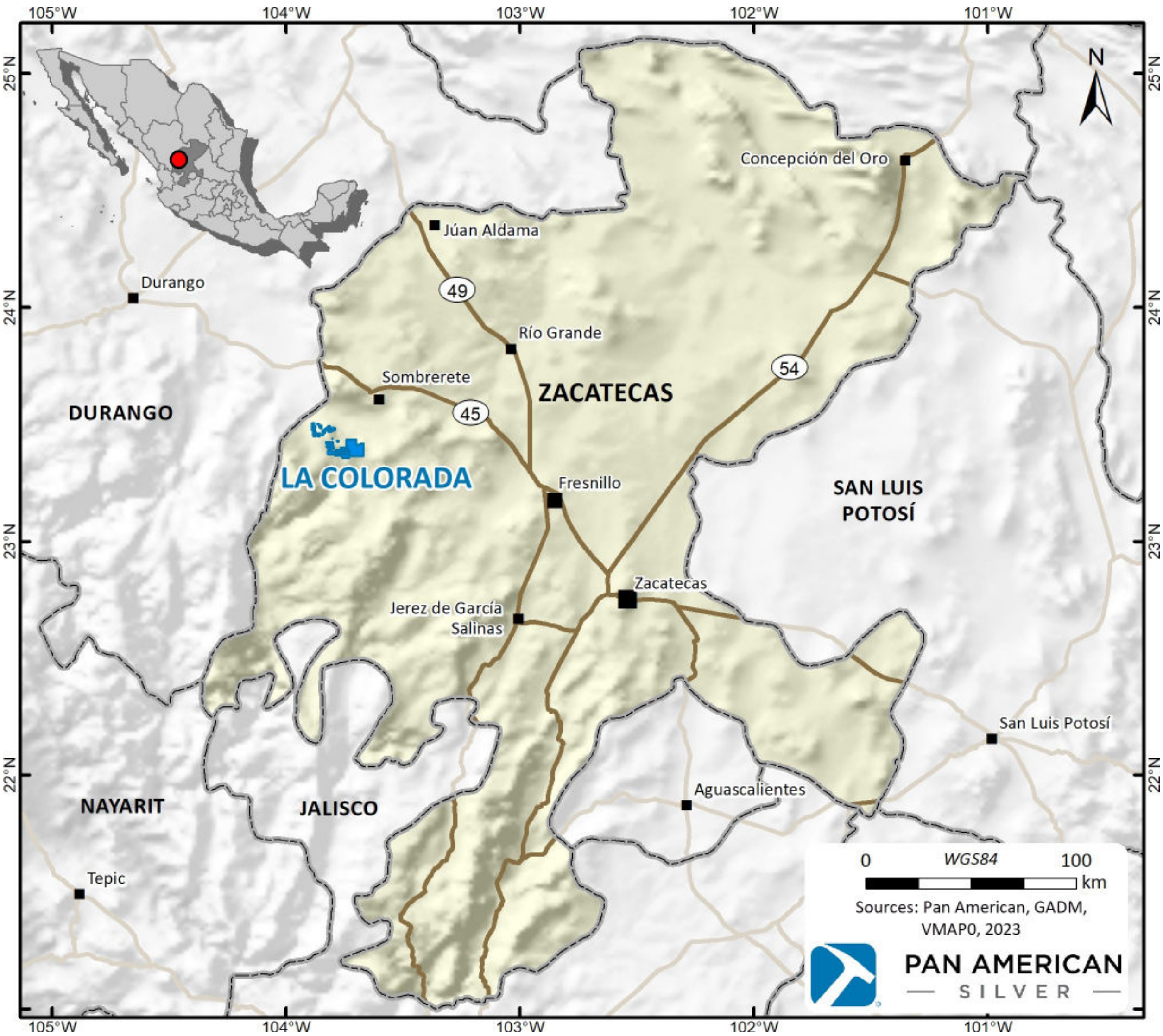


Figure 4-1: The La Colorada Property location

The La Colorada Vein Mine produces oxide and sulphide ores from three separate underground mines: Candelaria, Estrella, and Recompensa (no mining is currently taking place at the Recompensa mine). The La Colorada Property also hosts the Skarn Project, a large polymetallic skarn deposit discovered in 2018 through brownfield exploration near the La Colorada Vein Mine.

4.2 Issuer's Interest, Mineral Tenure, and Surface Rights

Pan American owns 100% of the La Colorada Property through its wholly owned subsidiary, Plata Panamericana S. A. de C.V. (Plata). The La Colorada Property, including certain exploration concessions outside the mining area, is comprised of 56 mining concessions totalling approximately 8,840 hectares (Figure 4-2 and Table 4-1). Pan American entered into a Memorandum of Understanding with respect to certain adjacent mineral concessions which would allow Pan American to access certain high-grade silver veins in the future, and has negotiated preliminary terms for a joint venture arrangement on certain adjacent mineral concessions, which would allow it to utilize these concessions for the Skarn Project.

On May 8, 2023, the Mexican government enacted a decree to reform various provisions of the mining law (the 2023 Decree), which was published in the Official Gazette and became law on May 9, 2023. Prior to the 2023 Decree, all concessions in Mexico had a lifespan of 50 years from the date of issue, with a potential to renew for an additional 50 years. Among other things, the 2023 Decree could reduce the renewal terms of current concessions, and the terms and renewal terms of future concessions, however, the impact of the 2023 Decree and its applicability to the La Colorada Property is uncertain. For further information regarding the 2023 Degree, please see Section 4.6.

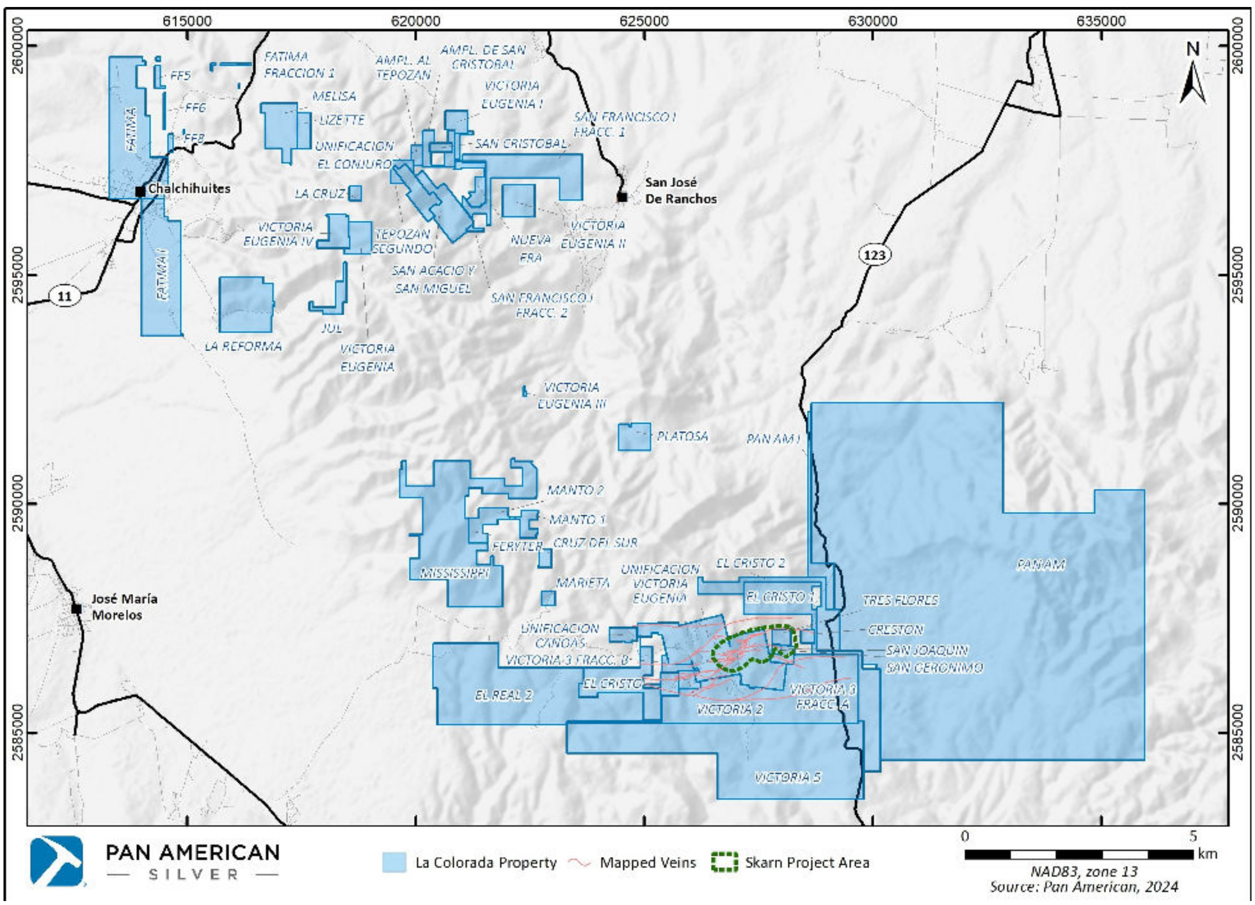


Figure 4-2: Mining concessions

Pan American pays an annual fee to maintain the concessions in good standing, and, to Pan American and the qualified person's knowledge, Pan American has met all necessary obligations to retain the La Colorada Property. Pan American has control over, or rights in respect of, approximately 1,300 ha of surface rights that cover the main workings of the La Colorada Vein Mine. Pan American has acquired or is in the process of acquiring further surface rights related to the Skarn Project consisting of 2,000 ha of private land and leasing an additional 2,800 ha of ejido land. Plata is currently the owner of 18 of the 21 properties and continues negotiations for the remaining properties.

The mineral reserves, mineral resources, mine workings, processing plant, effluent management and treatment systems, and tailings disposal areas are all located within the mining concessions controlled by Pan American.

Table 4-1 shows the term of the concessions granted to Pan American. The 2023 Decree, if applicable, may impact the renewal terms of these concessions and the term of any future mining concessions.

Table 4-1: Mining concessions

Pan American Mining Concessions							
Concession Name	**Title**	**Area (Ha)**	**Expiry Date**	**Concession Name**	**Title**	**Area (Ha)**	**Expiry Date**
Ampl. De San Cristobal	T-170097	29.1	15/03/2032	Marieta	T-171833	9	14/06/2033
Ampliacion Al Tepozan	T-182730	10.8	15/08/2038	Melisa	T-217670	69.6	05/08/2052
Creston	T-213594	9	17/05/2051	Mississippi	T-195070	432.1	24/08/2042
Cruz Del Sur	T-170155	11.1	16/03/2032	Nueva Era	T-214659	29.7	25/10/2051
El Cristo	T-228944	119.7	20/02/2057	Pan Am	T-233733	4,332.6	24/10/2061
El Cristo 1	T-229247	224	26/03/2057	Pan Am I	T-244604	53.1	03/11/2065
El Cristo 2	T-230727	98.5	04/10/2057	Platosa	T-216290	41	29/04/2052
El Real	T-214498	20	01/10/2051	San Acacio Y San Miguel	T-179719	73.1	11/12/2036
El Real 2	T-228945	561.3	20/02/2057	San Cristobal	T-170095	10	15/03/2032
Eureka	T-244603	0.6	03/11/2065	San Francisco	T-221728	7.8	29/01/2048
Fatima	T-233977	288.4	12/05/2059	San Francisco I Fracc. 1	T-223953	165.5	14/03/2055
Fatima Fraccion	T-234041	0.1	21/05/2059	San Francisco I Fracc. 2	T-223952	3.3	14/03/2055
Fatima Fraccion 1	T-234042	3.5	21/05/2059	San Geronimo	T-172102	4	25/09/2033
Fatima Fraccion 2	T-234043	0.8	21/05/2059	San Joaquin	T-172103	16	25/09/2033
Fatima Fraccion 4	T-234044	0.9	21/05/2059	Tepozan Segundo	T-163260	13.5	03/09/2028
Fatima Fraccion 5	T-234045	7.1	21/05/2059	Tres Flores	T-229893	13.6	25/06/2057
Fatima Fraccion 6	T-234046	2.8	21/05/2059	Unificacion Canoas	T-211969	18.5	15/03/2032
Fatima Fraccion 7	T-234047	0.3	21/05/2059	Unificacion El Conjuro	T-170592	44.9	01/06/2032
Fatima Fraccion 8	T-234048	4	21/05/2059	Unificacion Victoria Eugenia	T-188078	285.6	21/11/2040
Fatima I	T-233147	241.2	11/12/2058	Victoria 2	T-217628	16.7	05/08/2052
Feryter	T-192967	38.3	18/12/2041	Victoria 3 Fracc. A	T-217629	459.3	05/08/2052
Jul	T-232538	24.7	25/08/2058	Victoria 3 Fracc. B	T-217630	14.2	05/08/2052
La Cruz	T-211085	8.5	30/03/2050	Victoria 5	T-226310	693.4	05/12/2055
La Libertad	T-244944	3	30/05/2066	Victoria Eugenia	T-211587	36.1	15/06/2050
La Reforma	T-218667	135.6	02/12/2052	Victoria Eugenia I	T-204862	23.3	12/05/2047
Lizette	T-221172	23.4	02/12/2053	Victoria Eugenia Ii	T-211166	49	10/04/2050
Manto 1	T-238175	19.5	08/08/2061	Victoria Eugenia Iii	T-204756	1.1	24/04/2047
Manto 2	T-238757	0.9	24/10/2061	Victoria Eugenia Iv	T-217627	36.9	05/08/2052

4.3 Royalties, Back-In Rights, Payments, Agreements, and Encumbrances

In 2016, Maverix Metals Inc. (Maverix) acquired from Pan American a gold stream equivalent of 100% of the payable gold production from the La Colorada Property, less a fixed price of USD$650 per ounce for the LOM. Triple Flag Precious Metals Corp. (Triple Flag) acquired Maverix on January 19, 2023.

Plata is subject to governmental taxes, fees, and duties, including a special mining duty (SMD) of 7.5% applied to taxable earnings before interest, inflation, taxes, depreciation, and amortization; and a deductible extraordinary mining duty (EMD) of 0.5% that is applied to the sale of gold and silver. To the best of Pan American and the qualified person's knowledge, the La Colorada Property is not subject to any other royalties, overrides, back-in rights, payments, other agreements and encumbrances, or governmental taxes, fees, and duties.

4.4 Environmental Liabilities

There are no known significant environmental liabilities on or related to the La Colorada Property. There are no known environmental issues that could materially impact Pan American's activities on the La Colorada Property.

In December 2016, the Zacatecas state government enacted a new set of ecological taxes which took effect on January 1, 2017 (the Zacatecas Tax). The Zacatecas Tax targets carbon dioxide (CO2) emissions associated with the use of electricity and materials placed in tailings storage facilities. However, since the implementation of that tax in 2017, La Colorada Property has been exempted from taxes on tailings deposition as a result of a constitutional appeal (amparo). Pan American expect that this exemption will be extended to the Skarn Project (see Section 24). Therefore, Pan American is currently paying for its CO2 emissions released by fixed sources, and it is anticipated that only CO2 emissions will be taxable under the Zacatecas Tax.

4.5 Permits

The mine workings, processing plant, tailings storage facilities, waste disposal areas, effluent management and treatment facilities, roads, and power and water lines have already been constructed and are located within the boundaries of the mining leases and surface rights controlled by Pan American. To the best of Pan American and the qualified person's knowledge, all permits and licences required to conduct activities at the La Colorada Vein Mine have been obtained and are currently in good standing.

Future permits for any new mine components, including those for the Skarn Project discussed in Section 24, will depend on the location and engineering of the designed infrastructure. When project information becomes available, Pan American will determine the legal instruments relevant to permit application: either the Dictamen Tecnico Unificado (DTU), which unifies the Manifestacion de Impacto Ambiental (MIA) and Cambio de Uso de Suelo (CUS) or, alternatively, solely the CUS. The choice between these options will depend on the type of land designated for the project. The overall approval process consists of the preparation of documents and pertinent studies, the submission of required information to authorities, and the final authorization if no further materials or information is requested from the applicable governmental authority. A detailed permitting strategy and plan is being developed as details of the project components are confirmed.

4.6 Significant Factors and Risks

Certain individuals have asserted community rights and land ownership over a portion of the La Colorada Property's surface lands in the Agrarian Courts of Mexico. They have also initiated a process before the Secretariat of Agrarian, Territorial, and Urban Development of Mexico's Federal Government (the SEDATU) in Zacatecas State, which has been transferred to SEDATU's main offices in Mexico City, to declare such lands as national property. In February 2023, the Agrarian Court in Zacatecas resolved that the claimants did not prove their community rights and therefore they do not have any land ownership rights. In August 2023, the Superior Agrarian Court dismissed the appeal filed by the claimants. A further appeal has been filed with the Federal Court of Mexico by the claimants. The proceeding initiated before the SEDATU is still pending. If Pan American is unable to acquire or maintain access to these surface rights, there could be material adverse impacts on the La Colorada Property's future mining operations. The land that is the subject of the SEDATU proceeding is approximately 1,200 hectares of the La Colorada Property. The SEDATU proceeding does not cover the land comprising the Skarn Project.

The 2023 Decree makes significant changes to the current mining laws, including but not limited to the following:

- Reducing the duration of mining license concession terms from 50 years (subject to a one-time renewal for a second term of 50 years) to 30 years (subject to a one-time renewal for a second term of 25 years).
- Restricting the granting of mining concessions requiring public auctions.
- Imposing conditions on water use and availability.
- Imposing regulations on mining concession transfers.
- Imposing additional grounds for cancellation of mining concessions and further limitations on mining in protected areas.
- Granting preferential rights to mining strategic minerals to state-owned enterprises.
- Imposing additional requirements for financial instruments to be provided to guarantee preventive, mitigation, and compensation measures resulting from social impact assessments, as well as potential damages that may occur during mining activities.
- Potentially requiring consultation with Indigenous Peoples' (ILO 169).

These changes to the mining law have been appealed by numerous mining companies, including 13 amparos filed by Pan American which cover all of Plata's concessions (including the La Colorada Property), as well as a formal constitutional challenge by members of congress. The applicability of the 2023 Decree is subject to the final resolution of the Supreme Court of Mexico. Should these various appeals be ultimately unsuccessful, the 2023 Decree is expected to have impacts on Pan American's current and future exploration activities and operations in Mexico, the extent of which is yet to be determined but which could be material.

Pan American is exposed to many risks in conducting its business, both known and unknown, and there are numerous uncertainties inherent in estimating mineral reserves and mineral resources and in maintaining viable operations. Although the qualified persons and Pan American have no current expectation that the mineral reserve and mineral resource estimates in this technical report will be materially negatively impacted by external factors such as environmental, permitting, title, access, legal, taxation, availability of resources, and other similar factors, changes in relation to such factors are not uncommon in the mining industry and there can be no assurance that these factors will not have a material impact. For example, the third-party claims initiated before the SEDATU with respect to a portion of Pan American's surface rights described herein could, if determined adversely, have a material impact on the La Colorada Property's operations.

The political, economic, regulatory, judicial, and social risks related to conducting business in foreign jurisdictions, and changes in metal and commodity prices, pose particular risk and uncertainty to Pan American and could result in material impacts to Pan American’s business and performance. In addition to external factors and risks, the accuracy of any mineral reserve and mineral resource estimate is, among other things, the function of the quality and quantity of available data and of engineering and geological interpretation and judgment. Results from drilling, testing, and production, as well as a material change in metal prices, changes in the planned mining method, or various operating factors that occur subsequent to the date of the estimate may justify revision of such estimates and may differ, perhaps materially, from those currently anticipated, and readers are cautioned against attributing undue certainty to estimates of mineral reserves and mineral resources.

5 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

5.1 Physiography, Vegetation, and Climate

The La Colorada Property is located in the North American Cordillera, within the mountains of the Sierra Madre Occidental. The Sierra Madre Occidental is the largest continuous mountain range in Mexico and extends for approximately 1,500 km along the western margin of Mexico, parallel to the Pacific coast. It forms the western boundary of the Central Mexican Plateau, a large, elevated plateau extending from the US border in the north to the Trans-Mexican Volcanic Belt in the south. The elevated area within the southern portion of the CMP is referred to as the Mesa Central, which includes the states of Mexico, Guanajuato, Queretaro, Hildago, San Luis Potosi, and portions of Zacatecas and Jalisco. In the state of Zacatecas, which hosts the Zacatecas mining district, the Sierra Madre Occidental mountains partially overlap into the Mesa Central.

The physiography of the area is characterized by wide flat valleys and narrow, relatively low mountain ranges and hills at elevations ranging between 2,100 and 2,550 metres above sea level. The climate is arid to semi-arid, with vegetation typically including mesquites, pines, and cacti. The rainy season is from July to September, and winter temperatures are around freezing at night. The La Colorada Vein Mine operates year-round.

5.2 Accessibility, Local Resources, Population Centres, and Transport

The La Colorada Property is accessible from the city of Durango by a 120 km paved highway and a 23 km public, all-weather gravel road. The La Colorada Property is also accessible from the city of Zacatecas by similar types of roads. Both cities are major industrial and supply centres for the region and are a source of experienced workers. Flights to both cities are scheduled daily from Mexico City and other major commercial and industrial centres in Mexico. Chalchihuites, with a population of approximately 10,500 and located 16 km northwest of the La Colorada Property, is the closest municipality.

5.3 Surface Rights

The mine workings, processing plant, tailings storage facilities, waste disposal areas, effluent management and treatment facilities, roads, and power lines are located within the boundaries of the mining concessions and of approximately 1,300 ha of surface rights controlled by Pan American.

5.4 Power and Water

Pan American has agreements in place with the national power utility, Comisión Federal de Electricidad (CFE), for the supply of power sufficient for the current operating plans. The La Colorada Vein Mine also maintains diesel generators onsite to provide backup power when necessary. Water for the mining operation is supplied from the underground mine dewatering systems, tailings facilities, and wells located on the La Colorada Property; the water supply is adequate for the existing and planned future requirements of the La Colorada Property.

5.5 Infrastructure

The surface infrastructure includes the plant processing facilities, tailings and waste rock storage facilities, offices and workshops, accommodation camps, change houses, warehouses, fuel and lubricant facilities, water and diesel tanks, surface electrical distribution, air compressors, explosive magazine, water treatment plants, sludge settling ponds and piping, surface ventilation fans, mine portals, run-of-mine ore stockpiles, domestic waste landfill, roads, surface grading and drainage, security gates and fencing, and satellite communication.

Source: Pan American, 2023

PAN AMERICAN SILVER

Figure 5-1: Typical landscape and infrastructure

A: Surface infrastructure; aerial view looking north.
B: Typical vegetation: pine tree near mine site.
C: Tailings storage facility; aerial view looking south.
D: Ross Beatty shaft headframe; aerial view looking northwest.

6 History

In 1925, the Dorado family operated mines at two locations on the La Colorada Property. From 1929 to 1955, Candelaria y Canoas S.A., a subsidiary of Fresnillo S.A., installed a 100 tpd flotation plant and processed the old dumps of the two former mines. La Compañas de Industrias Peñoles also conducted mining operations on the La Colorada Property from 1933 to the end of World War II. From 1949 to 1993, Compañia de Minas Victoria Eugenia S.A. de C.V. (Eugenia) operated a number of mines on the La Colorada Property. In 1994, Minas La Colorada S.A. de C.V. (MLC) acquired the exploration and exploitation claims and surface rights of Eugenia and conducted mining operations until 1997 on three of the old mines at a rate of approximately 150 tpd. Exploration during this period was mainly in the form of development along known veins. Prior to Pan American's ownership of the La Colorada Property, 131 diamond drill holes had been drilled.

In 1997, Pan American entered into an option agreement with MLC. Pan American then conducted exploration and diamond drilling as part of its due diligence process. In April 1998, Pan American acquired the La Colorada Property from MLC and has since focused its production on the Candelaria, Estrella, and Recompensa mines.

In 2016, Maverix acquired from Pan American a gold stream equivalent of 100% of the payable gold production from the La Colorada Property, less a fixed price of USD$650 per ounce for the LOM. Triple Flag acquired Maverix on January 19, 2023.

6.1 Historical Mineral Resource and Mineral Reserve Estimates

Although a number of historical mineral resource estimates and mineral reserve estimates have been prepared for the La Colorada Property throughout its life, none of these estimates are currently regarded as significant.

6.2 Past Production

The production prior to Pan American's ownership is not readily available. Pan American started small-scale production in January 2001 from surface stockpiles and underground development headings. Full-scale production started in mid-2003. Production of silver, gold, zinc, and lead are tabulated in Table 6-1.

Table 6-1: Production history from 2001 to 2023

Year	Processed Tonnes	Ag Feed Grade (g/t)	Ag Recovery (%)	Ag Production (oz)	Au Production (oz)	Zn Production (t)	Pb Production (t)
2001	47,317	598	86.10	782,853	—	311	384
2002	50,662	442	87.00	626,035	—	333	316
2003	99,115	427	86.66	767,661	—	433	383
2004	171,155	449	86.29	2,036,075	2,428	122	136
2005	211,854	530	83.95	3,081,213	3,191	—	—
2006	233,743	462	87.32	3,493,995	3,501	—	153
2007	331,067	452	90.84	3,964,074	3,877	943	686
2008	377,844	397	92.20	3,910,830	3,773	1,835	1,012
2009	324,916	414	91.16	3,467,856	6,554	2,311	1,205
2010	345,697	378	87.99	3,701,568	4,312	2,940	1,366
2011	404,533	369	89.51	4,295,783	4,104	4,466	2,388
2012	419,591	374	89.62	4,431,111	3,578	5,599	2,766
2013	448,659	352	89.88	4,566,377	2,579	6,759	3,324
2014	471,347	366	89.82	4,979,290	2,569	7,700	3,740
2015	485,426	379	90.06	5,326,772	2,626	8,912	4,259
2016	528,817	377	90.35	5,795,038	2,933	11,400	5,997
2017	655,326	368	91.07	7,056,109	4,288	15,440	8,796
2018	725,967	358	91.16	7,617,256	4,398	17,785	8,845
2019	768,744	361	91.85	8,205,805	4,613	20,974	11,149
2020	559,144	308	90.84	5,024,807	3,474	13,582	6,631
2021	572,464	312	90.07	5,171,394	2,714	9,984	5,190
2022	641,054	316	91.00	5,927,183	3,327	10,017	5,647
2023	537,086	277	91.97	4,391,993	2,261	7,373	4,220
Total	**9,411,527**	**367**	**90.26**	**98,621,079**	**71,100**	**149,218**	**78,594**

7 Geological Setting and Mineralization

7.1 Regional Geology and Geological History

The La Colorada Property is located within the Sierra Madre Occidental (SMO) mountains, on the western margin of the Mesa Central within the Guerrero Composite Terrane (GCT) (Figure 7-1).

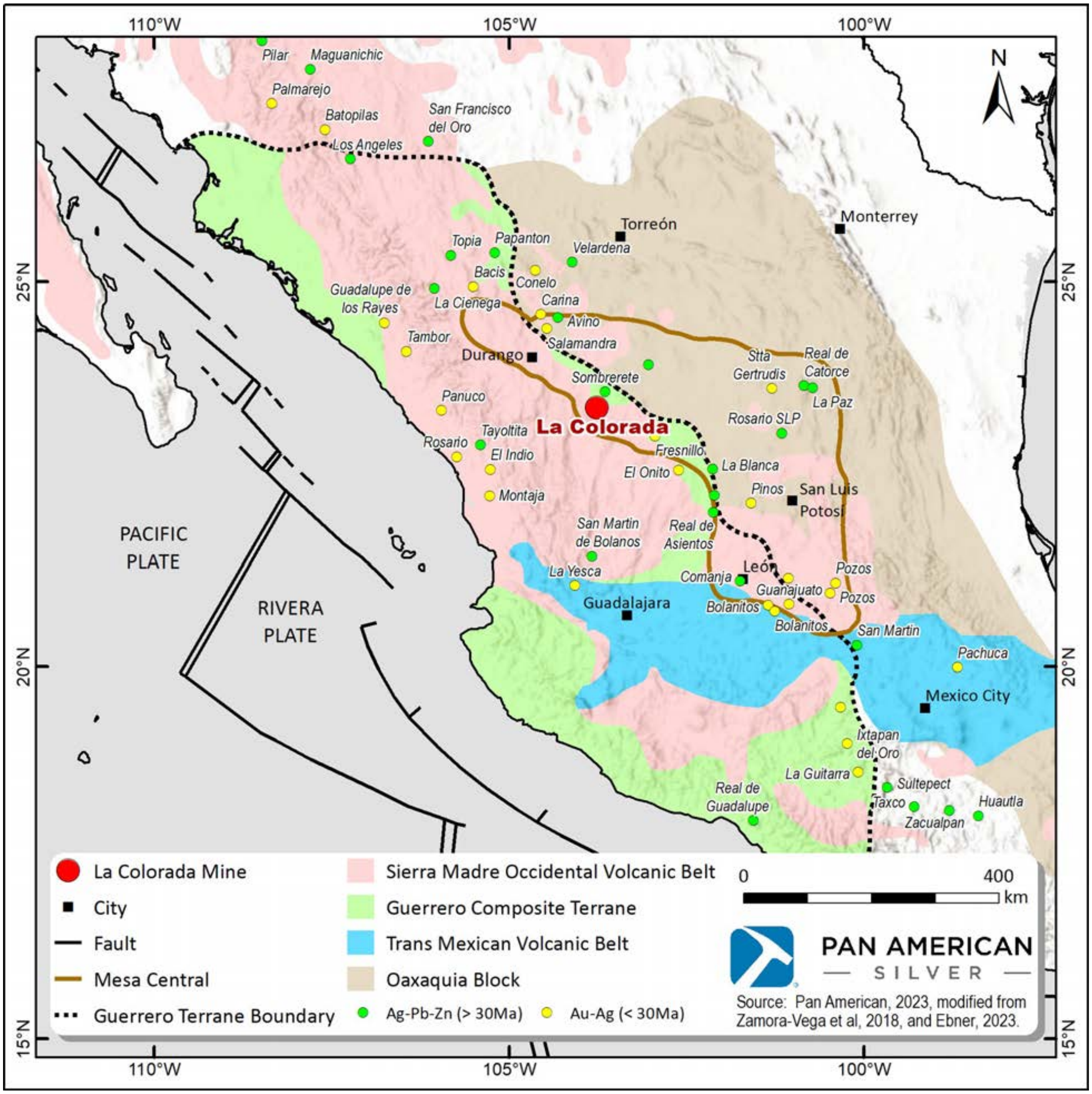


Figure 7-1: Regional geological setting

Mexico is split into several tectonostratigraphic terranes: crustal regions, bounded by major faults, that share the same geological history. The La Colorada Property is located within the GTC close to the thrust fault that forms the eastern boundary between the GCT and the Oaxaquia Terrane (Ebner, 2023). The Oaxaquia Terrane is a Gondwana crustal fragment which is composed of a Precambrian gneiss basement, covered by Paleozoic sediments and capped by Permian volcanic and volcaniclastic rocks. The GCT is a geologically varied and complex region to the west of the Oaxaquia Terrane. It formed as a result of crustal uplift and sedimentation as the Farallon Plate was thrust onto the Gondwana crustal fragment during Laramide-age subduction and is characterized mostly by submarine and locally subaerial volcanic and sedimentary successions that range in age from Jurassic to middle-Late Cretaceous.

The oldest rocks on the GCT were formed at the start of subduction and consist of Jurassic-age, deep water, near-slope turbididites, sub-aerial volcanic rocks (which formed at the subduction zone), and back-arc continental sandstone and conglomerate red beds with volcanic clasts. These are overlain by extensive early- to late-Cretaceous back-arc basin deep-sea limestone and mudstone sequences, which transition to reef and shallow marine limestone sequences.

Continued subduction-related E-W compression during the Cretaceous to Eocene resulted in uplift and deformation of the Cretaceous limestone sequences. Widespread erosion and a large-scale hiatus in sedimentation occurred at the end of the Cretaceous with only localized colluvial conglomerate deposits preserved in the rock record. Some plutonic rocks were emplaced during this period.

A relaxation of the regional compressional environment during the Eocene (between ~66 and 37Ma) resulted in voluminous calc-alkaline intermediate to felsic volcanics deposits known as the Lower Volcanic Complex (LVC) (Ebner, 2023). Volcanic composition changes throughout the LVC with andesitic-rich lower portions grading to rhyolite-rich towards the top contact. The LVC forms the base of the SMO volcanic belt.

During the Late Paleocene to Middle Eocene the regional structural setting of the GTC shifted from E-W compression to NE-SW extension as the Farallon and North American plates continued to collide at variable intensities and rates in different sections of the subduction zone. This extensional setting gave rise to grabens, half grabens, horsts and tilted blocks, and resulted in local thrusting of the older Mesozoic marine sediments on surface. Several of these Mesozoic thrust panels, referred to as inliers, are exposed in the region. The La Colorada Property lies on one such inlier, known as the Chalchihuites inlier. Concurrent with thrusting, sedimentary basins developed across central and southern Mexico forming continental red beds comprising of volcanic-clast conglomerates interlayered with lava flows.

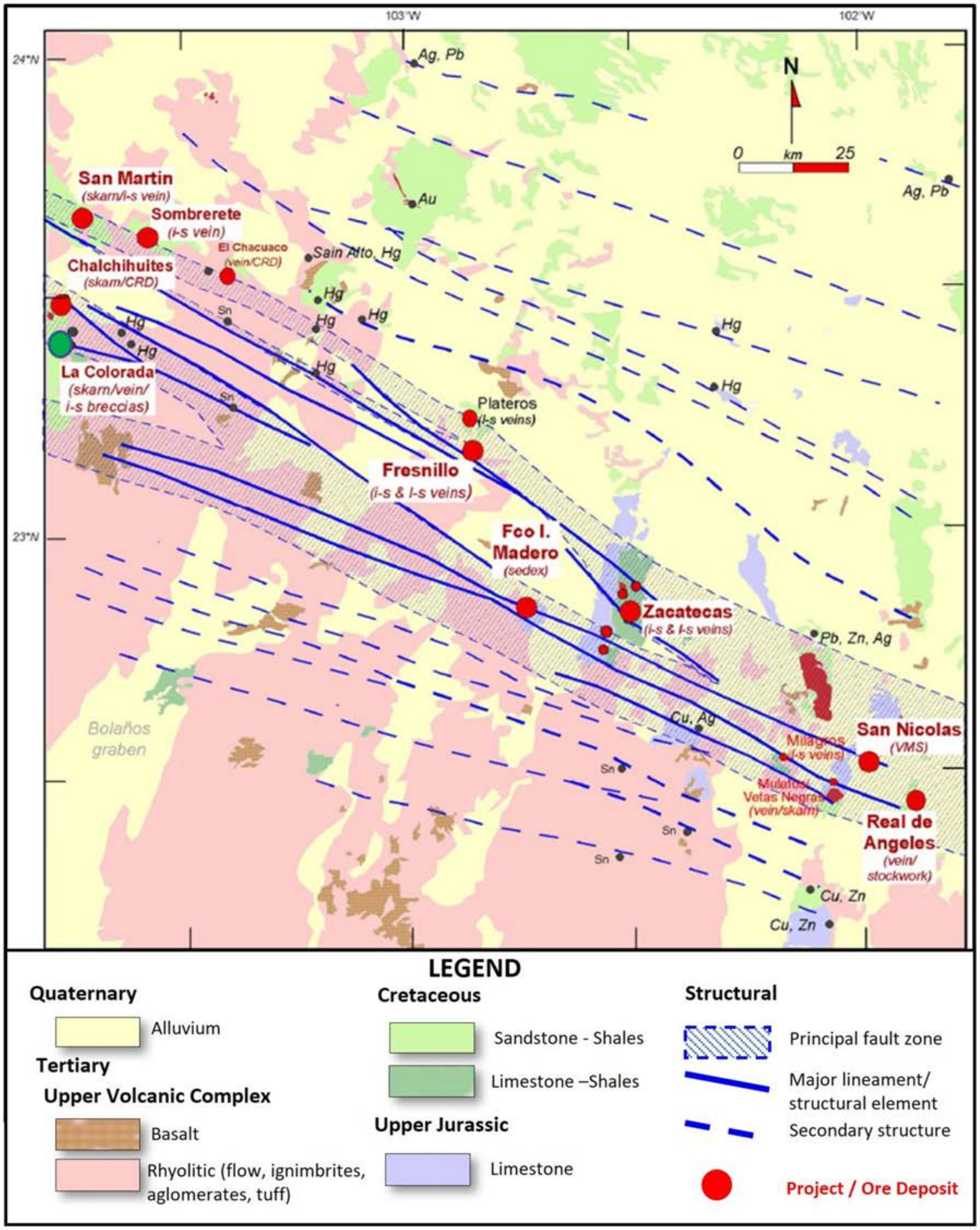
Continued Middle Eocene and Oligocene extension resulted in the deposition of the upper volcanic sequence (UVS). It forms the upper unit of the SMO volcanic belt and was emplaced in two pulses between 32Ma and 20Ma (Ebner 2023). The UVS deposits generally have well defined bedding and multiple tuffaceous horizons. They are capped by Pliocene to Quaternary volcanic deposits and landforms, and Quaternary conglomerates.

7.2 Regional Structural Geology

Five distinct deformation phases, from the late Mesozoic to Tertiary, are recognized in central Mexico (Starling 2022), and observed on the La Colorada Property:

- D1 – Early Laramide (~80-60 Ma) ENE compression caused by the subduction of the Farallon plate beneath Gondwanaland, resulted in low angle folding and thrusting of the Mesozoic marine sediments.
- D2 – Late Laramide (~60-40 Ma) NNE compression and contractional deformation, caused by the passage of the Caribbean Plate between the North and South American plates reactivated low angle northwest-trending basement structures, thought to be the main control on porphyry copper and associated orogenic gold deposits in Mexico.
- D3 – Early post-Laramide (~38-28 Ma) N-S to NNE extension resulting from the completed migration of the Caribbean Plate between the North and South American plates and the continued separation of the two continents. The low angle northwest-trending thrust faults were reactivated with sinistral trans-tension, producing E-W to NW-SE normal faults and tension fractures between the sets of reactivated faults. The majority of the epithermal vein, skarn, and CRD deposits found in the older SMO rocks in Mexico are thought to be associated with this deformation phase.
- D4 – Main stage Basin and Range ENE extension (~28–18Ma) caused by slower subduction of the Farallon Plate beneath Gondwana resulted in NNE and NW-orientated normal faulting and tilting of the SMO volcanic units. D5 – WNW extension in central and southern Mexico (~12–0Ma) related to the onshore projection of the subducting oceanic ridge as part of the N-S-trending East Pacific Rise. This event results in a series of N-S to NNE trends extending into the Altiplano with major faults that border the western side Fresnillo District and define the Zacatecas horst block.

The La Colorada Property is located within a regional WNW trending structural corridor that coincides roughly with the northeastern boundary of the GCT (Figure 7-2) and an ESE structure that forms along the southern margin of the Chalchihuites inlier.



Source: Pan American, 2023 modified from Starling 2017 internal report

Figure 7-2: Regional geology of western Zacatecas with major deposits and interpreted major basement fault zones

7.3 Regional Mineralization

The La Colorada Property is located in the Zacatecas mining district, within the Mexican Silver Belt (MSB). The MSB is oriented approximately NW-SE and extends from the southwestern United States in the north of the TMVB in the south. Many of the major MSB deposits are located within the SMO mountains and associated volcanic belt. The region contains epithermal Ag-Pb-Zn + Au + Cu vein, and polymetallic skarn, carbon replacement deposits (CRD), and porphyry deposits (Figure 7-3).

Epithermal Ag-Pb-Zn +/- Au intermediate sulphidation (IS) epithermal veins within the MSB are generally hosted in dacites of the LVC and in the underlying Cretaceous sedimentary sequences and tend to be older than 30 Ma (Ebner 2023) (Figure 7-3). Polymetallic CRD and skarn mineralization replace the Cretaceous limestone units , appear similar in age and composition to the IS epithermal veins, and may be genetically related to them (Ebner 2023). Ongoing studies may corroborate this hypothesis or determine that they result from different events within the evolution of the hydrothermal system. Gold-rich low sulphidation (LS) epithermal deposits are also found in the MSB and these tend to be hosted in the UVS rhyolites (younger than 30 Ma) and are controlled by large-scale NNE- and NNW-striking extensional faults (Zamora-Vega et al, 2018). The MSB also hosts additional volcanic-hosted massive sulphide, iron-oxide copper and gold, orogenic gold, carbonatite, pegmatite, tin vein and placer deposits (Ebner 2023).

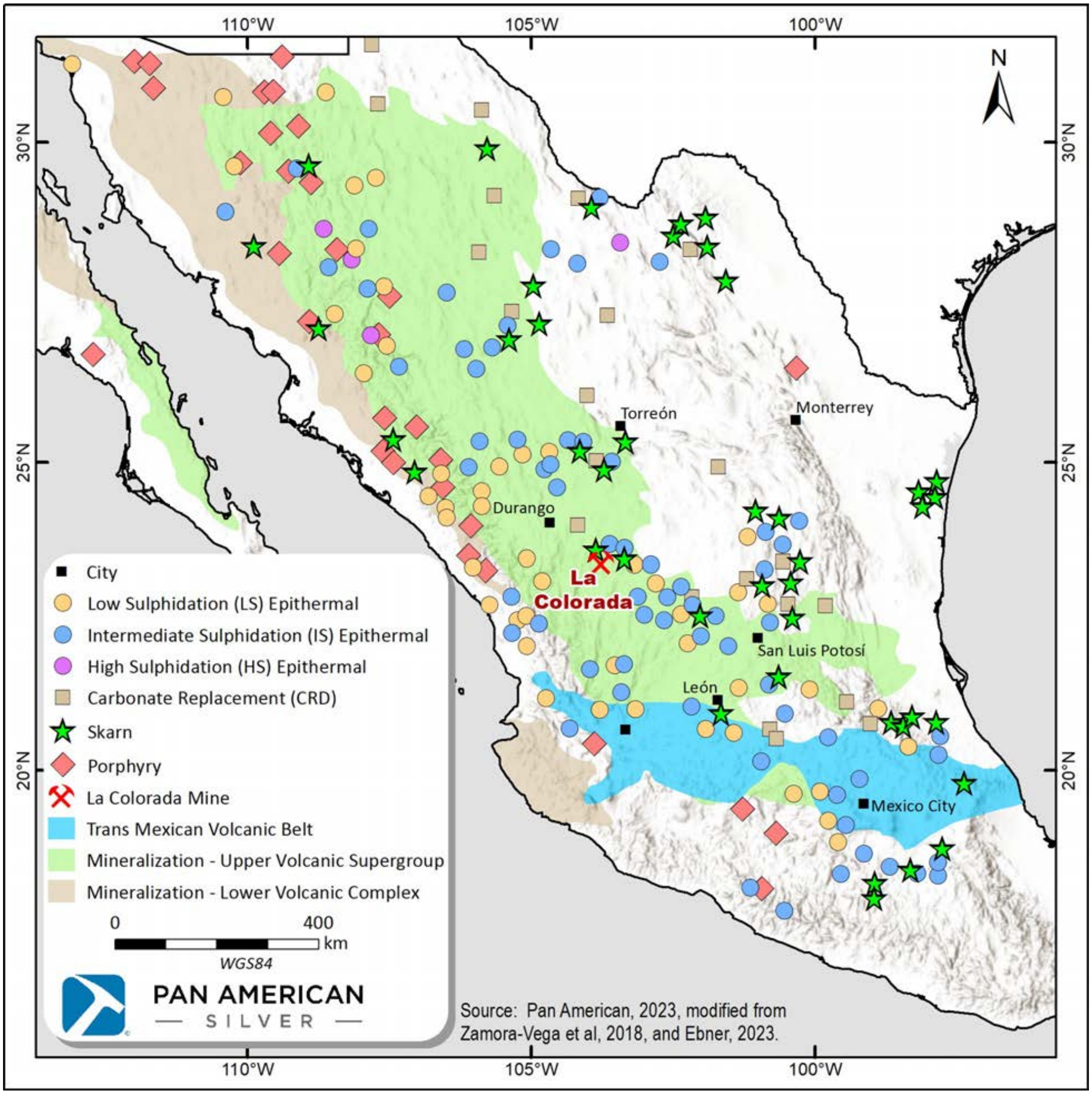
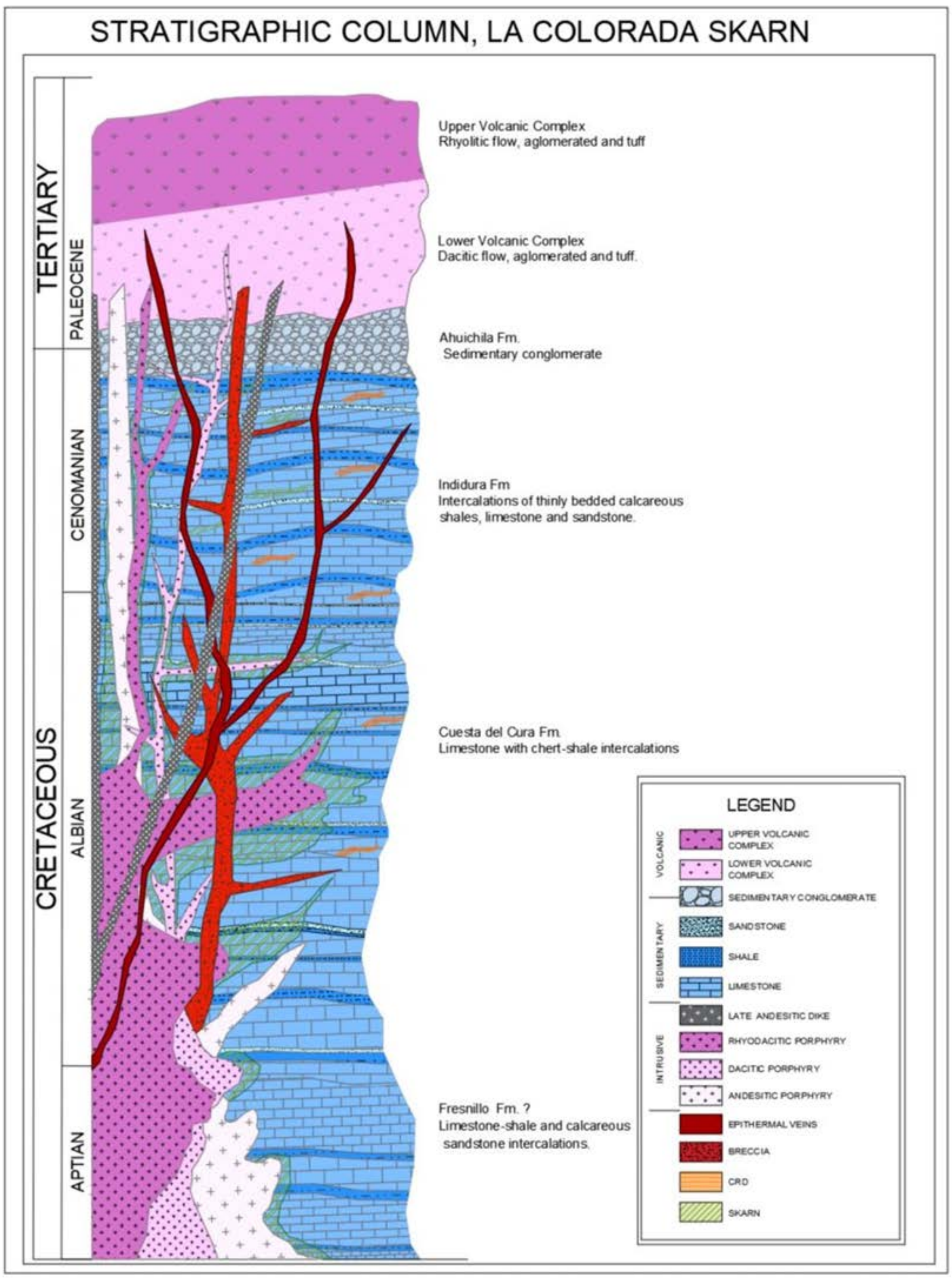


Figure 7-3: Plan of regional mineralization relative to the SMO volcanic belt and Trans-Mexican Volcanic Belt

7.4 Property Geology

The general stratigraphic column for the La Colorada Property is shown in Figure 7-4.



Source: Pan American, 2023

PAN AMERICAN SILVER

Figure 7-4: Local stratigraphy of La Colorada Property, Zacatecas, Mexico

The lower Cretaceous sedimentary rocks of the Fresnillo Formation constitute the base of the stratigraphic sequence and are composed predominantly of thick, fine-grained limestone beds interlayered with sandy mudstone and calcareous sandstones that were deposited in shallow marine and terrestrial environments. The unit does not outcrop on the La Colorada Property and, although it may be present at depth, the upper contact with the overlying Cuesta del Cura Formation has not been identified, possibly masked by skarn recrystallization of the limestone units. Regionally, the limestone beds of this formation provide an important host to mineralization.

The overlying Lower Cretaceous Cuesta del Cura Formation consists of thinly interbedded dark grey to black limestones, pelagic shales, black chert and calcareous mudstones. It was deposited in a reef environment. It has been intersected in drill holes over a unit thickness of at least 1,000 m and constitutes the predominant limestone stratigraphic unit and primary host to skarn alteration and mineralization at La Colorada Property. The Cuesta del Cura Formation is the oldest stratigraphic unit to outcrop on the La Colorada Property (Figure 7-4).

The Cuesta del Cura Formation is overlain by the Indidura Formation, an Upper Cretaceous sequence of thinly bedded shales interbedded with clayey limestone, calcareous sandstone and siltstone. The unit is light grey to yellow, commonly exposed in synclinal axes, and reaches a thickness of 100 m in the district.

The Laramide compressional events caused fracturing, faulting and folding of the Cretaceous sediments. These units generally dip shallowly towards the southwest in the La Colorada Property.

The limestone units are unconformably overlain by the Late Cretaceous to Early Paleocene Ahuichilla Formation which is a terrestrial red conglomerate formed at the base of steep slopes and cliffs as a result of gravitational material movement. The formation contains variably-sized, sub-rounded limestone, flint, sandstone, shale and dacite fragments within a consolidated calcareous clay matrix. At the La Colorada Property the Ahuichilla Formation is irregularly distributed but where present is approximately 40 m thick and dips t towards the northwest.

The sedimentary units are discordantly overlain by the northeast dipping dacite flows and tuffs of the LVC. Laramide-age fractures and faults provided conduits for the Late Cretaceous – Eocene intrusive phase of this unit and its associated hydrothermal fluids. Where intrusions and hydrothermal veins were in contact with the Mesozoic sediments, metamorphism and recrystallization, primarily of the limestone units, has occurred, resulting in marble, hornfels and skarn lithologies. At the La Colorada Property, the LVC has been the host of the majority of the epithermal IS Ag-Pb-Zn vein mining to date. LVC is approximately 825 m thick, dips moderately to the NE and is the dominant outcropping unit on the La Colorada Property.

The UVS rhyolite tuffs and ignimbrites unconformably overlie the LVC and dip gently to the south and southeast. Together the SMO volcanic rocks extend up to 1,200 m in thickness and covers the majority of the La Colorada Property to the east.

Quaternary conglomerates unconformably overlie the UVS in the NE and NW corners of the La Colorada Property.

Several blind intrusive bodies and phases of brecciation and veining have been identified at depth. Descriptive details in chronological order of emplacement follow:

1. Andesite porphyry forms both a large intrusion and dykes. This intrusive unit is cut by all the other intrusive phases.
2. Dacite porphyry dykes (dated at ~67Ma (Ebner 2023)) which appear to be feeders for the LVC intrusion. This intrusive phase is considered the primary source of the skarn mineralization (Chang 2021 internal report).

3. Rhyodacite intrusion and dykes, dated at around 63 Ma (Ebner 2023), are thought to be related to syn- to post-skarn mineralization. Representing the largest intrusion identified to date on the La Colorada Property, it may be responsible for mineralization in some areas (Chang 2021 internal report).
4. Several post-skarn breccias are observed on the La Colorada Property. They generally occur in or near marble units or faults and are fairly localized (only a few metres wide). These breccias are thought to have formed at low temperatures with minimal transportation or movement of the brecciated material. These breccias are interpreted as dissolution or collapse breccias that occurred after the skarn and associated mineralization events (Chang, 2021 internal report).
5. Several breccias on the La Colorada Property are related to a breccia pipe that present diverse fragments and evidence for several phases of brecciation. These breccias are developed mainly in the area between the 901 and 902 mineral zones (as seen on Figure 7-5 below) structurally controlled along the NC2 - Vein 3 trend. Economically significant mineralization occurs where skarn fragments within this breccia pipe. Fine-grained, late-stage andesite dykes, related to the divergence of the Baja California Peninsula from the main continental plate, cut across all other intrusive and stratigraphic units including the LVC.
6. Epithermal veins, which preferentially follow structural planes, cut across the LVC and all underlying stratigraphic units. These veins are the focus of the La Colorada Vein Mine.
7. Small breccia bodies exposed at surface and in underground workings at the La Colorada Vein Mine are believed to post-date epithermal veins. These breccias, in contrast to the skarn breccia, are umineralized, localized and have limited continuity/expression at depth.

Figure 7-5 shows surface geology, mineralization and major interpreted structures in the area of the La Colorada Vein Mine and the Skarn Project.

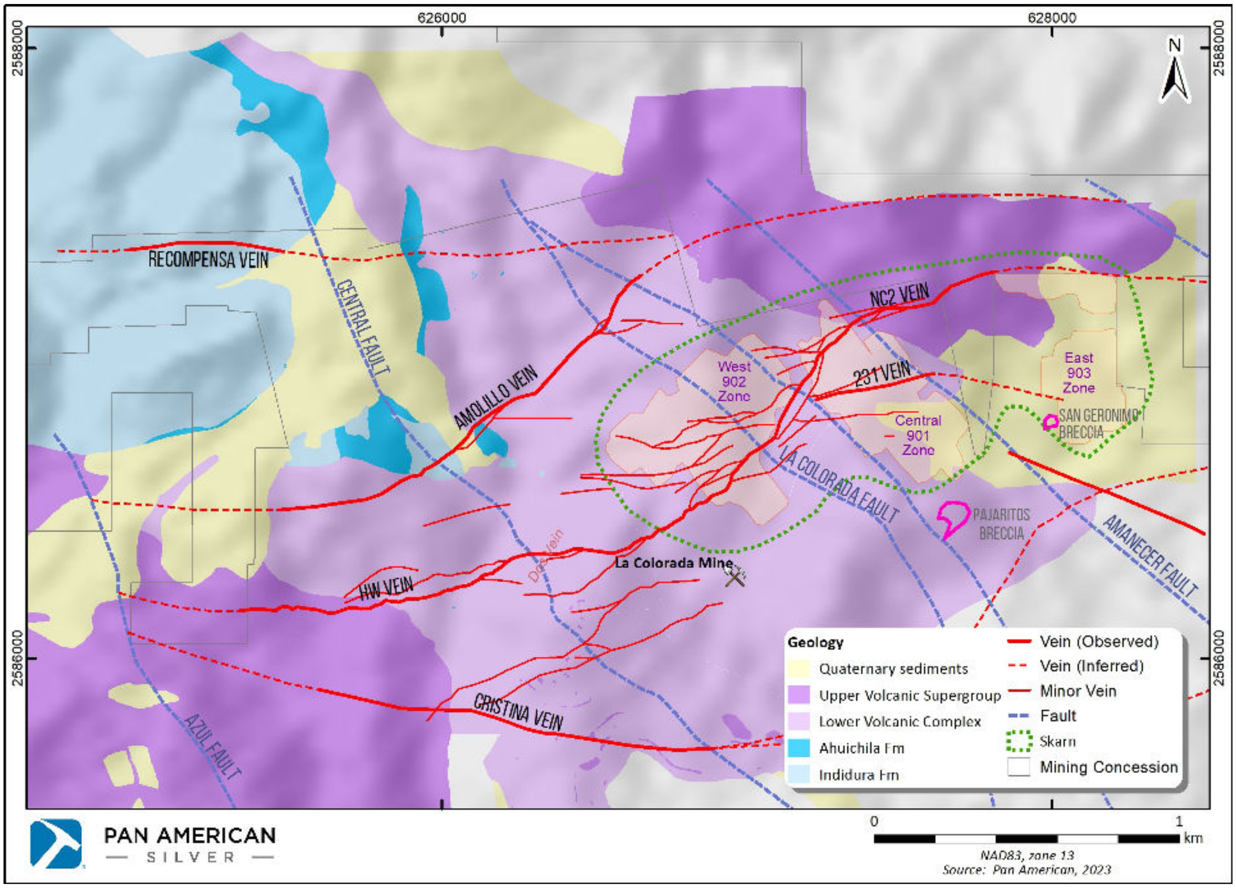


Figure 7-5: Plan showing surface geology, local structure, primary epithermal vein locations (at the 500-Level), skarn footprint and zones of economic skarn mineralization

7.5 Local Structure

All regional structural events are evident on the La Colorada Property, though Stages D1 to D3 are the principal events that affect mineralization. The major structures related to mineralization and surface geology are shown in Figure 7-5. The effects of structural deformation of local geology is described as follows:

- Structural phase D1 created in NNW-trending folds and thrusts in the Mesozoic sediments with fault displacement between tens to over hundreds of metres.
- The D2 structural phase is associated with NNE trending dextral shearing and is thought to control the orientations of porphyry intrusions and breccias.
- D2 structures were reactivated during the D3 structural phase along a sinistral orientation, and ESE and NNE trending secondary shear structures formed. The dextral and sinistral movement on the normal faults formed NE striking dilation zones which host the epithermal vein mineralization, and as such, the epithermal vein locations delineate the major northeast trending structures throughout the La Colorada Property.
- The D4 and D5 structural events tilted fault blocks to the ENE and ESE by as much as 10-20°.

7.6 Local Mineralization

Epithermal intermediate sulphidation Ag-Pb-Zn vein, CRD, and polymetallic skarn mineralization has been identified at the La Colorada Property. The upper portions of epithermal vein system have been the historic focus of the currently operating La Colorada Vein Mine, while the skarn and CRD mineralization is currently being defined and characterized by ongoing drilling and technical studies.

7.6.1 Epithermal Vein Mineralization

Fractures and faults formed during the D1 to D3 deformation events acted as conduits for emplacement of epithermal vein mineralization. There are three ENE to E-W-trending principal vein structures which, from NW to SE, are named Recompensa, Amolillo and NC-HW. Each vein has second order sub-parallel splays and duplexes, and there are also several NW- to WNW-trending veins. In general, the principal veins are strongly brecciated, locally oxidized, and often exhibit irregular vein boundaries. Most of the mineralization of economic significance is located in quartz veins that average 1 metre to 2 metres wide, but may be significantly wider. The vein fillings consist of quartz, calcite, and locally barite and rhodochrosite. Galena, sphalerite, pyrite, native silver, and silver sulphosalts are present in unoxidized veins. The major mineralized veins are strongly brecciated and locally oxidized. Amolillo strikes over 1.5 km to the northeast and dips 60° to the southeast, for over 800 metres down dip. The average vein width is 2.2 metres. The NC series of veins lies around 700 m to the southeast of Amolillo. The most significant of these veins, NC2, strikes around 1.2 km to the northeast and dips 75° to the southeast, for over 1 km down dip. The average vein width is 1.9 metres. The HW series is the western continuation of the NC series, strikes east-west, and dips 50° to the south, for over 600 m down dip. The average vein width is 1.8 metres. Veta 3 runs parallel to the HW and NC series, strikes for over 900 m to the northeast, and dips 75° to the northwest, for around 400 m down dip. The average vein width is 1.7 metres. Well banded epithermal textures are rare. Vein breccias generally lack cohesiveness and consequently show very little surface expression. Veins typically occur as narrow feeders with massive sulphides in the upper portion of the system.

7.6.2 Polymetallic Skarn and CRD Mineralization

Faults, primarily formed during the D2 deformation event, acted as a conduit for the intrusion of several porphyries and their associated hydrothermal fluids. To date, two intrusive centres with similar characteristics have been identified: the main intrusive centre located between the 901 and 903 zones of the Skarn Project; and a second centre north of the Skarn Project's 902 zone.

Emplacement of the intrusions fractured the sedimentary rocks and increasing porosity and permeability of the limestone host rocks which were metamorphosed where in contact with the hot fluids. Additional mineralogic changes resulted from cooling and infiltration of groundwater in the porous areas. Recrystallization and mineralization occur predominantly around intrusive bodies and is associated with intrusive sills, dykes or offshoots, and tends to follow the sedimentary bedding.

The evolution of the skarn system begins with contact metamorphism that in its early phase gives rise to the occurrence of marble, calc-silicate hornfels and recrystallized limestone. Metasomatism progresses to a prograde phase forming garnet, pyroxene and wollastonite and later develops into a retrograde phasethat consists of two stages:

- An early stage associated with epidote, amphiboles, illvanite, vesuvianite, magnetite, hematite and muscovite;

- This is followed by a late stage associated with chlorite, quartz, calcite, rhodonite, and sulphides containing molybdenum, copper, zinc, lead, silver and manganese.

The final stage of skarn development is a distal phase consisting of CRD replacement bodies and veinlets of carbonate with sulphides. CRD deposits are high temperature polymetallic deposits formed in proximity to porphyry systems. Carbonate host rocks are replaced by massive sulphides with mineralogy that varies according to the distance from the intrusion. CRD bodies typically occur in the limestone near vein contacts or above the skarn.

7.6.2.1 Mineral and Metal Zonation

Skarn minerals include garnets, pyroxenes, pyroxenoids and amphiboles. Almandine and andradite are the most common types of garnets with rare occurrences of grossularite and uvarovite garnet. Well developed zonation of garnet species occurs within the skarn units as a function of proximity to the porphyry intrusion. Zones close to the intrusion are characterized by predominantly dark brown to red almandine garnets with lesser light-coloured pyroxenes. With increasing distance from the causative intrusion, garnet content decreases and the garnet species transitions to a distal zone characterized by dominant dark pyroxenes with lesser green to yellow andradite garnets. In many distal areas, no garnets are visible and the skarn is composed entirely of dark pyroxenes. The zonation follows a general NW-SE trend in the main mineralized zone with a secondary NE-SW trend in the extreme northeast.

Mineralization is associated with sulphides closely associated with skarn development and the onset of hydrothermal alteration of early skarn minerals. Sulphide textures vary from disseminated and patchy to semi-massive and massive. Zinc, in the form of sphalerite, is typically yellowish-brown to reddish brown, and is accompanied by galena, pyrite, chalcopyrite and magnetite. CRD mineralization consists of massive to semi-massive sulphides.

Zinc, lead, copped, silver and, to a lesser extent, gold grades are strongly associated with host skarn lithology and are inversely proportional to proximity to the intrusion (i.e., grades are lower in close proximity). The CRD and pyroxene skarn units away from the intrusion, are therefore associated with the highest grades while the dark brown to red garnet skarn is associated with the lowest grades. The marble and porphyry units host minor mineralization; with in the limestone mineralization occurs primarily as veins or veinlets.

Metal zonation is present in the system: copper is highest in the intrusive and immediately proximal to the causative intrusion. Molybdenite grade is proportional to copper grade in the porphyry, and iron content follows copper in the proximal dark brown to red garnet skarn. Zinc-lead-silver mineralization occurs in the transition zone between almandine and andradite garnets and grades to lead-zinc-silver towards the distal zone where pyroxenes and CRD predominate and are associated with the highest grades.

7.6.2.2 Skarn Morphology

The Skarn Project is comprised of several zones of mineralization located between 700 m and 1,900 m below surface, extending some 1,800m in a NE-SW direction and 650m in a NW-SE direction. Skarn geometry is dependent on the shape of the causative intrusion, the composition and orientation of the stratigraphy, and the lithological contacts that generate permeability in the host rock. Economic skarn mineralization is well developed in the retrograde stages in skarn layers ranging from a few centimetres to tens and hundreds of meters thick. The skarn system is currently defined by three zones of economic mineralization with corresponding zone numbers. These are termed the West Zone (902 zone), Central Zone (901 zone), and East Zone (903 zone).

There is evidence of E-W to NE-SW stratigraphic and structural control on mineralization, similar to that of the epithermal system. Figure 7-6 below shows a typical cross section through the Skarn Project.

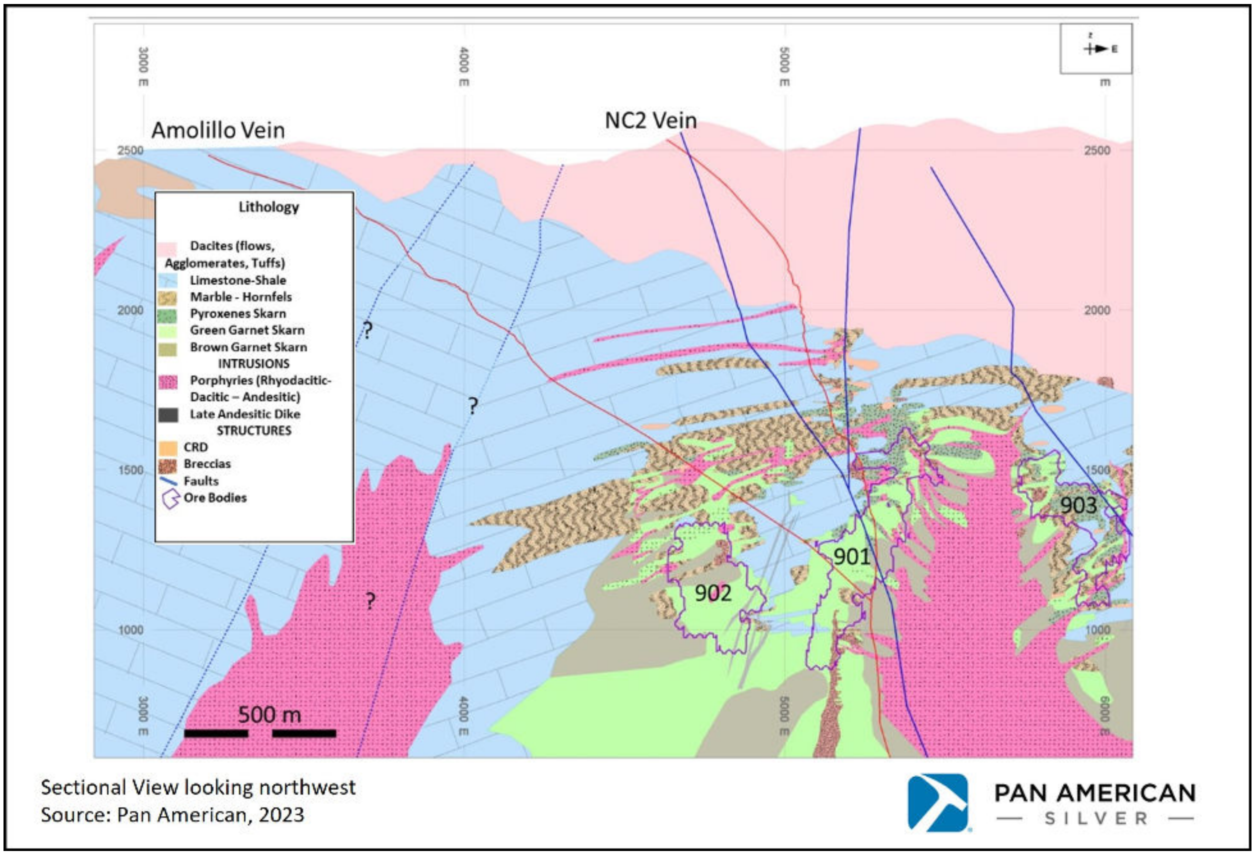


Figure 7-6: Typical cross section of the Skarn Project (looking NW) showing epithermal veins (red), faults (blue lines), porphyry intrusions (pink), skarn lithologies (greens and browns) and mineralized zones (purple outlines).

8 Deposit Types

La Colorada Vein Mine is considered a typical hydrothermal polymetallic deposit located in a region with significant silver and base metal production from well-known vein and skarn deposits.

The La Colorada Vein Mine's intermediate sulphidation epithermal vein model considered for exploration and mineral resource and reserve estimation transitions from silver-rich mineralization at surface to more base metal-rich mineralization at depth.

The Skarn Project deposit is a typical Mexican porphyry-related skarn system associated with andesitic, dacitic and rhyodacitic intrusive bodies and dykes in contact with limestone and siltstone. Significant economic mineralization occurs in light garnet skarn, light and dark pyroxene skarn and in the collapse breccias dominated by skarn fragments. Garnet and pyroxene skarn zones contain zinc, lead, copper, and silver mineralization. The presence of late andradite garnet and pyroxenes (johansenite and hedenbergite) are distinctive in the calcic skarn found in the Skarn Project and exemplify a zinc-dominant skarn deposit.

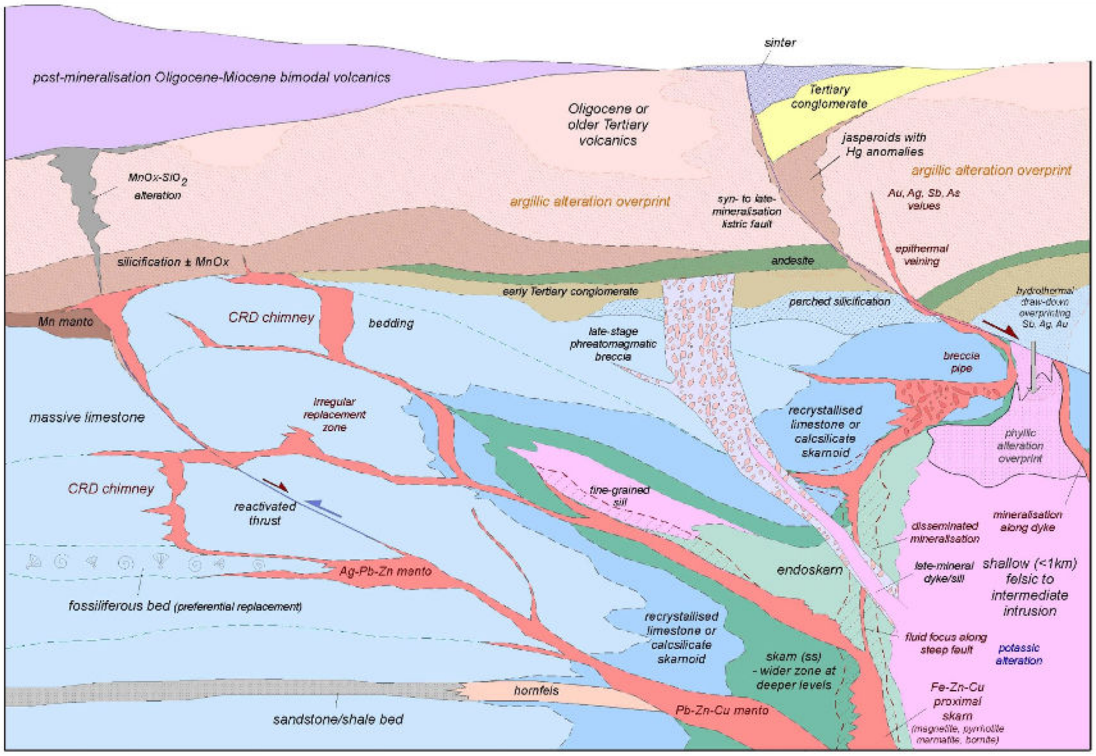
Mineralization is related to multiphase hydrothermal and magmatic activity and occurs as various types, such as CRDs, breccia pipes and epithermal silver-lead-zinc systems. Some evidence for copper molybdenum porphyry mineralization demonstrate the full evolution of the hydrothermal system.

Skarn Mineral Paragenesis

Multiple phases and superposition of hydrothermal events suggest that magmatic and hydrothermal activity has continued over time and may have produced possible deeper telescoping systems. Early-phase magmatic activity commenced with the emplacement of a copper-molybdenum porphyry, continued with the formation of a skarn-CRD deposit, and concluded with the development of epithermal veins, mantos, and hydrothermal breccias.

The skarn mineral paragenetic sequence is defined by the formation of magnetite, hematite I, pyrite, chalcopyrite and molybdenite at the end of the early porphyry phase and continued to the beginning of the late epithermal phase. Sphalerite, galena, tennantite, tetrahedrite and argentite and related clays and iron oxides are exclusively related to the later epithermal phase. (ASPAR November 2019-January 2020.)

Figure 8-1 shows a typical anatomy of a Mexican epithermal vein, skarn and CRD deposit.



Schematic sketch – not to scale
Source: Starling, 2020 internal report

Figure 8-1: Sketch summarizing main characteristics of Mexican skarn and CRD deposits

9 Exploration

The La Colorada Property was mined for several decades prior to any systematic exploration work. Most major structures were discovered through underground mine development before Pan American.

When the La Colorada Property was under option, Pan American conducted exploration and diamond drilling as part of its due diligence process. Since Pan American acquired the La Colorada Property, staff and consulting structural geologists have carried out near-mine surface and underground geological and structural mapping.

9.1 Sampling

Systematic sampling of underground channels and raises is conducted for grade control and mineral resource and reserve estimates as mining progresses.

The significant exploration results at La Colorada Property that are material to this technical report were obtained by core drilling (surface and underground) and underground channel sampling. This work and resulting interpretations are summarized in Sections 10, 14, and 15 of this technical report.

9.2 Geophysics

Between September 1997 and March 1998, while the La Colorada Property was under option, Pan American conducted very low frequency radio (VLF) and induced polarization (IP) geophysical surveys. In 2019, Zonge International, Inc. (Zonge) conducted a magnetotelluric (MT) geophysical survey over the Skarn Project area using Zonge High-Resolution ZEN receivers, operating with four or six channels equipped with 32-bit analog-to-digital converters. A total of 13 line-km of geophysical data were collected on six NE-SW oriented lines. In 2022, Zonge extended the MT survey with an additional 18.2 line-km distributed in twelve NE-SW oriented lines and by extending two lines from the first survey. The geophysical data was used to create 2D and 3D inversion models to assist with drill targeting of the Skarn Project at depth.

10 Drilling

Pan American initiated systematic testing of the silver-gold-lead-zinc-bearing zones in 1997 and has drilled continuously since then to expand the mineral resource and replace depletion of mineral reserves. Prior to acquisition by Pan American, MLC drilled 8,665 m in 131 core drill holes. To the end of June 2023, over 757,000 m have been drilled at the La Colorada Property in both the La Colorada Vein Mine areas (Recompensa, Estrella, and Candelaria) and the Skarn Project deposit (Table 10-1). This includes drilling between 342 drill holes (for 282,555 m) targeting the Skarn Project, of which 181 drill holes (126,697 m) were directional drilling from pre-existing drill holes to reach target depths.

Figure 10-1 illustrates the location of drilling in the La Colorada Property. Significant exploration results and interpretations obtained from surface and underground drilling are summarized in Sections 14 and 15 of this technical report.

Table 10-1: Distribution of drilling by zone as of June 30, 2023

Zones	Number of Drill Holes	Length (m)	Number of Samples
Recompensa	192	32,673	5,986
Estrella	610	153,503	18,869
Candelaria - Oxides	413	69,725	11,021
Candelaria - Sulphides	609	130,022	29,457
Brechas	77	9,900	3,964
Veta 3	277	78,985	14,510
Skarn Project	342	282,555	173,888
Total	**2,520**	**757,363**	**257,695**

Drilling and channel sampling are conducted continuously in the La Colorada Vein Mine area for the purpose of developing drill targets, upgrading mineral resources, converting mineral resources to mineral reserves, and replenishing depleted mineral reserves. Drilling density varies by category: brownfield potential is drilled at >100 m spacing, inferred mineral resources are drilled at 80 to 100 m spacing, and measured and indicated mineral resources are drilled on a 60 × 60 m grid.

Preliminary mineral resource estimates are made using the drill information. Later, the mineral resource models are refined using chip sample assays collected from the underground development along channels.

Underground definition core drilling is completed on a 40 × 40 m grid where required, and short test drill holes are drilled from underground at a 20 × 20 m grid to locate veins and parallel structures and to assist with mining and grade control.

Exploration and mineral resource definition of the Skarn Project has been conducted using deep core drilling and directional drilling from pre-existing holes, to allow access to the target depth; the drill spacing in this area varies from a few metres to >100 m.

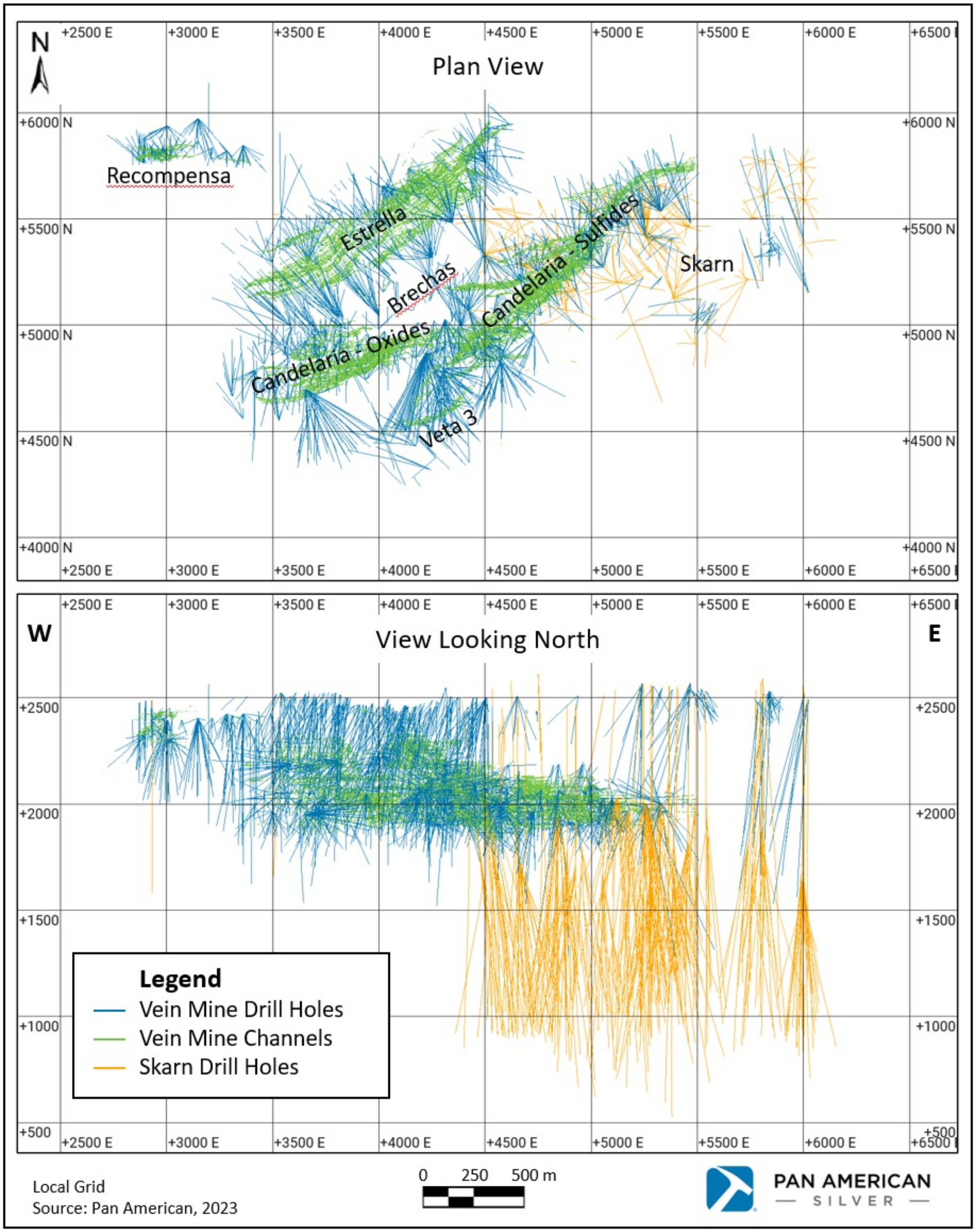


Figure 10-1: Location of drilling and underground channels. TOP: Plan view; BOTTOM: Longitudinal view looking north

Geologists and technicians at La Colorada Property follow a series of standard operating procedures for the planning and execution of core drilling programs as well as underground channel programs; their application by all operators has been consistent with industry standards.

10.1 Drilling Procedures

Drill core diameter ranges from PQ (85 mm), HQ (63.5 mm), NQ (47.6 mm), and BQ (36.4 mm) depending on location and hole depth. The current core drilling procedures are summarized as follows:

1. Prior to drilling, the collar locations of all drill holes are marked with the Minnovare Azimuth Aligner equipment by the La Colorada survey crews; the collars are surveyed using a differential base-station GPS after the completion of drilling.
2. A Reflex multi-shot survey instrument is used to measure directional downhole deviation (both azimuth and inclination); readings are taken at intervals of 30 m for single drill holes and every 1 m for directional drill holes during the curve process.
3. Core is placed in labelled plastic boxes at the drill site and the boxes are taped and secured before transportation by the drill contractor to the logging facility.
4. Pan American geologists conduct lithological and geotechnical logging of drill core, describing all downhole data including selected assay intervals. This information is recorded in digital format using Datamine DHLogger. The following features are recorded:
    - Core diameter.
    - Lithological descriptions that include:
        - Lithological contacts.
        - Type and intensity of various alterations.
        - Geological structures (faults, fractures, veins, veinlets, etc.).
        - Structural measurements (core angles).
    - Geotechnical description (core recovery and rock quality designation measurements).
    - Sampling intervals that respect lithological contacts; these are marked and labelled.
5. Core is photographed and images are stored in a cloud-based software (Imago from Seequent).

No overall core recovery statistics were reviewed, but overall core recovery is estimated at > 95% for core drilled with contractor drill rigs (both veins and skarn) and > 82% for core drilled with Pan American drill rigs (veins). The sampled core provides a reliable representation of the mineralization in the mining operation.

10.2 Underground Channel Sampling Procedures

The geologists or technicians who carry out the marking of the samples in the drift first check the mapping and sampling information of the previous drift. The collar location of the channel is identified in local mine grid coordinates, which are supplied by survey crews along the drift. The collar is identified on the left side of the drift. The width of the drift is measured with a measuring tape, perpendicular to the general strike of mineralization. In most of the cases the footwall, vein, and hanging wall samples are taken from the face. The sampled underground faces provides a reliable representation of the mineralization in the mining operation.

10.3 Material Impact on the Accuracy and Reliability of Drilling Results

There are currently no known drilling, sampling, or recovery factors that are reasonably expected to materially impact the accuracy and reliability of the results.

11 Sample Preparation, Analyzes, and Security

Analytical samples include both drill core and channel samples. The drill core samples are generated from exploration and infill drilling programs that are conducted on surface and underground; they are used for target generation and estimation of mineral resources and mineral reserves. The channel samples come from underground grade control channels in development drifts; they are used for short-term forecasting and grade control as well as for estimation of mineral resources and mineral reserves.

11.1 Sample Preparation and Security

All sampling is conducted on-site by Pan American personnel under the supervision of experienced Pan American geologists.

Sampling of Drill Core

Core drill holes are processed in a secure core logging facility located on the La Colorada Property; the core is logged and photographed. Samples, of a maximum length of 2 m, are selected based on their geological features. Sampling consists of cutting the core in half with a diamond-bladed saw; one half of the core is placed in previously labelled plastic bags containing two sample number tags, and the other half is left in the core box as a reference. The sample bags are sealed with security straps and placed in sealed sacks which are then sent to the primary laboratories; samples from the La Colorada Vein Mine are sent to the La Colorada internal mine laboratory (the La Colorada Laboratory), operated by Pan American, and samples from the Skarn Project are sent to external laboratories.

In the opinion of the qualified person responsible for this section of the technical report, the sampling methodologies at the La Colorada Property conform to industry standards and are adequate for use in mineral resource estimation.

Sampling of Underground Channels

The sampling of underground faces is carried out systematically by production geologists and technicians in the advance galleries after each advance. After the face is washed and secured, samples are taken from the bottom of the structure to the top. The sample location is determined by measuring the distance and azimuth from the nearest bolt left by the surveying team.

Geological contacts marking changes in lithology, alteration, mineralization, structures, etc., are identified and sampling intervals respect these contacts. The sample boundaries are marked on the face; the maximum channel sample length is set to 1 m. Sampling is done with a rock hammer or with a mallet and wedge. The resulting rock fragments that detach from the wall are placed in plastic bags properly identified with correlative sample tags. The samples are then transported to the La Colorada Laboratory for preparation and assaying.

In the opinion of the qualified person responsible for this section of the technical report, the sampling methodologies at the La Colorada Property conform to industry standards and are adequate for use in mineral resource estimation.

Security Measures

The security measures used to ensure that the samples are not contaminated or tampered with include sealing the sample containers with tamper-evident seals, storing the samples in secure locations, and limiting access to the samples.

11.2 Analytical Procedures

Analytical Procedures at the La Colorada Vein Mine

Most of the drill core and underground channel samples from the La Colorada Vein Mine areas are prepared and analyzed by the La Colorada Laboratory, which is operated by Pan American. Certain vein-bearing drill holes are prepared by independent laboratories; these include SGS Minerales (SGS) located in Durango, Activation Laboratories Ltd (Actlabs) located in Zacatecas, and Bureau Veritas located in Hermosillo for sample preparation and in Vancouver, Canada, for analysis. The La Colorada Property laboratory and Actlabs are certified to ISO 9001:2015 standards. SGS and Bureau Veritas are accredited to ISO/IEC 17025 standards. Actlabs, SGS, and Bureau Veritas are independent of Pan American.

Samples are sorted, logged in the laboratory database, weighed, and dried in a furnace. Samples are crushed and pulverized prior to analysis. Instruments are cleaned between each sample. Analytical methods for each lab are listed as follows:

1. The La Colorada Laboratory: for gold and silver assays: fire assay with gravimetric finish; for lead, zinc, and copper assays: acid digestion with atomic absorption finish.
2. Actlabs, SGS, and Bureau Veritas: for gold assays: fire assay with gravimetric finish; for silver, lead, zinc, and copper assays: acid digestion with inductively coupled plasma (ICP) finish.

Analytical Procedures at the Skarn Project

Drill core samples collected from the Skarn Project are sent to external laboratories for preparation and analysis. From early 2019, samples were sent to Actlabs in Zacatecas. Later in 2019 to 2022, samples were sent to SGS in Durango. ALS Global (ALS) is the current external laboratory for samples from the Skarn Project. Since 2022 and until now, samples have been processed by ALS in their Hermosillo facility for sample preparation and in their Vancouver, Canada, facility for analysis. Actlabs is certified to ISO 9001:2015 standards. SGS and ALS are accredited to ISO/IEC 17025:2017 standards. Actlabs, SGS, and ALS are independent of Pan American.

At all external laboratories, the samples are sorted, logged in the laboratory database, weighed, and dried in a furnace. Samples are then crushed and pulverized for analysis.

The analytical methods for samples from the Skarn Project varied with the different laboratories used over time. The analytical method used at Actlabs in 2019 for silver and multi-element analysis consisted of aqua regia digestion with a combination of concentrated hydrochloric and nitric acids to leach sulphides, some oxides, and some silicates. This method was used for the analysis of the following elements: Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Te, Ti, Tl, U, V, Th, W, Y, Zn, and Zr.

Between 2019 and 2022, samples analyzed at SGS for silver and multi-element analysis were analyzed using aqua regia, nitric, and hydrochloric acid digestion, and inductively coupled plasma optical emission spectroscopy (ICP-OES) finish (ICP14B method code). This method was used for the analysis of: Ag, Al, As, Ba, Be, Bi, Ca, Cd, Cr, Co, Cu, Fe, Hg, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sn, Sr, Ti, V, W, Y, Zn, Zr. Gold was determined using fire assay with an atomic absorption spectroscopy (AAS) finish (GE_FAA313 method).

In 2022 and 2023, samples sent to ALS were assayed for silver and multi-element analysis using aqua regia digestion and an inductively coupled plasma atomic emission spectroscopy (ICP-AES) finish (ME-ICP41 method). This multi-element method was used for the analysis of Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Th, Ti, Tl, U, V, W, and Zn.

More recently, the method for silver and multi-element analysis at ALS was changed to a four-acid digestion with ICP-AES finish (ME-ICP61 method). This method analyzes for: Ag, Al, As, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, In, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Re, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn, and Zr. When silver exceeds 100 g/t, the determination is made by four acid digestion and reading by atomic absorption spectrometry (Ag-OG62), if silver exceeds 300 g/t, the sample is analyzed by fire assay and gravimetric finish. When copper, lead, or zinc exceed 10,000 ppm, the samples are analyzed by four-acid digestion and reading by atomic absorption spectrometry (Cu, Pb, Zn-OG62). Gold is determined using fire assay with an atomic absorption spectroscopy (AAS) finish (Au-AA23 method).

11.3 Quality Assurance and Quality Control

Pan American implements a quality assurance and quality control (QAQC) program that includes the submission of the following types of quality control (QC) samples to the internal and external laboratories:

- Blanks to detect cross-sample contamination in the sample preparation phase.
- Certified reference materials (CRMs or standards) to evaluate analytical accuracy and bias.
- Coarse reject/preparation duplicates to evaluate the reproducibility of assays within one original sample.

Blanks are inserted to monitor potential contamination in the preparation sampling stream. The blank material is composed of gravel-size silica that is known to contain silver, gold, lead, and zinc grades that are less than the detection limit of the analytical methods.

The reference materials are composed of material from the La Colorada Property and manufactured and certified by independent laboratories. The CRMs have been prepared by SGS and Actlabs, both in Mexico. Each CRM is provided with a certificate listing the round-robin assay results and the expected standard deviation. These CRMs are individually packed in paper envelopes (100 to 120 g per envelope), inserted in plastic bags, and vacuum sealed.

Coarse reject (or preparation) duplicate samples consist of sample material that has been crushed by the laboratories (not pulverized) and returned to the sampling team. Samples for duplicate assay are selected from those returning high assays; these are then repackaged with new sample numbers and resubmitted on a monthly basis.

Assay results are reviewed regularly to ensure that appropriate and timely action is taken in the event of a failure. Any sample batch containing QAQC failures is resubmitted to another laboratory for analysis.

QAQC at the La Colorada Vein Mine

For samples from the La Colorada Vein Mine, Pan American inserts one quality control (QC) sample for every 6 samples submitted to the primary laboratories (the La Colorada Laboratory, SGS, Actlabs, Bureau Veritas, or ALS).

Silver assay results for blanks are presented in Figure 11-1. Results indicate that cleaning protocol between samples is effective at minimizing contamination.

Project	La Colorada Vein Mine
Data Series	2008 - 2023
Data Type	Drill core & Channel samples
Commodity	Ag (g/t)
Laboratory	All laboratories
Analytical Method	MA ICP - FA Grav
Detection Limit	5 g/t Ag
Source	Pan American, 2023

Control Samples Statistics	Coarse Blank Ag
Sample Count	6,929
Expected Value	5.000
Observed Average	2.598
Standard Deviation	0.536
Upper Limit (10xDL)	0.0%

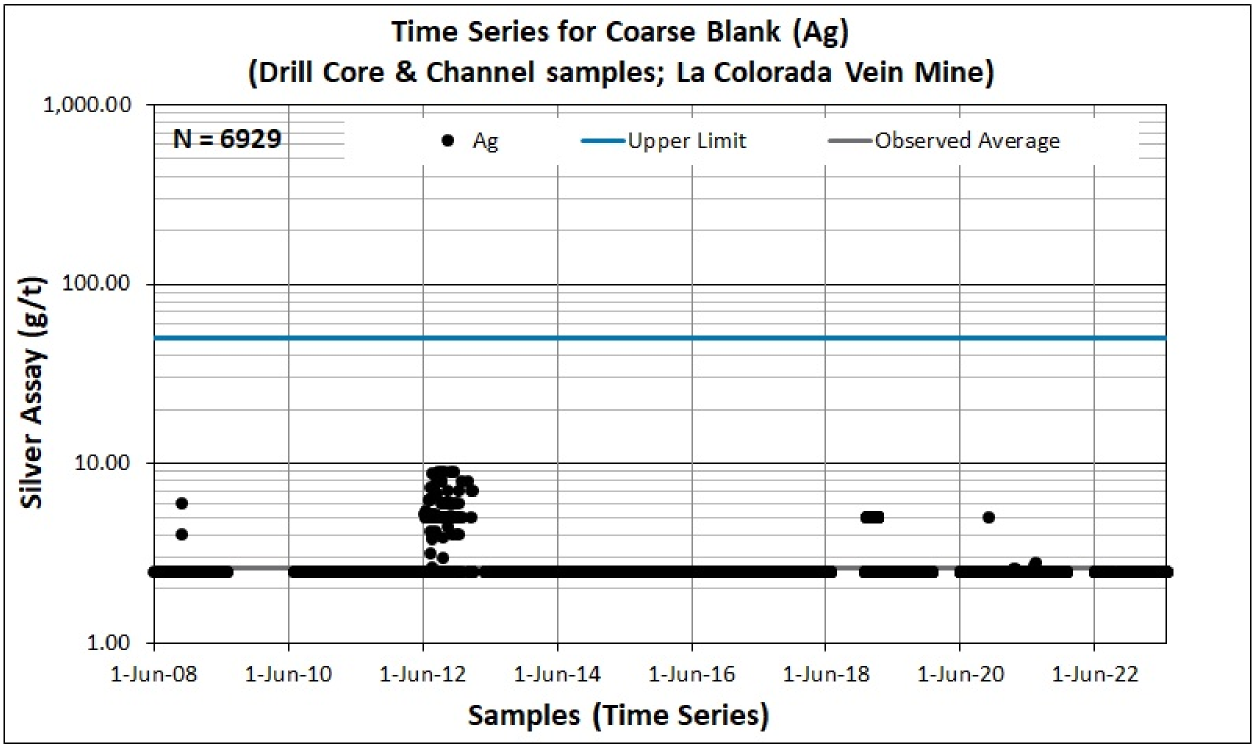


Figure 11-1: Silver assays for blank samples from the La Colorada Vein Mine (various laboratories, 2008–2023)

Results for CRMs, tested from 2008 to 2023 for silver and gold, are presented in Figure 11-1. The results are plotted as the Z-score versus time. The Z-score is calculated as ((Measured-Expected))/Tolerance). The tolerance is the number of standard deviations used as the failure criteria. The purpose of the Z-score is to plot multiple reference materials together on one chart normalized to one common scale and to identify any overall trends in the data. The silver CRM results show a negative bias since 2019, which is considered minor but is being monitored by Pan American.

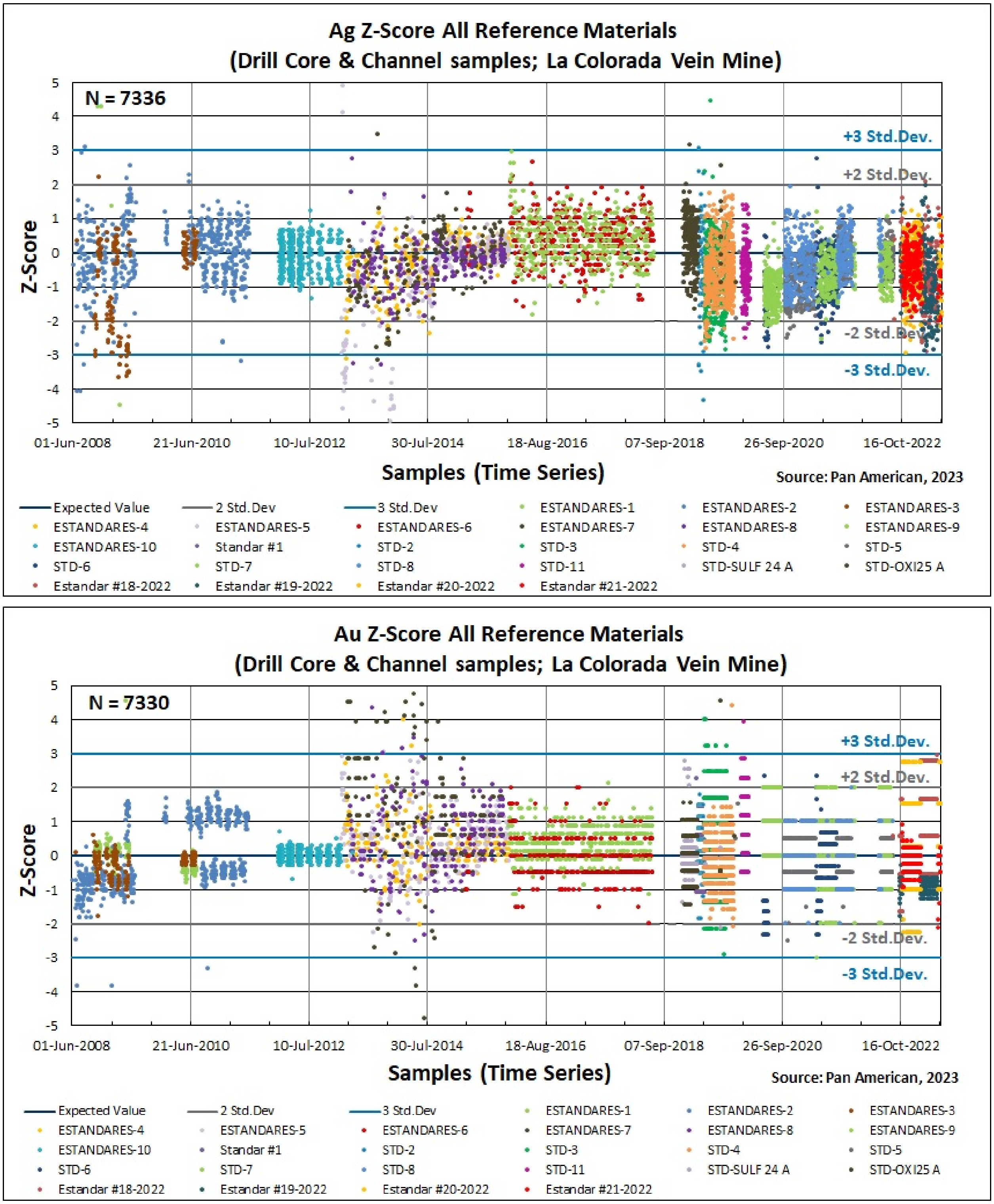


Figure 11-2: Silver and gold Z-score of CRMs from the La Colorada Vein Mine (2008–2023)

Approximately 1 sample in 20 (or 5%) is resubmitted as a coarse reject duplicate. Results comparing the original silver assays with that of their coarse reject duplicates, submitted between 2009 and 2023, are shown in Figure

11-2. For duplicate pairs with a mean grade above 50 g/t Ag, 91.9% of the pairs have a relative percentage difference (RPD) less than 20%, indicating excellent reproducibility over long periods.

Project	La Colorada Vein Mine	Statistics	Original	Duplicate
Data Series	2009-2023 Coarse Reject Duplicates	Sample Count	9,865	9,855
Data Type	Channel and Drill Core Samples	Minimum Value	2.5	2.3
Commodity	Ag in g/t	Maximum Value	24,188	23,994
Analytical Method	Fire Assay/Gravimetric	Samples > 10DL	8,192	
Detection Limit	5 g/t Ag	Pairs +/- 20% RPD if > 10DL	91.9%	
Original Dataset	Original Assays	Precision = 2xCV		
Paired Dataset	Coarse Duplicates	Precision 10DL to 100 g/t Ag	28.6%	
		Precision 100 to 1000 g/t Ag	18.6%	
Source	Pan American, 2023	Precision > 1000 g/t Ag	18.1%	

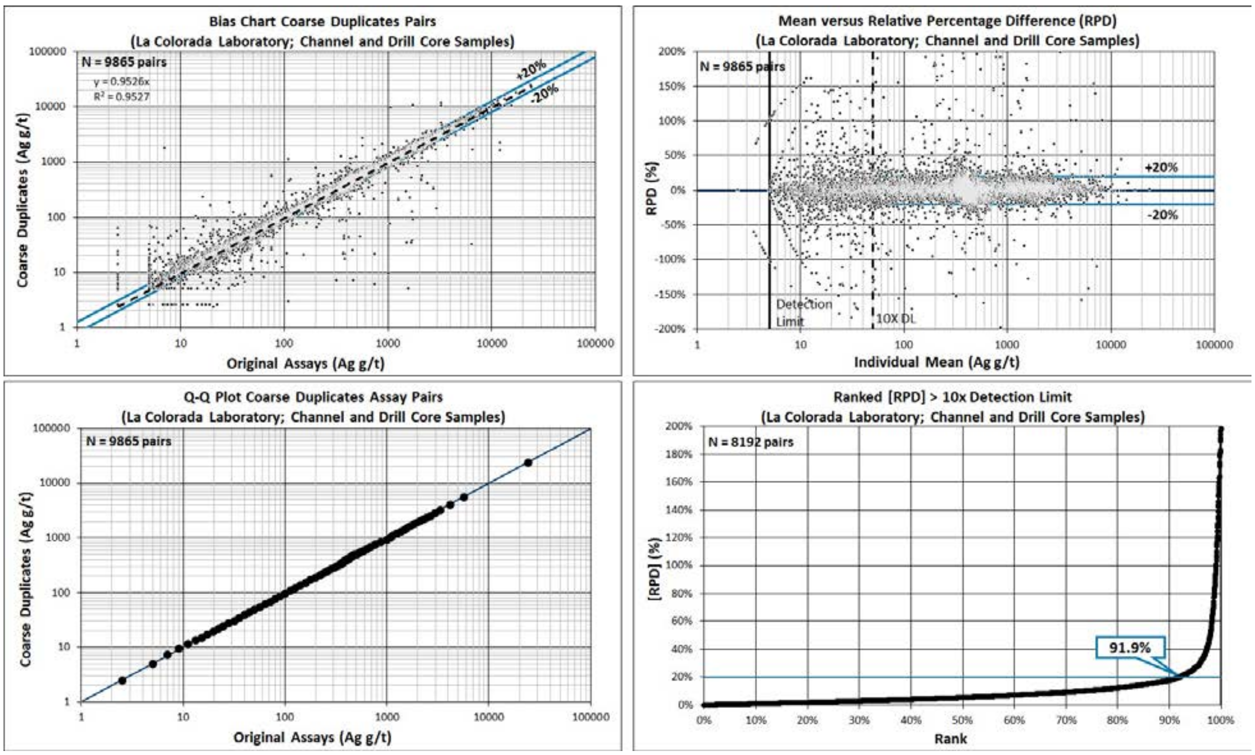


Figure 11-3: Silver grades in duplicate pairs from the La Colorada Vein Mine (La Colorada Laboratory, 2009–2023)

QAQC Skarn Project

When sampling the Skarn Project, Pan American inserts either one blank or one CRM for every 10 samples submitted to the primary laboratories (SGS, Actlabs, or ALS). In addition, coarse reject/preparation duplicates are selected from samples returning high assays at a monthly submission rate of 5%.

Assay results for blanks showing silver, copper, lead and zinc are presented in Figure 11-4. Results obtained indicate that the cleaning protocol between samples is effective at minimizing contamination.

Project	La Colorada Skarn Project
Data Series	2019 - 2023
Data Type	Drill core samples
Commodity	Ag (g/t); Cu (%); Pb (per); Zn (%)
Laboratory	All laboratories
Analytical Method	Au: Fire Assay AAS; Ag, Pb, Cu Zn: MA ICP, AAS
Detection Limit	0.005 g/t Au, 2 g/t Ag, 0.001% Cu, 0.001% Pb, 0.001% Zn
Source	Pan American, 2023

Control Samples	Coarse Blank			
Statistics	Ag	Cu	Pb	Zn
Sample Count	9,278	9,278	9,278	9,278
Expected Value	2.000	0.001	0.0010	0.0010
Observed Average	0.699	0.000	0.002	0.003
Standard Deviation	1.782	0.004	0.013	0.070
Upper Limit (10xDL)	0.01%	0.17%	1.94%	3.98%

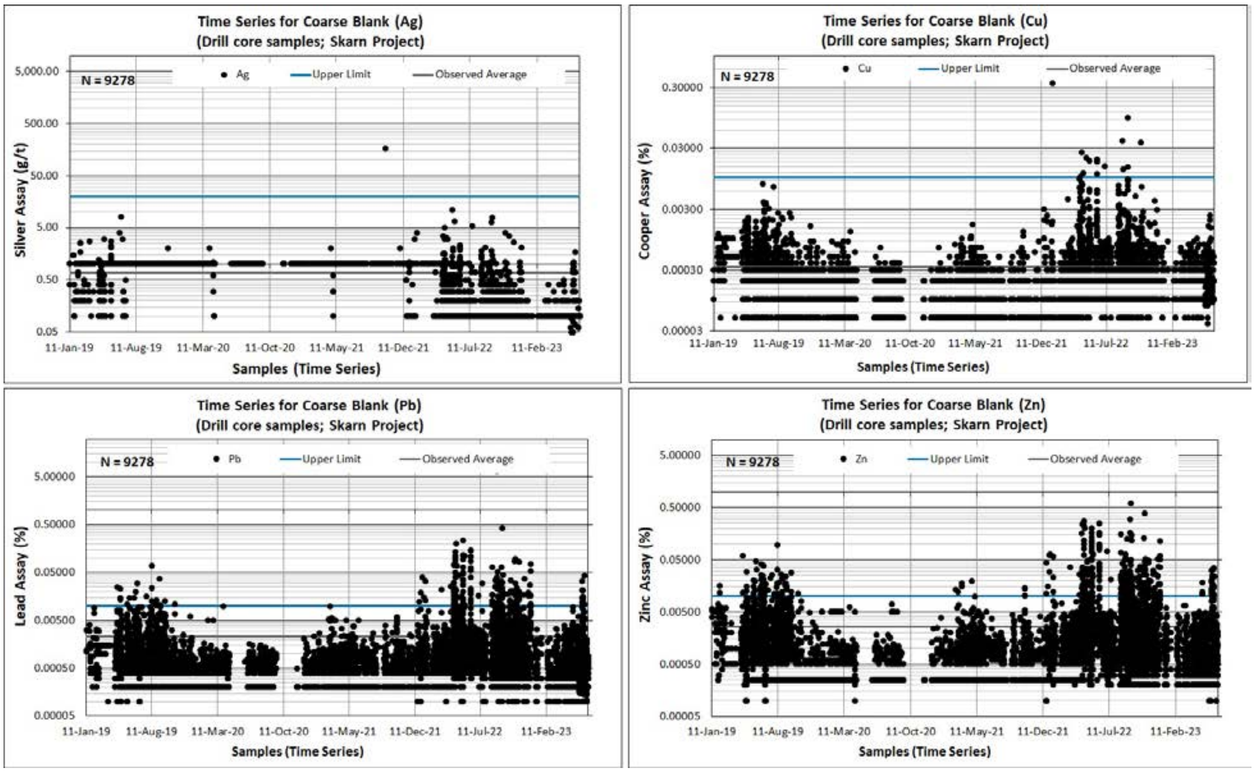


Figure 11-4: Blank sample results analysed from the Skarn Project (various laboratories, 2019–2023)

Lead and zinc assay results for CRMs tested from 2018 to 2023 are presented in Figure 11-5. The results are plotted as the Z-score versus time. The CRMs results show good accuracy for all monitored analytes. The acceptance level for the reference materials is between 98.9% and 99.72%. No bias is observed for gold, copper, lead or zinc; a slight positive bias is observed for silver (with 76.5% of the results above the reference value) but is constrained within 3 standard deviations.

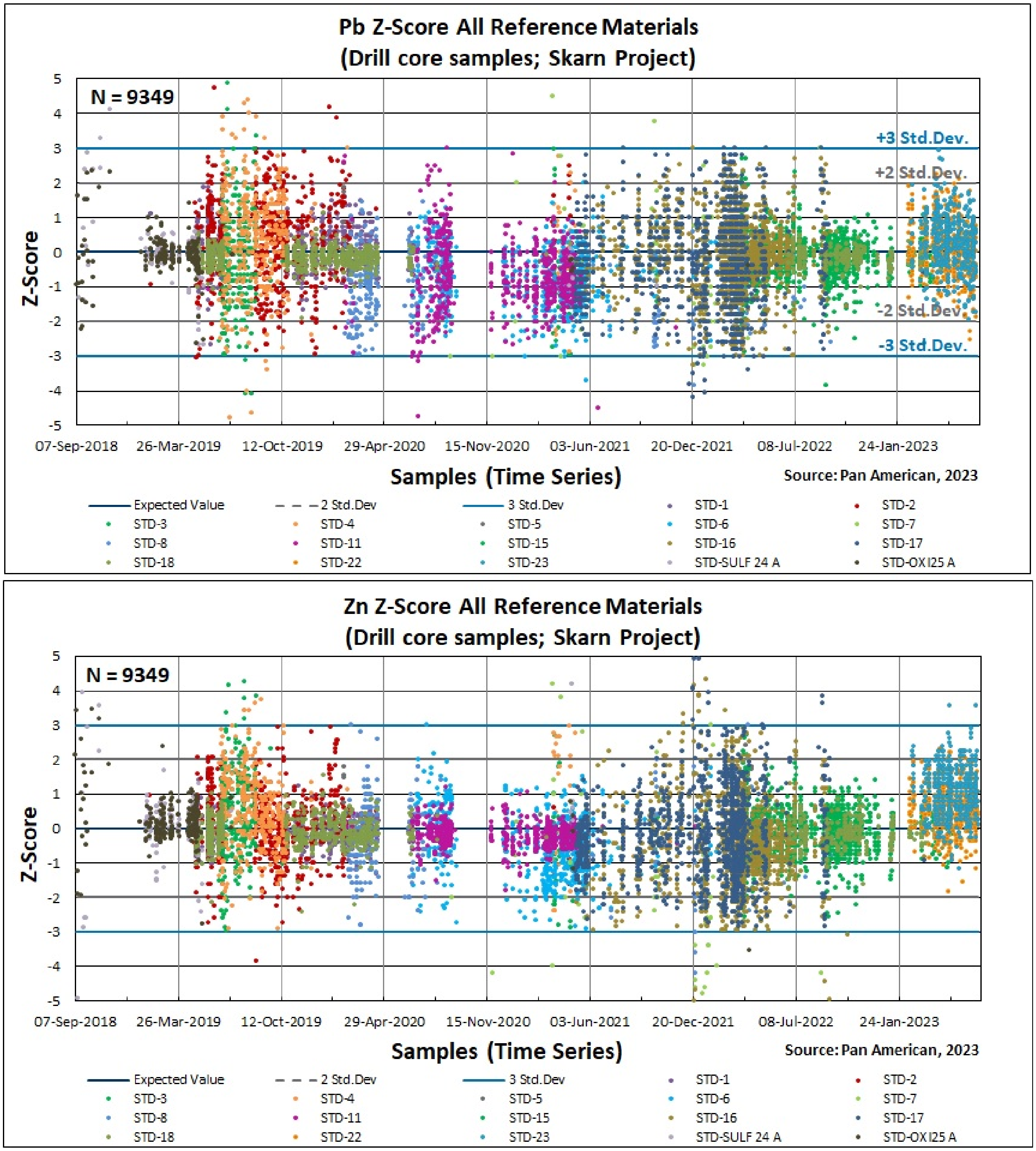


Figure 11-5: Lead and zinc Z-score of CRMs from the Skarn Project (2018–2023)

Approximately 1 sample in 20 (or 5% of samples) is resubmitted as a coarse reject duplicate. Results comparing the original lead assays with their coarse reject duplicates, submitted between 2019 and 2023, are shown in Figure 11-6. For duplicate pairs with a mean grade above 0.01% Pb, 92.6% of the pairs have a relative percentage difference (RPD) of < 20%, indicating excellent reproducibility. Similarly good reproducibility has been observed with zinc (91.6% of samples below 20% RPD), copper (92.2% of samples below 20% RPD), and silver (91.7% of samples below 20% RPD).

Project	La Colorada Skarn Project	Statistics	Original	Duplicate
Data Series	2019-2023 Coarse Reject Duplicates	Sample Count	5,825	5,825
Data Type	Drill Core Samples	Minimum Value	0.0002	0.0004
Commodity	Pb in %	Maximum Value	49.9200	52.2700
Analytical Method	Agua Regia/AES	Samples > 10DL	5,603	
Detection Limit	0.001 % Pb	Pairs +/- 20% RPD if > 10DL	92.6%	
Original Dataset	Original Assays	Precision = 2xCV		
Paired Dataset	Coarse Duplicates	Precision 10DL to 1 % Pb	20.5%	
		Precision 1 to 5 % Pb	15.2%	
Source	Pan American, 2023	Precision > 5 % Pb	14.9%	

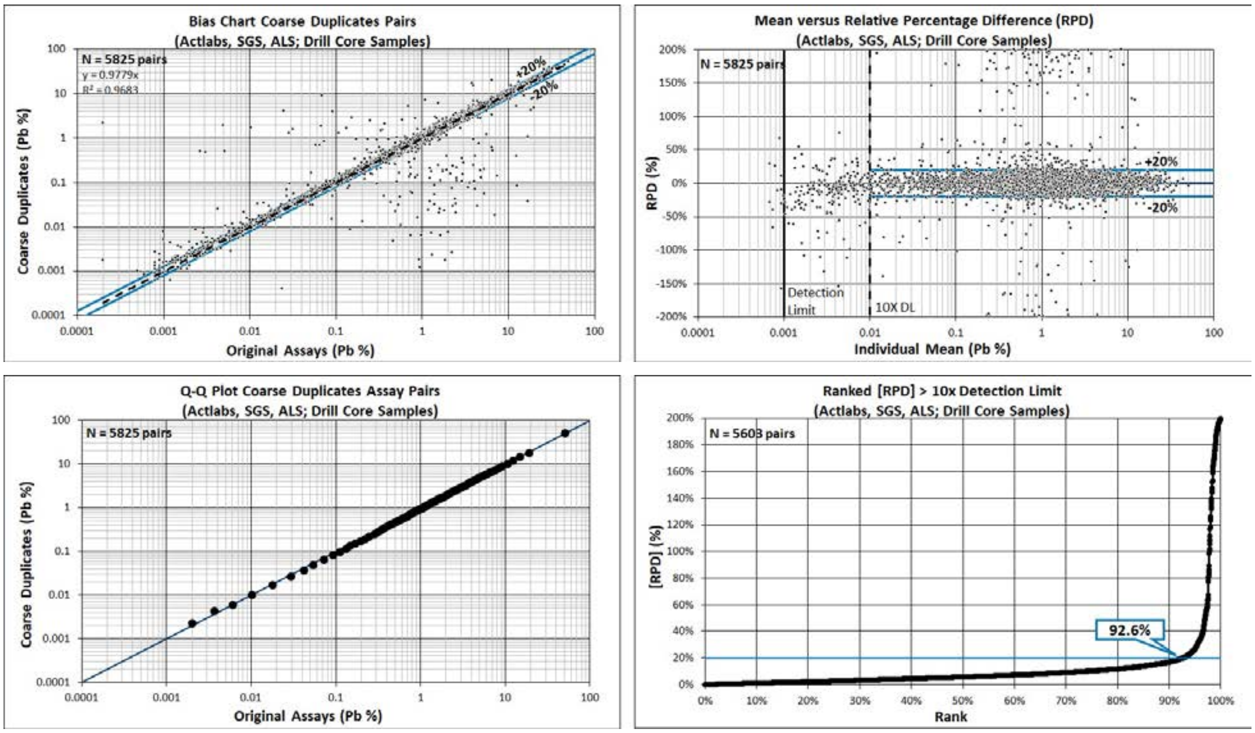


Figure 11-6: Lead grades in duplicate pairs from the Skarn Project (various laboratories, 2019–2023)

11.4 Bulk Density

Spatially and geologically representative samples have been measured for bulk density using the water displacement method and the results are used for the estimation of tonnes and contained metal in the mineral resource and reserve estimates.

11.5 Material Impact on the Accuracy and Reliability of Sample Data

The opinion of the qualified person responsible for this section of the technical report is that the sample preparation, analytical, and security procedures followed for the samples are sufficient and reliable for the purpose of the mineral resource and mineral reserve estimates.

12 Data Verification

This section describes the information verification procedures performed by Pan American and those reviewed by the qualified persons responsible for this technical report. There were no limitations in the ability of the qualified persons to verify the data. All qualified persons have completed site visits to verify available information and discuss with on-site personnel. It is the opinion of the qualified persons that the data used for the purposes of this technical report are adequate.

12.1 Mine Engineering Data Verification

The qualified person, Martin Wafforn, P.Eng., undertakes regular reviews of Pan American's mining fleet; its mine operational and production data; grade control data including dilution and ore loss; geotechnical and hydrological studies; waste disposal requirements; environmental and community factors; processing data; development of the LOM plan including production and recovery rates, capital and operating cost estimates 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 mineral resource and mineral reserve estimates and economic model.

In the opinion of the qualified person, the data, assumptions, and parameters used to estimate mineral resources and mineral reserves are sufficiently reliable for those purposes.

12.2 Geology Data Verification

The qualified person, Christopher Emerson, FAusIMM, undertakes regular reviews, for both the La Colorada Vein Mine and the Skarn Project, of drilling plans; drilling, sampling, and QAQC results; drill core and geological interpretations; mineral resource estimation procedures including the interpretations of mineralization; and reconciliation between the mine plan and the processing plant. During site visits, the exploration drilling, sample, and security protocols are reviewed, along with the operational mine plan, actual mine operation data, and grade control protocols.

In the opinion of the qualified person, the data and parameters used to estimate mineral resources and mineral reserves are sufficiently reliable for those purposes.

12.3 Mine Engineering of the Skarn Project PEA Data Verification

The qualified person, Peter Mollison, P.Eng., oversaw the Skarn Project PEA including reviewing the work conducted by external consultants regarding the mine engineering aspects of the PEA.

In the opinion of the qualified person, the data, assumptions, and parameters used to prepare the mining engineering sections of the Skarn Project PEA are sufficiently reliable for those purposes.

12.4 Metallurgy Data Verification

The qualified person, Americo Delgado, P.Eng., undertakes regular reviews of Pan American's processing plants, tailings storage facilities and dams, and operational data including metallurgical results, production, reagent consumption, treatment rates, plant availabilities and utilization, pumping capacities, pond levels, solution concentrations, metallurgical and analytical lab procedures, and general business performance. The qualified person also oversaw the Skarn Project PEA and reviewed work conducted by external consultants regarding the surface infrastructure, metallurgy, and tailings storage aspects of the PEA.

In the opinion of the qualified person, the metallurgical testing and analytical procedures are reliable for the purposes used in this technical report. The available operating results relating to the recoverability of silver, zinc, and lead show that the processing methods used at the La Colorada Property are appropriate and adequate for the type of mineralization. In addition, the tailings management systems followed during design, construction, and operation are aligned with best practices and considered suitable for the La Colorada Vein Mine.

12.5 Environment, Social, and Permitting Data Verification

The qualified person, Matthew Andrews, FAusIMM, undertakes regular reviews of Pan American's environmental, social, and permitting factors including baseline studies, impact assessments, water studies, water treatment plants, mine closure plans and cost estimates, and related risks.

In the opinion of the qualified person, the La Colorada Property's environmental studies, project permitting status, social and community involvement, and mine closure plans are considered adequate for this operation and for the Skarn Project PEA.

13 Mineral Processing and Metallurgical Testing

13.1 Introduction and Previous Work

The metallurgical assumptions used in this technical report for the mineral resource and mineral reserve estimates for deposits at the La Colorada Vein Mine are based on operational plant performance and are confirmed by bench-scale testing of samples representative of the planned monthly mine feed. This work has confirmed that the optimum processing method is selective lead/zinc sulphide flotation for sulphide ore and cyanidation for oxide ore.

The metallurgical assumptions used for the Skarn Project are based on mineral processing and metallurgical testing conducted on representative samples. The test work has confirmed the optimum processing method of lead/zinc sulphide flotation and is expected to have a very good metallurgical performance, producing high-grade lead and zinc concentrates with high metal recoveries. The mineral processing and metallurgical testing for the Skarn Project, including expected metallurgical recovery, description of the concentrates, and if material issues or deleterious elements were found, are described in Section 24.1.4.

13.2 Metallurgical Recovery

In the sulphide plant, recoveries in 2023 averaged 93% for silver, 58% for gold, 86% for lead, and 84% for zinc. In the oxide plant, metallurgical recoveries in 2023 averaged 82% for silver and 43% for gold. Table 13-1 summarizes the silver, gold, zinc, and lead recoveries and throughputs achieved in the plant from 2017 to 2023.

Table 13-1: Production at La Colorada mineral processing plant from 2017 to 2023

	2017	2018	2019	2020	2021	2022	2023
Oxide Ore							
Tonnes Milled	163,341	183,113	140,126	76,393	106,164	71,876	46,078
Throughput (tpd)	448	502	384	209	291	197	126
Grades							
Ag g/t	314	291	302	360	326	337	250
Au g/t	0.24	0.27	0.28	0.3	0.28	0.26	0.25
Recoveries							
Ag Recovery	84%	84%	84%	85%	84%	84%	82%
Au Recovery	54%	48%	48%	53%	53%	49%	43%
Sulphide Ore							
Tonnes Milled	491,985	542,855	628,618	482,751	466,300	569,178	491,008
Throughput (tpd)	1,348	1,487	1,722	1,319	1,278	1,559	1,345
Grades							
Ag g/t	386	381	375	299	309	313	279
Au g/t	0.35	0.35	0.33	0.32	0.24	0.26	0.23
Pb %	2.1%	1.9%	2.0%	1.6%	1.3%	1.2%	1.0%
Zn%	3.7%	3.8%	3.8%	3.2%	2.5%	2.1%	1.8%
Recoveries							
Ag Recovery	93%	93%	93%	92%	92%	92%	93%
Au Recovery	66%	60%	61%	61%	61%	63%	58%
Pb Recovery	87%	87%	88%	85%	83%	84%	86%
Zn Recovery	84%	87%	88%	87%	85%	84%	84%

	2017	2018	2019	2020	2021	2022	2023
Total Production							
Tonnes Milled	655,326	725,967	768,744	559,144	572,464	641,054	537,086
Ag g/t	368	358	361	308	312	316	277
Ag Recovery	91%	91%	92%	91%	90%	91%	92%
Silver Ounces Oxide	1,380,455	1,433,131	1,138,961	749,235	931,932	653,306	305,386
Silver Ounces Sulphide	5,675,654	6,184,125	7,066,844	4,275,572	4,239,462	5,273,877	4,086,608
Total Silver Ounces	7,056,109	7,617,256	8,205,805	5,024,807	5,171,394	5,927,183	4,391,993
Gold Ounces	4,288	4,398	4,613	3,474	2,714	3,327	2,261
Zinc Tonnes	15,440	17,785	20,974	13,582	9,984	10,017	7,373
Lead Tonnes	8,796	8,845	11,149	6,631	5,190	5,647	4,220

13.3 Material Issues and Deleterious Elements

All processing factors, including an allowance for deleterious elements, have been considered in the flow sheet and financial model, based on operational performance and results.

14 Mineral Resource Estimates

Mineral resource estimates were carried out separately for the La Colorada Vein Mine and the Skarn Project. The La Colorada Vein Mine mineral resource consists of 64 mineralized zones, each estimated separately. Annual updates are carried out on those mineralized zones that have significant mining or additional drilling information since their previous estimate. The Skarn Project is updated when significant additional drilling information becomes available. The Skarn Project is distinct from the La Colorada Vein Mine and is estimated separately.

Both the La Colorada Vein Mine and the Skarn Project were estimated in accordance with the generally accepted standards set out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practice Guidelines (November 2019) and classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines. Mineral resources are not mineral reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources will be converted into mineral reserves.

The combined mineral resource for the La Colorada Vein Mine and the Skarn Project is tabulated below in Table 14-1. The effective date of the mineral resource is June 30 2023 for the La Colorada Vein Mine and December 18 2023 for the Skarn Project. Mineral resources are reported exclusive of mineral reserves and mineral resources that are not mineral reserves do not have demonstrated economic viability.

For the La Colorada Vein Mine, the vein, hanging wall and footwall zones were combined into a practical mining width that includes 40 cm or 35 cm of each hanging wall and footwall for cut and fill or long-hole stoping mining methods respectively. A minimum mining width of 2.6 m was used for cut and fill and 2.2m for long-hole mining areas. The resulting diluted mining intervals were reported above a cut-off grade that varies per mineralized zone and was calculated using prices of US$19 per ounce of silver US$1,300 per ounce of gold, US$2,600 per tonne of zinc, and US$2,000 per tonne of lead. The lead and zinc grades listed for the La Colorada Vein Mine are averages for the deposit, however, the only payable base metals are those from concentrates produced from the sulphide ores, not those from the doré produced from the oxide ores.

The mineral resource estimate for the Skarn Project was reported using a Net Smelter Return (NSR) cut-off grade. The metal price assumptions used for the long term Skarn Project mineral resource statement are higher than those used for the La Colorada Vein Mine mineral reserves to reflect Pan American's view of the long term metal prices as well as reasonable prospects for eventual extraction of the Skarn Project mineral resource. NSR values were calculated using metals prices of US$22/oz silver, US$2,800/t zinc, and US$2,200/t of lead and metallurgical recoveries of 87.4% silver, 88% lead and 93% zinc with mineral concentrates containing 67% Pb in the lead concentrate and 60% Zn in the zinc concentrate, obtained from metallurgical testing. The Skarn Project's mineral resource estimate was reported by determining the total in-situ tonnes and metal grades constrained inside volumes that are based on a SLC mining method. To determine the constraining SLC shapes, an initial elevated cut-off value of $50/t NSR was applied. Geotechnical, geometry and caving rules were then applied to ensure that practical mining shapes and sequences were achieved. Each level, and each zone was individually tested for overall economics, and then tested as part of the caving sequence. The resulting constraining shapes were then considered as practical mining outlines. The tonnes and grades are inclusive of the must-take low-grade material within the volume. No other mining recovery, ring recovery, dilution, or mineral losses have been applied. Additional material outside the SLC shapes but within the development volumes that is above a cut-off grade of $10/t NSR was included in the mineral resource estimate.

The qualified person responsible for this section of the technical report is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the mineral resource estimate.

Table 14-1: Mineral resource statement for the combined La Colorada Vein Mine and Skarn Project

Classification	Tonnes (Mt)	Ag Grade (g/t)	Ag Metal (Moz)	Au Grade (g/t)	Au Metal (Moz)	Pb Grade (%)	Pb Metal (Mt)	Zn Grade (%)	Zn Metal (Mt)
La Colorada Vein Mine									
Measured	0.7	153	3.58	0.13	0.00	0.64	0.00	1.18	0.01
Indicated	2.5	182	14.62	0.19	0.02	0.87	0.02	1.41	0.04
M+I	3.2	175	18.19	0.18	0.02	0.82	0.03	1.36	0.04
Inferred	14.7	174	82.23	0.20	0.09	0.94	0.14	1.67	0.25
Skarn Project									
Indicated	173.6	33	183.18	-	-	1.32	2.29	2.79	4.84
Inferred	103.6	35	116.18	-	-	1.03	1.07	2.47	2.56
Total									
Measured	0.7	153	3.58	0.13	0.00	0.64	0.00	1.18	0.01
Indicated	176.1	35	197.80	0.00	0.02	1.31	2.31	2.77	4.88
M+I	176.8	35	201.38	0.00	0.02	1.31	2.31	2.76	4.89
Inferred	118.3	52	198.41	0.02	0.09	1.02	1.21	2.37	2.80

1. *Numbers may not add up due to rounding.*
2. *Mineral resources exclude those mineral resources that were converted to mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.*
3. *Mineral resources were estimated in accordance with the guidelines laid out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practice Guidelines (November 2019) and classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*
4. *For the La Colorada Vein Mine, the vein, hanging wall and footwall zones were combined into a practical mining width that includes a minimum dilution of 40 cm, or 35 cm of each hanging wall and footwall for cut and fill or long-hole stoping mining methods respectively. A minimum mining width of 2.6 m was used for cut and fill and 2.2 m for long-hole mining areas.*
5. *For the La Colorada Vein Mine, the diluted mining interval was reported above an economic cut-off grade that was calculated using a price of US$19 per ounce of silver US$1,300 per ounce of gold, US$2,600 per tonne of zinc, and US$2,000 per tonne of lead. Economic cut-off grades used for reporting the resource vary for each vein as a function of oxidation, depth, mining method, and geotechnical and processing variables.*
6. *The La Colorada Vein Mine's listed lead and zinc grades are averages for the deposit. However, the only payable base metals are those from concentrates produced from the sulphide ores, not those from the doré produced from the oxide ores.*
7. *The effective date for the mineral resource estimate for the La Colorada Vein Mine is June 30, 2023.*
8. *Prices used to report the Skarn Project mineral resources were: US$22 per ounce of silver, US$2,800 per tonne of zinc, and US$2,200 per tonne of lead.*
9. *For the Skarn Project mineral resource, an estimated NSR (in US$/t) was calculated using metallurgical recoveries, obtained from metallurgical testing, of 87.4% silver, 88% lead and 93% zinc with mineral concentrates containing 67% Pb in the lead concentrate and 60% Zn in the zinc concentrate. Estimates for transport, payability, and refining/selling costs, based on experience and long-term views of the marketing, treatment, and refining of these types of mineral concentrates, were included.*
10. *Reasonable prospects for eventual economic extraction were assessed for the Skarn Project by determining the total in-situ tonnes and metal grades constrained inside volumes that were based on a SLC mining method. To determine the constraining SLC shapes, an initial elevated cut-off value of $50/t NSR was applied. Geotechnical, geometry and*

caving rules were then applied to ensure that practical mining shapes and sequences were achieved. Each level, each zone was individually tested for overall economics, and then tested as part of the caving sequence. The resulting constraining shapes were then considered as practical mining outlines. The tonnes and grades are inclusive of the must-take low-grade material within the volume. No other mining recovery, ring recovery, dilution, or mineral losses have been applied. Additional material outside the SLC shapes but within the development volumes that is above a cut-off grade of $10/t NSR was included in the resource.

11. *The effective date of the Skarn Project mineral resources estimate is December 18, 2023. The geological model was completed in December 2022 and results from diamond drilling conducted in 2023 are therefore not included in this estimate.*
12. *The mineral resource estimates for the La Colorada Vein Mine and Skarn Project were prepared under the supervision, or reviewed by Christopher Emerson, FAusIMM, who is a qualified person as that term is defined in NI 43-101.*

14.1 Mineral Resource Estimate of the La Colorada Vein Mine

This section describes the mineral resource estimation for the vein deposits at the La Colorada Vein Mine. These deposits include 61 mineralized veins and 3 mineralized breccias. The estimate is based on drilling and channel sampling conducted until May 31, 2023. The mineral resource has an effective date of June 30, 2023.

Mineral resource estimation for the Skarn Project, effective December 18, 2023, is outlined in Section 14.2.

14.1.1 Introduction

The mineral resource for the vein deposits at the La Colorada Vein Mine was estimated using block models that contain a total of 64 mineralized zones. Annual resource updates are carried out for zones where significant additional drilling or mining has occurred since the previous update; of the 64 mineralized zones, 24 were updated in 2023.

Three-dimensional (3D) geological modelling and grade estimation has been carried out on site at the La Colorada Vein Mine using the Leapfrog Geo and Datamine Studio RM software packages. A combination of ordinary kriging (OK) and length-weighted inverse distance (LWID) methods are used to interpolate grade into the five main veins (Amolillo, NC2, HW, Recompensa and Veta 3), and a LWID interpolation method is used for the minor veins and breccia zones.

14.1.2 Database

The drilling database includes all historical drilling and infill drilling data collected between 1997 (prior to PAS acquisition) and the end of May 2023. A total of 2,508 core drill holes and 217,052 underground channels were included in the 2023 models. The resource database for the 2023 models was closed for most veins on May 31, 2023. The La Colorada Geology Modelling Department was responsible for updating the drill hole and channel sampling database.

Exploration and production data were received as a set of CSV tables that included collar, survey, lithology, oxidation and assay data. The tables were imported into Leapfrog Geo and Datamine Studio RM for validation, geological modelling, and estimation. The database was validated for missing information, overlapping records, and anomalous values. Errors were corrected and the database updated. Assays below detection were set at half the detection limit prior to use in estimation.

14.1.3 Geological Modelling and Domains

A total of 64 mineralized zones are defined at the La Colorada Vein Mine; 61 of these zones are mineralized veins and three are mineralized breccias. The mineralized zones are located in the extensions of the existing underground mine workings or adjacent to them. Mineralized vein structures measure between 0.20 and 3.0 m thick, strike generally NE-SW, and dip between 40 and 90 degrees. Mineralization is in the form of veins, veinlets, and breccias which contains mainly silver with minor amounts of gold, lead, and zinc.

3D geological modelling of each vein structure was carried out in Leapfrog Geo software at the mine site. Exploration drilling and channel sampling results were used to define the vein wireframes; structural observations and mapping from mine levels were incorporated in the model. Vein intersections were defined using geological logging data from drill holes and channels samples. No minimum mining width was used to model the mineralized vein shapes. Wireframes were extrapolated to a maximum of half the local drill hole spacing, measured from the last defined vein intersection. In addition to the mineralized vein wireframes, hanging wall and footwall wireframes were constructed for each vein structure by applying a 2 m offset either above (hanging wall wireframe) or below (footwall wireframe) each of the defined veins.

Three additional wireframes were constructed for the breccias based on geological logging data. No hanging wall or footwall zones were defined for the breccias.

The final mineralization and hanging wall/footwall wireframes were audited and reviewed internally prior to use in estimation. Each mineralized zone was assigned a domain code; the hanging wall and footwall zones were assigned the same domain code as the mineralized vein plus a suffix of 01 (for hanging wall) or 02 (for footwall).

The vein system is currently modelled to cover an area extending over 3,000 m along strike, 2,000 m wide and 1,000 m deep. The spatial distribution of the mineralized structures is shown in Figure 14-1.

Table 14-2 lists details for the modelled veins, their domain codes, year they were updated, average grade and proportion of the total mineral resource (for all classification categories). Recompensa, NC2, HW, Veta 3 and Amolillo are the five main vein structures and account for 37% of the total silver ounces contained in the resource model. Mining activities are focused on the five main veins and have the majority of mineral resources converted to mineral reserves. These represent the most material veins to the La Colorada Property and, as such, are highlighted in this technical report.

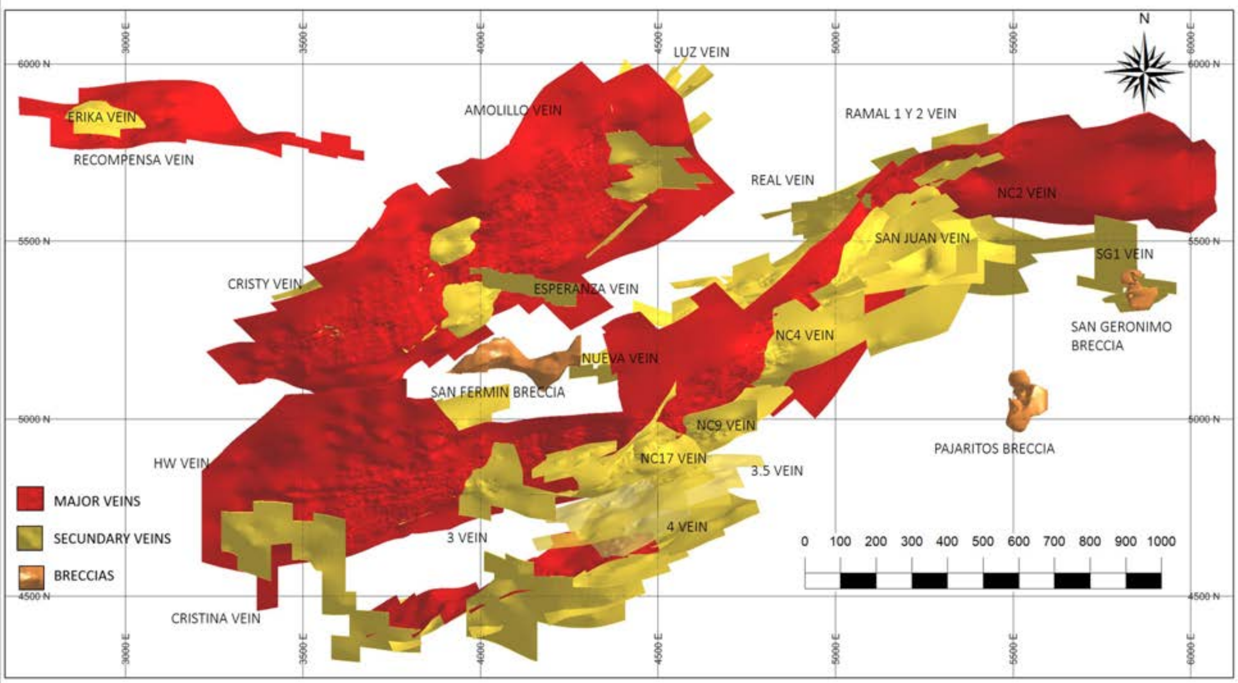


Figure 14-1: La Colorada Vein Mine modelled principal vein structures (red), secondary structures (yellow) and breccias (orange)

Table 14-2: Modelled mineralized structures, associated domain codes and proportion of total

Domain	Vein	Year Updated	Average Ag Grade (g/t)	% Total Resource Ag (oz)
202	NC2	2023	227	12.2%
401	AMOLILLO	2023	230	7.7%
309	VETA 3	2023	390	7.0%
302	HW	2023	238	5.6%
110	RECOMPENSA	2023	201	4.6%

Domain	Vein	Year Updated	Average Ag Grade (g/t)	% Total Resource Ag (oz)
308	VETA 3.5	2023	290	3.7%
601	SAN FERMIN BX	2022	93	3.0%
770	SG1	2022	360	2.8%
306	VETA 3.6	2023	342	2.7%
220	ZENDY	2021	384	2.7%
215	VETA 4	2021	255	2.7%
760	BX PAJARITOS	2022	82	2.5%
921	CRISTINA	2023	201	2.4%
203	NC3	2021	306	2.1%
609	SAN GERONIMO BX	2022	136	2.1%
209	NC8	2022	302	1.8%
412	ESPERANZA	2021	213	1.7%
210	NC9	2023	208	1.7%
208	NC7	2022	228	1.7%
305	4235	2021	271	1.5%
221	RAMAL 1 NC2	2023	319	1.5%
422	LIZ	2023	364	1.4%
404	LUNA ROJA	2022	247	1.3%
315	FERNANDA	2022	528	1.2%
750	SAN JUAN	2021	88	1.1%
227	VETA REAL	2023	258	1.1%
607	INVERSA	2021	241	1.0%
407	LUZ	2023	206	1.0%
213	VETA NUEVA	2023	204	1.0%
211	NC10	2022	345	1.0%
219	DOÑA	2023	307	0.9%
303	HW2	2021	283	0.9%
194	NC14	2021	262	0.8%
120	ERIKA	2021	146	0.8%
301	FW	2021	153	0.8%
228	ISABEL	2022	194	0.8%
311	INTERMEDIA 1	2021	400	0.7%
197	NC5	2022	226	0.7%
415	LANA	2022	111	0.7%
196	NC4	2022	144	0.6%
500	ARACELI	2023	316	0.6%
201	NC1	2021	531	0.6%
193	NC15	2021	128	0.6%
217	NC17	2023	272	0.6%
403	ESTRELLA	2021	229	0.6%
207	NC6	2021	147	0.6%
297	FW1	2022	206	0.5%
300	CAPRICHO	2023	155	0.5%
225	MONICA	2021	159	0.5%
216	NC16	2021	90	0.4%
310	VETA 2	2021	413	0.4%
304	VETA 3.4	2023	210	0.4%
405	AMOLILLO III	2021	148	0.4%

Domain	Vein	Year Updated	Average Ag Grade (g/t)	% Total Resource Ag (oz)
408	AMOLILLO II	2023	221	0.4%
409	ANNA	2022	255	0.3%
420	CRISTY	2023	203	0.3%
411	AMOLILLO VII	2021	196	0.3%
222	RAMAL 2 NC2	2023	133	0.2%
616	INVERSA VI	2023	154	0.1%
195	NC12	2022	471	0.1%
218	ABRIL	2022	147	0.1%
421	CARMEN	2023	232	0.1%
414	MIA	2022	121	0.1%
230	OLGA	2021	137	0.0%
226	LUCY	2022	153	0.0%

14.1.4 Compositing and Capping

For the main veins and associated hanging wall and footwall domains, samples were not composited. Length weighted estimates were carried out to account for any potential bias that may result from estimation using samples of unequal length. Table 14-3 lists the length-weighted statistics for these veins.

Table 14-3: Length-weighted basic statistics for the main five veins

Vein	Domain	Element	Sample Count	Minimum	Maximum	Mean Grade	Standard Deviation	CV
Recompensa	110	Ag g/t	1,998	0.5	15,007	995	1,588	1.6
		Au g/t	1,998	0.01	81	1.2	4.5	3.8
		Pb %	1,998	0.005	72	3.8	6.7	1.8
		Zn %	1,998	0.005	59	3.5	4	1.2
NC2	202	Ag g/t	15,791	0.5	42,508	1,099	1,424	1.3
		Au g/t	15,791	0.003	139	0.7	2.1	3
		Pb %	15,791	0.001	63	4.8	5.1	1.1
		Zn %	15,791	0.005	63	9.2	7.6	0.8
HW	302	Ag g/t	13,794	0.5	42,669	806	1,289	1.6
		Au g/t	13,794	0.01	80	0.3	1.7	5.1
		Pb %	13,794	0.005	58	2.1	3.5	1.7
		Zn %	13,794	0.005	45	3.4	5.4	1.6
Veta 3	309	Ag g/t	1,152	2.5	24,895	1,844	2,366	1.3
		Au g/t	1,152	0.015	189	2.7	10.9	4.1
		Pb %	1,152	0.005	39	5.1	4.8	0.9
		Zn %	1,152	0.005	41	8	6.7	0.8
Amolillo	401	Ag g/t	26,096	0.5	33,766	705	1,024	1.5
		Au g/t	26,096	0.01	55	0.8	1.8	2.3
		Pb %	26,096	0.005	55	2	3.9	2
		Zn %	26,096	0.005	58	3.2	5.5	1.7

For the minor veins samples were composited. Composites were created for each of the vein, hanging wall, and footwall domains using a maximum composite interval that approximated the full thickness of the domain, thus creating a single composite per domain for the vast majority of drill holes and channels. The composite length was adjusted to fit the domain and no minimum composite length was used. As for the major veins, estimates were length weighted to remove any potential bias created by using unequal composite lengths. Table 14-4 details the composite statistics for the five most sampled minor veins.

Table 14-4: Basic statistics of composites for the best informed minor veins

Vein	Domain	Element	Sample count	Minimum	Maximum	Mean	Standard Deviation	CV
FW	301	Ag g/t	2,565	0.5	25,332	618	1,043	1.7
		Au g/t	2,565	0.01	164	0.3	3.9	14.7
		Pb %	2,565	0.005	29	0.8	2	2.4
		Zn %	2,565	0.005	35	1.3	2.6	2.0
Veta Nueva	213	Ag g/t	1,854	3	25,388	2,816	2,920	1.0
		Au g/t	1,854	0.015	8	0.3	0.5	1.5
		Pb %	1,854	0.01	46	6.4	5.9	0.9
		Zn %	1,854	0.039	42	12.2	9.6	0.8
NC3	203	Ag g/t	1,829	1	30,057	2,110	2,584	1.2
		Au g/t	1,829	0.01	22	0.5	1.2	2.1
		Pb %	1,829	0.005	40	4.9	5.3	1.1
		Zn %	1,829	0.005	45	9.3	8.9	1.0
NC1	201	Ag g/t	1,802	2	23,588	1,610	1,659	1.0
		Au g/t	1,802	0.015	29	0.4	1.1	2.7
		Pb %	1,802	0.005	39	4.3	4.5	1.0
		Zn %	1,802	0.005	44	8.7	7.2	0.8
Luz	407	Ag g/t	1,388	0.5	15,523	915	1,270	1.4
		Au g/t	1,388	0.01	9	0.4	0.5	1.4
		Pb %	1,388	0.005	42	2.7	3.8	1.4
		Zn %	1,388	0.005	61	5.1	6.1	1.2

Outlier analysis was undertaken on sample or composite data for all elements within each domain. Traditionally, outliers are capped globally using the data distribution to guide an appropriate capping threshold and all data above that threshold are reset to the threshold value. This approach was not considered appropriate as, in many areas, sample grades were not sufficiently high to be above a global outlier threshold, but were significantly higher than the surrounding composite grades. Retaining these samples without capping could result in a local overestimation of the grade. For this reason a local capping approach was selected. This approach calculates the average grade in a local search ellipse with and without a composite. If including the composite causes a significant difference in the local averages, the composite is considered a local outlier and the composite grade is reduced to a value that doesn't impact the local averages is significantly. This approach does not target only high-grade composites and, indeed, the highest-grade composites globally may not be capped if they are surrounded by composite grades of a similar magnitude. Thresholds for determining what is considered a significant difference were selected to ensure that approximately 5% of data was capped.

Table 14-5 shows the impact of local capping on the mean and coefficient of variation (calculated by dividing the standard deviation by the mean) for the five main veins. Although only the vein intersections are shown in the table, the hanging wall and footwall domain data were capped in the same way.

Table 14-5: Impact of local capping on the mean and CV for the five major veins

Vein	Domain	Element	Number Samples	Raw data		Capped data		% Data capped	% Difference	
				Mean	CV	Mean	CV		Mean	CV
Recompensa	110	Ag g/t	1,998	995	1.60	899	1.43	6%	-10%	-10%
		Au g/t	1,998	1.19	3.75	0.89	2.93	5%	-26%	-22%
		Pb %	1,998	3.8	1.77	3.48	1.64	5%	-8%	-7%
		Zn %	1,998	3.49	1.16	3.31	1.04	5%	-5%	-10%
NC2	202	Ag g/t	15,791	1099	1.30	1025	1.08	5%	-7%	-17%
		Au g/t	15,791	0.71	3.00	0.61	1.55	4%	-15%	-48%
		Pb %	15,791	4.78	1.06	4.59	0.98	4%	-4%	-7%
		Zn %	15,791	9.21	0.83	9.13	0.82	2%	-1%	-1%
HW	302	Ag g/t	13,794	806	1.60	734	1.31	5%	-9%	-18%
		Au g/t	13,794	0.34	5.09	0.27	3.05	3%	-22%	-40%
		Pb %	13,794	2.09	1.69	1.91	1.60	5%	-8%	-5%
		Zn %	13,794	3.39	1.60	3.22	1.60	5%	-5%	0%
Veta 3	309	Ag g/t	1,152	1844	1.28	1682	1.05	5%	-9%	-18%
		Au g/t	1,152	2.67	4.09	1.83	2.61	5%	-31%	-36%
		Pb %	1,152	5.06	0.94	4.89	0.89	3%	-3%	-6%
		Zn %	1,152	7.99	0.84	7.78	0.82	5%	-3%	-2%
Amolillo	401	Ag g/t	26,096	705	1.45	655	1.22	5%	-7%	-16%
		Au g/t	26,096	0.78	2.26	0.66	1.45	5%	-15%	-36%
		Pb %	26,096	1.98	1.98	1.79	1.83	5%	-10%	-8%
		Zn %	26,096	3.21	1.72	3.03	1.70	5%	-6%	-1%

14.1.5 Density

Density determinations were undertaken on representative core or grab samples in each area, using a volume displacement method on wax-coated material. The average density measurement within each domain was assigned to the block model. Different density values were assigned for oxides and sulphides. Assigned density values typically ranged between 3 g/cm3 and 3.42 g/cm3 for oxide veins, 2.6 g/cm3 to 3 g/cm3 for sulphide veins, and between 2.68 g/cm3 and 2.73 g/cm3 for hanging wall and footwall domains.

Table 14-6 shows the density value assigned to the five main veins and their associated hanging wall and footwall domains.

Table 14-6: Density values assigned to the five main vein domains

Domain	Structure	Oxidation	Density (g/cm^3)		
			Vein	Hanging Wall	Footwall
110	Recompensa	Oxide	2.65	2.69	2.66
110	Recompensa	Sulphide	3.19	2.7	2.81
202	NC2	Sulphide	3.42	2.68	2.74
302	HW	Oxide	2.65	2.69	2.66
302	HW	Sulphide	3	2.73	2.65
309	Veta 3	Sulphide	3.42	2.68	2.74
401	Amolillo	Oxide	2.8	2.67	2.67
401	Amolillo	Sulphide	3.02	2.7	2.71

14.1.6 Variogram Analysis and Modelling

A detailed variogram analysis was undertaken on sample data for the five major veins (Recompensa, NC2, HW, Veta 3 and Amolillo) and their associated hanging wall and footwall domains for silver, gold, lead, and zinc (a total of 60 variogram models). Variogram directions were chosen according to the dip and strike of each structure; that same direction was chosen for the associated hanging wall and footwall domains as well as all elements in a domain. No plunge was modelled for any of the veins and the primary direction of continuity was set to either along strike or down dip. Variograms were modelled using a nugget and two or three spherical structures. The nugget effect was determined from downhole variograms and standardized values vary per vein . Modelled standardized nuggets tend to be low (0.16-0.22) for all variables in Recompensa vein (domain 110) and for lead and zinc in Amolillo Vein (domain 401), moderate (0.29-0.54) for all variables in HW vein (domain 302) and silver and gold in Amolillo Vein (domain 401), and high (0.57-0.86) in NC2 vein (domain 202).

Total modelled ranges of continuity typically vary between 25 and 200 m in the primary direction of continuity for all variables. Although variograms were calculated and modelled for the hanging wall and footwall domains, they were not used for estimation.

Table 14-7 details the variogram models used in the updated June 2023 vein estimates.

Table 14-7: Standardized variogram parameters for the five major veins modelled in 2023

Vein	Domain	Assay	Vario Angle			Vario Axis			Nugget	Structure 1					Structure 2					Structure 3				
			1	2	3	1	2	3		Type	Range1	Range2	Range3	Sill	Type	Range1	Range2	Range3	Sill	Type	Range1	Range2	Range3	Sill
Recompensa	110	Ag	5	75	0	3	1	3	0.15	1	7	7	1	0.66	1	24	25	3	0.19	-	-	-	-	-
		Au							0.20	1	8	6	1	0.65	1	28	12	3	0.15	-	-	-	-	-
		Pb							0.15	1	7	10	1	0.58	1	80	50	3	0.27	-	-	-	-	-
		Zn							0.12	1	8	12	1	0.59	1	110	55	3	0.29	-	-	-	-	-
NC2	202	Ag	135	75	90	3	1	3	0.72	1	5	6	2	0.20	1	30	47	4	0.08	-	-	-	-	-
		Au							0.86	1	2	5	2	0.11	1	24	26	4	0.03	-	-	-	-	-
		Pb							0.61	1	4	60	2	0.28	1	78	161	4	0.11	-	-	-	-	-
		Zn							0.57	1	4	7	2	0.29	1	78	287	4	0.14	-	-	-	-	-
HW	302	Ag	170	55	180	3	1	3	0.54	1	9	8	5	0.23	1	97	107	6	0.23	-	-	-	-	-
		Au							0.29	1	176	56	5	0.54	1	565	72	6	0.17	-	-	-	-	-
		Pb							0.43	1	22	9	5	0.38	1	116	115	6	0.19	-	-	-	-	-
		Zn							0.33	1	28	7	5	0.42	1	170	226	6	0.26	-	-	-	-	-
Veta 3	309	Ag	150	110	180	3	1	3	0.50	1	5	21	3	0.12	1	128	69	5	0.38	-	-	-	-	-
		Au							0.37	1	7	3	3	0.11	1	124	67	5	0.51	-	-	-	-	-
		Pb							0.48	1	5	8	3	0.17	1	149	84	5	0.36	-	-	-	-	-
		Zn							0.35	1	11	5	3	0.20	1	203	61	5	0.44	-	-	-	-	-
Amolillo	401	Ag	55	-60	0	3	2	1	0.54	1	6	5	7	0.18	1	109	86	20	0.21	1	220	250	35	0.07
		Au							0.43	1	4	10	6	0.21	1	25	71	18	0.19	1	104	800	21	0.17
		Pb							0.19	1	8	5	15	0.28	1	94	75	17	0.29	1	126	800	39	0.25
		Zn							0.15	1	4	6	14	0.21	1	123	78	16	0.28	1	180	5,000	38	0.36

14.1.7 Block Model

Block models were generated in Datamine Studio RM for each mineralized zone. A parent cell size of 5 × 5 × 5 m was sub-celled to 0.5 × 0.5× 0.5 m to better define geological contacts. Blocks were flagged by mineralization area and domain, and density values were assigned.

For the five main veins, cells within the hanging wall and footwall domains were flagged according to their distance from the vein contact in order to carry out better waste modelling. Three sub-domains were defined for each the hanging wall and footwall domains based on changes noted in sample grade with increasing distance from the vein contact. The distance domains used were:

- 0–25 cm
- 25–75 cm
- > 75 cm

14.1.8 Grade Estimation

Silver, gold, lead, and zinc grades were estimated into the coded block model using locally capped data. A check estimate was carried out using uncapped data to assess any impact that capping had on the estimated grade. Estimates were carried out separately for each domain and hard boundaries were used. Parent cell estimation was carried out using a block discretization of 3 × 3 × 3. Dynamic anisotropy was used to vary the search ellipse across the undulating vein surfaces for all domains for all veins; all estimates were carried out with combined drill hole and channel sample datasets.

Two different grade interpolation approaches were utilized: one for the five major veins, and one for the rest of the mineralized zones.

14.1.8.1 Main veins (Recompensa, NC2, HW, Veta 3, and Amolillo)

To improve the modelling of dilution for the main veins, the hanging wall and footwall data were each split into three categories and flagged according to distance from the vein contact, as grade was shown to decrease with increasing distance from the vein contact. The same distance categories were applied as those used to code the block models. There are therefore a total of seven estimation domains defined for each of the main veins.

Silver, gold, lead ,and zinc grades were interpolated into each estimation domain using five expanding search passes. Each search pass was a multiple of the first search so that the last search had a radius eight times the first search. Search ranges were derived from variograms analysis or continuity assumptions by site geologists based on underground mining observations.

The first two search passes estimated grade into blocks using a large number of samples and an octant search criteria. The interpolation methods in these searches were ordinary kriging (OK) for the vein domains and length-weighted Inverse Distance (LWID) with a power of 2 for the hanging wall and footwall domains. The OK estimates were post-processed to apply a length-weighting to the estimated grade to account for the unequal sample intervals. Due to the large number of samples required for estimation in these passes, blocks estimated in these searches were located in areas informed predominantly by channel sampling and were restricted to short-term mining areas.

Any blocks that remained unestimated after the first two search passes (passes 1–2) were estimated using three more search passes (passes 3–5). These final three search passes estimated grade into areas informed by drilling (without channel samples) and were more relevant to the medium- and long-term mineral resource.

Passes 3 and 4 estimated grade using a LWID with a power of 2 interpolation method, a small number of samples, and no octant search criteria. The final search pass (pass 5) used a large search radius, a small number of samples for estimation, a LWID interpolation method with a power of 0, and combined subdomains in each the hanging wall and footwall to ensure all cells were estimated.

14.1.8.2 Secondary Veins and Breccias

For secondary veins and breccias, silver, gold, lead, and zinc grades were estimated into vein, hanging wall, and footwall domains for each vein structure, and into a mineralized domain for each modelled breccia unit. Unlike for the main veins, the hanging wall and footwall domains were not subdomained by distance from the vein. All domains were estimated using the same search strategy.

Grade was estimated using the same five expanding search pass strategy as for the main veins; however, only LWID interpolation method was used. Search ranges were derived from continuity assumptions from site geologists based on geological understanding and/or underground observations. As for the main veins, the first four searches used a power of 2 while the final search used a power of 0. The first two search passes used a large number of samples and an octant search strategy; the third, fourth, and fifth searches used a small number of samples and no octant search.

14.1.9 Model Validation

The final grade estimates were validated for each domain and element against the input data using the following methods:

- Visual comparison of grade on plan and section.
- Average grade comparisons per domain.
- Swath plots.

14.1.9.1 Visual Comparison

Composite grades were compared to the block grades for each domain. In general, block grade distributions match well for the various domains. Some of these examples are shown in Figure 14-2.

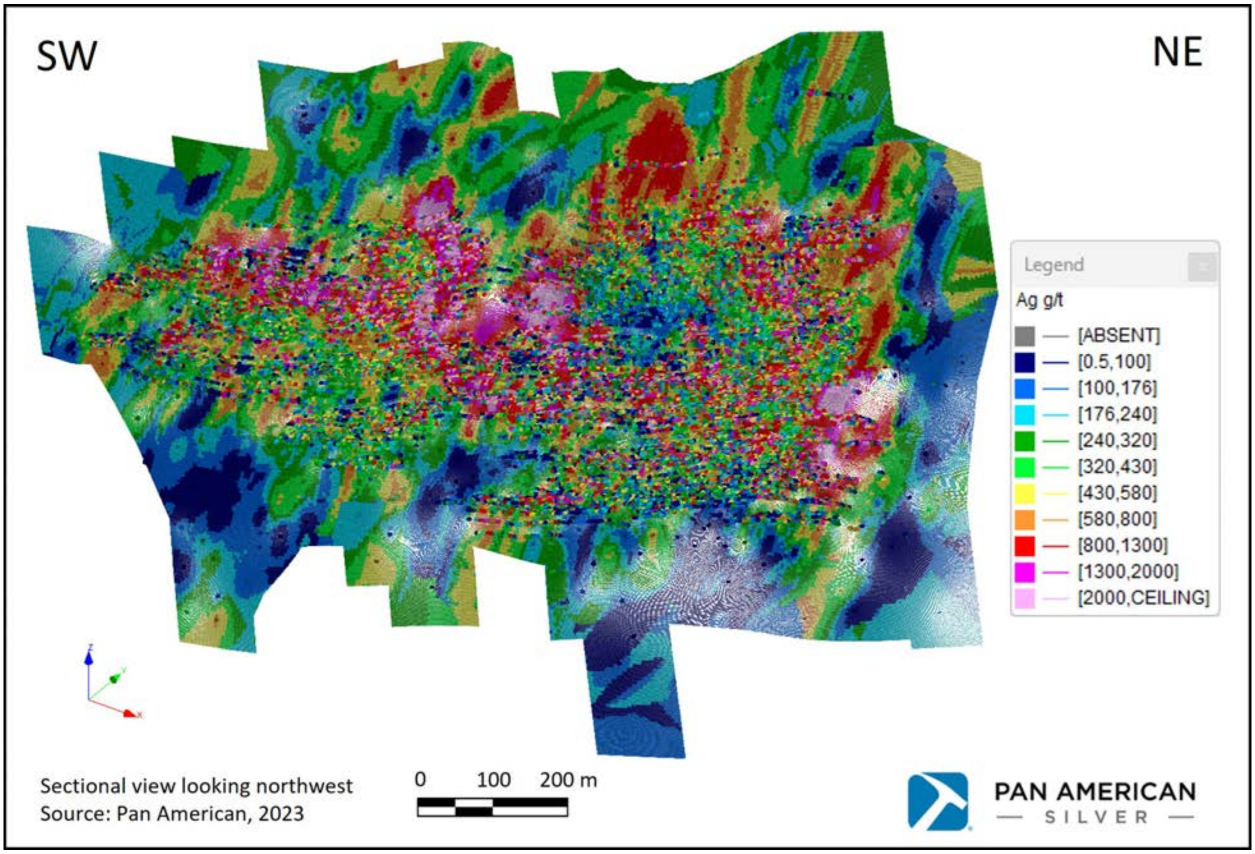


Figure 14-2: Visual Comparison of block estimates against input data for Amolillo Vein 401

14.1.9.2 Comparative Statistics

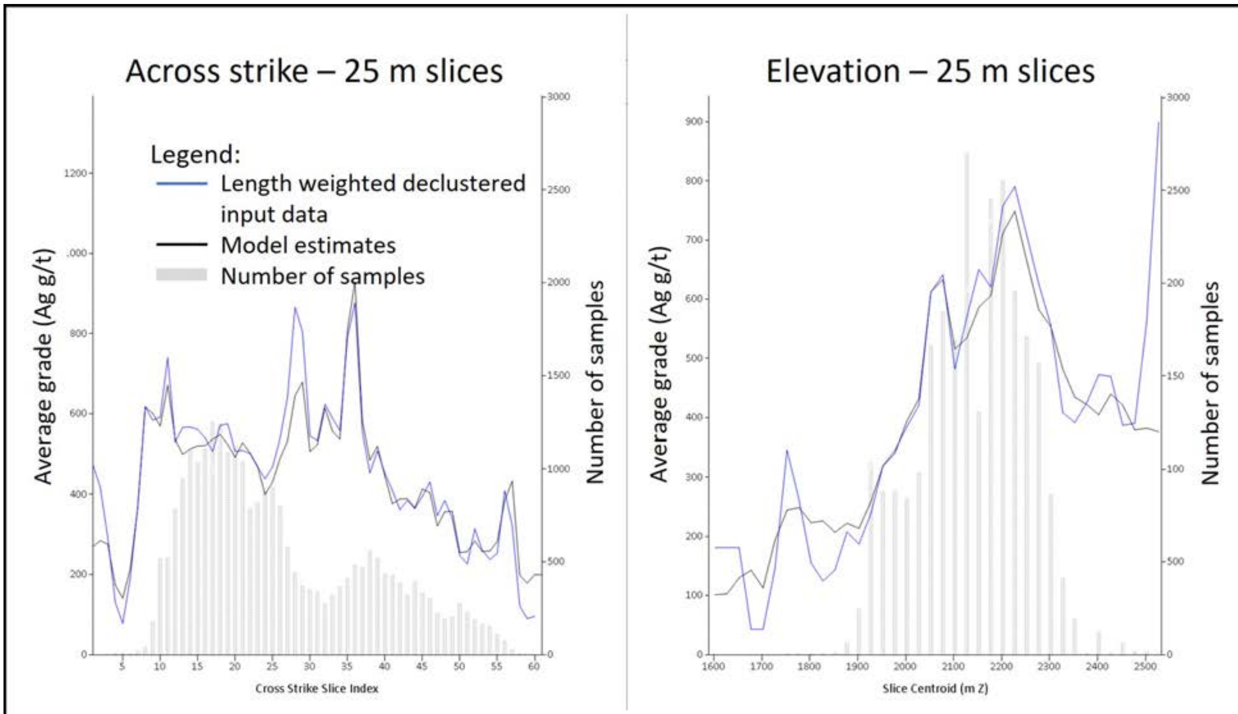
Global mean comparisons between the estimated block grades and input data for the same zones and volumes were carried out. The results showed that, in almost all cases, the blocks featured a mean that is lower or similar to the input data grades. These analyses were completed for all estimated values in all mineralized zones, to establish whether there was any over/under estimation. The global mean comparison for the five main veins is shown in Table 14-8 for blocks estimated in the first three passes only. The table shows that the estimates adequately reflect the input data for all variables.

Table 14-8: Global mean comparisons for the five main veins

Vein	Domain	Declustered Length-Weighted Capped Input Data				Model Estimates (Estimation passes 1-3 only)				% Difference			
		Ag (g/t)	Au (g/t)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)	Pb (%)	Zn (%)	Ag	Au	Pb	Zn
Recompensa	110	377	0.41	2.23	2.74	423	0.49	2.26	2.64	12%	20%	1%	-4%
NC2	202	703	0.40	3.96	7.83	718	0.41	3.94	7.77	2%	2%	-1%	-1%
HW	302	465	0.18	1.35	2.18	501	0.19	1.46	2.39	8%	4%	8%	10%
Veta 3	309	1116	0.82	3.14	4.92	1098	0.79	3.22	4.98	-2%	-3%	3%	1%
Amolillo	401	549	0.48	1.56	2.51	553	0.48	1.56	2.53	1%	—%	—%	1%

14.1.9.3 Swath Plots

A swath plot is a graphical representation of the average grade of the block model compared to the input composites for a series of metre-thick bands, or swaths, generated in the X, Y, Z directions and/or across strike orientations through the deposit. These plots are used to assess whether the model estimates accurately reproduce the grade trends noted across the deposit in the input data. Swath pots were generated for each estimated domain. Generally, the model estimates were found to adequately reproduce the grade trends noted in the input data for all domains. An example swath plot from Amolillo is shown in Figures 14-3.



Swath plots for the across strike (left) and elevation (right) orientations
Amolillo vein
Source: Pan American, 2023

PAN AMERICAN SILVER

Figure 14-3: Swath plots for Amolillo Vein 401

14.1.10 Classification Criteria

The qualified person is satisfied that the geological modelling honours the current geological information and knowledge. The location of the samples and the assays data are sufficiently reliable to support resource evaluation. The sampling information was acquired primarily by core drilling or limited channel sampling.

The block model was classified into measured, indicated, and inferred confidence categories in accordance with CIM Definition Standards (CIM, 2014). The following criteria were used to classify the mineral resource:

- Measured category: blocks estimated with a distance of less than 25 m away from drilling and informed by at least three drill holes.
- Indicated category: blocks estimated with a distance of less than 50 m away from drilling and informed by at least two drill holes.

- Inferred category: blocks estimated with a distance of less than 80 m away from drilling and informed by at least two drill holes.

Mineral resources are reported exclusive of mineral reserves. An example of the classification applied to the mineralized zones is shown in Figure 14-4 for the Veta 3 vein.

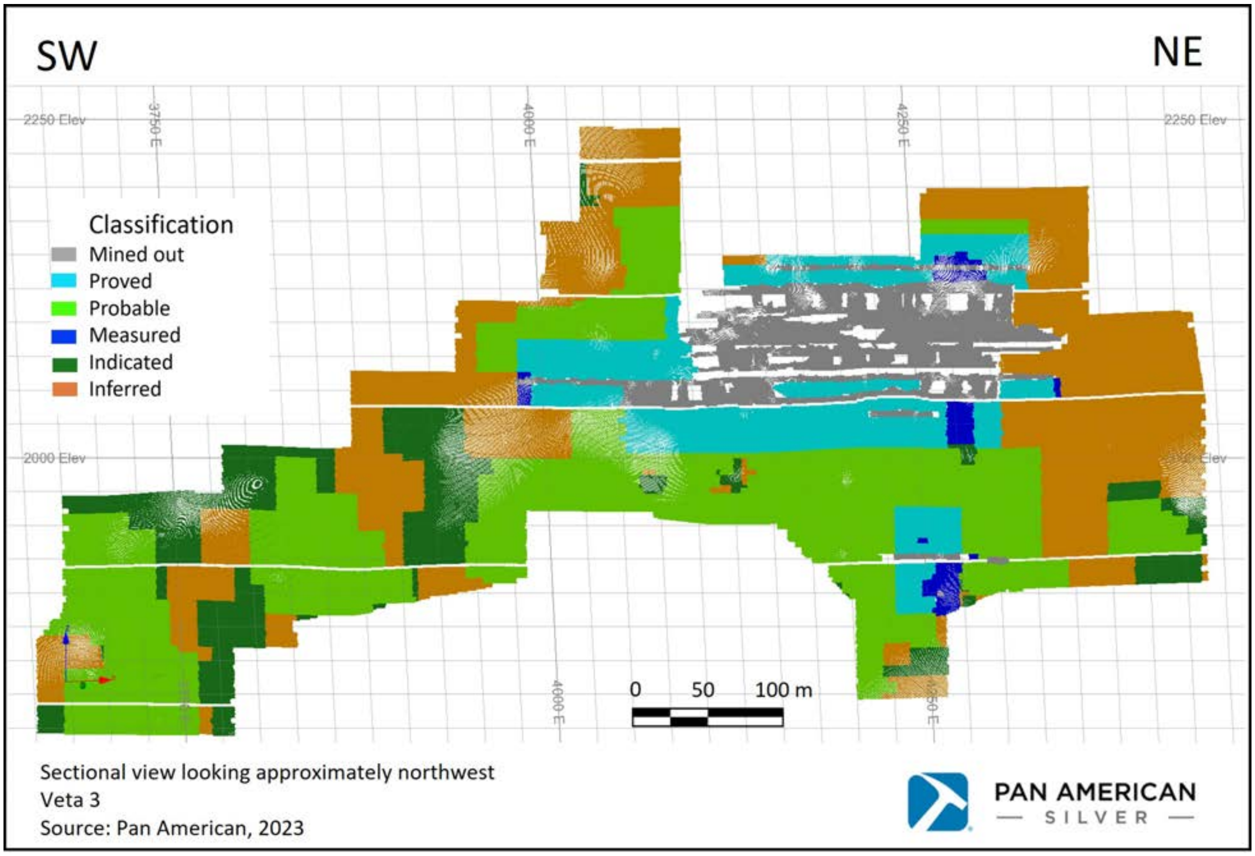


Figure 14-4: Classification applied to the Veta 3 mineralized zone

14.1.11 Mineral Resource Statement

For reporting purposes, the vein, hanging wall and footwall zones were combined into a practical mining width that includes 40 cm or 35 cm of each hanging wall and footwall for cut and fill or long-hole stoping mining methods respectively. A minimum mining width of 2.6 m was used for cut and fill and 2.2m for long-hole mining areas.

Mined out areas up to 30 June 2023 were removed from the block model and the diluted mining interval grades and tonnages were reported above a cut-off that varies per mineralized zone. The cut-off grade was calculated using prices of US$19 per ounce of silver US$1,300 per ounce of gold, US$2,600 per tonne of zinc, and US$2,000 per tonne of lead. The reported lead and zinc grades are averages for the deposit, however, the only payable base metals are those from concentrates produced from the sulphide ores, not those from the doré produced from the oxide ores.

Estimated mineral resources of the La Colorada Vein Mine as of June 30, 2023, are shown in Table 14-9.

Table 14-9: La Colorada Vein Mine mineral resource statement as at June 30, 2023

Classification	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag (Moz)	Au Grade (g/t)	Pb Grade (%)	Zn Grade (%)
Measured	0.73	153	3.58	0.13	0.64	1.18
Indicated	2.50	182	14.62	0.19	0.87	1.41
Measured + Indicated	3.23	175	18.19	0.18	0.82	1.36
Inferred	14.68	174	82.23	0.20	0.94	1.67

1. *Numbers may not add up due to rounding.*
2. *Mineral resources exclude those mineral resources that were converted to mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.*
3. *Mineral resources were estimated in accordance with the guidelines laid out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practice Guidelines (November 2019) and classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*
4. *For the La Colorada Vein Mine, the vein, hanging wall and footwall zones were combined into a practical mining width that includes a minimum dilution of 40 cm or 35 cm of each hanging wall and footwall for cut and fill or long-hole stoping mining methods respectively. A minimum mining width of 2.6 m was used for cut and fill and 2.2m for long-hole mining areas.*
5. *Mineral resources were reported above an economic cut-off grade that was calculated using a price of US$19 per ounce of silver US$1,300 per ounce of gold, US$2,600 per tonne of zinc, and US$2,000 per tonne of lead. Economic cut-off grades used for reporting the resource vary for each vein as a function of oxidation, depth, mining method and geotechnical and process variables.*
6. *The mineral resource estimate for the La Colorada Vein Mine was prepared under the supervision, or reviewed by Christopher Emerson, FAusIMM, who is a qualified person as that term is defined in NI 43-101.*
7. *Listed lead and zinc grades are averages for the deposit. However, the only payable base metals are those from concentrates produced from the sulphide ores, not those from the doré produced from the oxide ores.*
8. *The effective date for the La Colorada Vein Mine mineral resource estimate is June 30, 2023.*

14.2 Mineral Resource Estimate for the Skarn Project

14.2.1 Introduction

The Skarn Project deposit is a zinc-lead-silver polymetallic skarn that was discovered in 2018 through brownfield exploration below the La Colorada Vein Mine. The skarn deposit lies between 700 and 1900 m below the average surface and was drilled mostly from surface using directional drilling from primary (or mother) drill holes.

The mineral resource estimate presented herein is based on the results of approximately 242,000 m of core drilling conducted predominantly between 2018 and October 2022.

14.2.2 The Skarn Project Database

The following data categories were exported from the Skarn Project's drill hole database at the listed extraction dates:

- Drill hole collars: 298 records; October 2, 2022.
- Assays: 147,613 records; October 3, 2022.
- Downhole surveys: 37,775 records; October 2, 2022.
- Lithology: 105,755 records; October 2, 2022.

- Density: 7,718 records; October 2, 2022.

The database was reviewed for anomalous values, overlaps, and gaps. Minor inconsistencies were addressed.

All drilling consisted of core (or diamond) drilling. To access the deep mineralization through the thick cover of unmineralized dacite and limestone, a series of primary (or mother) holes are drilled from surface and provide the basis for deflections by directionaly drilling a secondary (or daughter) holes towards a specific direction. Fans of up to 15 deflections per primary hole have been used. Deflections start in the upper limestone areas, only one directional drill hole was deviated from the dacite volcanics.

Underground fan drilling from the La Colorada Vein Mine is also carried out with up to 24 holes drilled from a single location. In this type of drilling, hole spacing is irregular and increases with depth.

The database includes unsampled intervals as well as samples assaying below detection limit values. Unsampled intervals occur either where no visible mineralization is present in the core or where sampling is not possible (e.g., the top portion of a deflection). Assays below detection limit and unsampled intervals were assigned the same below detection limit values (Table 14-10).

Table 14-10: Values assigned to below detection limit and unsampled intervals

Element	Value Assigned for Below Detection Limit and Unsampled Intervals
Au (g/t)	0.005
Ag (g/t)	2
Fe (%)	0.01
Mo (ppm)	1
Cu (%)	0.01
Pb (%)	0.01
Zn (%)	0.01
Mg (%)	0.01

14.2.3 Geological Modelling and Domaining

Drill holes are logged using an extensive list of codes (ROCA) which reflect lithology, mineralization, and alteration. These codes are then combined into larger-scale stratigraphic and alteration groups (ROCASIMP) for the purposes of geological modelling and estimation. Definitions of the ROCASIMP codes are shown in Table 14-11.

Table 14-11: Simplified geological modelling codes

Simplified Logging Code (ROCASIMP)	Explanation
690	Upper Volcanic Supergroup (UVS) rhyolite
750	Lower Volcanic Complex (LVC) dacite
680	Indidura Fm
700	Cretaceous sedimentary rocks
730	Marble
720	Pyroxenite skarn
710	Garnet skarn
760	Skarn-related breccia
770	Porphyry intrusion
780	Epithermal vein and mantos
740	CRD
790	Late-stage andesite dyke
517	Fault zone
505	Breccia
507	Voids or workings
508	Soil
8501	Hydrothermal breccia
8503	Contact breccia
526	Skarn

Mineralization in the Skarn Project is primarily associated with garnet or pyroxene skarn units in proximity to porphyry intrusions. Within the garnet skarn, garnet varieties vary with proximity to the causative porphyry intrusion, producing a zoning of majority garnet compositions. The garnet skarn is subdivided into zones of dominantly “brownish” or “greenish” garnet marked by transitional contacts from one to the other:

- Brownish garnet skarn zones (primarily almandine garnets) are associated with lower zinc grades and are generally observed near (proximal to) the porphyry.
- Greenish garnet skarn zones (primarily andradite garnets) are associated with higher zinc grades and are located further away from (distal to) the porphyry.

Pyroxene skarns are more distal than the garnet skarns and are associated with the highest zinc grades of all the skarn lithologies.

Alteration of the host limestone to marble is a distal alteration style with no visible mineralization.

High-grade, apparently discontinuous veins and veinlets cut through all lithologies (including the porphyry). Where present in marble and porphyry or largely unmineralized (limestone) lithologies, these veinlets represent the only type of mineralization. Skarn-associated breccias contain mineralization primarily where they contain brecciated garnet or pyroxene skarn. A late-stage andesite dyke and the overlying dacite are unmineralized.

Three-dimensional (3D) geological modelling was carried out on site using Leapfrog Geo. The ROCASIMP codes were used as a basis for domaining. Although many of the geological wireframes (domains) are generated based on a single ROCASIMP code, the following modifications were made:

- The Cuesta del Cura and Indidura Formations were combined with the other Cretaceous sedimentary rocks into a limestone unit referred to as Domain 700.
- Since the garnet skarn showed internal zonation of garnet species, the garnet unit was split into two units based on the dominant garnet colour: domain code 7101 was assigned to areas of reddish or brownish garnets, while domain code 7102 was assigned to those areas of greenish garnets.
- The porphyry intrusion was split into three units based on different orientations, but are essentially the same unit. Domain codes 770, 7701, and 7702 were used to differentiate the various orientations. The domains were combined for grade estimation.
- Several breccia units were first grouped together under ROCASIMP code 760. However, since the higher grades were associated with breccia units containing skarn clasts, this unit was split into three domains:
    - 8505 – breccia with skarn fragments.
    - 8509 – brecciated sedimentary units.
    - 8513 – breccia without skarn fragments.
- Epithermal veins were not modelled due to their small size and the difficulty of linking vein intercepts between drill holes with any confidence.
- CRD and mantos were combined for geological modelling and assigned domain code 9543.

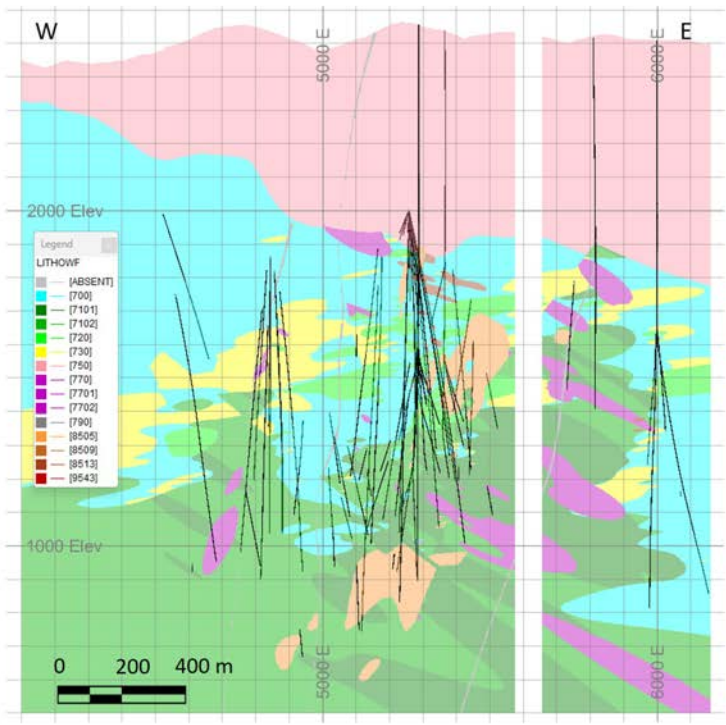
Table 14-12 lists the modelled geological units and respective domain codes and wireframe names.

Table 14-12: Modelled geological units and respective domain codes and wireframe names

Description	ROCASIMP Code	Assigned Domain Code	Wireframe Name
Limestone	680, 700	700	700
Pyroxene Skarn	720	720	720
Marble	730	730	730
Volcanic Rocks	690, 750	750	750
Porphyry Intrusion	770	770	770
		7701	770_A
		7702	770_B
Andesite Dyke	790	790	790
Almandine Garnet Skarn	710	7101	710_Brownish
Andradite Garnet Skarn		7102	710_Greenish
Breccia with Skarn	760	8505	8505
Brecciated Sediments		8509	8509
Breccia without Skarn		8513	8513
Mantos and CRD	740 and ROCA code 543 (in ROCASIMP 780)	9543	9543

Three major faults were interpreted as and displacing the lithological/alteration units; they correspond to major epithermal veins in the overlying La Colorada Vein Mine.

An example of the geological model is provided in Figure 14-5.



Sectional view looking North
Source: Pan American, 2023

Figure 14-5: W-E section (looking north) at 5400N +- 100m showing modelled geology relative to drill holes

14.2.3.1 Modelling Challenges

Although the logged lithologies are grouped into broad categories, the geology of individual alterations and skarn units is complex and variable, which results in the inclusion of multiple lithological units within one category. Logged skarn units vary in thickness from a few centimetres to several metres and, while the modelling of the geological units is as accurate as possible, the mixing of geological units is unavoidable.

Incidences where the modelled geological unit is different from the logged geological unit are referred to as geological misclassifications. Geological misclassifications are a concern in unmineralized or poorly mineralized lithologies because the geologically misclassified material tends to be associated with significantly higher grades than those typically found in the logging unit assigned to that material (correctly classified). For example, 75% of the composites modelled within the limestone domain (Domain 700) are logged as limestone and have an average grade of 0.16% Zn. The remaining 25% of the composites within the limestone domain are geological misclassifications (are not logged as limestone) and have an average grade of 1.09% Zn.

The presence of epithermal veins, which are associated with high grades and cut through all lithologies, also pose modelling challenges. Due to their small size and the unlikelihood of confidently linking intercepts between drill holes, it was not possible to model them. The presence of epithermal veins within a composite can have a significant impact on the grade of that composite.

Including these geological misclassifications and vein intercepts without control could potentially result in overestimation of the grade for the unmineralized units.

14.2.4 Compositing and Boundary Analysis

Samples were composited into set 2 m intervals downhole as this was the most common sample interval length. Composites were assigned the dominant ROCASIMP code in that composite as a proxy to its logging code. Domain codes were assigned to composites by selecting them within the modelled domain wireframes. Composites were not density weighted.

The grade behaviour at domain contacts was investigated. Gradational contacts were noted between the two garnet skarn units and also at other skarn/skarn contacts. These transitions were modelled at first but gave poor validation results. Better results were achieved using hard boundaries between all domains; gradational contacts were therefore not used.

14.2.5 Outlier Definition and Management

Two types of outliers were identified: geological and statistical.

14.2.5.1 Geological Outliers

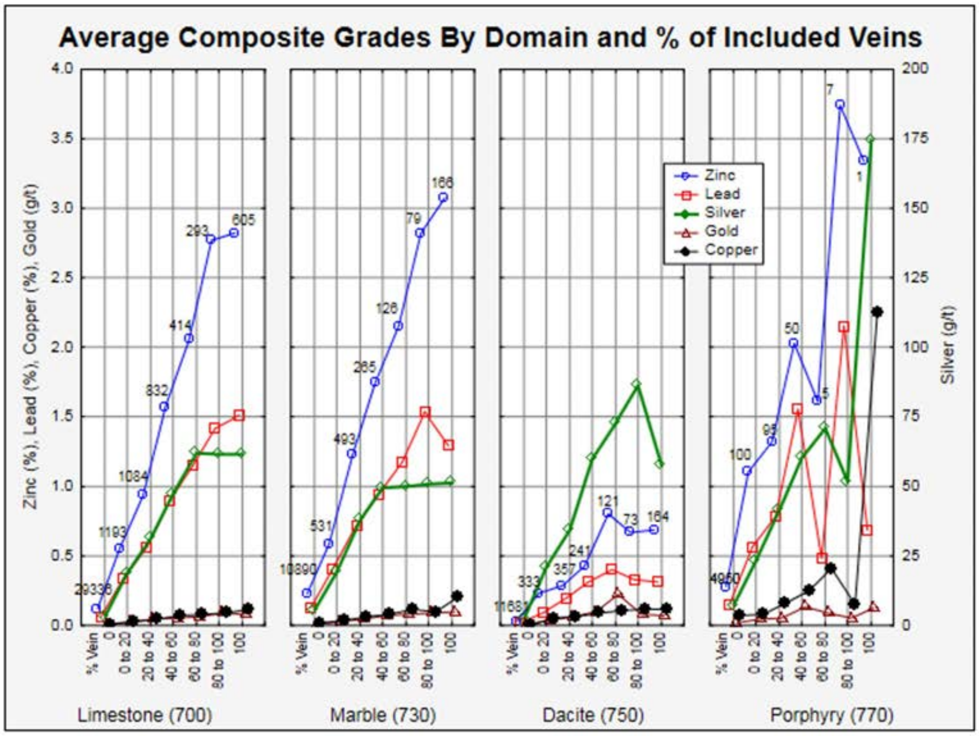
Geological outliers occur in two instances:

- When a composite includes an important proportion of high-grade veins or skarn.
- In cases of geological misclassification in a low-grade domain.

Veins and Skarn

To understand how average grade is influenced by the presence of veining, the logged proportion of veins within each 2 m composite was compiled, and average grades were determined as a function of vein proportion within each domain. For all domains, the relationship between average grade and vein proportion was nearly linear. Figure 14-6 shows the plots for the low-grade domains. Based on these plots, a threshold defined as a maximum allowable vein proportion was defined for each domain; composites with vein proportion exceeding that threshold were flagged as geological outliers.

In addition to the proportion of vein within a composite, the proportion of skarn lithologies per composite was also calculated. Where any logged skarn material was included in a composite which was assigned a majority logging code of 700 (limestone), 730 (marble), 750 (volcanic rocks), 7701 or 7702 (porphyry intrusion), the composite was flagged as a geological outlier and treated in the same way as the veins.



Source: Pan American, 2023

Figure 14-6: Average grade relative to proportion of logged vein within composites in low-grade domains

Geological Misclassification

In order to define significant geological outliers, the average grade for each ROCASIMP code within a modelled domain was compared to the composite grade of the correctly classified domain. Logged lithologies that have average grades that differ significantly from the expected grade of a domain were flagged as geological outliers.

14.2.5.2 Statistical Outliers

A statistical outlier occurs when the grade of a composite is significantly higher than the grade of neighbouring composites within the same domain. Typically, this type of outlier is identified by examining the global distribution of grades, selecting an upper threshold, and assigning all grades higher than the threshold as outliers. However, an examination of composite grades, after removing geological outliers, shows that this simplistic approach is not adequate as it relies exclusively on a maximum grade, without considering the grade of adjacent composites. For example, long intervals of barren limestone with no values above detection limits can be intercalated with one or two composites with detected grades (logged as limestone but with no reported veins). These grades are not high enough to be considered global outliers and in a traditional top capping approach would not be reset. They are, however, locally elevated not consistent with neighbouring grades and, depending on the difference in grade, could result in inflated local block estimates.

To identify local statistical outliers for each variable, a local capping algorithm was applied. It compares the grade of each composite to the local average grade, calculated both with and without the composite. If an individual composite significantly changes the local average grade, then that composite is considered a statistical outlier and its assigned grade is reduced to a level that does not significantly change the local average. The definition of "significant change" varies by estimation unit and grade.

Since the local capping algorithm considers grades in the vicinity of each composite, capping is not applied to only the highest observed grades; in areas where high grades are surrounded by composites with grades of a similar tenor, these composites may not be capped.

14.2.5.3 Outlier Management

The approach followed to manage each of the defined outliers is as follows:

- Geological outliers (veins/skarn): If the proportion of veins in a composite exceeds the defined threshold, or if there is any proportion of skarn within composites for domains 700, 730, 750, 7701 and 7702 (limestone, marble, volcanic rocks, and porphyry intrusion, respectively), the volume of influence of the composite is restricted to 4×4×2 m blocks located within an ellipse with radii of 12×10×6 m centred on the composite. The ellipse axes are oriented N50E/60, N140E/0, and N230E/30 and are aligned according to the general vein orientation. The size of the ellipse was determined following a sensitivity analysis which considered various ellipse dimensions.
- Geological outliers (misclassified composites): Composites coded as geological outliers as a result of geological misclassification were managed by changing the code of the composite to one that reflects the originally logged code (as opposed to the modelled domain code). This recoding usually results in the removal of the composite from estimation.
- Statistical outliers: The grades of identified local outliers were reduced to a grade that no longer produced a significant change in the local average.

Local capping was carried out for all estimated variables; it was only applied to those samples that were not classified as geological outliers. The impact of local capping on the zinc composite mean grade and coefficient of variation (CV) (calculated by dividing the standard deviation by the mean) statistics is shown Table 14-13.

Table 14-13: Effect of local capping on composite zinc grade for composites not flagged as geological outliers

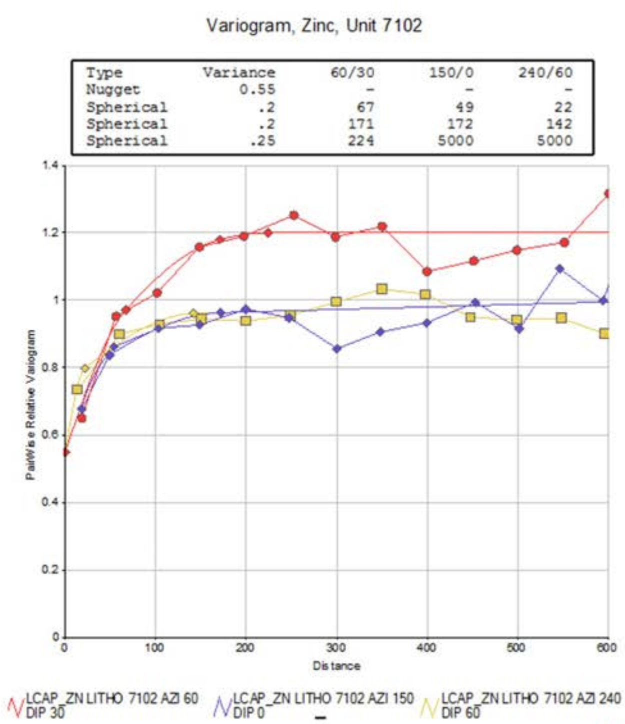
Domain	No. Samples	Uncapped Zn (%)			Capped Zn (%)			Percent Change	
		Maximum	Mean	CV	Maximum	Mean	CV	Mean	CV
700	27,081	18.07	0.07	4.91	4.41	0.05	2.88	-23%	-41%
720	8,109	31.06	2.78	1.35	31.06	2.73	1.32	-2%	-2%
730	9,548	11.78	0.16	2.98	5.46	0.14	2.22	-14%	-26%
750	11,675	9.78	0.03	6.59	1.8	0.02	3.5	-24%	-47%
770	4,948	17.12	0.27	3.17	9.31	0.23	2.88	-16%	-9%
790	1,793	5.29	0.04	6.72	1.24	0.02	3.85	-47%	-43%
7101	7,906	36.34	1.37	2.15	32.68	1.28	2.1	-7%	-2%
7102	13,383	36.04	2.17	1.65	36.04	2.11	1.63	-3%	-1%
7701	466	10.33	0.42	2.45	10.15	0.39	2.33	-6%	-5%
7702	45	0.61	0.12	1.3	0.61	0.12	1.3	0%	0%
8505	12,214	27.83	1.04	1.71	26.54	1.01	1.62	-4%	-5%
8509	528	7.82	0.36	1.77	3.33	0.34	1.45	-7%	-18%
8531	1,186	9.35	0.32	1.97	5.05	0.3	1.58	-8%	-20%
9543	263	27	6.86	0.95	27	6.86	0.95	0%	0%

14.2.6 Variography

Pairwise relative experimental variograms were computed for silver, zinc, lead, copper, and gold. Variograms were calculated using the locally capped composite data excluding geological outliers. Directions of continuity were selected using the strike and dip of the domains. The most common strike direction (across all elements) is N150E. The down-dip direction in the skarn units is often to the southwest at 60 degrees. In low-grade units, the correlation ellipse often shows zero dip. A third (plunge) rotation angle was not used in correlation modelling since there is no indication of plunging geological features and the correlation pattern shown by experimental variograms in the dipping plane was isotropic. All variables use the same directions of continuity.

Experimental variograms were modelled for three orthogonal directions using a nugget and two or three spherical structures. Standardized modelled nuggets vary from 0.2 to 0.65 for zinc and lead for all domains, with the mineralized domains having nuggets in excess of 0.36 for both variables.

An example of the experimental and modelled variograms is shown for zinc in domain 7102 (greenish garnet skarn) (Figure 14-7). In many instances, as for the domain illustrated in Figure 14-7, one direction has a different apparent sill to the others. In those instances, a very long range was modelled in order to satisfy the mathematical requirements for all directions to be modelled to the same total sill. Practical ranges of modelled continuity are typically between 100 and 600 m.



Source: Pan American, 2023

Figure 14-7: Experimental and modelled variograms for domain 7102 (greenish garnet skarn)

Note: Red: direction 1, blue: direction 2, yellow: direction 3

14.2.7 Search Parameters

Multiple expanding search passes were used for grade estimation. The first search ellipse orientation and dimensions were defined using the variogram model and validated by examining the spatial distribution of grades in plan and on section. The search distance in the direction of greatest continuity was set to 100 m and the corresponding modelled variogram value read off the variogram. Search distances were selected from the distances at which the modelled variograms (for each of the semi-major and minor directions) intersected the chosen variogram value. A 100 m primary distance was selected as it provides a reasonable representation of the range of correlation for all elements and estimation units. When selecting distances along the semi-major and minor axes, anisotropy ratios larger than 2:1 were avoided to minimize grade striping in section or plan in the resulting grade estimates.

For search passes 2 and 3, the dimensions of the search were expanded by factors of 2 and 2.4, respectively. For pass 1, a minimum of 11 and maximum of 15 composites from a minimum of three drill holes were used to estimate a block. For passes 2 and 3, a minimum of two drill holes were required and the number of composites reduced to a minimum of 8 and maximum of 12 for pass 2, and a minimum of 6 and maximum of 8 for pass 3.

14.2.8 Grade Estimation

A block model with a parent cell size of 15 mN x 15 mE x 5 mRL was constructed and coded within the domain wireframes. Blocks were subcelled along domain boundaries to provide volume resolution. In addition, restricted search ellipse areas were defined using 4 mN x 4 mE x 2 mRL blocks around flagged geological outliers. Subcell sizes can be as small as 0.25 mN x 0.375 mE x 0.5 mRL for all the combined subcell parameters.

Estimation was performed in two stages:

1. Grade was first estimated into the restricted geological outlier ellipse areas using all composites and no top capping (112,834 composites).
2. The remaining blocks were then estimated using locally capped composites after excluding the 13,698 flagged geological outliers.

Parent cell estimation was carried out using a discretization of 3 by 3 x 2 and an Ordinary Kriging (OK) interpolation method for Zn, Pb, Ag, Au, and Cu. For Fe, an inverse distance squared (ID2) interpolation method was used.

14.2.9 Density

Density measurements were undertaken on 10 cm, 15 cm, or 20 cm core samples using a water displacement method for paraffin-coated core. The database contains a total of 7,718 density records with values ranging from 1.56 g/cm3 to 5.44 g/cm3, with the highest densities associated with massive sulphide mineralization. Density measurements are well represented across all estimation domains and logged lithologies (Table 14-14).

Table 14-14: Summary of density measurements assigned to unestimated blocks

Domain	Number of Density Measurements	Average Density (g/cm^3)
700	2,702	2.761
7101	468	2.988
7102	970	3.150
720	633	3.055
730	736	2.783
750	783	2.552
770	316	2.637
7701	40	2.988
7702	4	2.598
790	145	2.744
8505	759	2.898
8509	45	2.807
8513	88	2.759
9543	27	3.462

Density was estimated for each domain using an ID2 interpolation method. Density values were not capped; however, the volume of influence of density values greater than 4 g/cm3 was limited to a N135E-oriented ellipse measuring 45×15×15 m. Multiple expanding search passes were used to estimate density into blocks. The density search strategy is shown in Table 14-15.

Table 14-15: Search strategy used for density estimation

Search Pass	Distance (m)			Number of Data	
	N135E	N45E	Vertical	Minimum	Maximum
1	200	100	100	3	10
2	400	200	200	3	8
3	600	300	300	2	6
4	800	400	400	2	6
5	1,200	600	600	2	6

Unestimated blocks were assigned the average density for samples within the estimation domain (Table 14-14). These blocks were coded as search pass 6.

An example of estimated density and the association between estimation domain and density is provided in Figure 14-8.

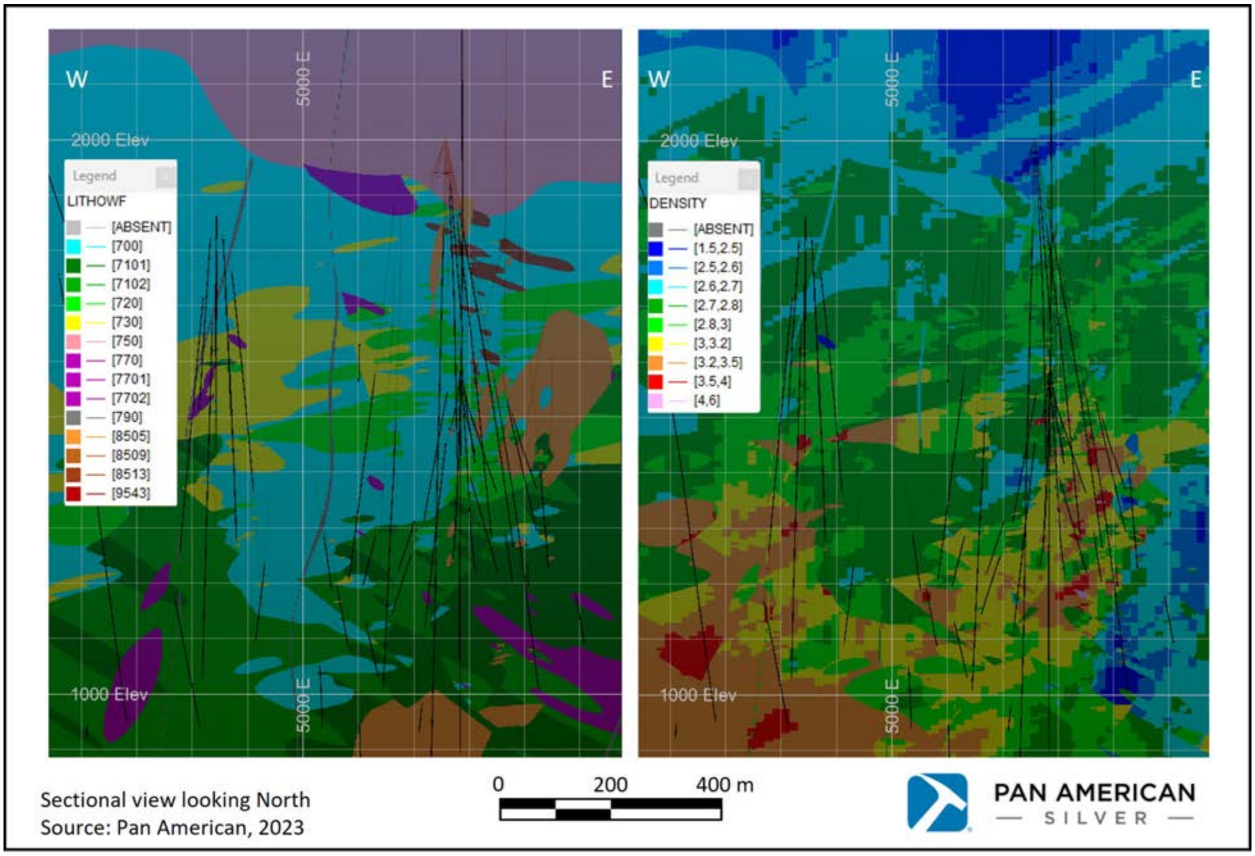


Figure 14-8: W-E cross sections (looking north) at 5400N showing modelled domains (left) and estimated density (right)

Note: trace of drill holes shown in black

14.2.10 Model Validation

The grade estimate was validated against the input composite for each estimated variable using the following methods:

- Visual comparisons of the block model to the composite grades on plan and section.
- Global mean comparisons per estimation domain.
- Swath plots.

14.2.10.1 Visual Comparisons

The model estimates were compared to the composite data in section and plan to ensure that mineralization trends were reproduced and estimates looked reasonable. Generally, the model and data match well (Figure 14-9).

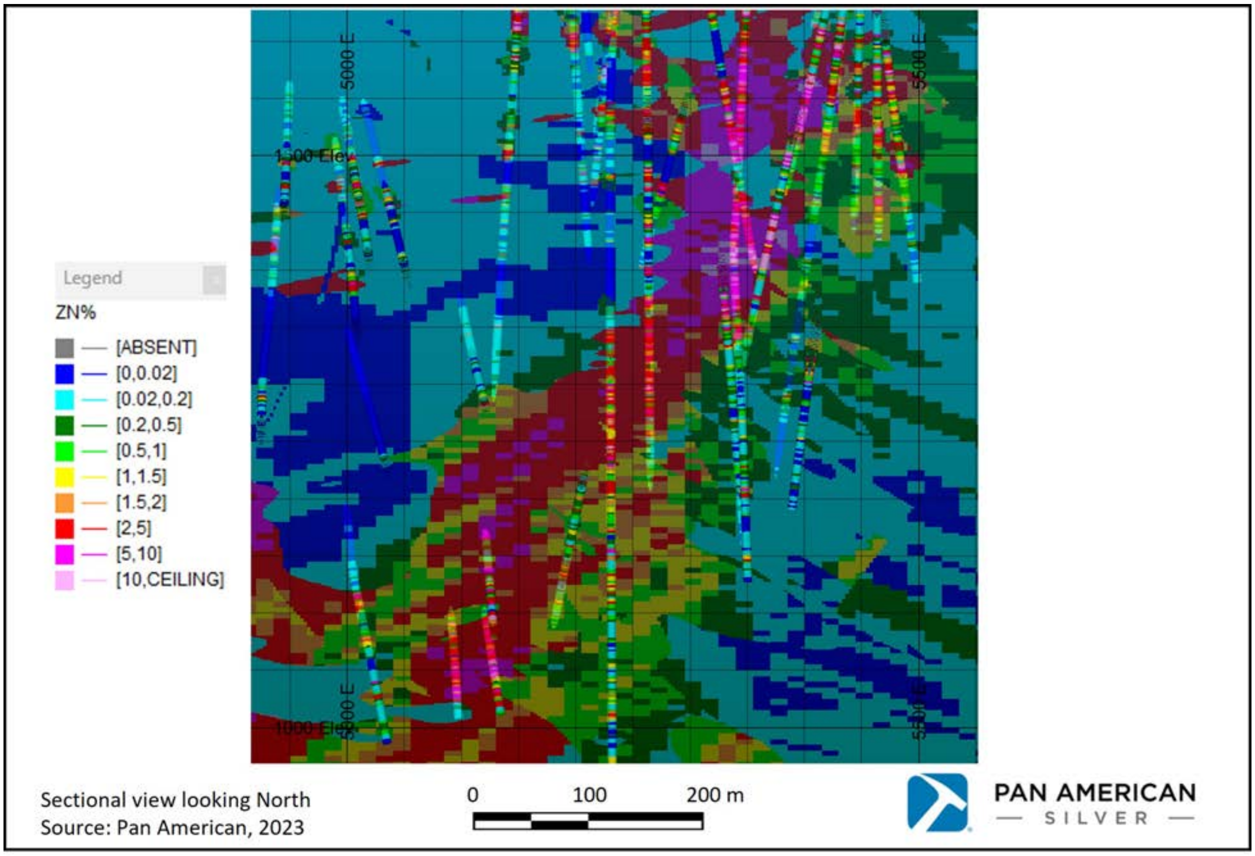


Figure 14-9: W-E section (looking north, 5500N (+- 20 m)) comparing the input composites to the model estimates for zinc

14.2.10.2 Global Mean Comparisons

Average grade for the declustered input composites were compared to the model estimates per domain for search passes 1 and 2 (Table 14-16). In order to represent the declustered composite grade, a nearest neighbour (NN) estimate (which assigns the grade of the nearest sample within a domain to a block) was conducted. Local capping and outlier restriction were taken into account when assigning the NN grade.

Table 14-16: Global mean comparisons per domain and search pass for zinc

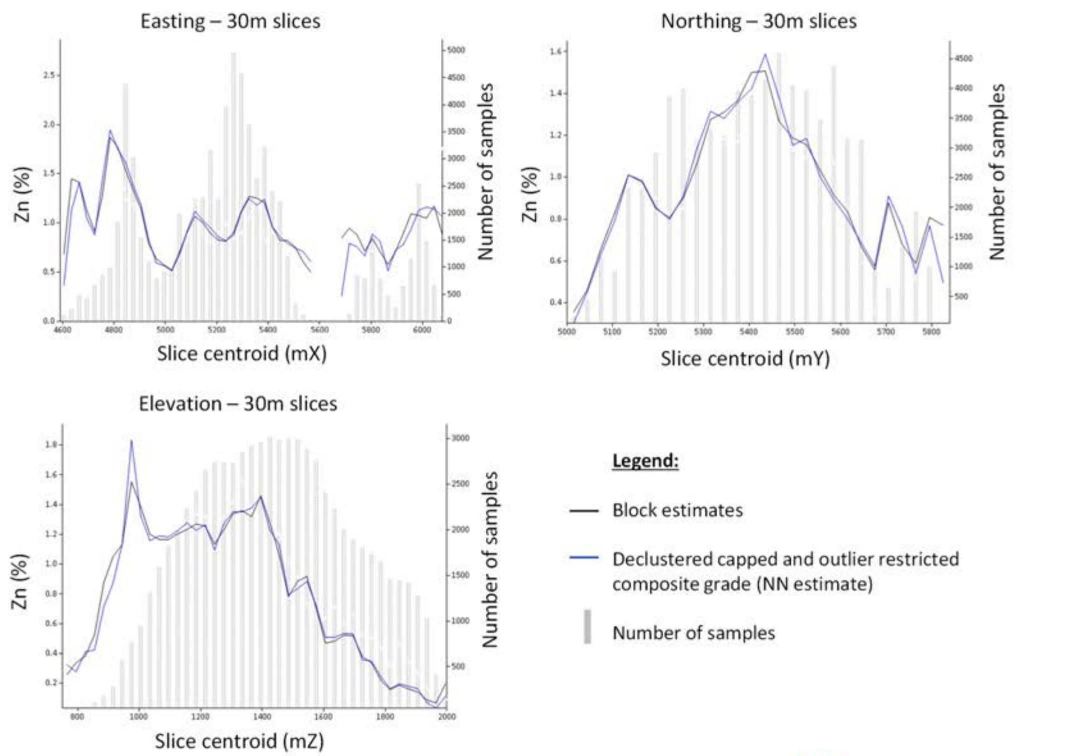
Estimation Domain	Search Pass	Metric Tonnes (×1,000,000)	Model Estimates (% Zn)	Nearest Neighbour Composite Grade (% Zn)	Difference (% Zn)	Relative Percent Difference
700	1	436	0.10	0.11	0.01	-10%
700	2	691	0.08	0.08	—	-3%
720	1	95	2.62	2.54	-0.08	3%
720	2	50	1.85	1.96	0.11	-6%
730	1	98	0.15	0.16	0.01	-6%
730	2	135	0.14	0.14	—	-3%
750	1	197	0.02	0.03	—	-5%
750	2	401	0.02	0.02	—	-5%
770	1	49	0.24	0.27	0.03	-11%
770	2	85	0.19	0.22	0.04	-19%
790	1	4.4	0.04	0.06	0.02	-68%
790	2	7.5	0.04	0.06	0.01	-35%
7101	1	120	1.18	1.15	-0.03	3%
7101	2	206	0.73	0.75	0.01	-2%
7102	1	201	2.16	2.16	—	0%
7102	2	252	1.22	1.13	-0.09	7%
8505	1	125	1.00	0.98	-0.02	1%
8505	2	73	0.85	0.86	0.01	-1%
8509	1	3.3	0.38	0.39	0.01	-3%
8509	2	0.5	0.44	0.38	-0.06	14%
8513	1	5.5	0.32	0.29	-0.03	9%
8513	2	8.2	0.08	0.08	—	-6%
9543	1	0.5	8.15	7.97	-0.18	2%
9543	2	0.3	7.59	9.10	1.51	-20%

Note: apparent discrepancies between zinc grade difference and percentage relative difference are due to rounding.

Generally, global means compare very well. Most domains show a difference between the declustered composite grade and model estimates of less than 0.1% Zn (percentage differences can be misleading in the lower-grade units). The only exception to this is domain 9543 (Mantos and CRD), particularly in the second search pass. This domain has the lowest total number of composites and is associated with a large amount of extrapolation; however, it is also associated with the smallest volume of all the domains. The differences noted are therefore not considered material.

14.2.10.3 Swath Plots

Average model and average composite grades were compared over slices of fixed width (using swath plots or slicing reports). For this check, the deposit was sliced in 75 m-thick intervals along E-W and N-S vertical sections and in 30 m intervals in plan (horizontal sections). Within each slice, the tonnage-weighted model and NN average grades (both capped and restricted) were computed for each estimation domain and search pass. Average grades (along with the model tonnage) per slice were then plotted and compared. Example plots of model and data average grade by elevation are shown in Figure 14-10 for domain 7102.



Swath plots in 30 m intervals. Domain 7102 indicated classification area only
Source: Pan American, 2023

Figure 14-10: Example of swath plots comparing declustered composite zinc grade to final model estimates in domain 7102

The validations performed show acceptable agreement between the model and composite data, especially within the indicated classification area; it was therefore concluded that the model is an adequate representation of the input composite spatial grade distribution.

As for grade, estimated density was validated by comparing average model and data values over slices/swaths through the model. The average of the data was defined by a NN estimate of density. The two sets of estimated density values matched well for E-W, N-S, and vertical slices.

14.2.11 Classification Criteria

Block model quantities and grade estimates for the Skarn Project were classified according to the CIM Definition Standards (CIM, 2014). Mineral resource classification is typically a subjective concept; industry best practices suggest that mineral resource classification should consider the confidence in the geological continuity of the mineralized structures, the quality and quantity of exploration data supporting the estimates, and the geostatistical confidence in the tonnage and grade estimates. Appropriate classification criteria should aim at integrating these concepts in the delineation of consistent areas of similar mineral resource classification categories.

The resource was classified into indicated and inferred confidence categories. Confidence classification was based on drill hole spacing, the observed continuity of the mineralization, and model validation results.

An inferred confidence classification was assigned to blocks drilled with a spacing of 90 m.

An indicated confidence classification was defined for parts of domains with higher drill density, good grade continuity, and good model validation results. Only blocks within domains 720, 8505, 7101, and 7102 (pyroxene skarn, breccia with skarn, almandine garnet skarn, and andradite garnet skarn, respectively) were assigned an indicated classification and only when the following criteria were met:

- For domains 720 and 8505:
    - Drill hole spacing was ≤ 75 m.
    - Blocks were estimated with composites in at least 5 octants (data surround the block).
    - There was at least 1 composite within 30 m of the block centroid.
- For domains 7101 or 7102:
    - Drill hole spacing was ≤ 60 m.
    - Blocks were estimated with composites in a minimum of 5 octants (data surround the block).
    - There was at least 1 composite within 25 m of the block centroid.

For both indicated and inferred confidence categories, a final smoothed (cohesive) area was defined in order to avoid a "spotted dog" classification pattern. This resulted in some material from other domains being introduced into the indicated classification. The final classified model was then clipped to the boundary of the La Colorada Property. The final mineral resource classification is shown in Figure 14-11.

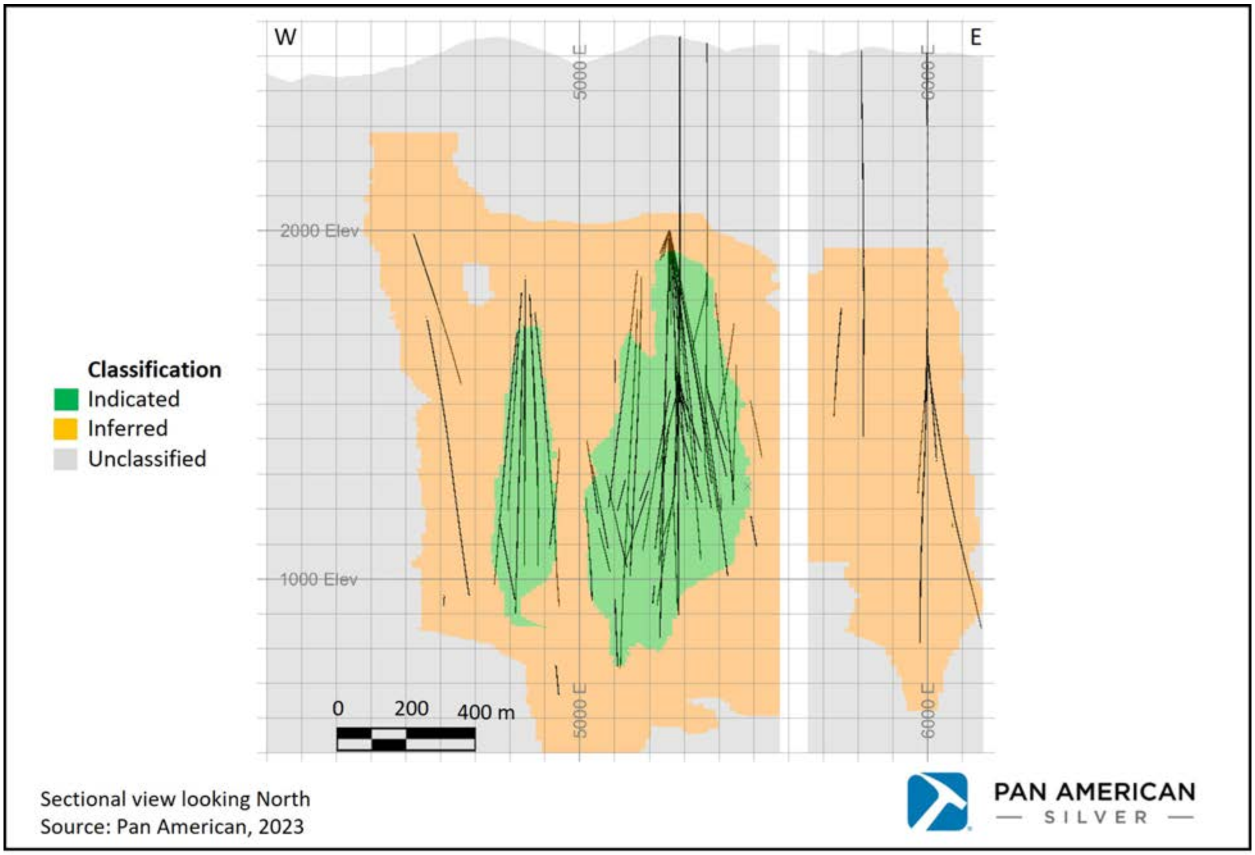


Figure 14-11: Final mineral resource classification for the Skarn Project

14.2.12 Mineral Resource Statement

CIM Definition Standards (CIM, 2014) defines a mineral resource according to the following statement:

"A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."

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

To determine reasonable prospects of economic extraction, total in-situ mineral resources were reported within bulk style sublevel caving (SLC) volumes that were generated using an economic cut-off grade of US$50/t NSR. The mineral resource is inclusive of the must-take low-grade material within the SLC volumes, as per CIM best practice guidelines (CIM, 2019), and does not include other mining dilution or mineral losses. Additional material above $10/t NSR outside of the SLC shapes but needing to be extracted nonetheless as part of the development has been included in the resource as this material would be processed and is above the cut-off grade required to cover processing costs. It accounts for some 2% of contained zinc in the indicated category and 5% of contained zinc in the inferred category.

NSR calculations were carried out using metals prices of US$22/oz for silver, US$2,800/t for zinc, and US$2,200/t for lead. Recoveries used in the NSR calculations are based on the following metallurgical recovery test work results: 87.4% Ag, 88% Pb and 93% Zn, with mineral concentrates containing 67% Pb in the lead concentrate and 60% Zn in the zinc concentrate.

The SLC volumes and associated development are shown relative to the drill holes in Figure 14-12.

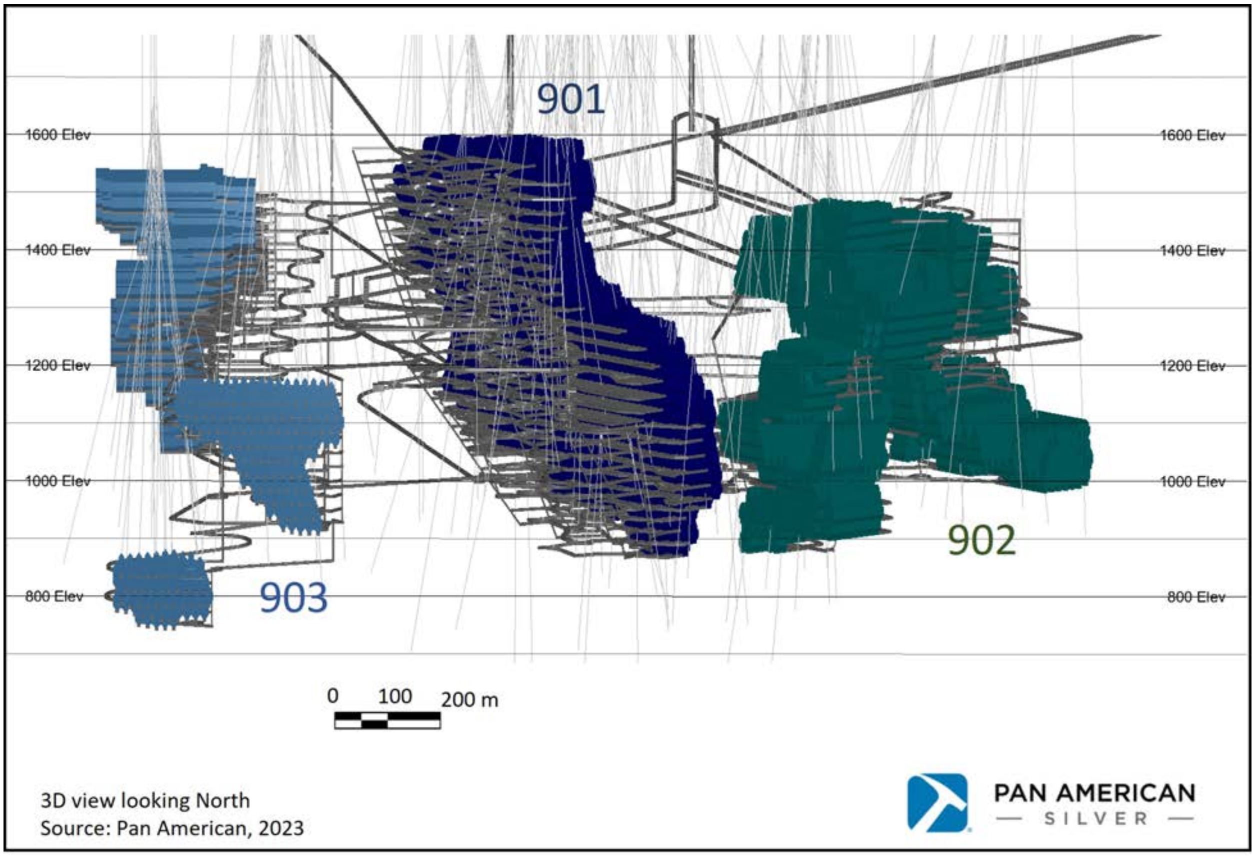


Figure 14-12: 3D view looking south showing resource SLC shapes and associated development

Table 14-17: Skarn Project mineral resource statement as at December 18, 2023

Classification	Tonnes (Mt)	Zn (%)	Pb (%)	Ag (g/t)	Zn Metal (Mt)	Pb Metal (Mt)	Ag Metal (Moz)
Indicated	173.6	2.79	1.32	33	4.84	2.29	183
Inferred	103.6	2.47	1.03	35	2.56	1.07	116

1. *The effective date of the mineral resources estimate is December 18, 2023. The geological model was completed in December 2022 and results from diamond drilling conducted in 2023 are not included in this estimate.*
2. *Mineral resources were estimated in accordance with the guidelines laid out in the CIM Mineral Resource and Mineral Reserves Estimation Best Practice Guidelines (November 2019).*
3. *Mineral resources have been classified into indicated and inferred confidence categories in accordance with the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*

4. *Mineral resources have demonstrated reasonable prospects for eventual economic extraction as they show sufficient spatial continuity of mineralization constrained within a potentially mineable shape. Mineral resources that are not mineral reserves do not have demonstrated economic viability. No mineral reserves are reported at this time for the Skarn Project.*
5. *Prices used to report mineral resources were: US$22/oz silver, US$2,800/t zinc, and US$2,200/t of lead.*
6. *An estimated NSR (in US$/t) was calculated using metallurgical recoveries of 87.4% silver, 88% lead and 93% zinc with mineral concentrates containing 67% Pb in the lead concentrate and 60% Zn in the zinc concentrate, obtained from metallurgical testing. Estimates for transport, payability, and refining/selling costs, based on experience and long-term views of the marketing, treatment, and refining of these types of mineral concentrates, were included.*
7. *Reasonable prospects for eventual economic extraction were assessed by determining the total in-situ tonnes and metal grades constrained inside volumes that are based on a SLC mining method. To determine the constraining SLC shapes, an initial elevated cut-off value of $50/t NSR was applied. Geotechnical, geometry and caving rules were then applied to ensure that practical mining shapes and sequences were achieved. Each level, each zone was individually tested for overall economics, and then tested as part of the caving sequence. The resulting constraining shapes were then considered as practical mining outlines. The tonnes and grades are inclusive of the must-take low-grade material within the volume. No other mining recovery, ring recovery, dilution, or mineral losses have been applied. Additional material outside the SLC shapes but within the development volumes that is above a cut-off grade of $10/t NSR was included in the resource.*
8. *This mineral resource estimate was prepared under the supervision of, or was reviewed by, Christopher Emerson, FAusIMM, Vice President Exploration and Geology, who is a qualified person as defined in NI 43-101.*

The qualified person responsible for this section of the technical report is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the mineral resource estimate.

15 Mineral Reserve Estimates

15.1 Mineral Reserve Summary

Pan American updates mineral reserve estimates on an annual basis following reviews of metal price trends, operational performance and incurred costs for the previous year, the results of diamond drilling and underground channel sampling conducted during the year, and production and cost forecasts over the LOM. The Mineral Reserve Statement of the La Colorada Vein Mine as of June 30, 2023, is presented in Table 15-1.

Table 15-1: Mineral reserve statement for the La Colorada Vein Mine as at June 30, 2023

Category	Tonnes (Mt)	Silver Grade (g/t Ag)	Gold Grade (g/t Au)	Lead Grade (% Pb)	Zinc Grade (% Zn)	Contained Silver (Moz)	Contained Gold (koz)	Contained Lead (kt)	Contained Zinc (kt)
Proven	5.0	296	0.21	1.25	2.15	47.2	33.8	61.9	106.6
Probable	4.2	292	0.19	1.26	2.22	39.1	25.3	52.5	92.7
Total	**9.2**	**294**	**0.20**	**1.25**	**2.18**	**86.3**	**59.2**	**114.5**	**199.3**

1. *Mineral reserves have been estimated by the La Colorada technical services team under the supervision of Martin Wafforn, Senior Vice President, Technical Services and Optimization at Pan American Silver Corp., and a qualified person as defined by National Instrument 43-101. The mineral reserve estimate conforms to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) guidelines.*
2. *Mineral reserves are reported by zone at variable cut-off values ranging from US$97.65/t to US$166.71/t. Metal price assumptions of US$19/oz for silver, US$1,300/oz for gold, US$2,000/t for lead and US$2,600/t for zinc were used in the estimation. Processing recovery assumptions for oxides are of 82.03% for silver and 45.68% for gold. Processing recovery assumptions for sulphides are of 93.10% for silver, 55.11% for gold, 84.62% for lead and 84.46% for zinc. Mine operating cost assumptions vary by zone and range from US$56.15/t to US$102.50/t, depending on the mining method, hauling distances, and lateral development requirements. Processing cost assumptions, including tailings disposal costs, are of US$14.58/t for sulphides and US$43.36/t for oxides, while G&A cost assumption are of US$20.85/t.*
3. *Mineral reserves are stated at a mill feed reference point and account for minimum mining widths, diluting material, and mining losses.*
4. *All selective mining units converted to mineral reserves contain a majority proportion of measured and indicated mineral resources.*
5. *Numbers may not add up due to rounding.*

15.2 Conversion Methodology

The methodology used at the La Colorada Vein Mine to convert mineral resources to mineral reserves is summarized as follows:

- Verify geometries for the block model and resource wireframes.
- Confirm accurate block model depletion with current excavated development and stope solids up to the effective reporting date.
- Create automated selective mining unit shapes using MSO in Datamine incorporating estimations of hanging-wall and footwall overbreak by zone; these estimations vary depending on the mining method, vein dip, and excavation span.
- Evaluate all selective mining unit shapes against the block model. Report ore tonnes, silver, gold, lead, and zinc grades. Determine the ore type contained within each selective mining unit (oxides or sulphides).

- Include additional tonnes at zero grades to account for additional dilution and calculate diluted grades of the selective mining units. Considering the diluted grades and the estimated metallurgical recovery for the ore contained, calculate the economic value per tonne.
- Design primary and auxiliary development for each mining zone, such as ramps, ventilation, escape ways, dewatering, materials handling infrastructure, access, and other infrastructure. Calculate the lateral development requirements and hauling distances. Estimate the mining cost for each mining zone by considering the expected mining method. Estimate the processing cost for each selective mining unit based on the ore type contained.
- Determine break-even and marginal cut-off values for each selective mining unit as follows:
    - Break-even cut-off value: includes 100% of the mining, processing and G&A costs.
    - Marginal cut-off value: includes the mining cost excluding the expenses for lateral development and the processing cost. A 15% contingency is applied on the resulting value to obtain the marginal cut-off value.
- Classify the selective mining units:
    - Selective mining units with a value per tonne below the marginal cut-off value are classified as waste.
    - Selective mining units with a value per tonne above the marginal cut-off value and a majority proportion of inferred tonnes are classified as inferred mineral resources.
    - Selective mining units with a value per tonne above the marginal cut-off value and below the break-even cut-off value that contain a majority proportion of measured or indicated tonnes are classified as measured or indicated mineral resources, respectively.
    - Selective mining units with a value per tonne above the break-even cut-off value that contain a majority proportion of measured or indicated tonnes are classified as proven or probable mineral reserves, respectively.
- In addition to the evaluation against the cut-off value, the selective mining units classified as mineral resources or mineral reserves are subject to additional analyses to determine accessibility and mineability. Selective mining units that are isolated from the current or designed mining infrastructure could be classified as uneconomic; if so, they would then be removed from the inventories or be downgraded from mineral reserves to mineral resources or from mineral resources to waste.
- Finally, selective mining units classified as measured or indicated mineral resource that are below the cut-off value but that need to be developed to access higher-grade mineral reserves, or that have the required lateral development completed, are included in the mineral reserves inventory as marginal ore.

15.3 Cut-Off Value

Cut-off values used for the mineral reserve estimate correspond to average projected unit operating costs per tonne for the La Colorada Vein Mine over the LOM plan period. Unit costs per tonne on which these projections were estimated derive from the actual results obtained up to Q1-2023 and were adjusted to reflect an estimated reduction in the unit costs when the ventilation circuit is fully restored and the mine returns to full capacity. The unit operating mining costs for the cut-off value analysis vary by mining method on a zone-by-zone basis due to variable hauling distances, lateral and vertical development requirements to access the zones. Processing and tailings disposal costs vary by ore type, as oxide and sulphide ores are treated in different processing circuits producing different products (i.e. mineral concentrates are produced in the sulphide circuit and doré is produced in the oxide circuit). In addition, unit site specific general and administration costs per tonne are determined from actual results in Q1-2023. Break-even cut-off values used range from US$97.65/t to US$166.71/t inclusive of the various components previously described. Product commercialization costs are deducted from the value per tonne calculation using the parameters summarized in Table 15-4 and are therefore excluded from the operating costs used to define the cut-off value.

Since production at La Colorada has recently experienced shortfalls due to ventilation restrictions, which are projected to persist until the Guadalupe Shaft is commissioned, productivity is expected to be lower in the initial year of the LOM plan and the unit operating costs per tonne are estimated to be above average. The unit operating costs estimates used for cut-off value calculations are adjusted for the expected productivity increase once the ventilation restrictions are alleviated. Cut-off values may require adjustments in future years due to current variations in the production rate and uncertainties in enhanced ventilation improvements, cost drivers, metal prices, inflation, higher wages and salary rates, additional costs associated with the operation of the refrigeration plant, increased use of shotcrete and long ground support and additional haulage, ventilation and dewatering costs associated with deeper mining.

Table 15-2 summarizes the cost parameters used to calculate the cut-off values for oxide ore and Table 15-3 summarizes the parameters for sulphide ore.

Table 15-2: Cut-off value cost parameters - Oxides

Item	Units	Candelaria	Estrella	Recompensa
Mining Cost	US$/t ore mined	56.15	79.65 to 94.86	102.50
Processing Cost Oxides	US$/t processed	36.77	36.77	36.77
Tailings Disposal Cost Oxides	US$/t processed	6.59	6.59	6.59
G&A Cost	US$/t processed	20.85	20.85	20.85
Break-Even Cut-Off Value	**US$/t**	**120.36**	**143.86 to 159.07**	**166.71**
Marginal Cut-Off Value	**US$/t**	**79.73**	**79.73 to 126.15**	**119.95**

Table 15-3: Cut-off value cost parameters - Sulphides

Item	Units	Candelaria	Estrella	Recompensa
Mining Cost	US$/t ore mined	62.22 to 128.62	62.80 to 97.75	84.29 to 91.51
Processing Cost Sulphides	US$/t processed	10.80	10.80	10.80
Tailings Disposal Cost Sulphides	US$/t processed	3.78	3.78	3.78
G&A Cost	US$/t processed	20.85	20.85	20.85
Break-Even Cut-Off Value	**US$/t**	**97.65 to 164.05**	**98.23 to 133.18**	**119.72 to 126.94**
Marginal Cut-Off Value	**US$/t**	**67.66 to 83.15**	**59.66 to 86.82**	**60.47 to 74.21**

Table 15-4 summarizes the main parameters that were used to complete the economic value per tonne calculation for each selective mining unit by considering the different ore types and their respective silver, gold, lead, and zinc grades.

Table 15-4: Parameters for calculation of value per tonne

Item	Units	Value
Metal Prices		
Silver Price	US$/oz	19
Gold Price	US$/oz	1,300
Lead Price	US$/t	2,000
Zinc Price	US$/t	2,600
Doré Parameters for Oxide Ore		
Silver Recovery	%	82.03
Gold Recovery	%	45.68
Payable Silver – Doré	%	99.85
Payable Gold – Doré	%	99.85
Shipping and Customs Cost – Doré	US$/oz	0.59
Zinc Concentrate Parameters for Sulphide Ore		
Zinc Recovery	%	84.46
Silver Recovery	%	4.5
Payable Zinc	%	85
Payable Silver	%	70
Minimum Zinc Deduction	g/t	80
Minimum Silver Deduction	oz/t	3
Treatment Charge	US$/dmt	230
Freight	US$/wmt	54
Lead Concentrate Parameters for Sulphide Ore		
Lead Recovery	%	84.62
Silver Recovery	%	88.6
Gold Recovery	%	55.11
Payable Lead	%	95
Payable Silver	%	96.5
Payable Gold	%	95
Minimum Lead Deduction	g/t	30
Minimum Silver Deduction	g/t	50
Minimum Gold Deduction	g/t	1
Silver Refining Cost	US$/oz-payable	0.5453
Gold Refining Cost	US$/oz-payable	16.134
Treatment Charge	US$/dmt	90
Freight	US$/wmt	114
General Parameters		
Precious Metal Royalty (on Silver and Gold)	%	0.5

15.4 Mining Width and Dilution

Reported mineral reserves include diluting material. Drift and cut-and-fill selective mining units are designed to the minimum development mining width. Since this parameter varies depending on the vein dip, it can therefore include dilution from the hanging wall and footwall of the veins. Selective mining units to be mined by long-hole stoping are designed to include the estimated equivalent linear overbreak slough (ELOS), which is based on the designed stope height, length, inclination, and the local rock mass quality.

An additional 13% dilution at zero grades is added to each selective mining unit, prior to the value per tonne calculation, to account for unplanned dilution.

15.5 Reconciliation

Reconciliation results for the period comprised between July 2022 and June 2023 are presented in Table 15-5. The table compares the tonnage and grades (silver, lead, and zinc) depleted from mineral reserves to those processed at the processing plant. Results are presented separately for oxides and sulphides since these ore types are processed separately.

Table 15-5: Reconciliation results – July 2022 to June 2023

Ore Type	Item	Tonnes (kt)	Silver Grade (g/t Ag)	Lead Grade (% Pb)	Zinc Grade (% Zn)
Oxides	Depleted Reserves	65	300	—	—
	Processed	61.6	273	—	—
	Difference (%)	-5%	-9%	0%	0%
Sulphides	Depleted Reserves	577.8	323	1.15	2.01
	Processed	595.9	281	1.09	1.92
	Difference (%)	3%	-13%	-5%	-4%
Total	Depleted Reserves	642.9	321	1.04	1.81
	Processed	657.5	280	0.99	1.74
	Difference (%)	2%	-13%	-5%	-4%

Mineral resource and reserve estimates are based on assumptions that include mining, metallurgical, infrastructure, title, permitting, taxation, and economic parameters that all have a degree of uncertainty. Although Pan American has no current expectation that the mineral reserve and resource estimates in this technical report will be materially affected by external factors, changes in relation to such factors are not uncommon in the mining industry and there can be no assurance that these factors will not have a material impact. In addition, the accuracy of any mineral resource and reserve estimate relies on the quality and quantity of available data and of engineering and geological interpretation and judgment. Results from drilling, testing, and production, as well as material change in metal prices, changes in the planned mining method, or various operating factors that occur subsequent to the date of the estimates, may differ, perhaps materially, from those currently anticipated, and such changes may justify revision of such estimates.

16 Mining Methods

16.1 Mining Methods and Mine Design

Currently, underground mining at the La Colorada Vein Mine is conducted at the Candelaria and Estrella mines (no mining is currently taking place at the Recompensa mine). Either the cut-and-fill (breasting) or sublevel long-hole stoping (SLS) mining methods are applied, depending on the local ground conditions and dip of the veins.

The main access ramps and haulage drifts are designed at 3.5 m wide by 3.5 m high, at a maximum gradient of 15%. From level 408 to depth, main ramps and haulage drifts sections measure 4.0 m wide by 4.5 m high to accommodate larger equipment and facilitate increased mechanization of the mine at depth. Electric hydraulic jumbo drills and hand-held drills are both used for the development mining to access the ore; their choice depending on the size of the excavation required and the mining method planned to be used at each specific zone. Scooptrams are used for tramming ore and backfill to and from stopes, and haul trucks are used for underground haulage. Development waste is hauled to stopes to be utilized as backfill, and ore is hauled to ore passes or to one of the rock-breaker grizzlies at the shaft. Ore is hoisted to surface using a shaft with a capacity in excess of 2,300 tpd and is hauled to the mill crusher stockpile. When required, ore can also be hauled to the surface using the two access ramps present in each mine.

Figure 16-1 shows a plan view of the three underground mines at the La Colorada Vein Mine and Figure 16-2 and Figure 16-3 show longitudinal sections of the mined-out areas and mineral reserves for the currently active Candelaria and Estrella mines, respectively.

16.1.1 Cut-and-Fill

Mechanized and semi-mechanized overhand cut-and-fill mining methods are used at the La Colorada Vein Mine, a common mining method in underground mines in Mexico. This mining method is considered safe and efficient for the type of geological conditions found at some of the veins at the La Colorada Vein Mine; it is predominantly applied in veins with dips less than 60° and with a Barton's Q-system value of less than 10. Cut-and-fill provides improved mining recovery and selectivity when these conditions are present. The method also provides ground support by backfilling the voids created by mining with development waste rock or mill tailings as ore extraction advances. The backfill also provides a stable working floor.

The development sequence of the overhand cut-and-fill method starts with the construction of accesses to the mineralized zones. These accesses are designed with inclinations of up to ±15% from the footwall drift or the main ramps, which are generally located 100 m away from the veins. The accesses are developed in sections of 3.5 × 4.0 m or 3.0 × 3.0 m, depending on the choice of mining method and the equipment planned to be used. Infrastructure for materials handling, ventilation, and dewatering required to complete the mining of the production panel is also developed at these accesses, generally close to the intersection of the accesses with the ramp declines.

When the development of the first access to the base of the production panel is completed, the overhand mining sequence, applied in an ascending pattern, begins. The initial horizontal cut consists of a sill drift developed along the strike of the vein. After completing the development of the first horizontal cut, the main access is pivoted to reach the next ascending cut.

From the second horizontal cut upwards, the broken ore is blasted to the void in the lower level, creating the necessary floor to continue the development of the drifts along the strike of the vein. As the development progresses, the ore from the floor is removed and replaced by backfill consisting of development waste and/or tailings. This provides support to the hanging wall and footwall and re-establishes the floor required to continue advancing the cuts horizontally.

At the La Colorada Vein Mine, drift cross-sections measure 2.2 to 2.8 m wide (depending on the dip and thickness of the veins) by 3.1 m high. The design of 100 m long accesses, at maximum declines of ±15%, allows for the development of mining panels in 10 horizontal cuts.

16.1.2 Sublevel Long-Hole Stoping

At the La Colorada Vein Mine, veins dipping higher than 60° located in ground of good rock quality, with a Barton's Q-system value greater than 10, are predominantly mined using the sublevel long-hole stoping method. This mining method is highly productive and the longitudinal variants of this mining methods are suited for the extraction of large tabular-shaped deposits.

The long-hole mining sequence starts with the development of the spiral declines, which provide flexibility to access the ore body at variable elevations. At the La Colorada Vein Mine, 4.0 m wide × 4.5 m high spiral declines are typically developed at a maximum gradient of ±15%. At each sublevel, an access crosscut is developed from the spiral decline to intersect the vein at the required elevation and enable the development of the sublevel drifts along the strike of the veins. Accesses are generally developed in sections 3.5 m wide × 4.0 m high and sublevel drifts are developed in sections 2.6 m wide × 3.8 m high. The typical vertical sublevel spacing is 10 m.

For mining sequence optimization purposes, large mining zones are divided into mining panels that generally consist of four levels. At the bottom sill level of the mining panel, a main haulage drift is also developed (at the same section as the main ramp declines) parallel to the vein and connected to the upper sublevels of the mining panel via ore and waste passes to optimize materials handling during production. Ventilation and dewatering infrastructure are also developed at main ramp declines and haulage drifts. This allows for the continued development of the spiral decline towards deeper levels and for parallel stoping activities to commence within the mining panel. Sill pillars measuring 2.0 m thick are left in place to separate the production panels.

Once the development of a mining panel and of its infrastructure are completed, production activities begin with the opening of a vertical slot raise to connect the two lower levels of the panel and generate free faces for production blasting. Production drilling is generally carried out from the upper to the lower levels. Blasted ore is mucked from the lower levels to the ore passes and subsequently hauled from the main levels to the shaft. To control dilution, once the designed stope span is reached, the open stope is backfilled using development waste and/or tailings. Some zones that are accessed via multiple spiral declines, are suitable for the Avoca mining method, which allows filling open stopes continuously from the opposite end, while production activities are carried out. Subsequently, a new slot is generated removing a small part of the fill and production activities continue blasting into the generated void. Occasionally, rib pillars are left in place to separate longitudinally adjacent stopes, providing additional ground stability and improving dilution control when required. In these cases, a new slot raise is needed to be opened beside the rib pillar.

Backfilled stopes are also used subsequently as working floors for the mining of the upper levels of the production panel. The sequence is completed when the top level of the panel is mined by undercutting the back, beneath the overlying panel's sill pillar.

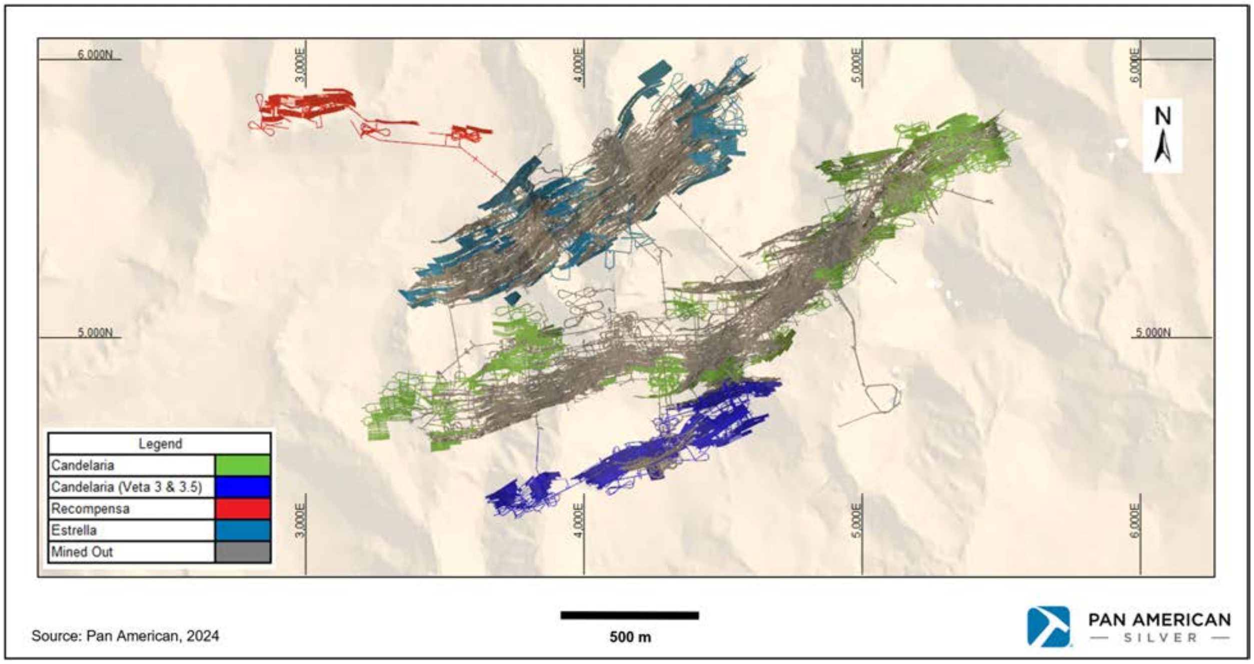


Figure 16-1: Plan view of the Candelaria, Estrella, and Recompensa underground mines

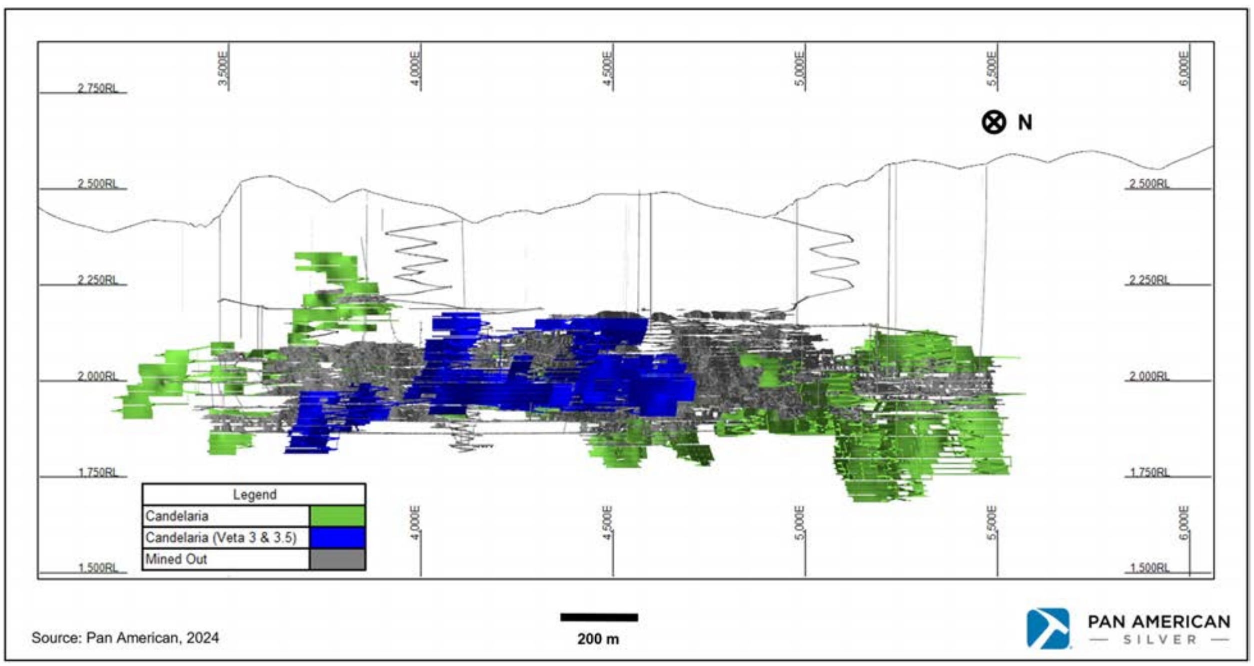


Figure 16-2: Longitudinal section – Mineral reserves – Candelaria

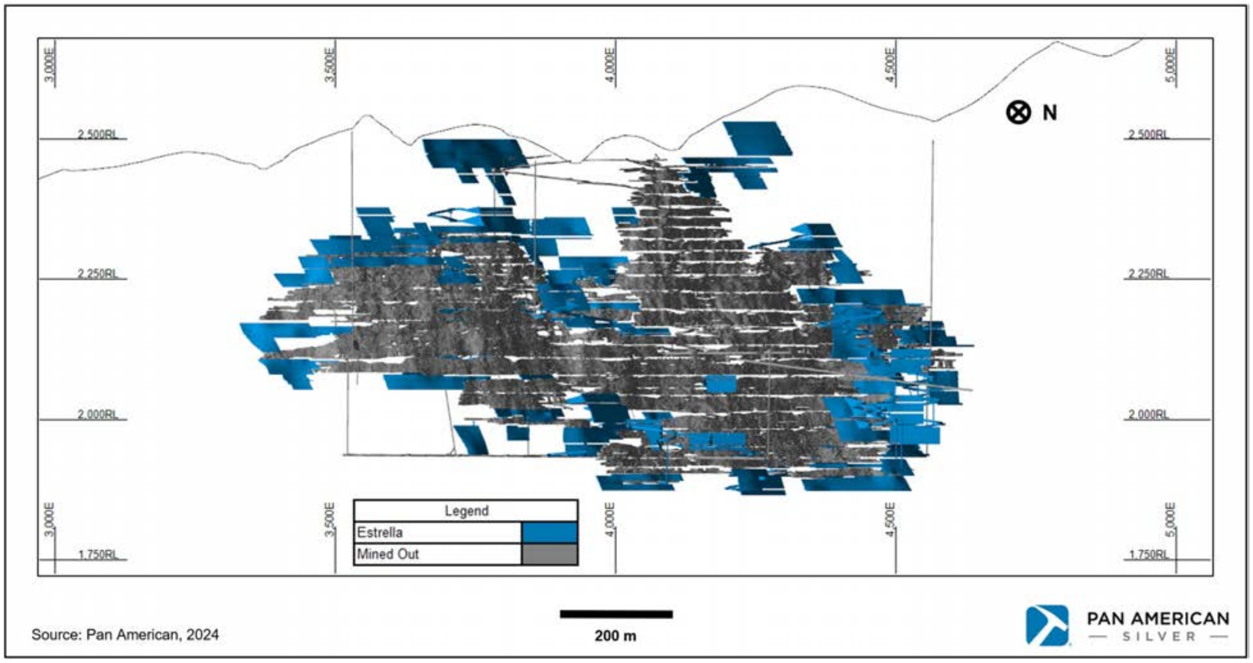


Figure 16-3: Longitudinal section – Mineral reserves – Estrella

16.2 Geomechanics

Stope design dimensions for long-term mine planning utilize the empirical Mathews Stability Graph. Long-term long-hole stope designs include dilution estimates obtained from dilution curves as a function of Bieniawski's rock mass rating (RMR) and stope geometry.

Ground support standards applied to underground excavations are selected according to Barton's Q-system and RMR rock mass classification systems. Available ground support elements include rebar, Swellex or split set bolts, and mesh and shotcrete which are used in different combinations, based on the service life of the excavation and rock mass quality. Typical ground support standards by excavation type and quality of the rock mass are summarized in Table 16-1.

Table 16-1: La Colorada Vein Mine ground support standards

Class	Bolt Length	Bolt Spacing (m)	Start Bolting Height (m)	Mesh Type	Shotcrete Thickness (mm)
Ramps and Permanent Development – 4.0 x 4.5 m					
III	2.4 m rebar	1.50 x 1.50	1.5	Welded	50
IV	2.4 m rebar	1.50 x 1.50	1.5	Welded	50 to 100
V	2.4 m rebar	1.50 x 1.50	1.5	Welded	100
Temporary Development – 2.6 x 3.5 m					
III	1.8 m Swellex – 1.5 m split set	1.00 x 1.20	1.5	Welded	50
IV	1.8 m Swellex – 1.5 m split set	1.00 x 1.20	1.5	Welded	50 to 100
V	1.8 m Swellex – 1.5 m split set	1.00 x 1.20	1.5	Welded	100

16.3 Life of Mine Plan

The life of mine (LOM) plan was developed based on the mineral reserve estimate at the La Colorada Vein Mine's vein deposits as of June 30, 2023. The LOM plan consists of an integrated operation where oxide and sulphide ore from the Candelaria and Estrella underground mines are fed to their respective processing plants, with approximately 95% of the ore tonnes planned to be processed at the plant for sulphide ore. The LOM plan extends from July 2023 to 2035 at target production rates, followed by production ramp-down in 2036, the last year of the plan. Since mining of lower-grade reserves is deferred where possible, planned annual silver production averages 6.5 Moz from 2024 to 2029 and 5.8 Moz from 2030 to 2035, at expected metallurgical recoveries.

From a mining perspective, approximately 68% of the ore tonnes are planned to be mined from Candelaria, while the other 32% is planned to be mined from Estrella. In terms of the mining method, long-hole stopes should provide approximately 54% of the ore tonnes, and drifts developed in ore for stope preparation and cut-and-fill should provide 19% and 26% of the ore, respectively. Total lateral development requirements to achieve the LOM plan are of approximately 178,000 m of primary development and 100,000 m of secondary development. Therefore, the development plan considers maintaining a relatively stable lateral development rate of approximately 23,000 m per year until 2035. The following figures show longitudinal sections of the current LOM plan mining sequences for the Candelaria (Figure 16-4) and Estrella mines Figure 16-5.

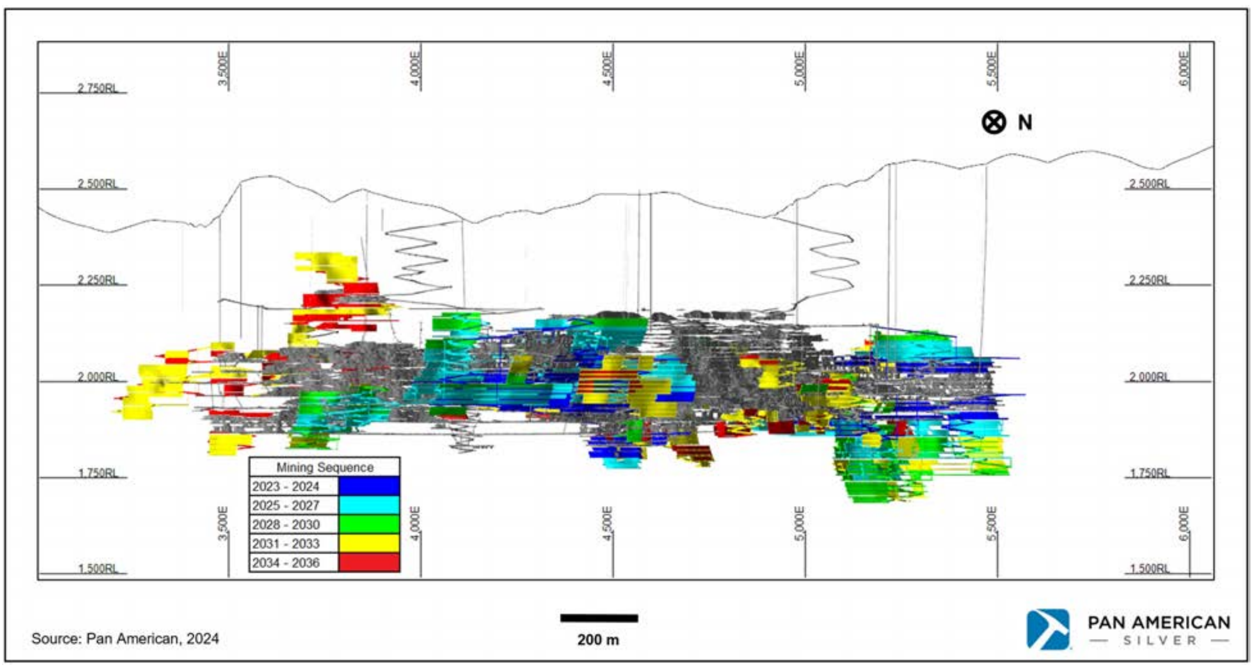


Figure 16-4: Longitudinal section – Mining sequence – Candelaria

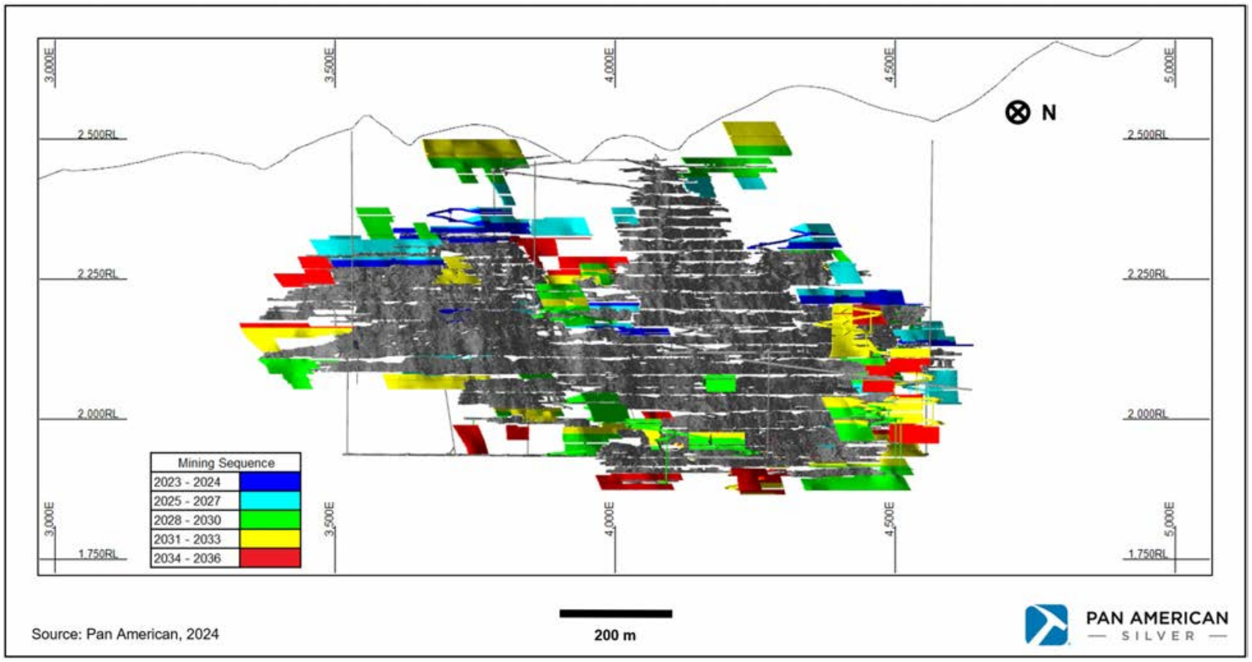


Figure 16-5: Longitudinal section – Mining sequence – Estrella

16.4 Mine Equipment

A list of the active mine equipment at the La Colorada Property is shown in Table 16-2.

Table 16-2: List of current mobile mining equipment

Equipment	Units
Loaders	29
Development Jumbo Drills	13
Long hole Production Drills	5
Rock Bolters	6
Trucks	14
Scissor Lifts	6
Telehandlers	1
Mini Raise Borers	2
Scalers	1

16.5 Ventilation

The current primary ventilation system at the La Colorada Vein Mine consists of seven main fans: four external fans located on surface and three booster fans installed in the Candelaria and Estrella underground mines. A list of the fans and models is shown in Table 16-3.

Table 16-3: List of main ventilation fans

Fan	Type	Location	Mine	Model
Óxidos	Exhaust	Surface	Candelaria	Spendrup 244-127-1200-A-2-D
Estrella	Exhaust	Surface	Estrella	Spendrup 244-127-1200-A-2-D
Sulfuros	Exhaust	Surface	Candelaria	Spendrup 213-127-1200-A-2-D
El Águila	Intake	Surface	Candelaria	Spendrup 244-127-1200-A-2-D
Level 468 Booster	Intake Booster	Underground	Candelaria	Zitron ZVN 1-16-400/4
Level 558 Booster	Intake Booster	Underground	Candelaria	Zitron ZVN 1-16-400/4
Level 528 Booster	Exhaust Booster	Underground	Candelaria	Spendrup 213-127-1200-A-2-D

The external fans at Candelaria consists of three Spendrup fans, two of which work as exhaust fans and one as an intake fan. The booster fans installed in the underground mines are two Zitron fans located in levels 558 and 468 which serve as intake boosters from the chilled air refrigeration plant. A third Spendrup booster fan located at level 528 supports exhaust through the Sulfuros exhaust raise.

Primary ventilation of the Candelaria mine is provided through a push-pull ventilation system. Return air is exhausted through return air raises to surface by main exhaust fans, while fresh air enters the mine pushed through intake raises by main intake fans. Due to the overall negative pressure generated, fresh air also enters the mine through portals and intake raises not equipped with fans. Primary ventilation is aided by main booster fans located in the underground mine; these booster fans improve the intake of cooled air from the refrigeration plant through the Campaña ramp and the exhaust through the Sulfuros raise. A schematic ventilation circuit for the Candelaria mine is shown in Figure 16-6; the intake and exhaust workings and air flows as of mid-2023 at Candelaria are summarized in Table 16-4.

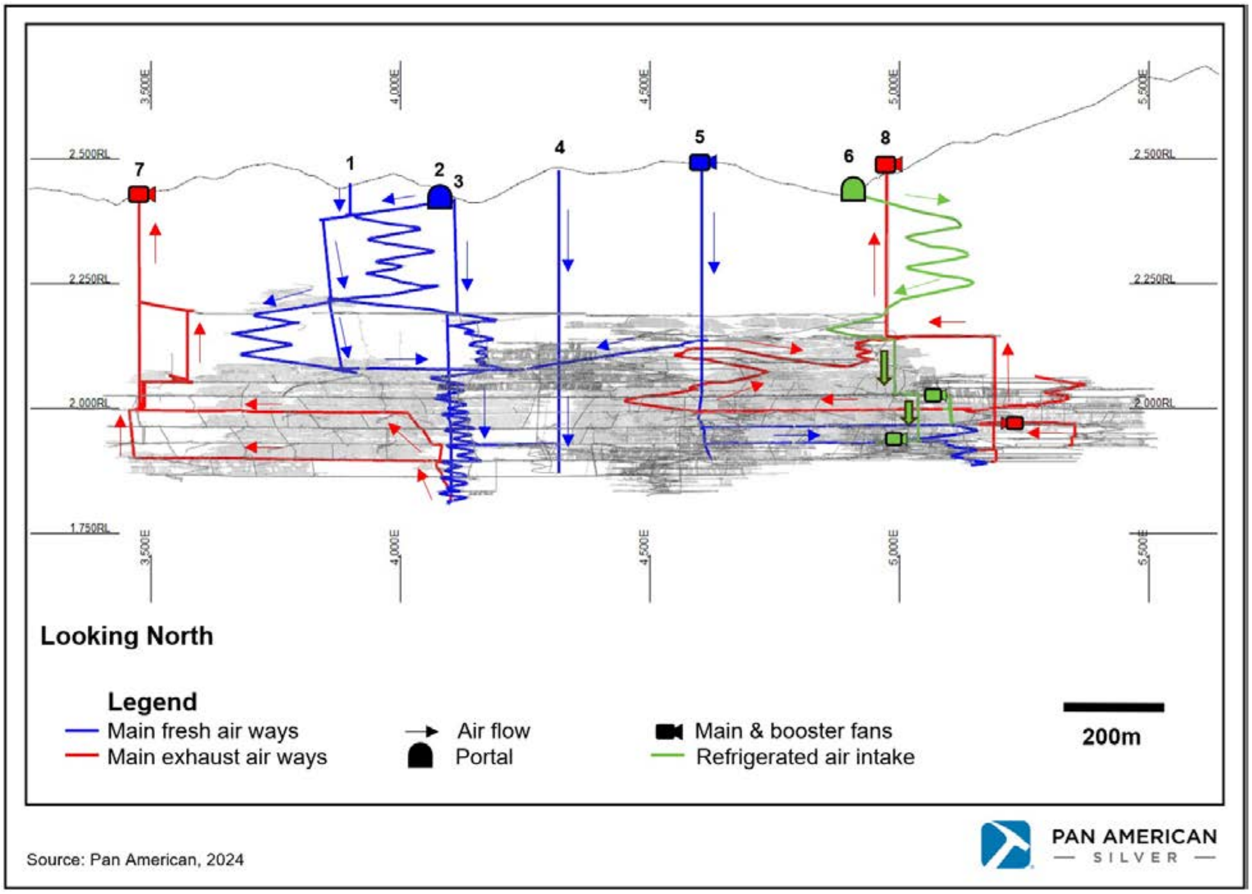


Figure 16-6: Schematic view of ventilation circuit – Candelaria mine

Table 16-4: Intakes and exhausts – Candelaria mine

Number on Figure 16-6 and Name	Working	Intake/Exhaust	Equipped with Fan	Airflow (CFM)
1 – San Fermín	Raise	Intake	No	30,000
2 – San Fermín	Ramp	Intake	No	65,500
3 – Bombeo	Raise	Intake	No	30,000
4 – Ross Beaty	Shaft	Intake	No	170,000
5 – El Águila	Shaft	Intake	Yes	150,000
6 – Campaña	Ramp	Intake	Yes (booster fans)	192,500
7 – La Libertad/Óxidos	Raise	Exhaust	Yes	340,000
8 – Gemelos/Sulfuros	Raise	Exhaust	Yes (and aided with booster)	277,300

It is important to highlight that, although the recently commissioned air refrigeration plant has improved temperature conditions in the deep portions of the La Colorada Vein Mine, especially those located in the deep eastern zone of the Candelaria mine, ventilation restrictions in those areas have led to the temporary reduction of production rates. These ventilation restrictions are related to poor ground conditions encountered during ventilation raise construction. To address these challenges, a fully concrete-lined ventilation shaft (Guadalupe Shaft), 5.5 m in diameter and 593 m deep, is currently under construction from surface in the eastern extremity of the Candelaria mine. The commissioning of this shaft is planned for 2024 and upon its completion it will not only solve the ventilation issues in the mentioned zones, but also improve the cool air injection from the refrigeration plant to control high temperatures transferred from the mine water and rock (which are both at high temperatures at depth) and from mobile equipment to the working environment.

The primary ventilation system of the Estrella mine is a pull ventilation system, where return air is exhausted through the Estrella raise by a main exhaust fan. Due to the negative pressure generated, fresh air enters the mine through portals and intake raises not equipped with fans. Intake and exhaust workings and airflows as of mid-2023 at Estrella are summarized in Table 16-5.

Table 16-5: Intakes and exhausts – Estrella mine

Name	Working	Intake/Exhaust	Equipped with Fan	Airflow (CFM)
Estrella	Ramp	Intake	No	140,000
Estrella	Ramp	Intake	No	28,300
Poniente	Raise	Intake	No	50,000
Oriente	Raise	Intake	No	62,000
Estrella	Raise	Exhaust	Yes	315,000

16.6 Dewatering

Maintaining an adequate underground air temperature at the La Colorada Vein Mine is critical for the efficiency of operations. Since underground heat sources include mining equipment, oxidation, and heat transfer through rock and groundwater, dewatering and ventilation are key to achieve that goal. The dewatering strategy aims to get the groundwater into pipes and to the pump stations as quickly as possible to minimize the time and surface area available for heat transfer.

The main pumping system at the La Colorada Vein Mine consists of pumping stations located at level 648 and 315. Both pumping stations are currently equipped with two 800 hp Xylem Goulds pumps, each with a pumping capacity of 1,850 GPM. The 648-level pumping station is also equipped with two backup pump sets, each consisting of five 250 hp pumps and a pumping capacity of 1,780 GPM. The 315-level pumping station is equipped with two backup pump sets, each consisting of four 250 Hp pumps also resulting in a 1,780 GPM pumping capacity per set. Water is pumped via two 14” diameter steel pipes from the 648-level to the 315-level pumping station, and from the 315-level pumping station to the water treatment plant located on surface. The installed pumping capacity of the main pumping system is of 3,700 GPM, with current dewatering flows averaging 1,765 GPM corresponding to a 49% utilization of the installed capacity.

The dewatering strategy at the La Colorada Vein Mine has been to extend the development of the decline to the next sublevel below the lowest mining level and to break into the water-bearing structures, which usually correspond to the veins. The water is pumped from there with submersible pumps to the main pumping stations. Also, two larger-diameter bore holes were drilled from the 618- and 588-levels (pilot holes using a raise-boring machine) to below the deepest level and equipped with 150 hp deep-water pumps with a total pumping capacity of 474 GPM. These pumps are submerged at a water depth of 145 m and deliver their flows to the 648-level main pumping station.

17 Recovery Methods

The La Colorada process plant contains two separate circuits: one for the treatment of sulphide ore and another for oxide ore.

The sulphide ore is treated in a conventional flotation circuit with a nominal processing capacity of 2,000 tpd. The process consists of crushing, grinding, and selective lead and zinc froth flotation circuits that produce lead and zinc concentrates. In 2023, metallurgical recoveries in the sulphide plant average 93% for silver; 58% for gold; 86% for lead; and 84% for zinc. Of the silver recovered from sulphide ore, 89% of it was from lead concentrate and 4% was from zinc concentrate. Lead grades in the lead concentrate average 37% lead in 2023. Zinc grades in the zinc concentrate average 57% zinc in 2023.

The oxide ore is treated in a conventional cyanide leach process with a nominal processing capacity of 400 tpd. The process consists of crushing, grinding, leaching, Merrill-Crowe zinc precipitation, and smelting of the precipitate to produce doré, with average recoveries of around 82% for silver and 43% for gold in 2023.

17.1 Sulphide Processing Plant

Sulphide ore is trucked to an 8,000 t capacity ore stockpile and fed via an apron feeder to a C-100 jaw crusher. The minus 6” material is conveyed to double-deck 2.4 × 6.1 m screen for size classification. Material oversize reports to a short head crusher in a closed loop for further size reduction. Screen undersize reports to one of two 800 t capacity fine ore bins and is then fed to a 4.0 × 5.7 m ball mill. Mill product is pumped to a bank of three cyclones for size classification. Cyclone underflow is returned to the ball mills for additional grinding to form a closed loop within the grinding circuit.

Cyclone overflow reports to the lead flotation circuit, which comprises six 30 m^3 tank cells, four for rougher flotation and two for scavenger flotation. This is followed by six 10 m^3 flotation machines that provide first and second cleaner stages in the circuit. Flotation concentrate from the cleaner circuit reports to a 7.0 m diameter lead concentrate thickener, and the slurry underflow reports to a filter press for dewatering. After filtering, the filter cake is stored in a lead-concentrate holding area for shipping to a smelter. The clear solution from the concentrate thickener is returned to the process water tank for reuse in the mill and flotation circuit.

Tailings from the lead scavenger circuit report to the zinc flotation circuit conditioning tank, where reagents for zinc flotation are added. The zinc flotation equipment and processes are similar to those of the lead flotation circuit: a 4.3 m diameter conditioning tank, a bank of six 30 m^3 tank cells (four for rougher flotation and two for scavenger flotation), and six 10 m^3 cleaner flotation cells for first and second cleaning stages. Flotation concentrate from the rougher cells reports to the zinc cleaning circuit and tailings report to the zinc scavenger circuit. Flotation concentrate from the cleaner circuit reports to an 8.0 m diameter zinc concentrate thickener, and the slurry underflow reports to a filter press for dewatering. After filtering, the filter cake is stored in the zinc concentrate holding area for shipping to a smelter. Clear solution overflow is returned to the plant process water for re-use in the recovery process.

Tailings from the zinc scavenger circuit report to the tailings system feed box for classification and disposal. Tailings are pumped to two cyclones for classification: the coarser material is directed to the hydraulic backfill plant for underground reuse as backfill in the sulphide stopes; the finer material is directed to a 22 m diameter thickener, for disposal in a lined tailings storage facility. Clear solution from the tailings thickener is used in the preparation of the hydraulic backfill or returned to the process water tank for reuse in the recovery process.

17.2 Oxide Processing Plant

Oxide ore is reclaimed from the coarse ore stockpile and screened through a stationary grizzly for sizing prior to crushing in a 600 × 900 mm primary jaw crusher. The crushed product is conveyed to a double-deck vibrating screen for size classification. Any oversize reports to a secondary cone crusher in a closed loop for further size reduction. Screen undersize reports to a fine ore stockpile for grinding via a diverter gate and pant leg chute.

The crushed ore is reclaimed from the fine ore stockpile by a belt feeder and conveyed to a 2.9 × 3.4 m ball mill. The milled product is pumped to a bank of cyclones for size classification. Cyclone underflow reports to a 2.4 × 3.0 m ball mill for additional grinding, this milled product then returns to the cyclone for classification. Dilute cyanide solution is used in the grinding circuit to initiate leaching of gold and silver.

Cyclone overflow reports to two 7.9 × 2.4 m primary leach thickeners. Clear solution overflow from the thickeners reports to the pregnant solution tank and slurry underflow reports to a series of seven agitated leach tanks. The slurry passes through five of these agitated leach tanks for leaching and then reports to a 7.9 × 2.4 m intermediate leaching thickener. Clear solution overflow reports to the pregnant solution tank and the slurry underflow reports to a series of four additional agitated leach tanks for continued leaching.

Following the leaching period, the leached solids are sent through four 7.9 × 2.4 m countercurrent rinse thickeners for further metal recovery and to reduce the cyanide content of the tailings. Rinse water reports to the mill water storage tank for reuse in the recovery process, and the thickened tailings report to a lined tailings storage facility.

The pregnant leach solution is pumped through a set of clarifiers to remove suspended solids, and after clarification, the solution passes through a vacuum tower to remove dissolved oxygen. Zinc dust is added to the solution stream, causing the precipitation of gold and silver. The solution with the metal precipitate passes through a set of filter presses to separate the metal precipitate from the solution stream. After leaving the filter press, the barren solution is returned to the process water tank for reuse in the recovery process. The filtered precipitate is mixed with refining fluxes and smelted in a gas-fired furnace to separate the contained metal from impurities. The molten metal is poured into molds and solidified into doré bars for shipping.

17.3 Power, Water, and Reagent Requirements

Power is supplied from the national grid and is supplemented by backup generator sets if necessary. Annual power consumption is 17 GW-hr. Water is sourced from the tailings storage facility, underground mine dewatering, or wells located on the La Colorada Property. In 2023, 78% of the processing plant water requirement was sourced by recirculation of water from the tailings storage facility (approximately 716,491 m^3), and 22% was sourced from the underground mine (approximately 207,097 m^3). These sources are sufficient to meet the requirements of the processing plant. Estimated material requirements for processing ore are listed in Table 17-1.

Table 17-1: Estimated reagent requirements per tonne of ore

Ore Type	Grinding Material	Lime	Sodium Cyanide
Sulphide Ore	0.56 kg/t	1.0 kg/t	N/A
Oxide Ore	0.80 kg/t	4.6 kg/t	3 kg/t

18 Project Infrastructure

The location of the La Colorada Vein Mine, processing plant, tailing facilities, and other main infrastructure are illustrated in Figure 18-1.

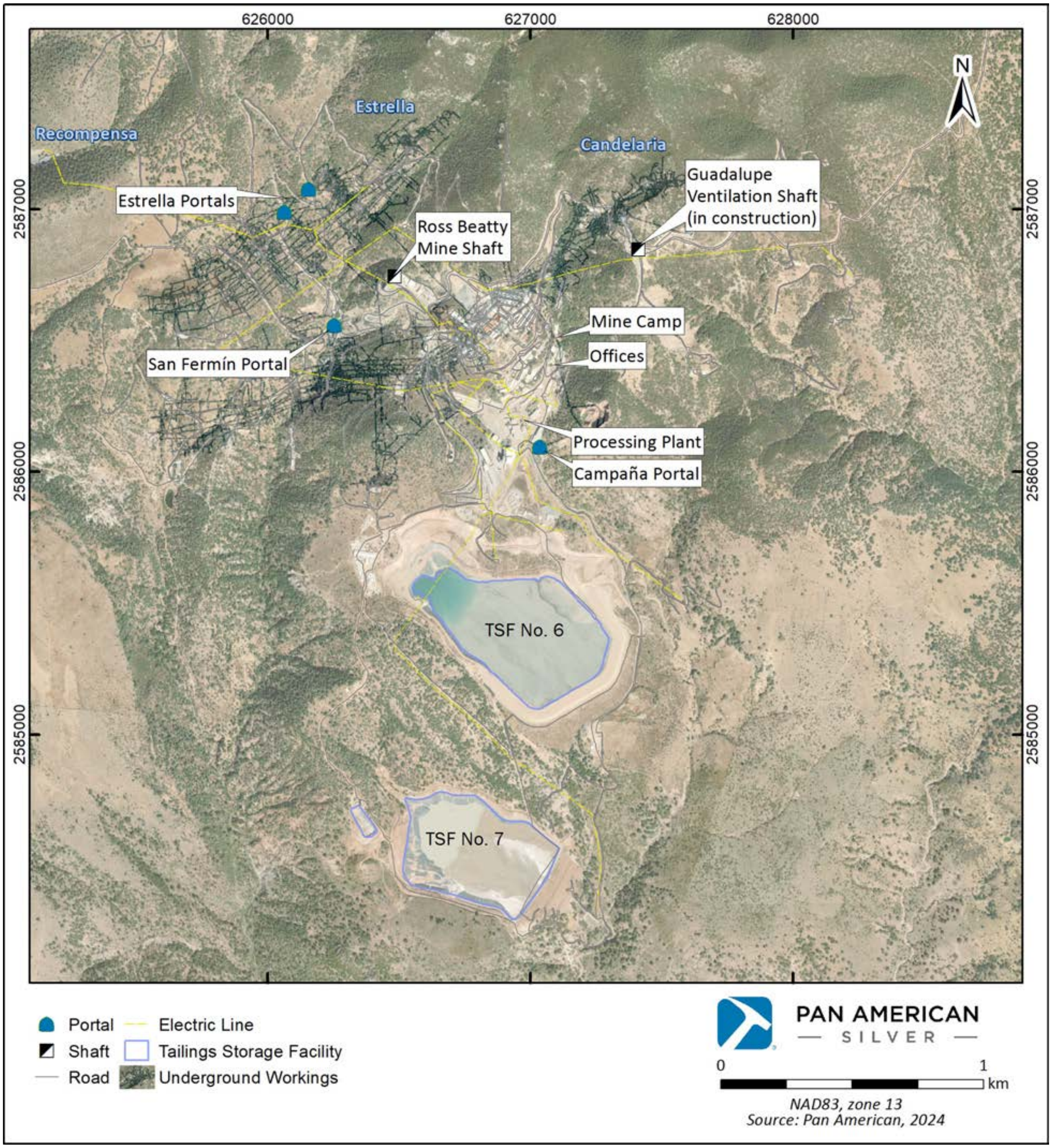


Figure 18-1: Site layout of mine infrastructure

18.1 Transportation and Logistics

Consumables and other materials are transported to the La Colorada Property from Durango via Federal Highway 45 (for 120 km), a paved two-lane highway with some four-lane sections, and a 23 km public all-weather gravel road. The La Colorada Property is also accessible from the city of Zacatecas by similar types of roads. Both cities are major industrial and supply centres for the region and are a source of skilled workers.

Doré is shipped via armoured vehicle and concentrates are shipped in covered trucks by a contractor specializing in secure transport of valuable cargo.

18.2 Mine, Processing and Tailings Facilities

Pan American currently operates the La Colorada Vein Mine which is comprised of two underground operating mines (Candelaria, Estrella) and one non-operational mine (Recompensa). La Colorada Property has all required infrastructure for a mining complex. The existing infrastructure includes the typical components of an operating underground mine, including the mine workings, shaft, hoist room, air refrigeration plant, compressors, workshops, laboratories, storage facilities, offices, drill core and logging sheds, water and power lines, access roads, and the worker's camp. The Guadalupe shaft, a fully concrete-lined 5.5 m in diameter and 593 m deep ventilation shaft is currently in construction in the eastern extremity of the Candelaria mine to address ventilation challenges and improve cool air injection from the refrigeration plant.

The processing facilities consist of stockpiles crushing, grinding, flotation, and reagent preparation areas; thickening, filtration, and concentrate storage areas and the Merrill-Crowe plant. The processing facilities area also includes process plant offices, maintenance facilities, analytical and metallurgical laboratories, and water treatment plants, pumping facilities, and the tailings storage facilities.

Tailings are stored in two separate facilities: the sulphide tailings are presently stored in TSF No. 6, approximately 1 km south of the mineral processing plant, and the oxide tailings are stored in the nearby TSF No. 7 (Figure 18-1).

TSF No. 6 is a compacted embankment dam constructed using competent fill material from nearby borrow sources. The TSF No. 6 reservoir is fully lined with a double liner system consisting of a high-density polyethylene (HDPE) liner on top of a low-permeability soil layer. The facility has a drain system associated with the liner system and perimeter diversion channels around the reservoir. TSF No. 6 is well instrumented with several piezometers, settlement monuments, and an inclinometer.

TSF No. 7 is located to the south of TSF No. 6. Like TSF No. 6, TSF No. 7 is a fully lined facility with a dam is instrumented with several piezometers, settlement monuments, and an inclinometer.

18.3 Power and Water

Pan American has agreements in place with CFE for the supply of power sufficient to execute the current production plan. Electrical power is brought to the mine main substation from the national power grid via a 115 kV transmission line. Power is stepped down to 13.2 kV at the mine for distribution. Pan American also maintains diesel generators onsite to provide backup power for the operation of critical equipment, such as mine dewatering pumps, in case of power outages. Annual power consumption is of 17 GW-hr.

Water for the mining operation is supplied from the mine dewatering systems, water reclaimed from the tailings storage facilities, and wells located on the La Colorada Property, and is adequate for the existing and planned future requirements of the La Colorada Vein Mine.

19 Market Studies and Contracts

19.1 Contracts and Marketing

Contractual agreements are currently in place for the supply of goods and services necessary for the mining operations. These include contracts for the supply of diesel for equipment operation and power generation, process reagents such as sodium cyanide, camp services including catering, and maintenance equipment for the mining equipment. The La Colorada Vein Mine utilizes specialized contractors for non-routine tasks such as shaft sinking, raise boring, and tailings dam construction or when additional capacity is required such as for mine development and shotcrete or cable bolt installation.

The doré produced at the La Colorada Vein Mine is sent to one of two arm's-length precious metal refineries for refining under fixed-term contracts. After refining, the silver is sold on the spot market to various bullion traders and banks, and the gold is sold to Triple Flag. All lead and zinc concentrates produced are sold to arm's-length smelters and concentrate traders under negotiated fixed-term contracts, which consider the presence of any deleterious elements. To date, Pan American has not experienced difficulties with renewing existing or securing new contracts for the sale of doré or concentrates, and none are expected.

19.2 Review by the Qualified Person

Martin Wafforn, the qualified person responsible for this section of the technical report, has reviewed the contract terms, rates, and charges for the production and sale of the doré and concentrates, and considers them within industry norms and sufficient to support the assumptions made in the mineral resource and mineral reserve estimates.

20 Environmental Studies, Permitting, and Social or Community Impact

20.1 Environmental Studies, Issues, and Permits

An environmental impact statement (EIS) and a risk assessment of the La Colorada Vein Mine on the La Colorada Property were submitted to the Mexican environmental authorities in 1999. The EIS described the impact of proposed development and mining activities and provided conceptual plans for closure and remediation. The EIS was approved by the Mexican authorities in 1999 and an update of the EIS was approved in 2010. In 2013, the Mexican authorities approved a modification to the existing environmental permits to allow the expansion of the La Colorada Vein Mine and process plant to up to 2,000 tpd. A subsequent permit modification application to expand the plant production was approved in early 2015.

The main environmental projects at the La Colorada Property focus on the stability and revegetation of historical tailings facilities. In the qualified person's opinion, there are no known environmental issues that could materially impact our ability to extract the mineral resources or mineral reserves.

Pan American has voluntarily participated in the Mexican Environmental Protection Authority's "Clean Industry" program, which involves independent verification of compliance with all environmental permits and the implementation of good practice environmental management procedures and practices. The La Colorada Vein Mine obtained its first certification in 2008 and is periodically recertified. The latest certification is valid until December 2023. Pan American is working to renew the certification for the next period.

Pan American has implemented a management system at the La Colorada Property covering health, safety, environment, and community through the Towards Sustainable Mining (TSM) initiative developed by the Mining Association of Canada (MAC). This system aids in overseeing environmental and occupational health and safety policies and community relations. Furthermore, it facilitates the management of proposed goals and the fulfillment of stakeholders' needs, expectations, and demands.

20.2 Mine Waste Disposal and Water Management

All waste rock and a portion of the tailings are repurposed as backfill during the mining process. Two engineered tailings storage facilities are located on the La Colorada Property, and additional lifts are added as required.

Water for the mining operation is supplied by the underground mine dewatering systems, tailings facilities, and wells located on the La Colorada Property; the water supply is adequate for the existing and planned future requirements of the mine. As permitted by Mexican law, water from mine dewatering is pumped to the surface, treated in a mine water treatment plant, and stored in tanks for use in the milling process and for domestic use. Treated water from mine dewatering is also pumped to a potable water treatment plant to provide potable water for camp use. Upgrades to the existing mine water treatment plant will be implemented in 2024 to ensure compliance with regulatory limits for temperature.

The 2023 Decree by the Mexican government makes changes to the current mining laws, including imposing conditions on water use and availability. The impact of the 2023 Decree and its applicability to the La Colorada Property is unknown. If applicable, the 2023 Decree could impact water use. See Section 4.2 and Section 4.6 for further information regarding the 2023 Decree.

20.3 Social and Community Factors

20.3.1 General Context

The La Colorada Vein Mine's direct area of influence includes five communities representing a total of approximately 500 inhabitants, according to the Pan American's 2022 social baseline:

- Colonia Orión (pop. 145) and San Juan de La Tapia (pop. 278) in the municipality of Sombrerete.
- The Magdalena ejido (74), Canoas (21), and La Libertad (17), in the municipality of Chalchihuites.

The indirect area of influence covers the municipal seats of Chalchihuites, with 3,689 inhabitants, and Sombrerete, with 25,068 inhabitants, according to the National Institute of Statistics and Geography's (INEGI) 2020 census.

The area around La Colorada Vein Mine is known for its mountainous terrain, agriculture, and cultural heritage, which is typical of rural Zacatecas. The mining sector plays a vital role in the region's economic development; according to data from the Economic Census 2019, mining represented Zacatecas's fourth-highest total income. The local communities primarily rely on agriculture and livestock, particularly cattle, for their economic development. Transportation services and the commercial sector have progressively increased in the municipal centres, playing essential roles in the region's economic growth.

This section presents the results of the social review based on documentation for La Colorada Property's operations and compares it with the relevant International Finance Corporation (IFC) Performance Standards (PS). It does not represent a detailed audit of La Colorada Property's compliance with the IFC PS but does assess La Colorada Property's social performance with respect to the following relevant IFC PSs.

20.3.2 PS1: Socio-Environmental Assessment and Management Systems

La Colorada Property's operating policies include a strategic stakeholder management approach and the assessment and management of social risks. The social risk management elements are shown in Table 20-1.

Table 20-1: Social risk management

Category	Management Elements
Stakeholder Engagement	Stakeholder identification and analysis (mapping)
	Stakeholder engagement
	Social risk management
	Grievances mechanism
Impact Management	Impact identification
	Impact management
	Community baseline information tracking
Benefits Management	Local employment and procurement
	Community investment
	Community development

This framework guides the La Colorada Property and its operations in the gathering of information about relevant stakeholders, assessment of potential impacts, and development of mitigation measures.

Guided by these elements, the La Colorada Propety has been monitoring stakeholder issues and risks related to the operation and has aimed for timely communication of project activities and other programs with stakeholders and the public. Regular audits and reports on social performance are carried out at the La Colorada Property, and recommendations are made to improve communication and performance based on audit findings and annual assessments.

20.3.3 PS2: Work and Working Conditions

The workers of the La Colorada Property receive several employment benefits (most of which are above the legal minimum Mexican requirements) that constitute a very competitive compensation package. Some of those benefits offered to administrative and operational personnel are listed as follows:

- Overtime pay
- Monthly and quarterly production bonus
- Monthly safety bonus
- Monthly attendance bonus
- Annual performance bonus
- Retirement bonus
- Employees profit sharing
- Laundry service
- Life insurance
- Health insurance
- Dental insurance
- Grocery vouchers (semi-annual)
- Local transportation services (daily to the town of Sombrerete and twice a month to other regional locations)
- Continuous training and certifications

The La Colorada Vein Mine generates 920 direct jobs and 540 indirect jobs.

The Health and Safety team guides La Colorada Property and its operations in the development of site-specific health and safety procedures and how to improve operations based on health and safety monitoring performance.

Regular audits and reports on worker health and safety are carried out at the La Colorada Property, and recommendations are made to improve performance based on the audit findings.

20.3.4 PS4: Community Health and Safety

Pan American's social performance approach towards local communities aims at improving trust and respect for human rights, manage its commitments and impacts, and, most importantly, enhance the community's social well-being and health conditions while helping maintain a safe environment. Pan American is committed to generating value by sustainably providing essential resources to local communities of interest, such as the following examples:

- Scholarships to increase formal education strengthened with a school transportation plan.
- Family garden program designed to support food security, managed by local families.
- Skills development program for women in the community to promote entrepreneurship.
- Programs to enhance community infrastructure in partnership with local government.
- Promotion of cultural events in the communities.
- Periodic informative meetings with interested parties.

20.3.5 PS5: Land Acquisition and Involuntary Resettlement

Pan American has undertaken a land acquisition and relocation process. The information on land acquisition is in Section 4. Activities for the relocation process are summarized as follows.

La Colorada Property Relocation History and Context

In the first half of the 20th century, a previous mine owner constructed adobe houses on the La Colorada Property to serve as housing for workers. Due to the travel distance between the mining facilities and the nearby towns and cities where the workers resided (approximately 120 km), they lived with their families in these dwellings, sometimes for generations, in a multi-generational manner as is typical in the region. Some families have lived there for almost three generations, as some children in the household would also work in the mine when grown up. This common practice continued until 2015.

Considering the age of the houses and their close proximity to several industrial facilities that were developed over time as the mine expanded, it was deemed necessary to relocate the families to a new housing zone that was constructed on the La Colorada Property in 2015.

Discontent with the relocation, fourteen of the families filed an agrarian lawsuit in 2015 to be recognized as an "agrarian community" before the Unitary Agrarian Tribunal (TUA). Subsequently, these families initiated a process before the SEDATU of Zacatecas to challenge ownership rights over this area.

In November 2021, the Pan American formally launched a plan (the Plan) to address issues related to the original 2015 relocation process with the assistance of external relocation consultants and monitored by the Office of the United Nations High Commissioner for Human Rights in Mexico. The Plan involved the participation of the fourteen families. At the time, eight families were still living on the La Colorada Property: seven in the new residential zone and one family remaining in its old home, having declined to relocate in 2015. The remaining six families resided in various locations in the states of Zacatecas and Durango.

Scope and Purpose

The Plan's main objective is to restore the living conditions of the families to equal to or better standards than those they had before relocation. This objective encompasses not only the families that were still living at the mine in 2021 but also those that no longer live there. Pan American intends to complete the relocation of the families through a comprehensive assessment, planning, stakeholder engagement, implementation, and monitoring and evaluation process.

The Plan consists of three stages:

- Stage 1: Planning and negotiation.
- Stage 2: Plan implementation.
- Stage 3: Monitoring and evaluation.

It is important to note that monitoring and evaluation were conducted throughout the process, not only in Stage 3.

Institutional and Legal Framework

The Plan is being carried out in compliance with applicable Mexican law and according to the IFC PS.

Stakeholder Engagement

Stakeholder engagement is not seen as an independent aspect of the overall relocation process but as a critical component of the Plan; it is deeply embedded in all Plan activities. To identify the people who were relocated in 2015, Pan American worked with the respective families to recognize all the individuals who were living in their homes at that time. Additionally, Pan American made sure to identify the legitimate representatives of each family.

Current Status of Relocation Groups

The relocation process is currently ongoing, with most of the families having relocated to other residences inside and outside the La Colorada Property's area of influence. Four families will be moving to their newly built residences in Chalchihuites, and four families are still living at the mining camp residences, pending the final legal decision on their relocation.

20.4 Project Reclamation and Closure

A closure cost estimate for the La Colorada Vein Mine, including post-closure maintenance and monitoring is prepared according to the US State of Nevada's approved SRCE methodology. It is updated every year for unit costs and discount rates, and every other year for physical disturbance estimates, if necessary. Pan American has estimated the present value of site reclamation costs for the La Colorada Vein Mine to be approximately US $7.0 million, effective December 31, 2022. No reclamation bond is currently required under Mexican law.

21 Capital and Operating Costs

The capital and operating costs outlined herein are based on the LOM plan presented in Section 16 of this technical report. Capital and operating costs for the Skarn Project are summarized in Section 24.

21.1 Capital Costs

Since the start of operations, estimated sustaining capital expenditures have been based on current operating performance. Sustaining capital expenditures throughout the LOM are estimated to average US$13 million per year; they include expenditures required for replacement and overhaul of mobile mining equipment, development of mine infrastructure, and the sustaining capital required to sustain the processing plants and tailings dam operations. Average yearly sustaining capital expenditures over the LOM are summarized in Table 21-1.

Table 21-1: LOM Average Yearly Sustaining Capital Expenditures

Category	Average Yearly Sustaining Capital Expenditures MUS$
Mine Equipment	4.36
Mine Infrastructure	1.90
Plant Upgrades	2.68
Tailings Dams	2.77
Site Infrastructure	0.83
Sustaining Lease Additions	0.38
Total	**12.91**

No exploration capital has been considered since the LOM plan is based on mineral reserves only. The amount of diamond drilling required to extend the mineral resources and mineral reserves beyond the basis of the current inventories of the La Colorada Vein Mine will be at the discretion of Pan American and may depend on the success of exploration programs and market conditions.

These capital expenditures do not include any expenditures related to the development of the Skarn Project, such as further exploration drilling, engineering, or project development.

Capital costs do not include project financing and interest charges, working capital, sunk costs for the completion of construction and commissioning of the Guadalupe Shaft, or closure costs. Mine closure costs are listed in Section 20.

21.2 Operating Costs

Operating costs include those for mine production, primary and secondary mine development, processing, general and administrative costs.

The LOM production plan and actual unit operating costs achieved in Q1-2023 drove the estimation of the mining, processing and G&A costs. Unit operating costs are estimated to average US$133.75/t over the LOM as set out in Table 21-2. Additionally, transport, shipping and refining costs are forecasted to average US$18.79/t over the LOM.

Since production rates at the La Colorada Vein Mine are currently lower than design due to ventilation restrictions at the Candelaria mine, unit operating costs are forecasted to be higher in the initial year of the plan, until the Guadalupe ventilation shaft is commissioned, and mining rates are ramped up to design production rates. Cut-off values may require adjustments in future years due to current variations in the production rate, future adjustments to the cut-off value calculation strategy and uncertainties related to enhanced ventilation improvements, metal prices, and costs associated to greater depths of mining and mine refrigeration needs.

Table 21-2: LOM Average unitary operating costs

Category	Average Operating Cost US$/t Processed
Mining Cost	99.03
Processing Cost	12.20
G&A Cost	22.53
Total Operating Cost	**133.75**
Transport, Shipping & Refining Cost	**18.79**

22 Economic Analysis

Financial information with respect to the La Colorada Vein Mine has been excluded from this technical report as Pan American is a producing issuer and the La Colorada Vein Mine is currently in production. Pan American has performed an economic analysis of the current La Colorada Vein Mine using metal price assumption of US$19/oz of silver, US$1,300/oz of gold, US$2,000/t of lead and US$2,600/t of zinc, and confirms that at the planned production rates, metal recoveries, and capital and operating cost estimated in this technical report, the outcome is a positive cash flow that supports the mineral reserve estimate. The planned production rates assume the successful completion of the Guadalupe ventilation shaft and fan installation. Due to the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

Additional information and results relating to the PEA for the Skarn Project, including the economic analysis, are presented in Section 24 of this technical report.

23 Adjacent Properties

There are no adjacent properties that are relevant to this technical report.

24 Other Relevant Data and Information

24.1 Skarn Project Preliminary Economic Assessment (PEA)

Section 24 of this technical report summarizes the PEA for the Skarn Project on the La Colorada Property. The PEA is current as of December 18, 2023. This section of the technical report was prepared by Pan American using internal resources and external consultants.

This PEA is preliminary in nature, it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

NI 43-101 defines a PEA as a study, other than a pre-feasibility study (PFS) or feasibility study (FS), that includes an economic analysis of the potential viability of mineral resources. It is intended as a step in the evaluation of a project's economic and technical potential that will determine if more detailed feasibility studies are warranted and recommended. The results of a PEA are not sufficient to support the disclosure of mineral reserves.

The mining inventory (the inventory) stated in this Section 24 does not constitute a mineral reserve nor a mineral resource. The inventory includes contributions from indicated and inferred mineral resources with the addition of some "must take" dilution of caved material, including unclassified material excavated by the chosen mining method. At this time, the mineral resource model contains no material classified as measured mineral resources.

Under NI 43-101, a PEA study is permitted to consider the contribution from inferred mineral resources. A PFS-level study, at a minimum, is required to disclose mineral reserves. As next steps, the qualified person recommends conducting a PFS, to more thoroughly investigate trade-offs from different options, followed by a FS.

24.1.1 Project Description and Proposed Mining Method

The Skarn Project consists of a mineralized zone on the La Colorada Property that is located 800 to 1,000 m below surface, and approximately 200 to 300 m below the lowermost levels of the mining operation at the La Colorada Vein Mine. For the purposes of this Section 24, the existing operations will be referred to as the "La Colorada Vein Mine", the "vein mine," or the "veins." The La Colorada Vein Mine deposits and the Skarn Project deposit are distinct in their geometry, grades, and relevant mining methods.

The PEA assumes a 50,000 tpd underground operation using sublevel caving (SLC) in three zones (901, 902, and 903; see Figure 24-1). The proposed workflow is for the mined material to be hauled to ore passes reporting to underground primary crushers, then transported to surface via a conveyor and treated through a conventional grinding and flotation circuit. Zinc and lead concentrate streams would be produced at site, with the lead concentrate containing almost all the payable silver content. Tailings would be stored in a filtered tailings storage facility (FTSF) adjacent to the processing area. The majority of the concentrates are to be shipped from Mexican Pacific ports to various international buyers and smelters, although some concentrate may be trucked or railed to internal Mexican buyers and smelters.

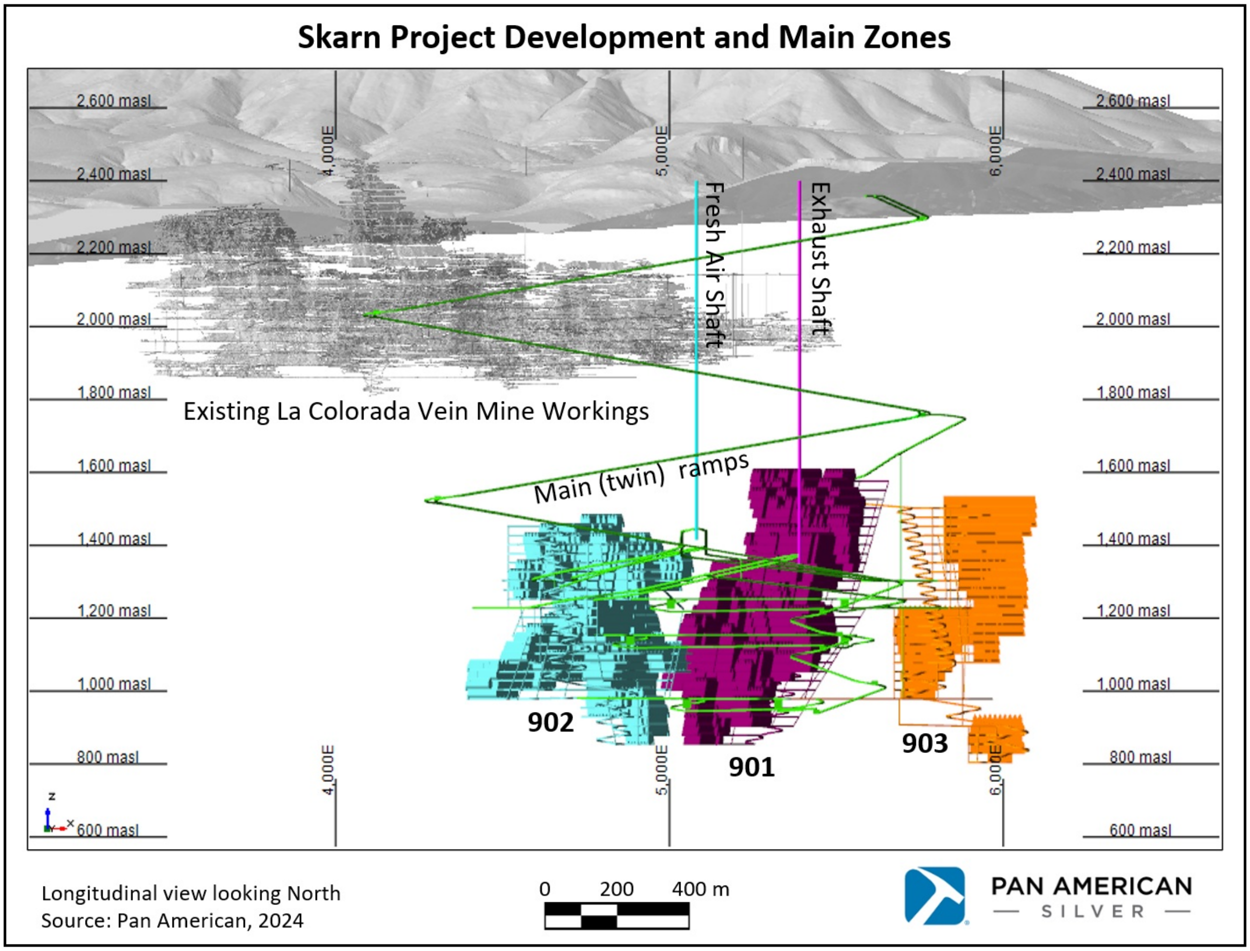


Figure 24-1: Longitudinal section of Skarn Project zones looking north

24.1.1.1 Mining of the La Colorada Vein Mine Deposit

The La Colorada Vein Mine is discussed in detail in the main body of this technical report and key elements are summarized here. The veins are mined using narrow-vein long-hole stoping (LHOS) or cut-and-fill mining methods. Variants of the cut-and-fill method on site are overhand (or breasting). Veins may be up to several metres wide, but typically measure around 2 to 3 m, once minimum mining width parameters or modifying factors are applied.

The ore from the La Colorada Vein Mine is mined at a nominal 1800 to 2000 tpd, and ore is hoisted via the Ross Beaty Shaft to the surface. The ore is trucked a short distance across the surface to the existing processing plants that treat sulphide and oxide ores in separate circuits. Silver-rich lead and zinc concentrates are produced; these are trucked to either Mexican smelters or exported via ports on the Pacific coast to international buyers.

This PEA assumes that areas containing the La Colorada Vein Mine mineral reserves will be mined preferentially in the areas where there would be interaction with the Skarn Project caving zones.

24.1.1.2 The Skarn Project Zones

The Skarn Project mineralization differs significantly from that of the La Colorada Vein Mine; it is more geologically complex, and its distribution is more dispersed (see Sections 7, 8, and 14 of this technical report).

In general, localized higher-grade zones are interspersed among bulk lower-grade zones, as is typical of skarn deposits. No definitive structural boundaries are currently modelled. The deposit remains open in most directions and is subject to ongoing exploration and delineation drill programs. It is assumed for the PEA mining inventory that all necessary permits and approvals would be obtained after satisfying all relevant criteria and regulations in each jurisdiction.

24.1.1.3 Mineral Resource Modelling

The resource model (modsb_dec4_2022_f_mining2022NSr v1.dm) was modified by adding an NSR field, and then renamed to modsb_dec4_2022_f_planning.dm. This model was used as the basis to derive the PEA mining inventory and subsequently prepare a mine design, life of mine (LOM) schedule, and a cashflow analysis.

The NSR was calculated using parameters defined in February 2023; the financial modelling completed in late 2023 used slightly different parameters. However, these slight differences are not material to the overall inventories. The metals prices are the same in both NSR calculations.

24.1.1.4 Development and Construction

The Skarn Project PEA assumes that company personnel and external contractors, all managed by Pan American, will be used for construction, mining development, and technical consulting. All plant and equipment are assumed to be purchased, or in some cases leased, maintained, and operated by Pan American.

The Skarn Project development and production activities were scheduled from mine designs, and the costs were estimated on a $/m, and $/t basis. Some scheduled periods of increased development and production in the early years may require additional short-term capacity inputs from mining contractors and/or equipment. Large capital items such as the mill and tailings and surface facilities were estimated using benchmarks and preliminary desktop estimates, mostly by consultants familiar with estimating costs for mining projects in Mexico.

Specialist consultants and contractors would be used for shaft sinking, refrigeration systems, crusher stations, conveyor installations, ventilation control systems, mine-wide control systems, and digitalization.

An initial construction period of approximately six years is required to establish surface facilities, processing, miscellaneous infrastructure, mine services, and to dewater and develop underground accesses and haulage routes.

The scheduling strategy proposes parallel development of the shafts and the ramps to maximize the number of working faces as early as possible. Large capital infrastructure elements, such as the mill, are constructed in years 3 to 6 and are as scheduled "as late as possible"; actual start of construction of these facilities would be driven by actual underground mine development advance.

Mine development sequencing was scheduled to ensure that the number of drawpoints and available haulage levels could comfortably sustain the throughput rate when caving starts. Figure 24-2 shows the three main stages of development:

1. Pre-production: initial access, ventilation, initial drawpoint and haulage setup.
2. Ramp-up and cave commencement.
3. Full production.

The ramp-up production phase pushes deep internal and main ramps early in the sequence to ensure that lower levels will be developed in time for the advancing cave, since the top of the cave in each zone is mined rapidly due to its smaller volume.

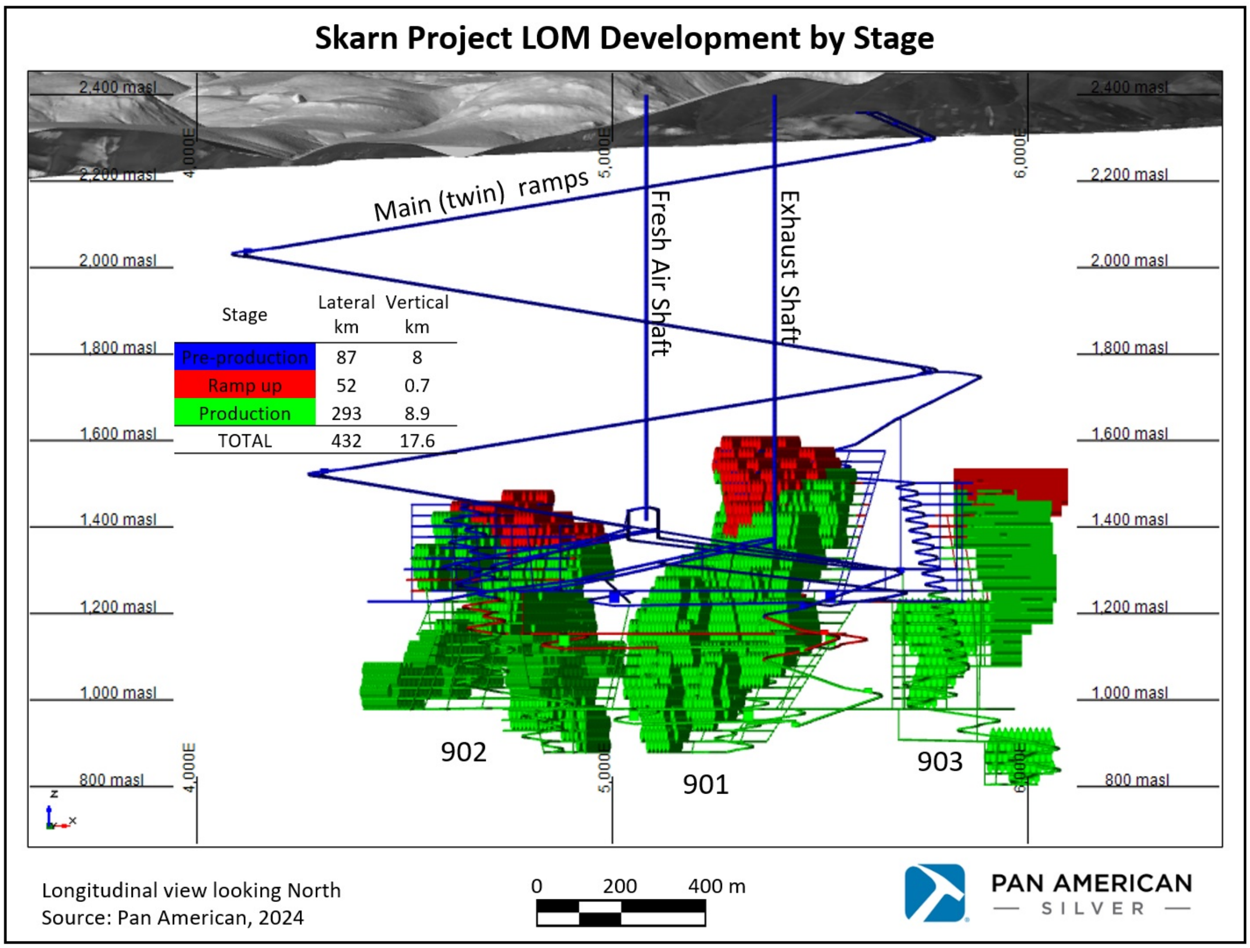


Figure 24-2: Longitudinal section (looking north) of LOM development by stage

24.1.1.5 Surface Facilities

The surface facilities will be constructed as late as possible in the pre-production period and the scheduling will be matched to the underground development progress.

Power

Even though connection to the regional power grid is sufficient for the current operations, the site will require a new higher-capacity electrical power line, as electrical loads required for production at the Skarn Project will exceed the existing line capacity. Initial concept studies have identified some power supply options. The electrical loads will be estimated at the PFS stage, and the selected options will then inform the design stage of the new power line.

It will be important to prioritize the permitting and securing of right-of-way to ensure that construction and commissioning of the new power line can proceed on schedule.

Water Management Infrastructure

The drainage and water management on surface will require that all built infrastructure be designed with minimized surface runoff distances. An overall erosion and sediment management plan will be established in future studies.

Water pumped from underground will be stored temporarily in surface cooling ponds before treatment and eventual discharge. The location of the ponds will be determined in a PFS once the flow rates and volumes of water from the mine have been estimated. Suitably sized catch basins designed specifically to manage surface contact water in this area will be constructed around the FTSF.

Processing Facilities

The existing mineral processing plant and associated surface facilities will be above an area of planned subsidence or within the buffer zone. These facilities will be demolished and removed before the sublevel caving operations break through the surface. The buffer zone is defined as a 300 m offset, on the surface, from the edge of the zone of influence of estimated cave subsidence. The new plant would be commissioned prior to demolition to ensure continuity of processing for the La Colorada Vein Mine feed.

The new mill for the Skarn Project (and any veins outside of the Skarn Project footprint) would be constructed in a stable zone outside of any subsidence buffer zones. The conceptual location for the new processing plant is to the southeast of the current mill, near the current TSF No. 6. The mill is designed at an average 50,000 tpd (averaged over 365 days), or 18.25 Mt/y. Surface stockpiles and some limited underground storage bins will provide decoupling of the mine and mill to provide stable rates of feed to the surface grinding facilities.

The PFS and other future studies will evaluate the location of all surface infrastructure including the process plant, roads, camps, and the TSF. Drilling data from ongoing exploration in the proposed mill location area, along with future updated drill data will be used to build subsequent geological and structural models and define any expansion of the footprint of the mining inventory. The current footprint has potential to expand, in which case the choice of a future location for the process plants and surface infrastructure would be modified. While the ultimate location of the mill remains undetermined at this stage, this is seen as a positive indicator of the exploration potential that still exists in this area of the La Colorada Property.

The mill design includes a filter plant to produce a tails filter cake stockpile, which will be transferred to a FTSF by truck or conveyor. The FTSF option was chosen to suit the topography and surface area of the available and current land holdings since investigations showed that they did not provide adequate storage volume for traditional deposition of wet tailings.

Tails deposition methods and storage locations will be revisited in the PFS once the updated inventory is assessed. The PEA tailings dam considers a PEA inventory that includes inferred material, which cannot be included in a PFS. All tailings are to be disposed into the surface FTSF, no underground tailings deposition is planned.

Concentrate filtration, storage and loadouts will be integrated into the mill footprint. Concentrates storage, handling, and transport would be managed to mitigate the risk of dust, particularly from the lead concentrate. The quantities of concentrate to be trucked each day will result in relatively high traffic volumes around the loadout area. The concentrate facility will therefore be separate from the mill and mineral processing facilities and a traffic management plan will be established to prevent interaction of concentrate haulage fleet with the general mine and processing operations activities.

An initial concentrate transport study recommends that concentrate be hauled by truck to the various ports and facilities. Other options include an existing rail line linking Durango and Felipe Pescador that is currently not in use and would require upgrading, and a concentrate terminal constructed about 23 km from the La Colorada Property. The option of truck haulage to a rail terminal and rail haulage to port will be investigated in future studies.

Other Surface Facilities

The surface buildings will consist of security checkpoints, camp, warehouse, administration building, surface workshops, refrigeration plant, and electrical substations and distribution systems. These buildings will be located outside of the sublevel caving subsidence buffer zone, and the camp will be located a practical distance from any mining and processing activities to prevent impact from noise, dust, and traffic.

The mine workforce will be highly skilled and relatively small for such a large throughput mine. A high level of automation will be used to minimize the required number of personnel. The camp and surface facilities will therefore be modest in size. The construction camp is assumed to transition over to house any site mining, processing, and other site personnel. Where possible, tasks will be conducted offsite to minimize travel and enable workforce flexibility and access to relevant skill sets.

24.1.1.6 Scheduling

Much of the surface infrastructure will be constructed in parallel with the shafts and main ramp construction so that it will be ready for first production. A surface stockpile of development mill feed will be created in Year -1 and Year -2; this will be fed to the mill in Year 1 of processing operations. This stockpile, combined with the initial ramp-up inventory mined from underground, allows a high proportion of the available milling capacity to be utilized in the first year of production.

The sublevel caving ramp-up production is only limited by the number of initial drawpoints available; the extraction process is streamlined and simplified, with no delays in waiting for backfill or paste before proceeding.

Therefore, the tonnage expected at ramp-up is possible due to the large available “on-level” footprints and the timely availability of pre-development drawpoints (as many as needed, plus a contingency) and haulage systems.

24.1.1.7 Deposit Description

The Skarn Project includes three distinct zones, named 901, 902, and 903 as shown in Figure 24-3. The edge definition of all zones will change over time as the infill and exploration drilling will continue to define the zone extents.

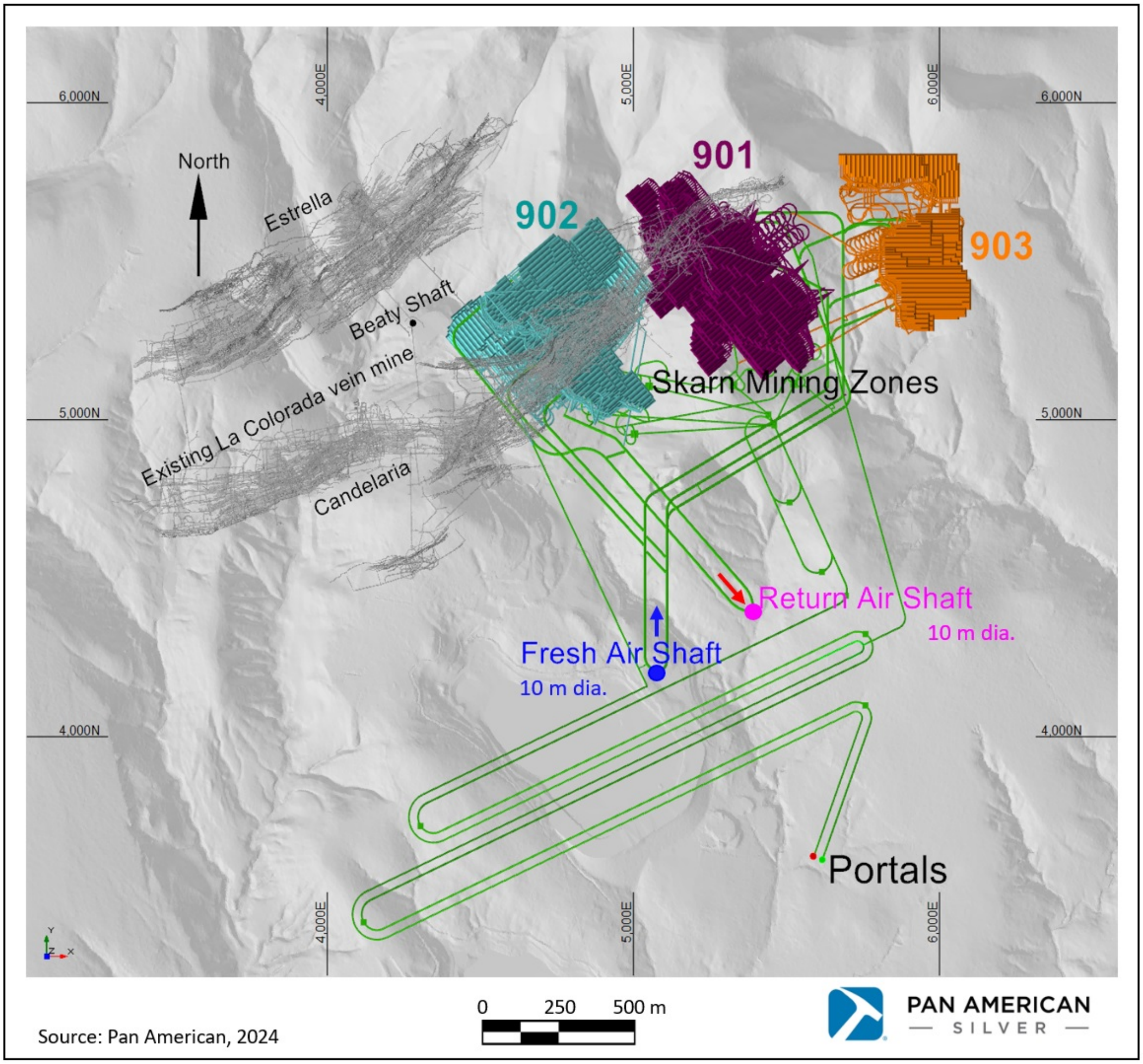


Figure 24-3: Plan view of Skarn Project LOM development

Zone 901 is the central zone and has a favourable steep dip to the south-west.

Zone 902, located to the west of 901, is the largest zone; it has a steep to near-vertical dip and is characterized by broad "squarish" caving footprints on each level. 902 will be able to deliver the highest productivities of the 3 mining zones as more drawpoints are possible per level. Of note is the consistent decrease in lead and silver grades with depth. Zinc grades decline at a much slower rate towards the base of this zone. The highest grades in this zone are at the top of the proposed mining inventory shapes.

Zone 903 is currently the smallest zone as its limits are artificially constrained by concession boundaries between the La Colorada Property and adjacent tenements. A memorandum of understanding between Pan American and the neighbouring mineral rights owner has been agreed to and the parties are proactively engaged in the negotiation process. Once an agreement is finalized between Pan American and the adjacent party, he mineralization geometry is expected to expand/change once future drilling results incorporated in the modelling. The current "hard" boundaries due to tenement limits explain the sharp cut-off shapes on the west, north, and east faces of the 903 mining inventory shapes, and on the north face of the 902 zone.

The PEA shapes are mineable and are carefully selected and modelled to ensure they are cavable. However, these shapes must be taken in context and any potential future operational layouts would be improved once the limits of the mineralization are further defined, modelled, and "available" to incorporate in future models and mine plans.

24.1.2 Mining

Several mining methods were considered before selecting sublevel caving for this PEA.

Sublevel caving (SLC) is a mining method that starts at the top of the mining zone and progresses downwards. Rings of holes are designed and drilled into the mining shapes and then blasted and mucked ring by ring according to a specified retreat sequence from the hanging-wall to the footwall side.

The block caving mining method was also considered and is compared to SLC in this section. Block caving is also a bulk mining method but, in contrast to SLC, the mining sequence starts from the bottom and mines upwards. For this reason, block caving requires a greater amount of pre-mining development, and therefore investment. Material is mined from the lowest levels first, which creates a gap that will cause the overlying rock mass to cave from rock stresses and gravity, as the ore is drawn from the extraction levels below.

More selective mining methods such as long-hole stoping were considered. Long-hole stoping is one of the mining methods currently used in the La Colorada Vein Mine. After the sublevel access has been established, additional development is established following the strike of the ore body until an economic or design constraint is reached. Production holes and a raise are drilled in between the sublevels. The raise is first blasted, then the ore is removed (mucked) leaving a void. Subsequent production drill holes are blasted into the void and mucked until the stope has been extracted. Depending on the mining sequence, the global extraction method could be top-down, bottom-up, or a combination and may (or may not) use backfill materials such as consolidated and non-consolidated run of mine waste rock, cemented rock fill, sand, and paste to fill the voids.

24.1.2.1 Mining Method - Sublevel Caving

Sublevel caving (SLC) has been selected as the preferred mining method for the PEA.

After reviewing all available methods and their suitability, considering the spatial distribution of the mineralization, sublevel caving was chosen for its ability to mine safely and reliably at high rates and without the need to introduce backfill. It is a simple, repeatable mining sequence. Although this method is not common in Mexico, it is applied at Minera Frisco in Zacatecas and is commonly applied in many other parts of the world.

Sublevel caving is becoming more prevalent globally as it is well suited to challenges faced by the next generation of mines such as decreasing grades, increasing depth, and complex geotechnical challenges. Mass mining methods, such as sublevel caving and block caving are better suited to such conditions than are long-hole, cut-and-fill, or more selective and manual mining methods.

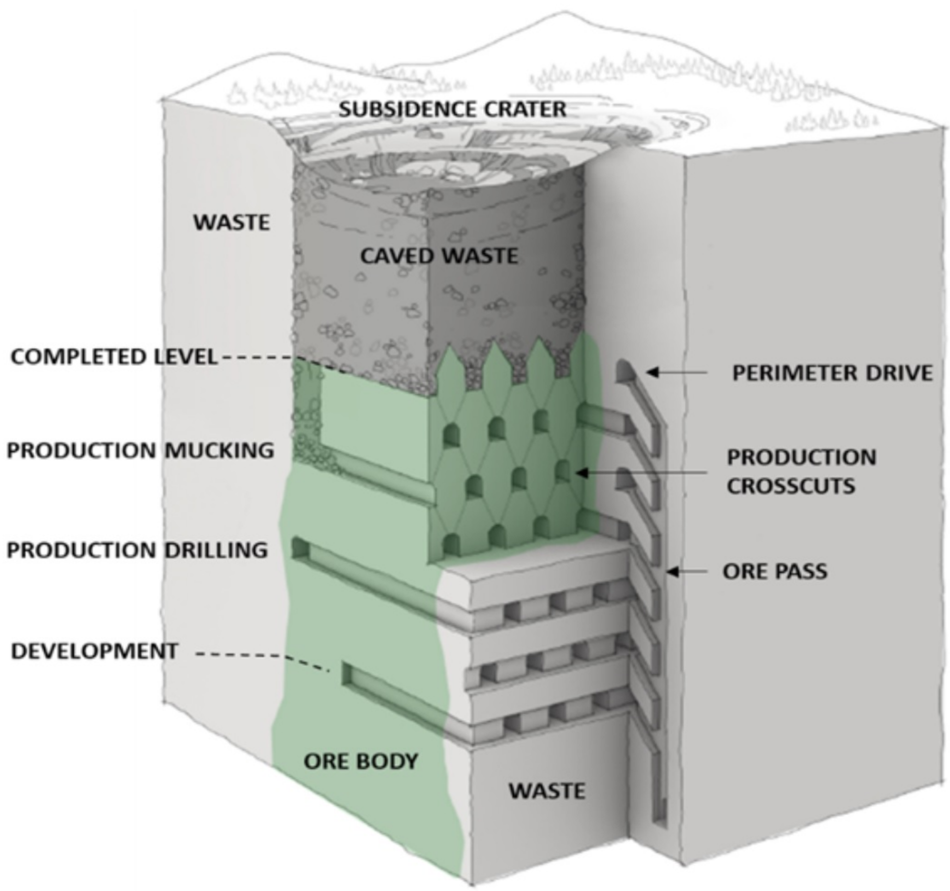
SRK Consulting (Canada) Inc. (SRK) also advised that long-hole mining is unlikely to be practical in the geotechnical and depth setting of the Skarn Project (Jakubec, 2023A).

Using the sublevel caving method will extract all the material within the footprint. Due to the irregular distribution of the mineralization and the difficulty to model it, this approach is deemed more practical and more economical than more selective methods. Draw control is used to control the extraction throughout the cave profile and maximize recovery of higher value blocks, and, where practical, minimize the recoveries of low-grade blocks and "must take" waste.

A general schematic view and a cross-section of a typical SLC mine are shown in Figure 24-4 and Figure 24-5, respectively. These figures highlight the simplicity of the method and illustrate that after each ring is blasted, the waste caves behind the ring as material is mucked from the drawpoints.

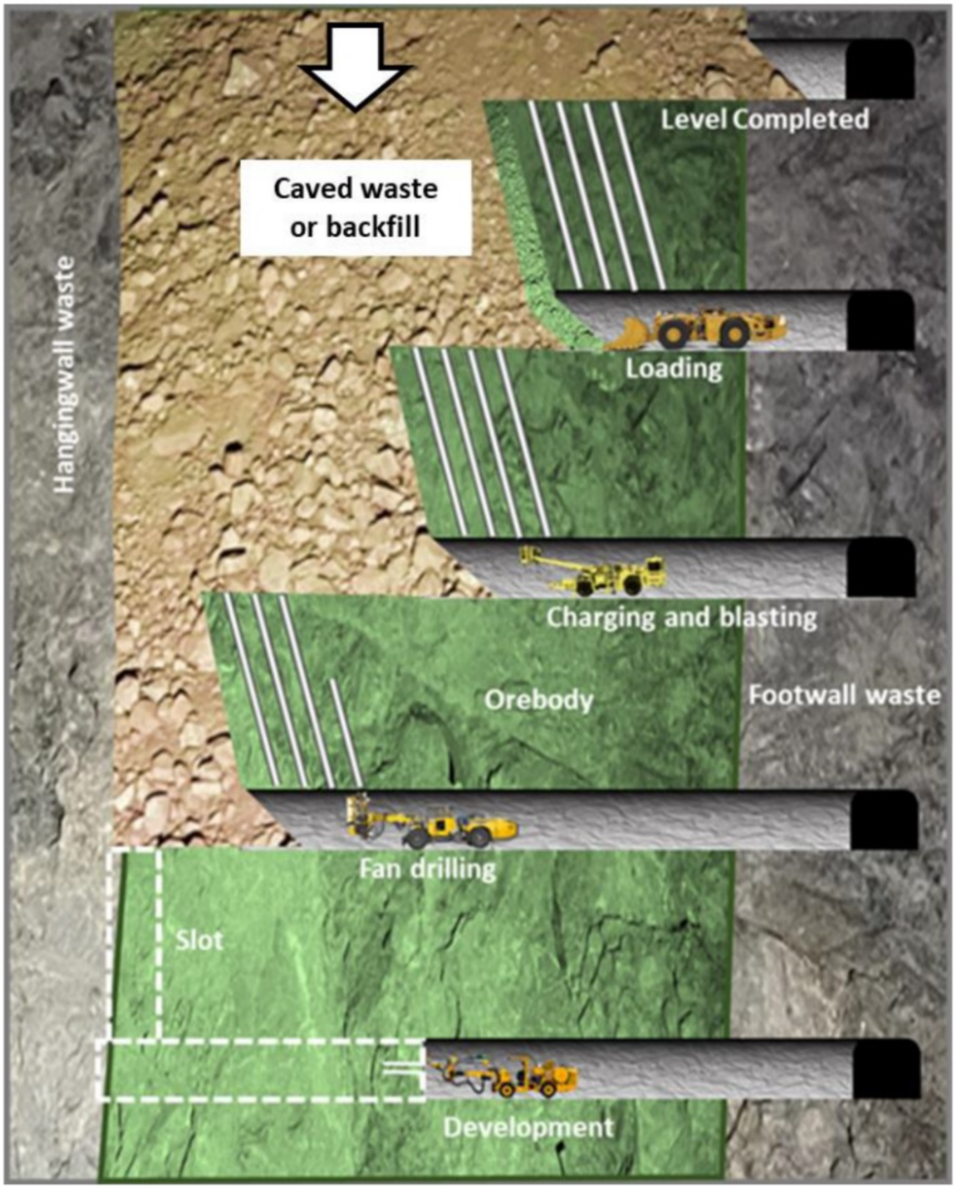
The SLC mining cycle consists of several levels operating at the same time. Typically, while the upper level is nearing completion, the next level down is in full production, while the level below that is ramping up production, and the lowest level is being prepared, with the extraction drifts being completed and slots blasted as required.

In contrast, the block cave method causes the ore and the surrounding waste to both cave without blasting (i.e., they fail under their own mass and from induced stress) as the ore is drawn from the extraction levels below.



Source: Jakubec (2023A)

Figure 24-4: Schematic representation of typical sublevel caving layout



Source: Jakubec (2023A)

Figure 24-5: Schematic cross-section through a typical sublevel caving mine

Higher grades and NSR $/t values are located at the top/upper levels of the Skarn Project and gradually decrease with depth. Since sublevel caving is a “top-down” mining method, it allows extraction of the highest margin material first, benefiting the overall NPV and payback.

The main criteria for mining method selection and sequencing was the optimization of $/t margin of mill feed. Grade and/or NSR alone are effectively meaningless if the mining and access costs to get to that material is not considered.

Sublevel caving causes the waste material above the fired rings to cave, and as the cave matures, it will ultimately break through to the surface. The subsidence at surface can vary from zones of broken ground, through to areas of cracking and small displacements with increasing distance outwards from the breakthrough zone. A discussion on geotechnical aspects of this method is provided in the following sections.

Sublevel caving has been used in Mexico at the First Majestic Silver, La Encantada Mine and the Minera Frisco Tayahua Mine. Globally, sublevel caving is becoming a particularly relevant and utilized mining method as mines get deeper, hotter, more geotechnically complex, and with average grades trending lower.

Productive low mining cost case studies considered for this PEA were the Carrapateena (Oz Minerals (now BHP)) and Ernest Henry (Evolution) mines, which are copper and gold operations currently operating in Australia. Other global case studies have been relied upon for various technical and design inputs and cavability assessments.

Pan American technical personnel conducted site visits to Lac Des Iles (sublevel shrinkage (SLS) and sublevel caving) and New Afton (block cave) mines to better understand topics such as cavability, drawpoint management, and materials handling. Visits to other sublevel caving mines are recommended as part of future studies.

The SLC top-down sequence is an important strength and a key driver behind selecting it over block caving. Since block caving is a "'bottom-up" sequence, it would result in the lower grades being mined first and would require more upfront capital before production. However, block caving remains a competitive option for further studies, due to its significantly lower operating costs compared to sublevel caving and other mining methods. Block caving options were evaluated for all the Skarn Project zones and were deemed to be a potential mining method for the future. Block caving will be assessed again with future iterations of the structural and resource models.

24.1.2.2 Assessment of Long-Hole Mining Method

The long-hole mining method has been assessed for each iteration of the resource model since the discovery of the Skarn Project. Geological models have evolved over time and the quantity of drill hole data has increased. To date no practical economic scenarios for long-hole mining methods have been found.

The higher mining cost associated with this method results in a low margin per tonne. In addition, long-hole mining has practical upper limits on maximum daily mined tonnage and number of stopes mined per week (stope turnover rate). Hence, the time needed to mine enough material, to generate enough revenue to pay back the initial capital, resulted in less than adequate economic results for the LHOS scheduling scenarios undertaken.

Long-hole mining would require paste fill to enable suitable resource recovery from secondary and tertiary stopes. Alternatives, such as long-hole stopes with rockfill or leaving open voids, were not practical, or in some cases not technically viable.

A paste fill study completed by RMS (2021) identified an unexpected loss of strength in the paste fill test samples after six months. The paste deteriorated and lost considerable strength, to the point where it would provide less than adequate support to any subsequent secondary or tertiary stope extractions. The reasons for this loss of strength have not been fully investigated. These test results point to the risk posed by choosing the long-hole method and provide another reason to discount it at this stage.

In the scenarios evaluated for long-hole mining, the schedules showed that a period of more than one year, and sometimes several years, was needed between primary extraction and paste filling through to the secondary extraction. This delay was due to the large footprints and associated retreat extraction sequences. Any future studies that consider long-hole mining would have to resolve the scheduling and paste issues. The addition of more cement, or the use of different cement types or additives may provide a solution for the paste deterioration issue.

The initial mine development capital is similar for all mining method options, since they all share the same constraints of depth below surface and the need for significant ventilation, dewatering, and access excavation capital upfront. The time needed to build this infrastructure and development means the discounting adversely impacts the economics of all cases.

There may be opportunities to apply long-hole open stoping (LHOS) to some upper sections that are adjacent to but not above the final caving shapes, particularly where any “vein style” mineralization may exist. Paste fill for ad hoc operations is an unlikely option, so rockfill and pillars may be required. Mining recovery would be average to poor.

Stresses and seismicity associated with adjacent SLC operations would have to be carefully considered, as these conditions may limit the ability to safely mine any adjacent LHOS stoping operations.

The likelihood of identifying any long-hole stoping opportunities at the depths of the Skarn Project mineralization is very low. No long-hole mining is considered in the PEA inventory.

24.1.2.3 Cave Draw Control Strategy

Sublevel caving is a dynamic stoping method in that it considers the variable mining recoveries from rings at the periphery of each caving level versus those in the centre. The “draw control,” or percentage of fired tonnes mucked from each ring is modelled and managed on a cave by cave, level by level, drawpoint by drawpoint, ring by ring basis. This means that sometimes there may be waste rings that are taken to achieve production from related high-grade rings later in the sequence, and similarly there may be high-grade rings that are lightly recovered, as a full recovery would introduce an overall poorer result from related waste “dilution” or lower-grade rings.

Figure 24-6 highlights the low recovery at the top of the caves and on the hanging walls, followed by full recovery, and sometimes greater than 100% recovery from the rings in the central parts of each level. Rings on the footwall are drawn to shutoff grade as they have no effect on subsequent levels below. Whilst not as “selective” as long-hole or other methods, there is some flexibility to vary draw to suit actual grades and performance as the cave progresses, especially on the footwall side.

Figure 24-7 shows the overall result of the variable recovery plus the addition of lower-grade materials from outside of the ring shapes. The Skarn Project shapes using the appropriate recovery parameters falls in the “good” extraction ranges as defined by Kvapil (1992).

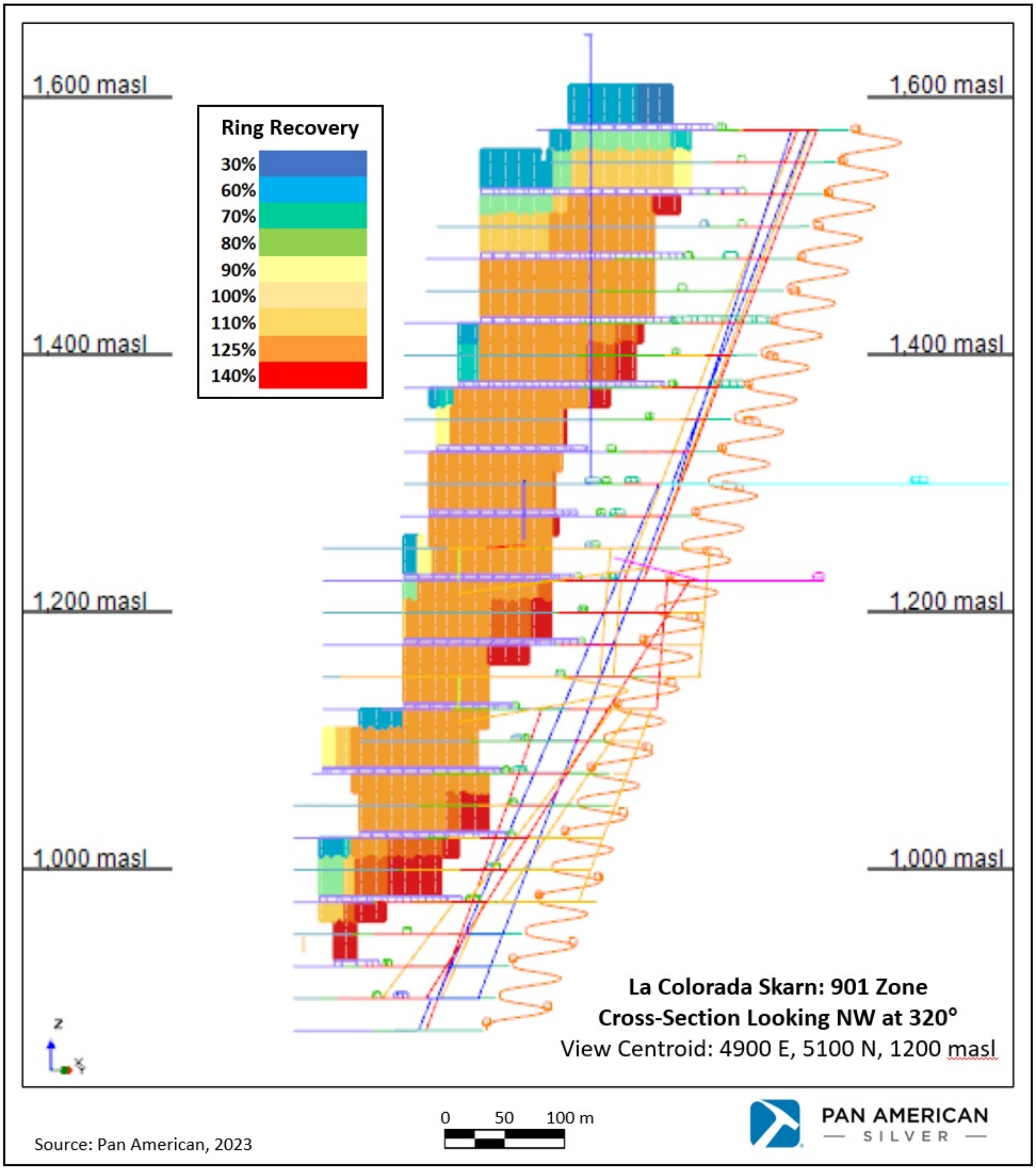
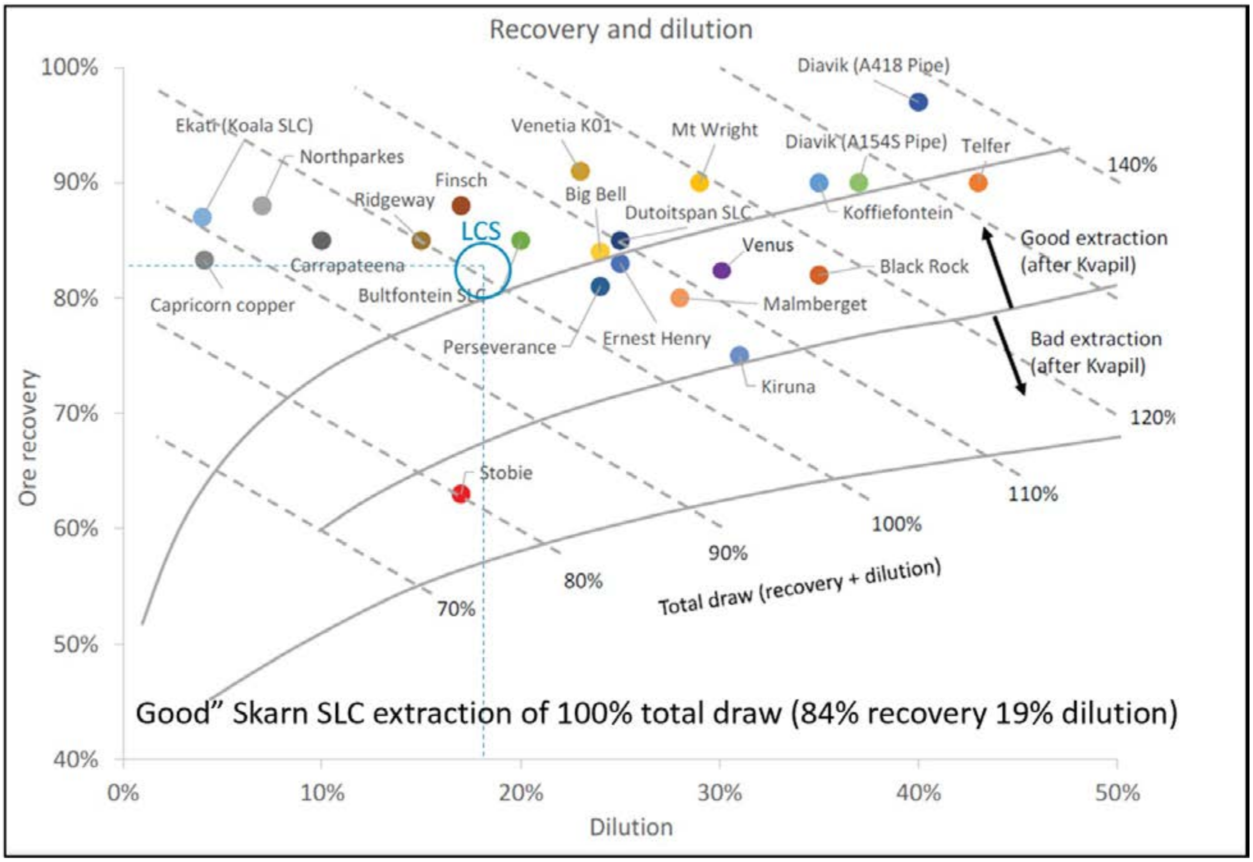


Figure 24-6: Draw control strategy and ring mining recovery



Modified from Kvapil (1992)

Figure 24-7: Cave recovery and dilution benchmarks

24.1.2.4 Caving Flow Modelling

Cave geometry is a key consideration for both cavability and scheduling. The SLC mining shapes were derived using initial cut-off values of $40, $45, and $50/t. The $50/t shapes were ultimately chosen as a basis for further shape generation as they offered the best balance between margin and minimizing dilution introduced from the surrounding mineralization.

Amplify Mine Planning (Scott O'Connor, Denver) provided the design, scheduling, and cave flow modelling expertise for the study and has been involved in the project since the initial assessments were undertaken on the first resource model.

The shapes were optimized to account for the cave shape on each level to ensure continuity, minimum hydraulic radii and practical geometries. Any isolated drifts or protrusions were optimized for faster production rates. The production rate concept of not waiting for 2 or 3 protruding drifts to retreat, when a "smoother" cave front could potentially have 20 or more active drawpoints, has significant benefits for the level production capability. These protrusions would also have poor recovery as they extend into the hanging wall and could not be drawn optimally under the caving criteria.

Finally, some "level by level" economics were tested to ensure that the level was cashflow positive when considering the "off footprint" development such as ramps, ventilation, materials handling, and footwall drifts. This resulted in some lower levels being removed from the schedule, as they were either cashflow negative, or resulted in a low margin when the required development was considered. These removed levels did not impact overall cashflow or NPV of the assessment as they were scheduled late in the mine life.

The caving shapes were generated using a 3 m thick block based on a typical SLC production drill ring template. These blocks (or rings) were interrogated to determine tonnes, grades, and other design fields. The resulting rings were tested at $40, $45 and $50/t to generate some general outlines of potential cave areas. The $50/t cut-off was used as the initial basis for the shapes derived for the PEA.

Once the $50/t ring outlines were established, the hydraulic radius of the upper levels was assessed to ensure that the cave would initiate and propagate. In some locations this required additional rings of lower-grade material on the edges to achieve contiguous mining levels and smooth boundaries. In some cases, higher-grade material was removed to make practical shapes and boundaries.

The cave shapes were then sequenced in Deswik Scheduler to establish development and caving logic and strategies. The resulting schedule was used as a feed schedule for the flow modelling software.

Deswik Caving software was used to simulate the flow of material and the tonnes and grades recovered from each ring and in each drawpoint over the entire LOM. Deswik Caving uses the PGCA (Power Geotechnical Cellular Automata) engine. PGCA in its various forms is used in cave mine studies and operations globally.

The draw strategy for the flow model assumed a 12 m draw width, maximum 8 kt draw per ring, and ring recoveries based on geometry and grade. Figure 24-12 shows a general view of the 901, 902, and 903 zones where the low recovery at the top enables the initiation of caving, but keeps the voids to a minimum to manage airblast risk. Similarly, the hanging wall shows lower recovery as the cave is established on each new level.

The cross-sectional view of the 901 zone (Figure 24-6) illustrates how the ring mining recovery ranges between 90 and 110% for much of the cave zone. The extraction on the footwall rings can be much greater than 100%. Overall, the extraction rate averages 103%, with 84% in-situ ring recovery and 19% dilution.

Extraction rates are unique for each deposit. Characteristics such as dip, grade distribution (especially in the "must take" lower grade/waste), hydraulic radius, and level layout, individually or combined, can skew where a cave plots on the recovery curve. It should be noted that dilution is not necessarily zero grade or waste, as the bulk nature of the deposit means that a considerable amount of the dilution is simply grade material that sits outside the shapes or is internal to the caving shape but not necessarily above the $40/t mining cost.

24.1.2.5 Mine Development - Pre-Production

Initial access will be established from ramps and shafts located on the surface. A series of internal ramps will be developed to access the three mining zones, 901, 902 and 903. Extraction drifts, drawpoints, and a materials-handling system will be developed and commissioned.

Figure 24-2 shows the stages of development and highlights the initial development to be established prior to ramping up to full production.

The conveyor will be progressively installed in a lagging fashion behind the main ramp development. Mass excavations are required for the conveyor transfer stations, crusher stations, truck chutes, and material passes. These mass excavations will require some additional time to establish and have been accounted for in the LOM schedule.

Mined inventory from the SLC rings will be transported by LHD units to ore passes or into trucks which will distribute the mined material to the haulage and crusher levels. Bins (raises) will be used to increase surge capacity and maintain steady state crusher feed. Crushed inventory will then be transported to the surface using a standard belt conveyor located in the return air ramp.

A total of six crusher stations are planned over the LOM, with each scheduled to receive relatively consistent mill feed from the various feed sources. Crusher stations developed on the upper levels will be relocated to lower levels later in the LOM.

Managing the risks to the longevity of ore passes and transfer points will require the contribution from suitably experienced consultants and discussions with other mine operators.

Ventilation will be required during pre-production construction. The primary flow system will be located in the footwall/haulage drifts and form the foundation of the system. Secondary ventilation fans and ducting will supply air to the drawpoints.

A centralized automated ventilation control system will distribute the air on each level based on the daily mine plans, the quantity and type of equipment operating, temperature, humidity, and contaminant levels. Ventilation on Demand (VoD) will be possible in some areas, but other areas will require constant ventilation to manage the in-situ rock temperatures and prevent heat buildup. Battery electric vehicle (BEV) charging stations would be placed at strategic locations and on the exhaust side of the primary ventilation circuits, to facilitate heat removal and managing the risk of fires.

Conventional drainage will capture nuisance water, whereas water from drilling and other mining activities will be directed to sumps and then discharged on surface. The majority of groundwater will be pumped directly using surface dewatering bores. Once the Skarn Project progresses past the initial 1250L haulage level, the dewatering will be performed by large diameter underground bores drilled ahead of the mining fronts. Where possible, all water will be moved in pipes directly to surface, avoiding open water or pipes installed in ramps where possible.

24.1.2.6 Drill & Blast

Each extraction drift will require a slot to be developed on the hanging wall contact. Production rings will then be drilled retreating towards the footwall.

Slots may be either blasted using traditional single shot raises (SSR), or as this study proposes, using mobile raise-bore machines like the Epiroc Easer or the Sandvik Rhino large-diameter rigs. This would de-risk the slotting process and speed up the production rate compared to traditional single-shot slot raising. Slot reaming versus traditional slotting will be reviewed in the PFS.

A standard drill pattern is used for each production ring. Variations are made to account for changes in rock density, hardness, or other physical characteristics. Hole lengths may extend to more than 30 m.

A semi-autonomous type of production drilling is considered, with operators based on the surface monitoring the rigs and intervening when required. This will enable higher utilization rates and minimize operator exposure to heat and to the underground work environment. Underground services personnel will replenish consumables for drill rigs (such as drill bits and rods) as required. Battery-operated and other electric units that are connected to the mine grid are proposed.

Rings are choke-fired against the caved material; to do so typically requires a high powder factor (PF). A high PF generally results in finer fragmentation than what is produced by long-hole or other free-face stoping methods. All the material is blasted. The blasting practices would be reviewed and refined to deal with changes in rock types, structural orientations, and other factors that can affect blast performance. Pumpable emulsion-type explosives will be used for production blastholes.

Rings will be pre-charged with wireless electronic detonators up to 4 or 5 rings behind the brow; this is to maintain flexibility on firing sequences and to minimize the charge-up crews' exposure to brow hazards. Experience gained from other sites indicates that this method is both productive and safe when compared to using traditional non-electric detonators, as these have to be charged shortly before firing and typically cannot be left primed in the borehole while other mining-cycle activities are undertaken.

Blast vibrations at surface will be minimal due to the small size of each ring and the depth of blasts.

24.1.2.7 Underground Access and Egress

The Skarn Project will be accessed from surface using twin ramps (declines). This will enable the efficient transport of equipment, supplies, and personnel from the surface to the working areas. Figure 24-10 shows the location of portals, ramps, and other infrastructure. One of the two ramps will include an internal conveyor that will be used to haul materials to the surface. Options such as "shaft only" and "shaft plus ramp" were also considered. At this stage, however, ramps are the preferred alternative from a practical, productivity, and economic perspective.

The twin ramp system will be an integral part of the ventilation system and act as the primary means of egress and ingress. The conveyor ramp acts as a secondary egress/access. An alternate egress will also be established in the fresh air ventilation shaft via a rescue cage system that can be installed from surface in the case of emergency.

Ramps will measure a nominal 6 m wide × 5.5 m high, and they will be supported according to the ground conditions. The initial development is through the highly weathered dacite which is classified as a "poor" to "very poor" quality rock mass. This zone will require a heavy ground support program likely including systematic bolting, in-cycle shotcrete (or the potential use of cast concrete linings) and significant floor drainage and surface treatments. Drainage and floor management allowances have been included in the unit cost estimation.

The ventilation shafts will be circular, 10 m in diameter, concrete-lined and have a designed depth of 1,000 m for the fresh air intake, and 1,100 m for the exhaust/return air shaft.

An egress option (that is not detailed in the current design) would provide a link to the La Colorada Vein Mine that is located outside of any caving or subsidence zones and would also provide access for future exploration drilling platforms and potential ventilation sharing. Any links to the La Colorada Vein Mine are not material to the PEA assessment, and the design and scheduling of the Skarn Project assume an independent operation; in practice, however, the potential for synergies between the La Colorada Vein Mine and the Skarn Project can be incorporated into future studies.

Access and egress options will be explored further at the PFS-stage; however, this PEA includes enough practical options to enable the development of a suitable emergency plan. An allowance factor was included in the Deswik schedule to account for refuge chambers, level escapeways, ladderways, and other egress options.

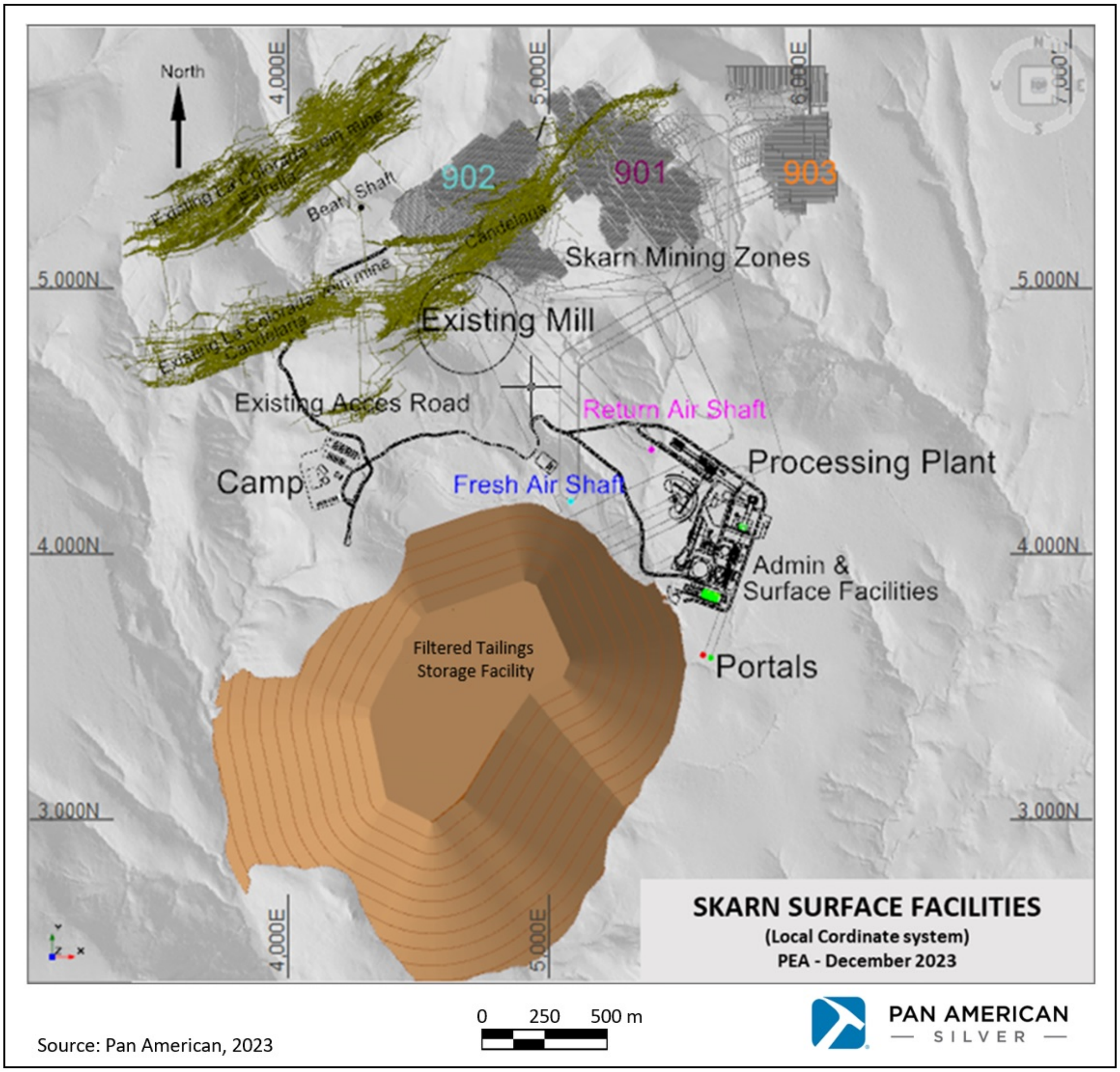


Figure 24-8: Skarn Project – locations of portals and shafts and surface infrastructure

24.1.2.8 Groundwater and Dewatering

The groundwater associated with the La Colorada Vein Mine is currently pumped to surface and used in the process plant or is treated and discharged. The Skarn Project dewatering program will generate greater volumes of water than the La Colorada Vein Mine dewater program. The dewatering program will start in advance of the ramp and shaft construction.

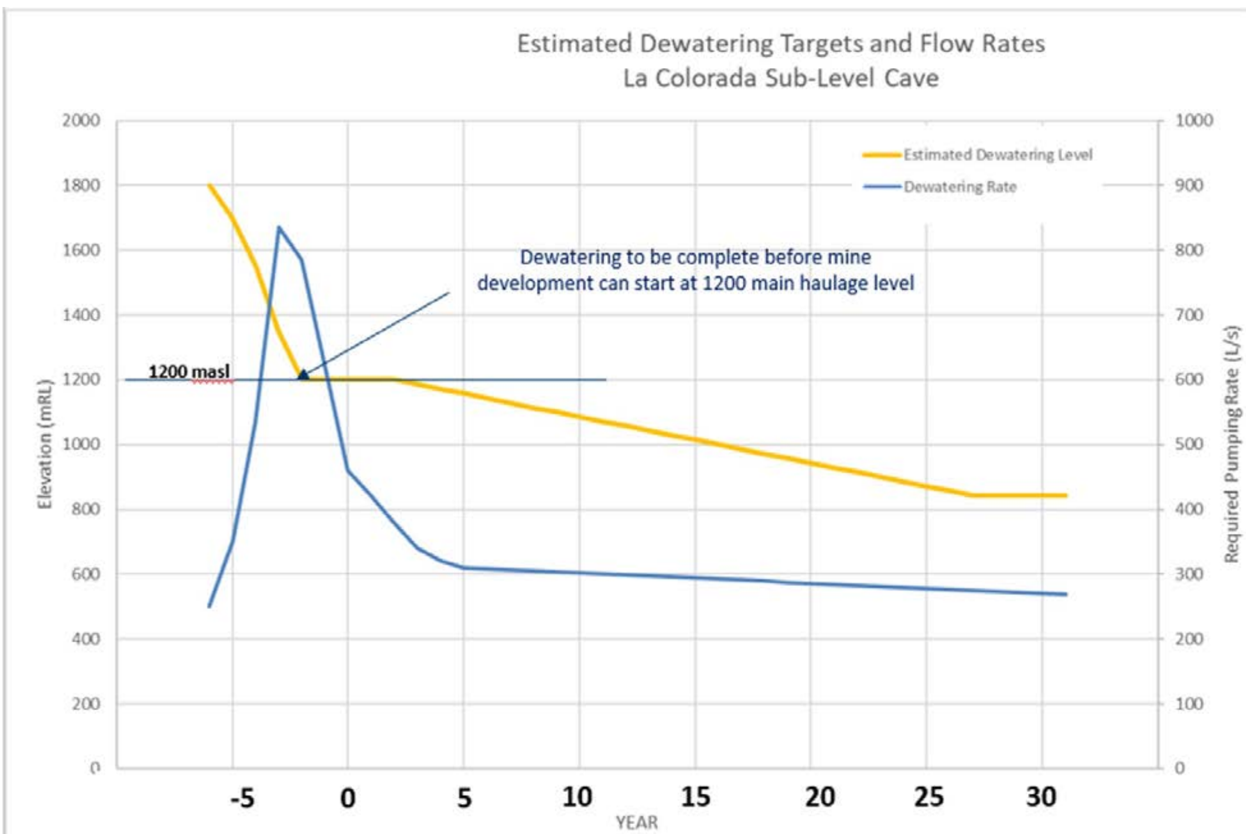
A preliminary assessment (Piteau, 2023) estimated water inflows and management strategies for the initial and LOM dewatering programs. Information used for the assessment included the dewatering volumes at the La Colorada Vein Mine, data from recent piezometer installations "off" the La Colorada Vein Mine footprint, feedback from the exploration drilling programs, and geological modelling.

The SLC method is a top-down method, and therefore the bores are only required to dewater the top of the deposit to start production. Ongoing dewatering at depth will occur in advance of the mining fronts as they progress deeper. All three zones exhibit a similar vertical “drop-down” rate, so dewatering depth progression is consistent for each zone.

The initial dewatering strategy is to install two or three large-diameter bores from surface and drawdown the bulk of the groundwater while the shafts and ramps are being excavated. The shafts and ramp excavations commence above the current phreatic water levels and can proceed for approximately one year before entering the dewatered zone. This lag provides time for the zone around the shafts and initial development to be dewatered.

Once the shafts and ramps are excavated to depth, underground dewatering galleries will be established; they will consist of a series of boreholes installed with downhole submersible pumps. These boreholes will be 100 to 200 m deep and pump directly to the surface to prevent heat transfer to the Skarn Project environment and to remove a potential source of humidity. Nuisance water and water from generated from drilling and mining activities will be collected in sumps and drained to a central settling and collection point on each level, prior to being pumped directly to surface, further reducing heat transfer and humidity.

The dewatering rates are estimated to be high for the first four years as the water level is lowered to the first haulage level, located at 1,200 masl. Figure 24-9 shows the preliminary dewatering estimates assumed for the PEA.



Source: Piteau (2023)

Figure 24-9: Dewatering rate estimate

A hydrological and structural analysis drilling program commenced in September 2023 to identify the main water-bearing structures and provide more data. This will enable ground water modelling, design, costing, and implementation of a suitable large-diameter borehole drilling, pumping, and disposal system. Initial dewatering could be undertaken prior to completion of a PFS as it would accelerate any potential project construction time frames. The initial stages of dewatering at the Skarn Project would also be beneficial to the La Colorada Vein Mine as it would offset or potentially eliminate the need for dewatering lower mine levels from within the La Colorada Vein Mine operation.

The in-situ water temperature is elevated (+40°C). Surface water holding dams and treatment facilities will be constructed to manage the expected flows from the initial dewatering and manage the ongoing steady-state dewatering phases over the LOM. The water stored on surface will be cooled before final discharge.

24.1.2.9 Ventilation

Ventilation and heat management will be critical to the project's success. The in-situ rock temperatures are expected to be elevated at depth due to the natural geothermal gradient in the region. Rock temperatures well above 40°C are likely and the groundwater will be above 40°C as a result. Heat will be managed using suitable ventilation flow rates and the introduction of chilled air via a refrigeration system.

The refrigeration system will add chilled air to the ambient intake air and will only operate when the ambient conditions necessitate the extra cooling input. Overnight and during the winter, the cooling plant is expected to only be required on a part-time basis, whereby in summer it would likely run for much of each day.

A small refrigeration plant is currently installed at the La Colorada Vein Mine and it will be expanded in stages as that mine deepens. Knowledge gained from the operation and performance of the La Colorada Vein Mine plant will be invaluable for establishing the designs and specifications for any large-scale refrigeration plant for the Skarn Project.

The main sources of heat are the effects of auto compression in the fresh air intake shaft, and heat absorption from the rock strata, electric motors, and electric/diesel fleet.

As discussed above in the groundwater section, the dewatering management will include piping groundwater from underground direct to surface via dedicated boreholes. This will reduce heat transfer into the mine workings and minimize sources of humidity.

BBE (Canada) has completed an initial assessment of the ventilation and has estimated the quantities and methodologies required for a fit-for-purpose ventilation system. BBE has also estimated the capital and operating costs for the ventilation system based on VENTSIM modelling, supplier quotations, and specifications of fans and motors.

The mine development layouts for the Skarn Project incorporate ventilation shafts, raises, drifts, and other suitable bypasses. VENTSIM was used to model the ventilation requirements during all stages of the mine life, from initial development, ramp up, steady state, and through to final extraction. The VENTSIM model confirmed that adequate ventilation could be delivered to all areas throughout the mine life, based on the available schedule development headings at each of those stages. The ventilation networks adapt and change over time as vertical developments are added to the Skarn Project infrastructure.

The ventilation has been modelled using kg/s of air rather than m3/s of air to account for the depths and heat involved. The mass of air (and its heat-carrying capacity) is more relevant than the volume of air. Ontario (Canada) ventilation standards were used as a basis for all the ventilation requirements as these are seen as an example of global best practice. The ventilation plan discussed below reports values in m3/s; at peak production the airflow is 1,130 m3/s.

The ventilation plan considered proper air distribution to each area of production and support infrastructure; it was based on the LOM design and schedule provided by Pan American. The vent plan consisted of five main stages (0-4):

Stages 0 and 1:

Mining development is starting. Main shafts are being sunk and connected at the bottom, allowing them to circulate 140 m^3/s of airflow. In addition, the main access and conveyor tunnels are being developed simultaneously and connected at regular intervals, allowing them to circulate 175 m^3/s of airflow.

Stage 2:

Main ventilation circuits are completed and ore bodies 901 and 902 are being exploited, taking 160 m^3/s of airflow (80 m^3/s per exhaust raise) plus 35 m^3/s to ventilate the material-handling system haulage drifts.

Stage 3:

Production is at its maximum capacity and development of the Skarn Project continues to sustain production. An airflow of 260 m^3/s (130 m^3/s per exhaust raise) is being supplied to ore bodies 901, 902, and 903, while the airflow dedicated to ventilating the material-handling drifts increases from 30 m^3/s to 70 m^3/s to ensure good dust dilution ratio and allow trucks to enter to the haulage drifts.

Stage 4:

Ramp-down of the production plan and of ventilation intensity with no major changes in the distribution. Ore bodies 901, 902, and 903 reduce airflow requirements from 260 m^3/s to 200 m^3/s and material-handling system drifts from 70 m^3/s to 50 m^3/s. The quantities by stage are shown in Table 24-1.

Table 24-1: Ventilation plan summary

Ventilation Plan Summary (m^3/s) by Stage					
Stage	**0**	**1**	**2**	**3**	**4**
Development	100	100	100		
Access Tunnel	175	140	140	140	140
Main Intake	140	175	490	965	750
901 - 1			80	130	100
901 - 2			80	130	100
Material Handling System - 901			35	70	50
902 - 1			80	130	100
902 - 2			80	130	100
Material Handling System - 902			35	70	50
903 - 1				130	100
903 - 2				130	100
Material Handling System - 903				70	50
Conveyor Tunnel	175	175	175	175	175
Main Exhaust	140	140	455	955	715
Total Intake	**315**	**315**	**630**	**1105**	**890**
Total Exhaust	**315**	**315**	**630**	**1130**	**890**

Two 10 m diameter ventilation shafts are proposed. One of the vent shafts will be for fresh (and chilled) air delivery and the other for heat and exhaust air removal. One of the twin ramps from surface will be used for the mine access and as a fresh-air intake, the other will house a conveyor haulage system and act as an exhaust. The conveyor ramp will also act as alternate egress (but not in the event of fire).

It is assumed that in the event of fire, personnel will report to the refuge chambers underground until the fire is out and the mine environment is declared safe. Personnel tracking and communication systems will enable the surface control room to know where all persons are relative to the emergency event, and they will be able to direct them to the most appropriate course of action in accordance with the site emergency management plan.

The twin ramps will be connected at regular intervals with crosscuts to enable traffic flow and access for conveyor maintenance. These crosscuts will have double ventilation doors (airlocks) installed to prevent disruption to steady-state ventilation through the entire ramp system. The conveyor ramp will be able to be isolated in the event of a fire. All conveyors will be on the exhaust sides of the circuit.

Detailed fire management and emergency planning would be undertaken as part of future studies and ultimately as part of operational readiness and implementation phases. Expert opinion will be sought with respect to fire management for BEV (battery electric vehicle) equipment. The fires from these types of equipment are of longer duration and more difficult to extinguish than traditional diesel equipment/other underground fires.

Fire management with BEV equipment is an evolving body of knowledge, and the results of specialized future studies will ultimately determine the risk controls required. Regulations are expected to evolve rapidly as traditional ventilation regulations are currently centred around diesel equipment and the contaminants and characteristics of that type of work environment.

Similarly, the risk of fire from conveyors will be evaluated. Conveyors are widely used safely and efficiently in large-scale underground mines globally. Suitable risk controls would be implemented in line with best practices to minimize fire risks. Of note is that conveyor fire risk controls are complementary to de-risking the production aspects. Conveyor fires are usually caused by heat buildup from failed rollers or other worn parts, and these are issues that also cause poor availability and utilization. The conveyor is the sole materials transport method out of the Skarn Project mine, and as such is generally maintained, monitored, and operated using best practices to ensure production continuity and optimal cost performance.

Ventilation doors, bulkheads, and other control systems have been accounted for in the capital and sustaining capital estimates for the project.

24.1.2.10 Ventilation (Surface Facilities)

The surface ventilation and cooling system will consist of two main circuits. The main circuit will be a fresh air intake shaft and a return air exhaust shaft. Fresh air will be augmented with chilled air to overcome the effects of auto compression and friction expected as the air drops some 1,000 m in elevation. The other circuit will be in the twin ramp and access ramp network. This will provide fresh air for the ingress of personnel and equipment, and exhaust hot and dusty air on the conveyor side.

The refrigeration plant to provide the chilled air will be located near the fresh air shaft and near to the main site transformer.

Ventilation fan installations will be in a fenced area that will contain the shaft collar, fan, and electrical equipment. The fans will be supplied with electricity from a feed line off the main transformer at the mine site. Vent shafts have been located on the prevailing downwind side of the mill and camp facilities.

24.1.2.11 Production Schedule

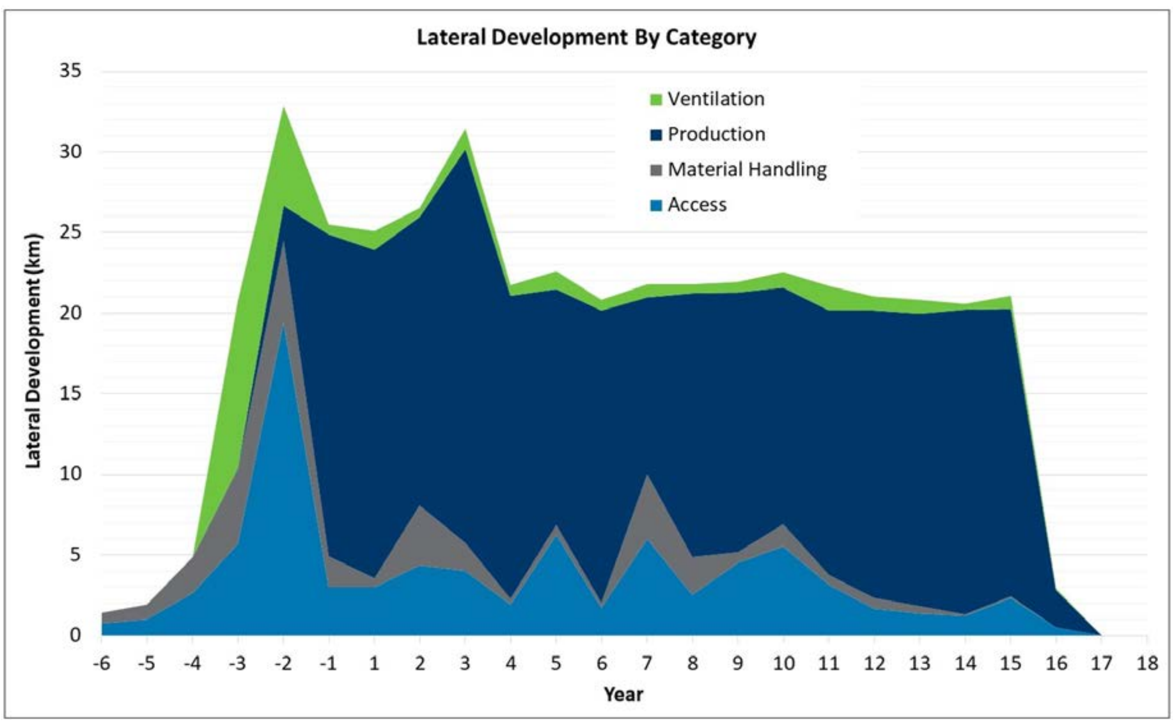
The pre-production phase will establish suitable lateral and vertical development and associated services to execute the production rates specified in the ramp-up and steady-state phases of the LOM. Deswik Scheduler has been utilized to “level” the production and development tasks to ensure there is suitable development “effort” applied across the LOM to achieve the desired development advance, ring drilling metres, and hence production rates. There is over 2 Mt of inventory from development headings in the pre-production phase that will be stockpiled on surface and be available for milling once SLC rings start firing, and once the mill is commissioned.

Several production rates were tested for the production schedule. The inventory assumed mining costs associated with a 50,000 tpd/18.25 Mt/y average mining rate. At certain times, the mining rate will be higher to account for downtime associated with maintenance and planned shutdowns, and unplanned shutdowns or delays.

The mining output will be lower at times, as in cases of maintenance on the crushers and conveyors, initial stages of cave initiation, and when 902 reorients its cave direction. The 50,000 tpd is an average rate that takes these downtimes into account and is spread across the three caving zones. The Skarn Project LOM includes 17 years of production, with a six-year construction period.

The Skarn Project is assumed to run 24 hours a day, 7 days a week. Where possible most mine operations including drilling, bolting, loading, hauling, crushing, and conveying will continue through production and development firing times. This will be enabled by using autonomous/semi-autonomous systems that are monitored and operated from the surface or from safe locations underground.

The Skarn Project development peaks in year 3 through to year 4, as shown in Figure 24-10. A total of 432 km of lateral development and 17.6 km of vertical development are scheduled.



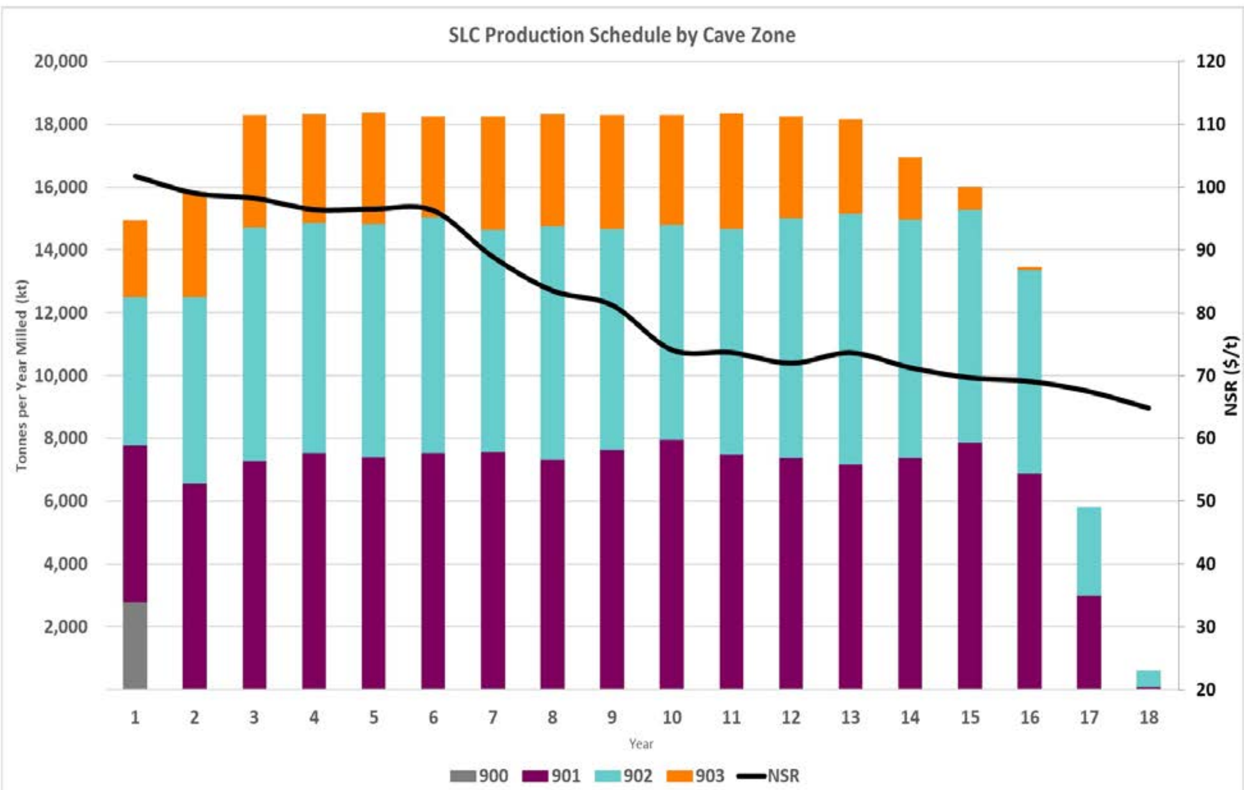
Source: Pan American, 2023

Figure 24-10: Skarn Project LOM lateral mine development profile

Figure 24-11 and Figure 24-12 show the production and grade profiles for the LOM. The 901 and 902 zones being the largest, they provide most of the tonnages per year, with the 903 being scheduled to vertically drop down at similar rates to the main 901 and 902 caves. At depth, the silver and lead grades decrease, the zinc grade dips mid-life, but slowly increases again towards the end of mine life. Zinc predominantly stays in the range of 2.25% to 2.75% and is the main contributor to the total NSR.

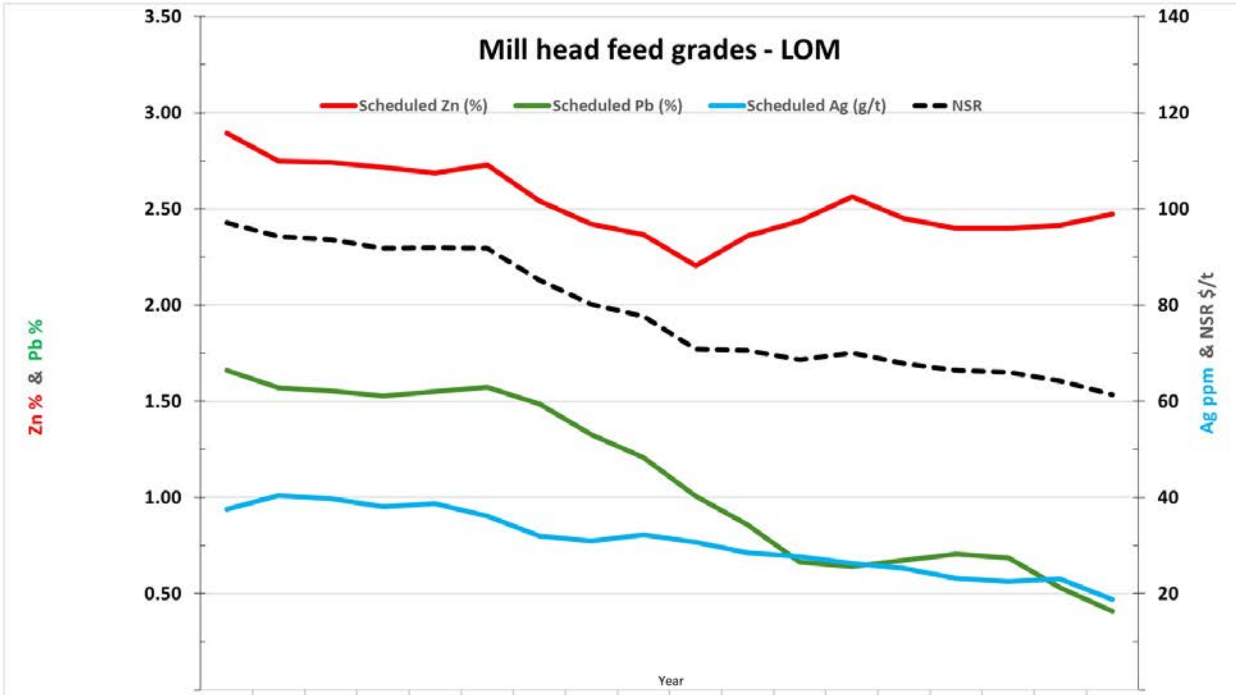
Table 24-2 details the tonnes and grades by zone and provides a breakdown of the contained metal and the payable metal. Most of the payable silver is associated with the lead concentrate, with approximately 1% of the total payable silver reporting to the zinc concentrate.

Table 24-3 shows the feed tonnes and grade of the PEA inventory by year. The total inventory fed to the mill is 285 Mt over 17 years. The 50 ktpd rate is achieved in year 3 and is maintained through until year 13. After year 13, the production decreases as the 903 is exhausted, and the 901 and 902 start to diminish in footprint size. The reduced footprint is a function of the lack of drilling to date at these lower levels, and of the lower grades encountered at depth. The 903 is also smaller due to being cut-off at the concession boundaries.



Source: Pan American, 2023

Figure 24-11: Skarn Project 50,000 tpd per day production schedule



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scheduled Zn (%)	2.89	2.75	2.74	2.72	2.68	2.73	2.54	2.42	2.37	2.21	2.36	2.44	2.56	2.45	2.40	2.40	2.42	2.47
Scheduled Pb (%)	1.66	1.57	1.55	1.53	1.55	1.57	1.49	1.33	1.21	1.01	0.86	0.66	0.64	0.67	0.71	0.69	0.53	0.41
Scheduled Ag (g/t)	37	40	40	38	39	36	32	31	32	31	28	28	26	25	23	23	23	19
NSR	97	94	94	92	92	92	85	80	78	71	71	69	70	68	66	66	64	61

Source: Pan American, 2023

Figure 24-12: Mill feed head grades of Skarn Project LOM

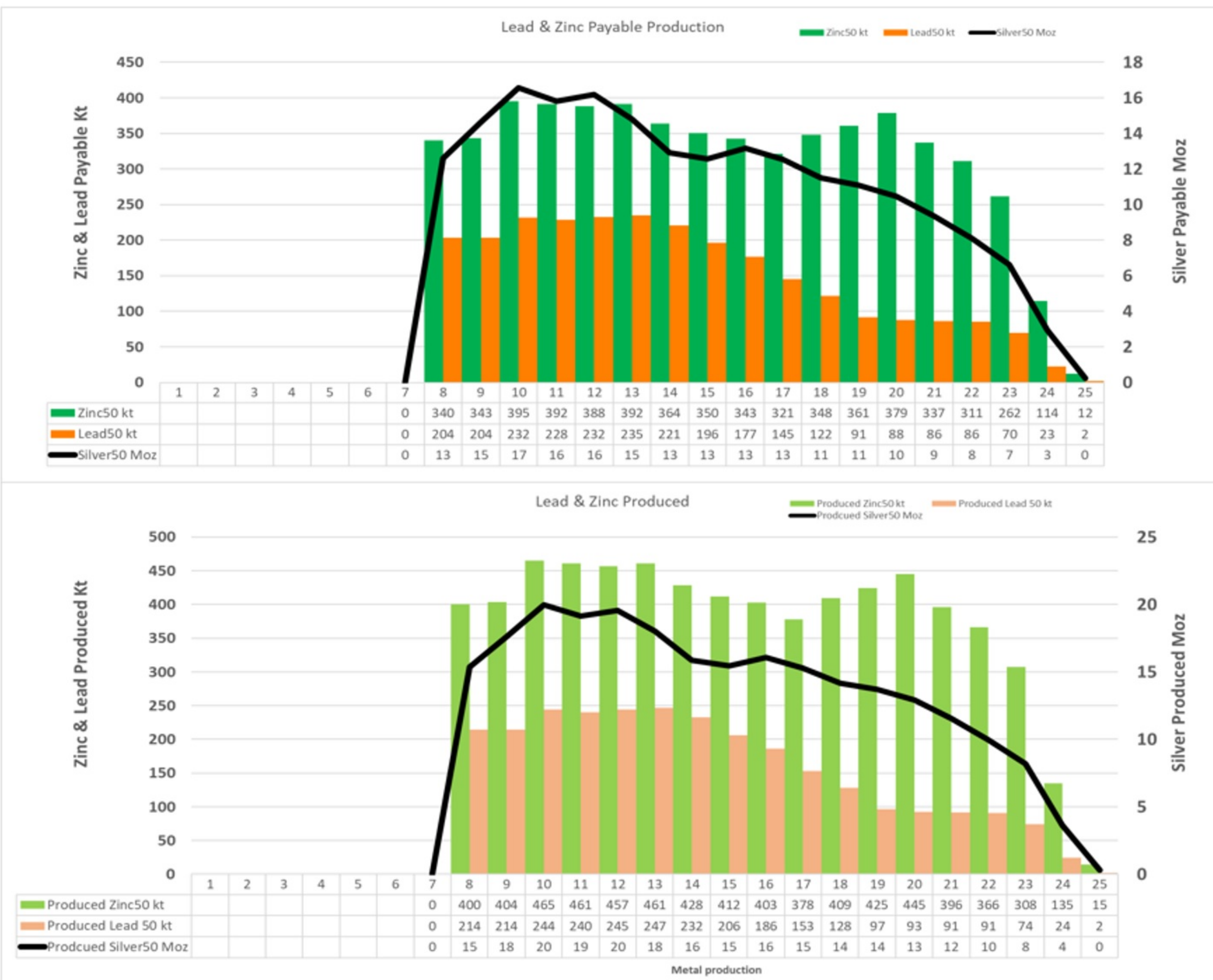
Table 24-2: Mining inventory by Skarn Project zones

					Contained Metal			Payable Metal		
Zone	**Inventory (Mt)**	**Ag (g/t)**	**Pb (%)**	**Zn (%)**	**Ag (koz)**	**Pb (kt)**	**Zn (kt)**	**Payable Ag (koz)**	**Payable Pb (kt)**	**Payable Zn (kt)**
900	2.8	35	1.44	2.43	3,086	40	68	2,150	32	53
901	118.9	29	1.08	2.4	110,982	1,280	2,856	77,295	1,025	2,276
902	116.4	33	1.33	2.68	124,919	1,544	3,118	87,001	1,236	2,484
903	46.6	35	0.94	2.53	51,929	437	1,179	36,166	349	939
Total	**284.7**	**32**	**1.16**	**2.54**	**290,915**	**3,301**	**7,221**	**202,612**	**2,642**	**5,752**

Table 24-3: Skarn Project LOM mill feed schedule

			Year																	
	LOM Total		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scheduled Inventory	284.7	Mt	14.9	15.9	18.3	18.3	18.4	18.2	18.2	18.3	18.3	18.3	18.3	18.3	18.1	16.9	16	13.4	5.8	0.6
900 (devt. feed)	2.8	Mt	2.8																	
901	118.9	Mt	5	6.6	7.3	7.5	7.4	7.5	7.6	7.3	7.6	7.9	7.5	7.4	7.2	7.4	7.9	6.9	3	0.1
902	116.4	Mt	4.7	5.9	7.4	7.3	7.4	7.5	7.1	7.4	7	6.9	7.2	7.6	8	7.6	7.4	6.5	2.8	0.5
903	46.6	Mt	2.4	3.4	3.6	3.5	3.6	3.2	3.6	3.6	3.6	3.5	3.7	3.2	3	2	0.8	0.1	—	—
Scheduled Ag	32	g/t	37	40	40	38	39	36	32	31	32	31	28	28	26	25	23	23	23	19
Scheduled Pb	1.16	%	1.66	1.57	1.55	1.53	1.55	1.57	1.49	1.33	1.21	1.01	0.86	0.66	0.64	0.67	0.71	0.69	0.53	0.41
Scheduled Zn	2.54	%	2.89	2.75	2.74	2.72	2.68	2.73	2.54	2.42	2.37	2.21	2.36	2.44	2.56	2.45	2.4	2.4	2.42	2.47

The concentrates produced are zinc and lead. The LOM payable and produced metals are shown in Figure 24-13. The average annual silver payable for the first 10 full years of production is 14.2 Moz. The average annual production for the first 10 full years is 17.2 Moz of silver, 427 kt of zinc and 218 kt of lead.



Source: Pan American, 2023

Figure 24-13: Payable and produced metal for Skarn Project LOM

The production schedule was undertaken using Deswik CAD, Deswik Scheduler and Deswik Caving. The scheduled tonnes consider the caving recovery and modelled flow of the material based on the design and draw strategy assumptions.

24.1.2.12 Mining Inventory

The mine plan presented in this PEA is based on a mining inventory estimated using the mineral resource models as of December 18, 2023, and includes indicated and inferred mineral resources and some must-take materials.

Mineable cave shapes were generated using Deswik Software. Deswik Caving (PGCA) flow modelling software was used to model the extracted tonnes and grades reporting to each drawpoint. Each drawpoint extracts inventory from several proximal rings and flow modelling is the only practical way to manage the estimation of the cave inventory.

The mineral resources reported in Section 14 are in situ unrecovered tonnes and grades that are considered to have a reasonable prospect of eventual economic extraction (RPEE). The RPEE test is made by constraining the resource model within the designed sublevel caving rings and associated development. A characteristic of sublevel caving operations is that the mining inventory is a dynamic recovered and diluted “flow” of material; in contrast, the mineral resource is only a static in-situ quantity; this difference is highlighted to explain the relationship between resource tonnages and mining inventory tonnages.

The mining inventory considers variable mining recovery and dilution as defined on a ring-by-ring, cave-by-cave basis, and, since it includes other must-take material, it contains a higher tonnage than the mineral resource.

Table 24-4: Modifying factors for the Skarn Project PEA inventory

Factor	For All Mining zones
Ag Price ($/oz)	22
Pb Price ($/t)	2200
Zn Price ($/t)	2800
Metallurgical Recovery	
Ag Recovery to Zn Concentrate	12.4%
Ag Recovery to Pb Concentrate	0.0975 x Silver Feed Grade(g/t) + 69.282
Zn Recovery to Zn Concentrate	98.12 - 9.62 x %Pb/%Zn
Pb Recovery to Pb Concentrate	7.3292 x ln(%Pb feed grade) + 82.74
Smelter Treatment Costs	Variable
Transport Costs	Variable
Average Operating Cost ($/t mined)	40
Mining Recovery	Variable by ring and location – overall 84%
Mining Dilution	from flow model – overall 19%
Productivity (t/drawpoint/day)	400

24.1.2.13 Mucking, Hauling and Material Handling

Stope mucking will be conducted using 18 load-haul-dumps (LHDs) and haulage will be by 50 t articulated dump trucks. All production mucking and most development mucking will be performed by semi-autonomous loaders that are operated from the surface where practical to do so.

Material from the drawpoints will be hauled to the orepass on each level and it will then report to a haulage level where it will be picked up and loaded into trucks or deposited via truck chutes directly into trucks. The trucks will then haul to the crushers strategically located on the main haulage levels. Crushers and haulage levels are shared between the zones to enable flexibility and minimize haulages.

The material is crushed and fed onto a conveyor and transferred to the main decline conveyor transfer points. From there the main conveyor delivers the material to the surface coarse feed stockpile prior to further crushing and grinding on the surface. The conveyor runs in a dedicated ramp, this enables better heat, dust, and ventilation management. It also is part of fire management and risk mitigation strategies.

During initial underground development, all waste and future mill feed will be hauled to surface by trucks or in some cases up the ventilation shafts. Once the conveyor, crusher and underground bin system is installed all material will be conveyed out of the Skarn Project mine. The proportion of waste to be hauled is not material and separating it would cost more than simply incorporating it into the mill feed stream, therefore all waste post commissioning will be treated through the mill. The waste is not always barren, and often contains reasonable NSR value, albeit at values lower than the $40/t operating cost.

All costs for material handling on surface are included in total mine operating costs.

24.1.2.14 Mining Equipment

The main objectives when selecting underground mobile mining equipment are to maximize productivity, minimize operating costs, provide a safe working environment, whilst minimizing emissions. Therefore, many underground tasks will be automated or conducted from a centralized control room on surface to maximize utilization.

The Skarn Project would utilize real-time monitoring and communication systems including personnel tracking and direct communication, fatigue and situational awareness tools, anti-collision technology, and ventilation-on-demand (VOD– where possible).

A telecommunication network, such as 5G LTE, covering 100% of operations on surface and underground will support the digital architecture, along with fibre optic connectivity to minimize latency when operating equipment from the surface or remotely.

The mining equipment fleet will be purchased in phases and gradually built up over the LOM, before declining in later years as the production and development drops away.

A table of the equipment is shown in Table 24-5.

Table 24-5: Initial mobile mining equipment at full production

Equipment list	# units
Mobile Equipment	**Quantity**
Cablebolt Drill	3
Concrete Mixer Truck	3
Development Charge Up	4
Grader	3
Haul Truck - 50 t	23
Integrated Tool Carrier	6
Jumbo Drill	9
LHD - 18t	22
Mobile Crane	2
Mobile Rockbreaker	4
Personnel Carrier (22 persons)	4
Production Charge Up	10
Production Drill Rig	13
Rhino / Easer Slot Boring Drill	10
Scissor Truck	5
Service Truck	10
Shotcrete Sprayers	4
Skid Steer	3
Small Personnel vehicles UG	15
Telehandler	8
Blockholer	5
Water Truck	5
Subtotal	**171**

24.1.2.15 Automation and Digitalization

Automation will be a key driver of productivity and operability. Factors such as the high temperatures, water, time to get to and from the work areas (due to depth), and shortages of skilled personnel across all disciplines means that automation or remote operation will be a practical necessity. Mines of the next decade will be deeper, hotter, lower grade and geotechnically challenging, and as such the reliance on automation and the movement towards zero entry mining is a practicality that will need to be embraced by potential operations like the Skarn Project.

Consultation with original equipment manufacturers (OEMs) and digital control systems specialists would be a key component of the PFS and future detailed studies. A particular area to establish early will be the backbone of the digitalization systems so that all aspects of the operation are integrated, monitored, and operated efficiently and coherently.

Initial discussions with companies such as ABB have established an initial understanding of the scale and value of a digitalized “future mine” implementation, and this would require further study in the PFS. A digitalized mine will have connectivity across the mine value chain, and the actionable intelligence enabled by that connectivity and visibility will improve safety, productivity, and efficiency.

As with the materials handling systems, the automation and digitalization studies will benefit from visits to sites that are currently implementing connected mine systems. The turnover rate of new technology indicates that by the time the Skarn Project is ready for production, that automation processes will become a “stock standard”component of many mining operations. Pan American will visit and study successful technology deployments from a variety of suppliers and OEMs during any future studies to practically balance the level of digitalization and complexity.

SLC mining method lends itself to automation due to the repetitive ring drill patterns, long life drawpoints, point to point haulages, dedicated haulage levels, loadouts, and tip points, conveying of all material (including waste), consistent top down mining, no backfill and consistent ventilation layouts.

24.1.2.16 Geotechnical Considerations

The geotechnical studies to date have covered general rock property and characterization studies as well as cavability assessments.

Stability assessments for long-hole mining were undertaken to determine stable spans and backfill requirements. The geotechnical analysis is based on data collected from core logging, photo logging, televiewer surveys, and hydrogeological testing. Intact rock strengths are based on Uniaxial Compressive Strength (UCS) and Triaxial tests.

Ground support requirements for the Portal and for the initial ramp development are expected to be heavy due to the highly weathered volcanics, requiring systematic bolting and in-cycle sprayed or cast concrete surface support. As the ground conditions improve with depth, the ground support requirements for the ramp and other capital development are expected be typical for good rock conditions requiring systematic bolting with either weld mesh and/or shotcrete surface support.

On foot-print development in some locations may require higher levels of deformation capacity to accommodate mining induces stress from the cave front.

The structural model for the Skarn Project is still being developed, however, results from the geotechnical drilling campaign to date have not identified many adverse features. Global RQD (rock quality designation) and joint frequency values for the major lithologies typically range between 60% and 100% and 1.5 to 4 joints per metre. Lower RQD and higher fracture frequency counts are observed near lithological contacts or fault structures.

The major geotechnical risks for the Skarn Project, which are similar with all operating bulk mining methods, include the following:

- Mining induced stress and seismicity.
- Uncontrolled inrush of weathered volcanics.
- Existing site infrastructure and roads that is currently located within the projected subsidence zone.
- Overlying highly weathered dacite.
- Water ingress and mud inrush potential.
- Airblast risks into mine workings.

Operating with exposure to the aforementioned risks has been successfully managed in many operating mines, and the suitable risk controls and strategies employed for the Skarn Project will be explored in future studies.

The long life span of the access development and level accesses will necessitate a trade-off between long life ground support installations and the number of rehabilitation cycles planned for the life of the excavations. In the PEA rehabilitation cycles have been assumed in the relevant $/metre rates to account for repairs and rehabilitation.

24.1.2.17 Cavability

A cavability assessment lead by Jarek Jakubec from SRK in Vancouver (Jakubec, 2023B), reviewed existing data, reports, and over 6,000 m of geotechnical core drilled between 2021 and 2023. Golder Mexico was engaged during the drilling program to provide quality control, conduct rock testing and infield technical support to the Pan American geotechnical team.

The goal of the cavability assessment was to identify any risks to the sublevel caving or block caving options with respect to the Skarn Project, and if so, what risk management strategies could be employed to reduce and ideally eliminate those risks.

The major geological units include an unweathered competent limestone crown over the 901 deposit of approximately 400–450 m thick, and this is overlain by a nominal 800 m thick moderately to extremely weathered dacite rock mass. The 902 crown is situated at approximately 400 masl, which increases the limestone thickness from 400–450 m up to 600–650 m.

SRK has estimated that the mining rock mass rating (MRMR) values range between 50 and 60, which has been based on rock mass rating (RMR) calculations and core photographs. Laubscher's Stability Chart correlates these results to a hydraulic radius ranging between 28 and 35.

The production rate curves (PRC) influence the ramp-up period and rate of draw has been assumed as follows:

- Stage 1: Before critical hydraulic radius is achieved (no caving will occur).
    - PRC = 0 mm/day
- Stage 2: Before cave breaks through to the surface.
    - PRC 100–200 mm/day
- Stage 3: After the surface breakthrough.
    - PRC 200–400 mm/day

24.1.2.18 Future Options for Mining Methods

Block caving is a potential option for the Skarn Project should exploration success continue. Just as sublevel caving offers a step change in mining costs compared to long-hole stoping, block caving (BC) represents a further step change reduction in operating costs. True BC "rock factories" can be setup for potential sustained long life, low cost operation.

Sublevel caving and block cave options trade-off studies are recommended in the next study phase. A study option could include initiating the operation as a sublevel caving to extract the higher grades at the top and generate sustainable cashflows, while developing a high throughput block cave to mine the lower grade material around and below the initial sublevel caving.

The ultimate extents of the caves are not yet defined geologically and there is opportunity with further drilling to expand the footprints and potentially merge them together. One constraint with the previous models was the concession boundaries against neighbouring non-Pan American concessions, particularly in the area between the 901 and 903 zones. In the time between this model being prepared and the publishing of this report, an agreement has been reached in principle with the neighbouring concession holders, and drilling of this area and of adjacent mineralization commenced in 2023.

The current shapes are constrained by concession boundaries and this artificial/abrupt truncation to some mining zones shapes is not what is expected to be mined once the extents are defined. There is opportunity to improve and expand the mining shapes in these areas once the model is revised.

24.1.3 Project Surface Infrastructure

The main facilities at the La Colorada Property currently consist of a 2,000 tpd sulphide flotation concentrator, a 400 tpd oxide plant, a production shaft, maintenance facilities, office facilities, and camp facilities. Most of this infrastructure is located within the projected subsidence zone, and as such will need to be removed or relocated prior to the commencement of production from the Skarn Project. Where practical, these facilities will be moved to a new location and reused. However, some newer and in some cases larger facilities will need to be constructed to support the Skarn Project.

The following major permanent facilities will be required on surface:

- 50,000 tpd sulphide flotation processing plant, including concentrate handling and loading facilities.
- Surface facilities to support the underground mine (refrigeration plant, ventilation fans).
- Roads (on- and off-site).
- New power line and substations.
- Camp facilities for both construction and operations.
- Office buildings.
- Maintenance and warehouse buildings.
- Filtered tailings storage facility.
- Water treatment facilities.
- Communication system.

24.1.3.1 Site Access

A two-lane partially paved/gravel road provides access to the area northeast of the current La Colorada Vein Mine operations. As caving operations commence, the road would require a diversion to avoid any surface subsidence buffer zones. A new road could be developed to the east of the current road using some of the initial underground waste as construction material.

The road to the La Colorada Property links with paved local roads and state and federal highways. Most of the road traffic will travel between the site and ports on the west coast. M3 Engineering has reviewed the roads and site access opportunities, and an options report has been prepared as a basis for future studies (Hopkins, 2023).

24.1.3.2 On-Site Access Roads

Concentrate from the Skarn Project will be trucked to smelters and warehouses within Mexico using the local road and highway network. Concentrates may then be exported from a number of Pacific ports to markets in Oceania, Asia, and beyond.

The concentrate haul trucks will only be able to access site on the loadout-side of the processing area and will not be able to interact or cross into the mill or mine operations areas. This will provide traffic separation between the fleets and any personnel.

On-site road maintenance will typically consist of grading, watering, compacting and application of gravel and signage. No road sealing is planned in the immediate vicinity of the Skarn Project. Local road maintenance will be the responsibility of the respective government authorities.

24.1.3.3 Electrical Power Line and Substation

Based on a preliminary study conducted by M3 Engineering, a new 400 kV power substation and transmission line is required to provide adequate power for the Skarn Project. This power line will likely run from Durango to the site. Easements, substations, and other engineering works are likely to take several years to finalize which will need to be done prior to construction. Early execution of the power line project will be necessary as this will be a critical path item for the construction schedule.

24.1.3.4 IT and Site Communications

Site communications options include combinations of microwave links, fibre optic, and mobile 5G networks. Bandwidth will need to be sufficient to enable voice, data, and video transmission with minimal lag/latency between the Skarn Project mine, the site operations centre, and possibly off-site centres in Durango or other Mexican cities.

The majority of the surface and underground equipment are planned to be operated remotely from dedicated surface operations centres; this will allow high utilization rates and eliminate unnecessary risk exposure for the operators. Minimal lag/latency will be required to operate the equipment close to “real time.” Other similar global mining operations systems operate within suitable site-specific latencies.

24.1.3.5 Main Office and Surface Buildings

A building located near the new mill and workshop area will house the main offices. It will also contain the medical centre, a training room, and associated facilities. The operations centre would accommodate technical services, operations, and other administration personnel.

The office parking lot will be located outside of the operating area to ensure that only authorized persons can access the Skarn Project working areas such as mill and shops.

A security gate will allow access to the administration area. A secondary security gate will allow access to the Skarn Project mine and mill operations areas.

24.1.3.6 Warehouse and Maintenance Shop

The warehouse and maintenance shop will be sized to provide capacity for overhaul and major repairs of the underground equipment. Routine maintenance and breakdown repairs will be completed at strategically located underground workshops. The optimal location(s) for underground workshops would be determined in future studies. The warehouse will be located adjacent to the mill and mine workshops, and the access point for deliveries will be separated from the active maintenance and milling areas to minimize risk to delivery operators, and to enhance security.

Fabric/canvas-style roofed domes installed on top of sea containers will form additional work and warehouse spaces for items and tasks that are not affected by adverse or extreme weather. The following applications are typical for these structures: tire change bay, wash-down bays, welding and fabrication areas, drive-through service lanes, and storage of supplies and consumables.

The number of permanent structures will be kept to a minimum as they may eventually have to be moved if/when the surface subsidence zones propagate outwards towards the proposed infrastructure areas.

24.1.3.7 Camp and Other Facilities

Given the relatively remote location, a camp facility will be required to house a portion of the workforce. The existing camp units and construction camp facilities will be relocated and upgraded to provide adequate facilities for the operations personnel. A number of site workers will live off-site in local communities and will be bussed in and out daily, as is currently the case for the existing La Colorada Vein Mine operations.

24.1.3.8 Run of Mine (ROM) Coarse Feed Stockpile

Following underground primary crushing, the underground conveyor will feed the live run of mine (ROM) coarse feed stockpile at a nominal minus 150 mm. The stockpile will also have a “dead” capacity to enable stockpiling in the event of underground shutdowns or issues with the underground crushers or conveyors.

24.1.3.9 Compressed Air

A network of compressed air is not required in the Skarn Project mine as all equipment requiring air will have compressors on board and be self-sufficient. This dispenses with the installation of these services and minimizes air losses over the vast networks of shafts and drifts in the Skarn Project. Compressed air may be required on surface and in the underground workshops on an ad hoc basis for certain air tools and in areas like tire bays and drill shops.

24.1.3.10 Hoist Buildings

The hoist on the ventilation shafts will only be required for shaft sinking and for some initial waste haulage from the initial underground development. A rescue cage system that can be deployed to either shaft will be established once the shaft hoists are decommissioned.

24.1.3.11 Hydrocarbon Storage

A storage facility for fuel, oils, and other hydrocarbons will be established on site to supply surface and underground equipment. Although the use of battery-powered electric vehicles will be maximized, there will still be a requirement for some diesel-powered equipment and for oils and lubricants for transmissions, gears, moving parts, linkages, and pumps.

The hydrocarbon facility would hold suitable lubricants and approximately 50,000 litres of diesel in double-walled fuel tanks to contain spillage in the event of tank leakage or failure. A fuel-dispensing area for light vehicles and light trucks would be established away from the Skarn Project traffic area.

24.1.3.12 Tailings Management

The Skarn Project tailings will be stored in a filtered tailings storage facility (FTSF) that will be developed in stages and eventually undergo a closure phase where the surface will be vegetated and stabilized into a long-term landform. The facility design has the capacity to hold all tails produced and be entirely within the Pan American land holding areas.

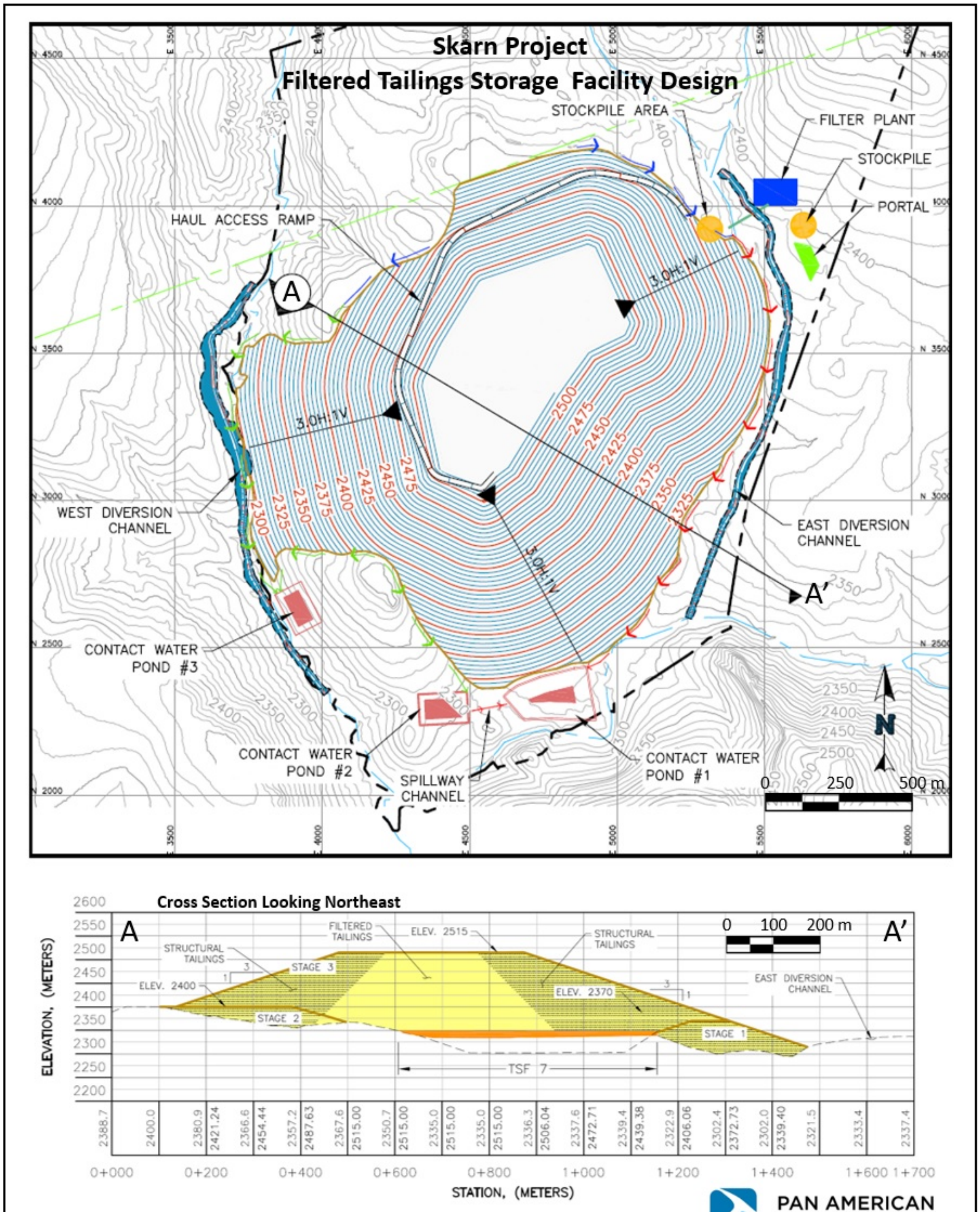
Whilst not included in the PEA, there is an option in future studies to assess the placement of tails in the subsidence zones above mined out zones. This will introduce risks of fines or water ingress into the cave zones, and therefore would require implementing a rigorous management plan to mitigate and manage these risks. Understanding the interactions between the various cave zones, and monitoring and measuring those interactions will be the subject of further studies and of course continue into any operational phases.

The proposed tailing management strategy is to utilize a FTSF that will be placed covering the existing conventional tailings storage facilities (TSFs) No.6 and No.7, as shown on Figure 24-14.

The first stage of the FTSF will buttress the downstream slopes of the existing TSFs and extend below them into the natural drainage, remaining within the La Colorada Vein Mine permit boundary. The facility's second stage, which would commence in year 5, will extend the FTSF to the west of the existing TSF No.7 and toe into the existing drainage. The first and second stages do not cover TSFs No. 6 and No. 7. A third stage will consist of placement of tailings over the historical tailings of TSFs No. 6 and No. 7; this stage will allow for natural drainage through diversion channels along the east and west sides of the FTSF.

The FTSF will be designed assuming overall slopes of 3:1 (H:V), reaching a maximum effective height of 180 m (measured vertically from the top of the prepared subgrade at the base of the facility). During the first stage, the filtered tailings will be conveyed from the filter plant via an overland conveyor to an intermediate stockpile on the ridge separating both existing TSFs. During the second stage, the overland conveyor will be extended to the west and the intermediate stockpile will be moved to this area. During the third and last stage, the overland conveyor will be removed, leaving only the first section of the original overland conveyor that crosses the drainage from the filtration plant to the FTSF area. At each stage, the FTSF will be built by hauling filtered tailings from the intermediate stockpile using articulated trucks.

Once deposited by the trucks, the tailings will be spread in lifts using low-pressure bulldozers and tilled with tractors and disks to aid with drying and compaction. As denoted on the schematic cross-section in Figure 24-14, the outer 100 m rim of the tailings, measured from any outside slope towards the centre, will be designated as "structural tailings" and will be compacted to 95% of the maximum Standard Proctor Density. Non-structural tailings, placed in the centre of the facility, will still be compacted as much as possible but without a minimum density requirement. These wetter tailings will be kept in a confined area where they do not compromise the outer shell and the slope stability of the facility. The placement of tailings will be carried out in separated sections or cells in a sequential order, and the moisture content will be periodically controlled prior to compacting of the layer.



Source: Pan American, 2024 modified from Romo (2024)

Figure 24-14: Skarn Project FTSF layout and cross section

A network of drains has been incorporated as part of the construction design of the FTSF foundation to manage potential seepage from the FTSF. The foundation drains will consist of perforated corrugated polyethylene (CPe) pipes covered by clean drainage gravel and wrapped with a separator geotextile.

As a measure to protect the tailings from erosion, mitigate dust emission, and minimize geochemical mobility, a 1 m thick layer of protective rockfill will be placed on the outer slopes, concurrently with the deposition of filtered tailings. After operations cease, the top surface will be regraded to promote stormwater runoff and will be also be covered by a 1 m thick layer of protective rockfill. Once all tailings are covered with waste rock, topsoil can be added, and the entire area revegetated to permanently close the resulting landform. Runoff will be directed to the natural drainages and if seepage continues after capping, the contact water ponds can be converted into passive treatment systems.

24.1.4 Recovery Method

24.1.4.1 Metallurgical Processing and Metallurgical Testing

The Skarn Project is adjacent to the existing silver-lead-zinc La Colorada Vein Mine operation. Metallurgical test work has been conducted on the Skarn Project since 2019 and results indicate that the Skarn Project is expected to have very good metallurgical performance, producing high-grade lead and zinc concentrates with high metal recoveries.

A traditional lead and zinc process flowsheet using selective flotation has been selected for the project, producing a high-grade lead concentrate of 60–65% lead that contains most of the payable silver and a high-grade zinc concentrate of 55–60% zinc. The LOM average metallurgical performance, based on test work completed and expected mine production grades, is shown in Table 24-6.

The test work has been completed on 32 large composite samples from the Skarn Project and should be capable of supporting this project through pre-feasibility and feasibility stages of project evaluation. All samples were found to respond well to a single process design criteria, without exception.

The lead and zinc concentrates produced from the Skarn Project were shown to contain low levels of deleterious elements and are expected to be readily saleable.

Table 24-6: Summary of overall metal recovery of the Skarn Project

Process stream	Mass (%)	Concentrate Grade			Metal Recoveries		
		Pb (%)	Zn (%)	Ag (g/t)	Pb (%)	Zn (%)	Ag (%)
Lead Concentrate	1.6	61	4	1,438	84.3	2.5	72.5
Zinc Concentrate	4.0	1	59	97	5.2	93.7	12.4

Metallurgical Test Work

Two significant metallurgical test work programs were conducted on Skarn Project materials, both at ALS Metallurgy of Kamloops, BC. Ancillary test work was also conducted on various products from these tests. A summary of completed tests is outlined in Table 24-7. The testing objectives were to provide detailed process design criteria and accurate projections of metallurgical performance for the Skarn Project.

Table 24-7: Summary of metallurgical tests

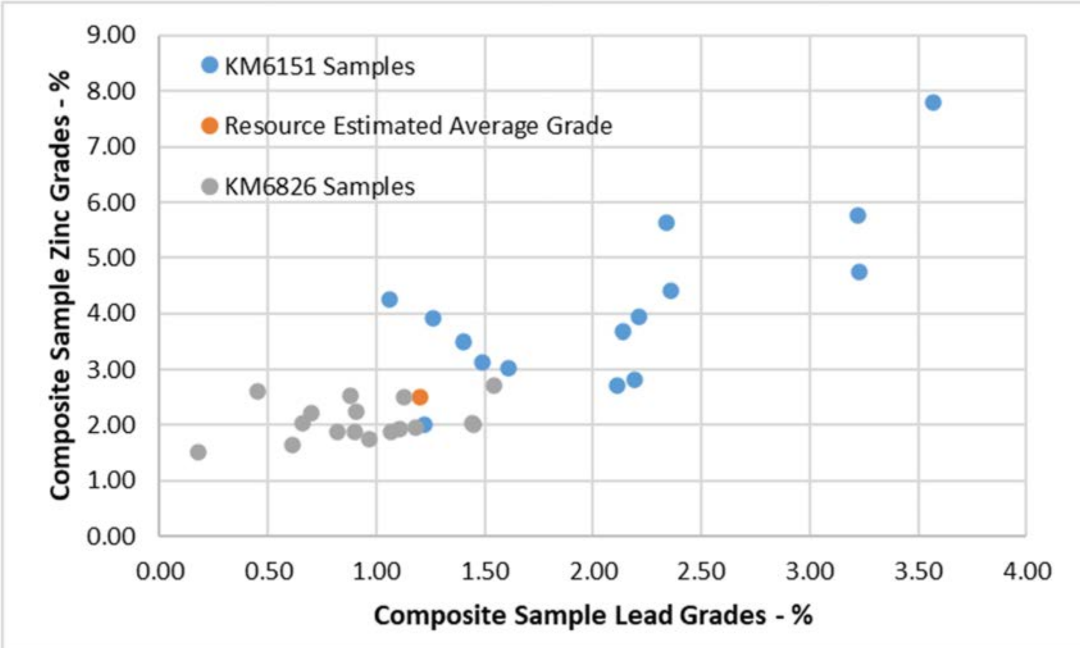
Laboratory	Project No.	Report date	Test Work Objectives
ALS Metallurgy	KM6010	Feb. 21, 2020	Preliminary mineralogy and flotation testing
ALS Metallurgy	KM6151	June 1, 2021	Detailed comminution and flotation test work
JKTech	20017/P6	May 2020	Drop weight testing and SMC testing
Pocock Industrial, Inc.	-	January 2021	Thickening and filtration testing of tailings
ALS Metallurgy	KM6365	Sept. 30, 2021	Testing of vein samples including blending
ALS Metallurgy	KM6826	May 11, 2023	Testing of low-grade, diluted samples

For the purposes of this preliminary economic evaluation, the Skarn Project is best represented by the metallurgical test work contained in test work programs KM6151 (ALS Metallurgy, 2021A) and KM6826 (ALS Metallurgy, 2023) by ALS Metallurgy. The initial test work conducted in the KM6010 (ALS Metallurgy, 2020) program also provided excellent metallurgical test results; however, the samples in the KM6151 and KM6826 programs take representational precedence over the initial test work results of KM6010. The most recent ALS Metallurgy program, KM6826, looked at materials similar to program KM6151, but was conducted on samples that included significant dilution as a way to represent a bulk mining scenario and lower metal grades. The KM6151 test work program was more detailed and investigative, providing guidance to the subsequent KM6826 metallurgical test program.

Metallurgical Test Samples

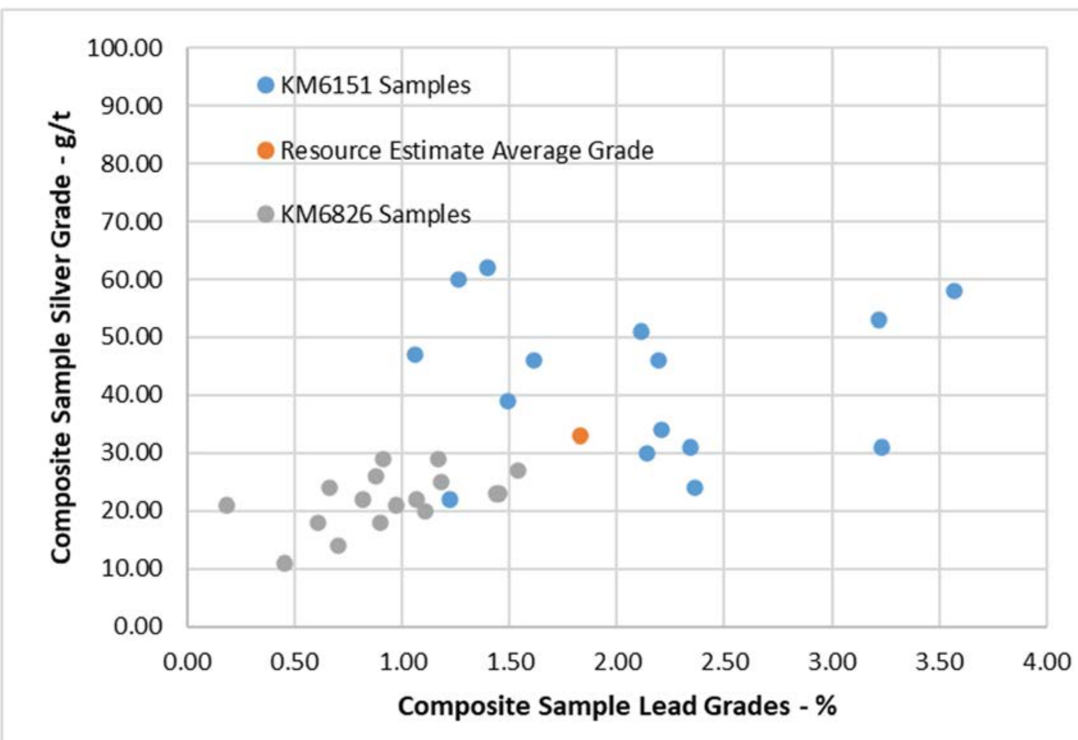
Test samples in both major test work programs (KM6151 and KM6826) were selected from drill core intervals that best represented the lead-zinc-silver mineralization in the Skarn Project. Sample intervals were selected by geological staff of the exploration team and were widely dispersed across the mineralized body within the Skarn Project. The samples used were representative of the deposit.

Figure 24-15 and Figure 24-16 compare the test sample feed grades to the expected mine production grades for both KM6151 and KM6826 and demonstrate that the Skarn Project is well represented by the 32 samples used in the KM6151 and KM6826 metallurgical projects. The metallurgical performance of an operating facility is expected to compare favourably with the results of these metallurgical test programs.



Source: Austin (2024)

Figure 24-15: Comparison between Pb and Zn grades for KM6151 and KM6826 and average mineral resource grade



Source: Austin (2024)

Figure 24-16: Comparison between Pb and Ag grades for KM6151 and KM6826 and average resource grade

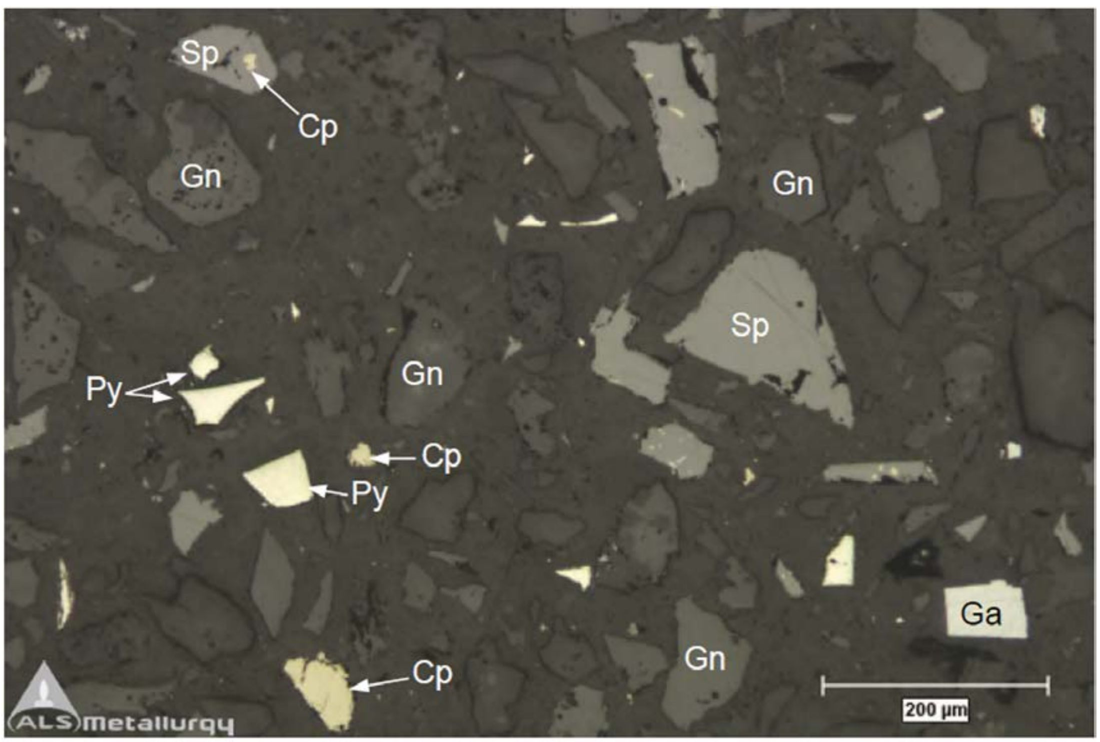
Mineralogical Evaluation of the Skarn Project Samples

The metallurgical samples for both the KM6010 and KM6151 test work programs were subject to detailed QEMSCAN analysis (automated mineralogy and petrography system) to evaluate mineral composition, occurrence, and liberation requirements of the contained base metal minerals. All samples displayed similar mineralogical characteristics, with some degree of variation between individual samples.

Lead and zinc were exclusively observed to be contained in galena and sphalerite, respectively. Copper was observed at low levels and was primarily observed in chalcopyrite, but some copper was also observed in tetrahedrite and tennantite.

The degree of mineral liberation observed in the KM6151 mineralogy analysis was sufficient for selective lead and zinc separation at approximately 70 to 90 microns (K80).

A photomicrograph of the key sulphide minerals is shown below in Figure 24-17; it includes a clear image of copper and zinc sulphides occurring in a common mineral grain. The QEMSCAN analysis of the 15 samples shows very little association of pyrite with either galena or sphalerite.



*Cp-Chalcopyrite, Sp-Sphalerite, Ga-Galena, Py-Pyrite, Gn-Gangue.

Source: ALS Metallurgy (2021A)

Figure 24-17: Photomicrograph of key sulphides in the Skarn Project

Comminution and Solid-Liquid Separation Test Work

Comminution test work was completed on the samples of the KM6151 project and included traditional Bond ball mill work index determinations, as well as a sub-program of the SAG mill test work conducted by JKTech (Weier, 2020). The average SAG Media Competency (SMC) test result was 45, indicating the materials are hard in terms of

SAG milling. The average Bond ball mill work index was 16.4, indicating the materials were moderate-to-hard in terms of ball milling.

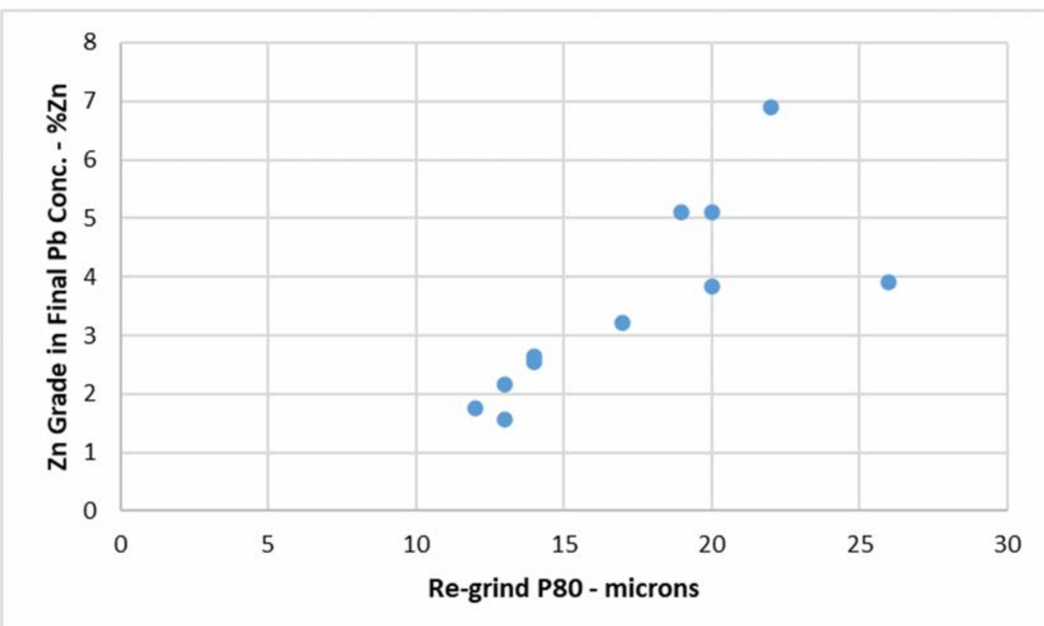
Solid-liquid separation was completed on tailings obtained from the flotation test work and includes pressure filtration, vacuum filtration, thickening, rheology, and flocculant selection. Tailings shows very good filtration capacity with results up to 11.3% moisture content with the pressure filtration.

Flotation Testing of the Skarn Project Samples

The Skarn Project test work included a substantial volume of both open-circuit bench scale flotation tests, as well as numerous detailed locked cycle test results. Based on the mineralogical evaluations, historical best practices, and preliminary test work contained in the KM6010 project, detailed flotation test work using a traditional selective flotation flowsheet was used in the KM6151 and KM6826 project at ALS Metallurgy, Kamloops.

The flotation process uses a traditional cyanide and zinc sulphate reagent scheme to depress zinc minerals (sphalerite), while recovering lead minerals using selective reagents in a lead rougher stage. Following lead flotation, the zinc mineralization is activated by copper sulphate to produce a zinc rougher concentrate. Both the lead and zinc rougher concentrates are reground and subsequently cleaned in two stages of dilution cleaning to produce high-grade lead and zinc concentrates.

All 15 composite samples performed well in flotation testing; the most important metallurgical relationship defined in the test work program was the need to regrind lead concentrates for optimal lead concentrate grade and to reduce zinc losses in the lead concentrate. Figure 24-18 shows the relationship between regrind sizes and the grade of contained zinc in the final lead concentrates. This relationship controls not only the quality of the final lead concentrate but also affects the recovery of zinc in the final zinc concentrate, as fine re-grinding of the lead concentrate moves zinc into the zinc recovery circuit. Changing the re-grind P80 for the lead cleaning process from approximately 30 microns to 18 microns results in an increase of approximately 3 to 4% zinc in the final zinc concentrate.



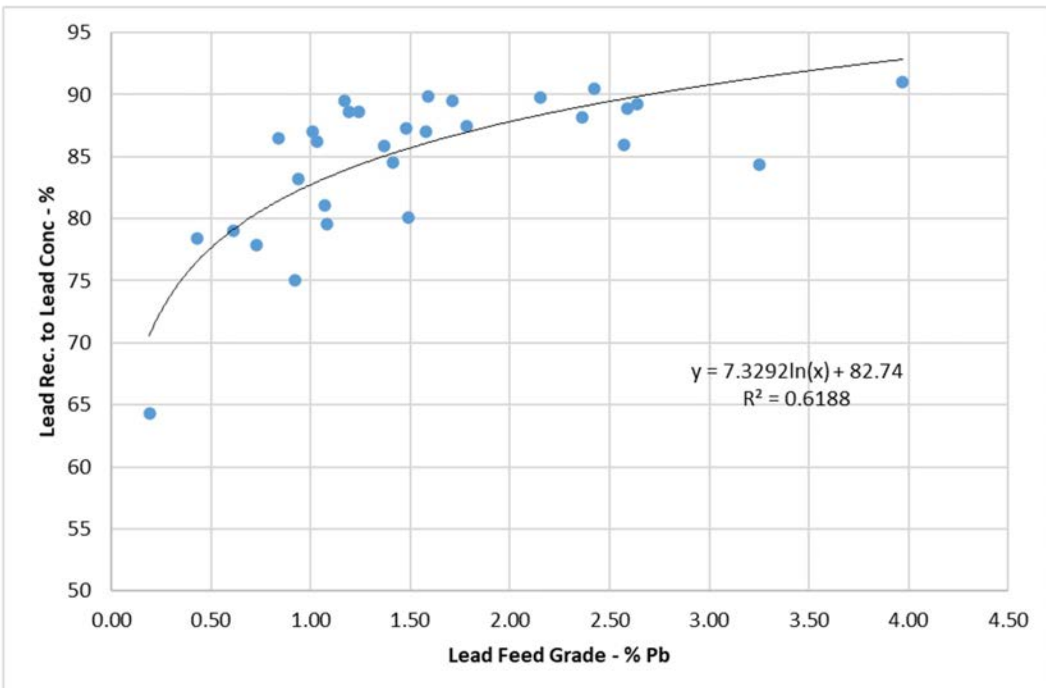
Source: Austin (2024)

Figure 24-18: Zinc content of final lead concentrate versus regrind size, Tests KM6151 - 64 to 77

Zinc concentrate re-grinding is not required to be as fine as the lead re-grind requirements and is estimated to be in the range of 25 to 30 microns, based on test work results seen in project KM6151.

Recovery estimates for lead, zinc, and silver can be predicted based using regression analysis to generate linear or log-normal grade-recovery relationships. All data used in the modelling is based on the locked cycle test results.

The combined recovery data from the KM6151 and KM6826 programs is plotted in Figure 24-19 that shows the relationship between lead recovery to a final concentrate and the process feed grades for lead. Lead recovery is significantly impacted at very low grades but is relatively constant above lead grades of > 1% lead, with lead recovery ranging between 85 and 90% for the upper range of feed grades.



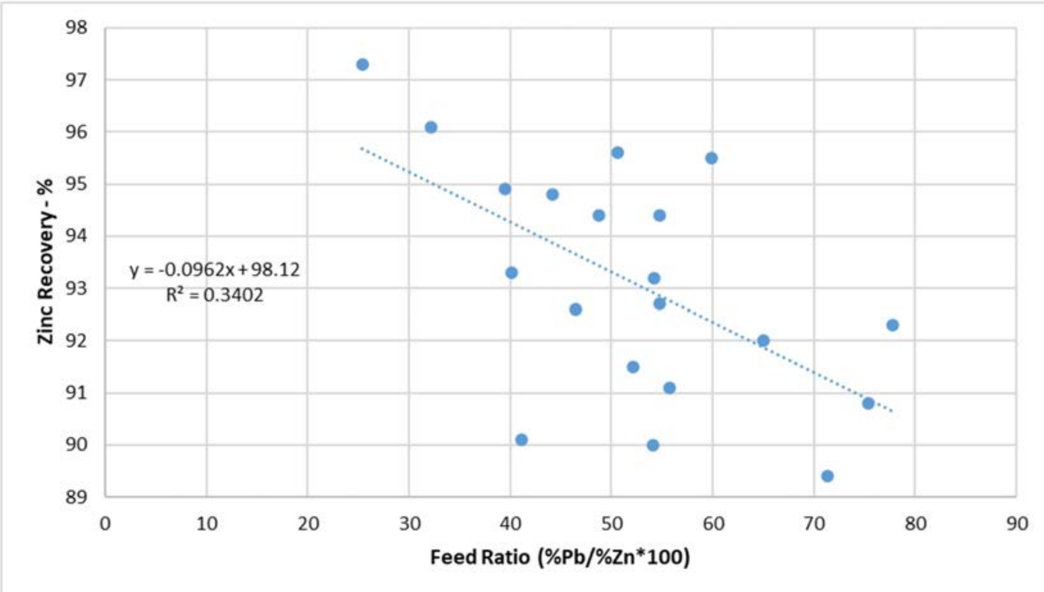
Source: Austin (2024)

Figure 24-19: Lead recovery versus lead feed grades

In terms of predicting lead recoveries, lead recovery is predicted using the equation shown on Figure 24-19:

Equation 1. Lead Rec.(%) = 7.3292 x ln(%Pb feed grade) + 82.74

The correlation for zinc recovery to zinc feed grades is poor, although zinc recoveries were all considered excellent and ranged from 89 to 96% throughout both test work programs. Analysis of the underlying data for zinc tended to show that zinc losses were higher in samples that had a higher lead to zinc ratio in the process feed. This relationship is shown in Figure 24-20 and indicates the impact of lead on zinc metallurgical performance. Comparing the correlations between the two factors impacting zinc recovery implies that the ratio of lead to zinc in the process feed is a much more significant factor in determining zinc recovery than zinc feed grade.



Source: Austin (2024)

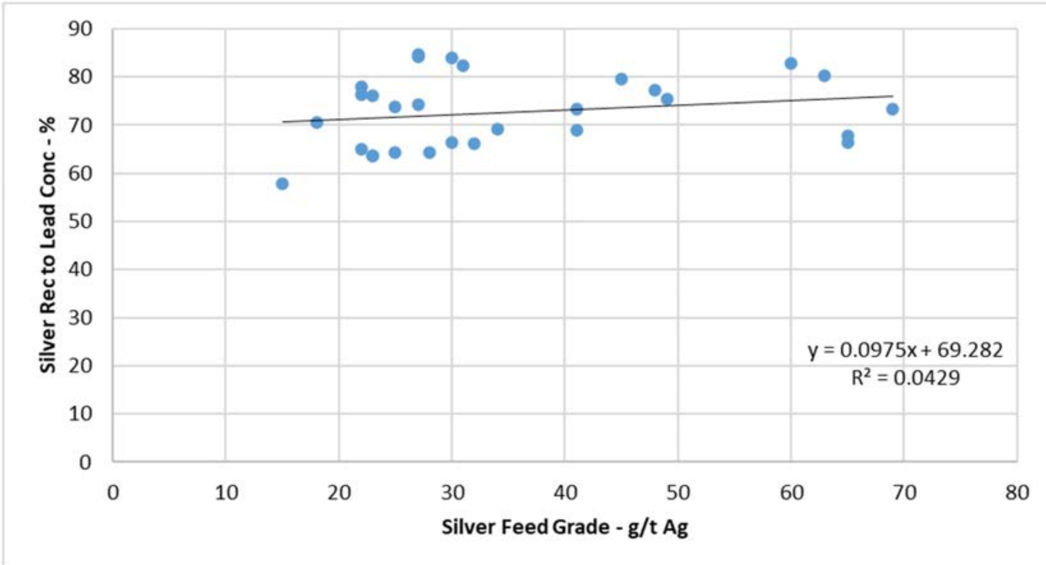
Figure 24-20: Zinc recovery versus lead-to-zinc ratio in process feed

Zinc recovery is predicted using the following equation, consistent with the relationship shown in Figure 24-20.

Equation 2. Zinc Rec.(%) = 98.12 – 9.62 x %Pb/%Zn

Silver recovery data are presented in Figure24-21; silver recovery shows a relatively poor correlation to silver feed grades. Silver recovery to a lead concentrate is relatively insensitive to silver feed grades and can be predicted by the following relationship shown in Equation 3.

Equation 3. Silver Rec.(%) = 0.0975 x Silver Feed Grade(g/t) + 69.282



Source: Austin (2024)

Figure 24-21: Silver recovery versus silver feed grades

Quality of Lead and Zinc Concentrates from the Skarn Project

There are no known material issues, and the lead and zinc concentrates from locked cycle tests for each composite were submitted for minor elements via ICP analysis for 48 elements, and in addition each composite was analyzed to evaluate the concentration of silica (SiO_2), mercury (Hg), chlorine (Cl), and fluorine (F). The lead concentrates averaged 0.02% As, 0.06% Sb, and 0.15 % Bi.

Cadmium content for the zinc concentrates measured about 0.3% across all composites. Bismuth content varied widely in the lead concentrates, with the highest content measured at about 0.4%. Mercury content measured in the lead and zinc concentrates was relatively low.

Manganese content in the zinc concentrates ranged between 0.2 and 0.5% and may be hosted within the sphalerite mineral matrix. The manganese content measured in the lead concentrates ranged between < 0.1% to about 0.6%.

Opportunities to Blend La Colorada Vein Mine Production with the Skarn Project

The current La Colorada Vein Mine has an existing underground operation that mines a vein system and processes high-grade Ag-Pb-Zn ores. The La Colorada Vein Mine materials could potentially be blended with the Skarn Project materials and processed in a common processing facility. Test work was completed to evaluate the metallurgical response of a blend of the Skarn Project and the La Colorada Vein Mine materials using a ratio of 82% Skarn Project and 18% La Colorada Vein Mine material. The process used in this test work mirrored the process developed for the Skarn Project materials. Results are summarized for this blended process feed and indicates that good metallurgical results can be expected when the two materials are blended into a common process feed stream.

Table 24-8: Metallurgical results for blended La Colorada Vein Mine (18%) and Skarn Project materials (82%)

Head Grades				Pb Concentrate				Zn Concentrate				Total
Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Mass pull (%)	Pb Grade (%)	Pb Rec. (%)	Ag Rec. (%)	Mass pull (%)	Zn Grade (%)	Zn Rec. (%)	Ag Rec. (%)	Ag Rec. (%)
0.17	2.2	4.3	93	3	64	85	72	7	58	94	15	86

24.1.4.2 Recovery Method - General Description

The conceptual design for the processing facility was based on results from the metallurgical test work. Specifically, the design for the flotation circuit was based on results and conditions from a locked cycle test (LCT). The new processing plat at the La Colorada Property will be designed to process 18,250,000 t/y (50,000 t/d) to produce lead-silver and zinc concentrates. Primary crushed ore will be supplied from an underground mine. The processing plant will consist of a two-stage fine crushing circuit followed by a single-stage ball mill grinding circuit, in turn followed by conventional lead and zinc flotation circuits to produce lead and zinc concentrates. The process plant will produce on average 846 t/d of lead concentrate at 61% Pb, and 2,003 t/d of zinc concentrate at 59% Zn, based on ore head grades of 1.2% Pb and 2.5% Zn.

The process operations required to extract silver, lead, and zinc from the ore are shown on a flowsheet in Figure 24-36 and are summarized in the following list:

- The primary crushing circuit will be located underground and will be fed directly from haul trucks.
- Size reduction of the ore by a primary jaw crusher to reduce the ore size from run of mine (ROM) to 80 percent passing 152 mm. Crushed ore will be conveyed to a coarse ore stockpile of 50,000 t live capacity located near the plant.
- The crushed ore will be reclaimed and conveyed to a fine crushing circuit consisting of double deck screens, open circuit secondary crushing, and closed-circuit tertiary crushing operated in parallel. Crushed ore will be conveyed to a fine ore bin.
- The crushed product will be ground in a conventional ball mill circuit to deliver a product size of 80% passing 90 microns to the flotation circuit. Three ball mills (26 ft x 44 ft) with 16,800 kW motor will operate in closed circuit with hydrocyclones.
- The flotation plant will consist of sequential selective flotation circuits to produce lead and zinc concentrates. The lead flotation circuit will consist of rougher flotation, rougher concentrate regrinding, and two stages of cleaner flotation. The zinc flotation circuit will consist of rougher flotation, rougher concentrate regrinding, and two stages of cleaner flotation.
- Final lead and zinc concentrates will be thickened, filtered, and loaded on trucks for shipment.
- Final flotation tailings will be thickened to recycle water to the process. The thickened slurry will be filtered and conveyed to a stockpile to then be trucked to the filtered tailings storage facility (FTSF).
- Water from tailings and concentrate dewatering will be recycled for reuse in the process. Plant water stream types include process/reclaim water, fresh/fire water, and potable water.
- The reagents used in this process will be stored, prepared, and distributed on site; these include lime (CaO), zinc sulphate ($ZnSO_4$), sodium cyanide (NaCN), copper sulphate ($CuSO_4$), and sodium isopropyl xanthate (SIPX), Aerophine 3418A, methyl isobutyl carbinol (MIBC), flocculant, and antiscalant.

- Air compressors and receivers will supply air for process plant operations, maintenance, and laboratory services. Blowers will supply air for the flotation cells.

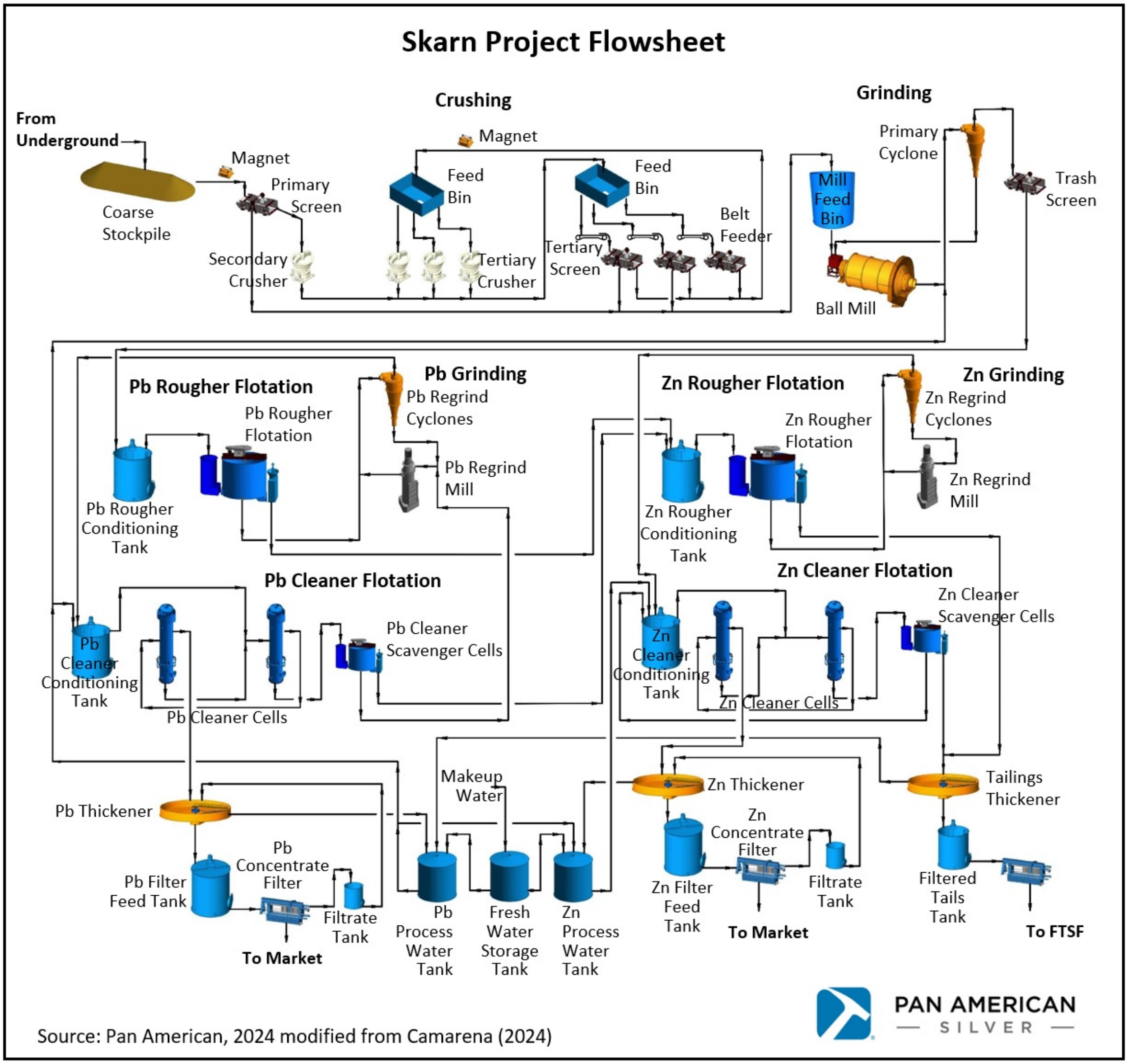


Figure 24-22: Simplified mineral processing flowsheet for the Skarn Project

Requirements for Energy, Water, and Process Materials

The Skarn Project process facility has an estimated 89.1 MW total connected load and 69 MW total demand load. This translates to approximately 33 kWh per tonne of ore processed. Process water is made up of fresh water, the water reclaimed from the dewatered tailings, and the overflow of the lead and zinc concentrate thickeners. Reagents required include lime, zinc sulphate, copper sulphates, xanthates, promoters, and frothers.

24.1.5 Environmental Studies, Permitting, and Social or Community Impact

24.1.5.1 Environmental Liabilities

There are no known significant environmental liabilities on or related to the La Colorada Property other than the existing La Colorada Vein Mine. Demolition, closure, and reclamation of the existing La Colorada Vein Mine infrastructure is covered in Section 20 of this technical report. There are no known environmental issues that could materially impact Pan American's activities on the La Colorada Property. It is expected that the Skarn Project will be taxable only for fixed greenhouse gas emissions sources under the Zacatecas Tax, similar to the existing La Colorada Vein Mine (see Section 4 of this technical report for more details).

24.1.5.2 Environmental and Land Use Permits

Pan American has completed environmental baseline studies across the site for the Skarn Project which builds on the extensive environmental monitoring database and original baseline data collected for the existing La Colorada Vein Mine.

Environmental impact (Manifestacion de Impacto Ambiental, MIA) and Change of Land Use (CUS) permits have been obtained for the Guadalupe ventilation shaft which is nearing completion, and twin decline ramps with associated ventilation shafts, waste storage areas, construction laydown areas, camp area, access roads, and water management ponds.This infrastructure would support both the La Colorada Vein Mine and exploration and underground development for the Skarn Project. Permits are also in place for surface exploration, geotechnical, and hydrogeological drilling associated with the Skarn Project.

As designs for the mine at the Skarn Project, process plant, tailings storage facilities, waste storage areas, mine dewatering and effluent management facilities, roads, and power and water infrastructure for the Skarn Project are confirmed, permitting activities will continue to advance in order to meet the project development schedule. The overall permitting strategy will seek to manage potential environmental and social risks according to international best practice, including consultation with potentially affected stakeholders and communities of interest. Short- and medium-term permitting processes are expected to be benefited by the existing permits held for the La Colorada Vein Mine and by Pan American's reputation in Zacatecas and Mexico as a responsible mining company. However, there is risk that construction and operating permits for the Skarn Project could be delayed or not obtained.

24.1.5.3 Environmental Management Systems

Since 2008, the existing La Colorada Vein Mine has voluntarily participated in the Mexican Environmental Protection Authority's "Clean Industry" program, which involves independent verification of compliance with all environmental permits and the implementation of good practice environmental management procedures and practices. Pan American plans to continue to participate in the program throughout the life of the Skarn Project.

24.1.5.4 Sustainability Management Systems

Pan American has implemented a management system at the La Colorada Property covering health, safety, environment, and community through the Towards Sustainable Mining (TSM) initiative developed by the Mining Association of Canada (MAC). This system aids in overseeing environmental and occupational health and safety policies as well as community relations. The Skarn Project will maintain TSM systems and practices implemented at the La Colorada Vein Mine (see Section 20 of this technical report).

24.1.5.5 Water Management

Mine dewatering and water management are expected to be key environmental issues for the Skarn Project and permitting processes. Water from mine dewatering will exceed requirements for project process and potable water and it will be at a higher temperature than the La Colorada Vein Mine dewatering, thus requiring additional water treatment and cooling infrastructure which is included in the current conceptual mine design.

Pan American continues to advance hydrogeological and geochemical studies to improve estimates of expected mine dewatering flows and water quality. These studies will inform refinements to dewatering and surface water management designs. Additional or modified water discharge permits may also be required as part of the permitting process.

24.1.5.6 Mine Closure

A conceptual mine closure cost estimate for the future Skarn Project mine has been developed based on local regulations, international best practice, and Pan American's experience with mine closure at its other sites in Mexico. An integrated mine closure plan will be developed in future studies; it will aim to optimize closure and decommissioning costs between the La Colorada Vein Mine and the Skarn Project, and ensure appropriate management of environmental and social risks at the site in the long term.

24.1.6 Capital and Operating Costs

All costs are listed in United States dollars (US$).

Capital and operating costs were estimated by Pan American using internal resources and external consultants to be at a PEA level of detail. The current resource definition still requires extents drilling and further delineation, and therefore the project scenarios upon which this PEA is based are a preliminary "point in time" scenario only. However, a suitably detailed mine design and schedule was prepared from a number of scenario options to determine a sublevel caving base case at 50 ktpd for the PEA.

The cost estimates are considered a reasonable representation of the typical capex and opex for an operation of this type and of this setting. Studies always aim to have a balanced cost estimate with suitable contingencies. Nominally a 30% contingency has been applied in this study throughout, however there is a possibility that costs may increase in future studies beyond these contingencies. Similarly, there will be opportunity to optimize and improve on all cost inputs along the mine value chain during future feasibility studies. The results of the PEA are not definitive.

24.1.6.1 Capital Expenditures

Capital estimates were prepared by various consultants and reviewed by Pan American.

The initial mine access, development, construction and commissioning period would be 6 years and require a capital outlay of $2.77 billion. Study and G&A costs of $60 million are added to give an initial capital of $2.83 billion. Ongoing sustaining capital is estimated at $951 million. The total capital estimated is $3.78 billion.

The initial capital expenditures are summarized in Table 24-9.

Table 24-9: Initial capital expenditures for the Skarn Project

Category	Capex (US$ Million)
Surface Infrastructure	202
Dewatering System on Surface	49
Processing Plant, Offices and facilities	1,173
Initial FTSF Works	43
Power	70
Total Surface	**1,537**
Underground Access and Development	1,023
Mining Fleet	103
Underground Construction and Materials Handling	53
Dewatering System Underground	54
Total Underground	**1,232**
G&A and Study Costs	60
Total Initial Capital	**2,829**

Table 24-10: Initial capital expenditures schedule for the Skarn Project

Year	Capex (US$ Million)
-6	120
-5	372
-4	288
-3	660
-2	868
-1	522
Total Initial Capital	**2,829**

Sustaining capital has been estimated to cover replacement plant and equipment, underground development, expansions of tails storage facilities, on ongoing dewatering amongst other items.

Table 24-11: Sustaining capital LOM for the Skarn Project

Category	Capex (US$ Million)
Surface Infrastructure	120
Staged Capacity FTSF Works	83
Power	40
Total Surface	**243**
Underground Access and Development	171
Mining Fleet	457
Underground Construction and Materials Handling	64
Dewatering System Underground	17
Total Underground	**709**
Total Sustaining Capital	**951**

The FTSF is progressively rehabilitated over the LOM and there will be no surface waste dumps at completion of mining. Closure costs are included in the surface infrastructure costs, in the FTSF sustaining capex and are also assumed to be offset by the salvage value at the end of the project. The demolition and decommissioning of the La Colorada Vein Mine infrastructure, of which most will have to be removed before mining the Skarn Project, is covered by the La Colorada Vein Mine accounts and bonds and is independent of the Skarn Project economics.

24.1.6.2 Operating Costs

Operating costs are estimated to total $11.64 billion over the LOM, with an average unit cost of $40.88/t of mill feed. The operating cost includes the underground mining, haulage, processing, G&A, and concentrate haulage costs, and these are shown in Table 24-12.

The costs for smelting, refining and other port charges are considered as revenue deductions and not included in the mine operating costs.

Table 24-12: Skarn Project LOM operating costs

	Operating Costs (US$ Million)	US$/t Processed
Mining	9,202	32.32
Process	2,144	7.53
G&A	293	1.03
Total Operating Cost	**11,638**	**40.88**

Some initial operating costs are incurred during the pre-production period are not included in the operating costs above, and these have been accounted for in the initial capital expenditures.

24.1.6.3 Mining Cost

The mining costs of $32.32/t of mill feed include the drawpoint development, drilling, blasting, mucking, haulage, underground crushing and conveying to a surface stockpile, supervision, technical services, tails materials handling (from filters), maintenance, ventilation, dewatering, general mine services and concentrate haulage. The costs were benchmarked against other sublevel caving and large throughput operations and considered to be suitable for this level of study. Factors that could impact costs in the future those that are sensitive to inflation or supply issues, these may include energy, steel, concrete, mobile plant, electronics and specialist labour and maintenance personnel.

24.1.6.4 Processing Cost

Processing costs will total $2,144 million over the project life and average $7.53/t of mill feed. Processing cost are most sensitive to the cost of electrical power, consumables, and reagents. The processing costs include labour, maintenance parts and services as well, for the crushing, stockpile, grinding, flotation, concentrate storage, and tailings thickening and filtration. The processing cost are on-site costs only and, as discussed previously, do not cover treatment cost for smelting, refining and other port charges.

24.1.6.5 General and Administration Costs (G&A)

G&A costs will total $293 million over the project life and average $1.03/t of mill feed.

The G&A costs include all surface personnel, site services (IT, security, safety, etc.), and site management. The mining G&A is separately covered in the mining costs.

24.1.7 Economic Analysis

24.1.7.1 Metal Price and Exchange Rate

The technical study economic analysis is based on a silver price assumption of US$22.00/oz, a lead price of US$2,200/t, and a zinc price of $2,800/t.

24.1.7.2 Taxation and Royalties

Taxes and royalties will total $2,736 million over the life of the project. The Skarn Project is subject to governmental taxes, fees, and duties, including a special mining duty (SMD) of 7.5% applied to taxable earnings before interest, inflation, taxes, depreciation, and amortization; and a deductible extraordinary mining duty (EMD) of 0.5% that is applied to the sale of gold and silver.

Table 24-13: Skarn Project LOM Taxes and Royalties

	Tax and Royalty Costs (US$ Million)
Income Tax	1,797
Special Mining Duty	916
Extraordinary Mining Duty	22
Total Taxes and Royalties	**2,736**

24.1.7.3 Financial Results

At the base case assumptions, the Skarn Project generates an after-tax discounted cash flow using an 8% discount rate of $1.087 billion dollars. Table 24-14 summarizes the financial results.

Table 24-14: Skarn Project Financial Results

Construction Period	6 Years
Production Mine Life	17 years
Production Rate	50,000 tpd (or 18.25 million tonnes per annum)
Mineable Inventory	284.7 million tonnes
Average Annual Silver Produced First 10 Years	17.2 million ounces
Average Annual Zinc Produced First 10 Years	427 thousand tonnes
Average Annual Lead Produced First 10 Years	218 thousand tonnes
Unit Operating Costs	$40.88 per tonne
Total LOM Revenue	$23,853 million
Initial Capital	$2,829 million
Total LOM Sustaining Capital	$951 million
Total LOM Operating Cost	$11,638 million
After-Tax $NPV_{(5\%)}$	$2,182 million
After-Tax $NPV_{(6.5\%)}$	$1,572 million
After-Tax $NPV_{(8\%)}$	$1,087 million
After-Tax IRR	14%
Pay-Back Period (after tax, undiscounted)	4.3 years

Table 24-15: Skarn Project LOM cash flow

Metric	Unit	LOM Total	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Development metre (lateral)	km	432.0	1.4	1.9	4.9	20.7	32.9	25.5	25.1	26.5	31.4	21.7	22.6	20.9	21.8	21.8	21.9	22.6	21.7	21.0	20.9	20.6	21.1	2.9	—	—
Development metre (vertical)	km	17.6	—	1.1	1.0	0.3	4.2	1.4	0.2	0.6	0.7	0.2	1.5	0.4	0.8	1.2	0.5	1.9	0.5	0.3	0.4	0.3	0.3	—	—	—
Processing																										
Total Tonnes Processed	Mt	284.7	—	—	—	—	—	—	14.9	15.9	18.3	18.3	18.4	18.2	18.2	18.3	18.3	18.3	18.3	18.3	18.1	16.9	16.0	13.5	5.8	0.6
Silver Grade	g/t	31.8	—	—	—	—	—	—	37.5	40.4	39.7	38.1	38.7	36.1	32.0	31.0	32.2	30.7	28.5	27.7	26.3	25.3	23.1	22.6	23.1	18.8
Zinc Grade	%	2.50	—	—	—	—	—	—	2.90	2.70	2.70	2.70	2.70	2.70	2.50	2.40	2.40	2.20	2.40	2.40	2.60	2.40	2.40	2.40	2.40	2.50
Lead Grade	%	1.20	—	—	—	—	—	—	1.70	1.60	1.60	1.50	1.50	1.60	1.50	1.30	1.20	1.00	0.90	0.70	0.60	0.70	0.70	0.70	0.50	0.40
Silver Recovery	%	84.8	—	—	—	—	—	—	85.3	85.6	85.5	85.3	85.4	85.1	84.7	84.6	84.8	84.6	84.4	84.3	84.2	84.1	83.9	83.8	83.9	83.4
Zinc Recovery	%	93.7	—	—	—	—	—	—	92.6	92.6	92.7	92.7	92.6	92.6	92.5	92.8	93.2	93.7	94.6	95.5	95.7	95.5	95.3	95.4	96.0	96.5
Lead Recovery	%	84.3	—	—	—	—	—	—	86.5	86.0	86.0	85.9	85.9	86.1	85.6	84.8	84.1	82.8	81.6	79.7	79.5	79.9	80.2	80.0	78.1	76.2
Zinc Concentrate Produced	kt	11,470	—	—	—	—	—	—	678	684	788	781	774	781	726	698	683	641	694	720	755	672	620	522	228	25
Lead Concentrate Produced	kt	4,560	—	—	—	—	—	—	352	351	400	394	401	405	381	338	305	250	211	158	152	150	148	121	40	3
Silver Produced	Moz	247	—	—	—	—	—	—	15.3	17.6	20.0	19.1	19.5	18.0	15.9	15.5	16.1	15.3	14.2	13.7	12.9	11.6	10.0	8.2	3.6	0.3
Zinc Produced	kt	6,767	—	—	—	—	—	—	400	404	465	461	457	461	428	412	403	378	409	425	445	396	366	308	135	15
Lead Produced	kt	2,782	—	—	—	—	—	—	214	214	244	240	245	247	232	206	186	153	128	97	93	91	91	74	24	2
Payable Production																										
Silver	Moz	203	—	—	—	—	—	—	12.6	14.7	16.6	15.8	16.2	14.8	13.0	12.6	13.2	12.6	11.5	11.1	10.5	9.4	8.1	6.6	2.9	0.3
Zinc	kt	5,752	—	—	—	—	—	—	340	343	395	392	388	392	364	350	343	321	348	361	379	337	311	262	114	12
Lead	kt	2,643	—	—	—	—	—	—	204	204	232	228	232	235	221	196	177	145	122	92	88	87	86	70	23	2
Project Gross Revenue from Sales	M$	26,378	—	—	—	—	—	—	1,678	1,731	1,982	1,948	1,955	1,940	1,791	1,690	1,639	1,497	1,495	1,457	1,484	1,340	1,239	1,033	435	44
Selling Cost	M$	-2,524	—	—	—	—	—	—	-159	-161	-185	-182	-182	-183	-170	-161	-155	-141	-145	-143	-148	-133	-124	-104	-44	-5
Net Revenue from Sales	M$	23,853	—	—	—	—	—	—	1,519	1,570	1,797	1,765	1,773	1,757	1,621	1,529	1,485	1,356	1,350	1,314	1,336	1,207	1,115	929	391	40
Mining Cost	M$	-9,201	—	—	—	—	—	-68	-438	-542	-623	-599	-619	-597	-604	-597	-590	-595	-581	-569	-565	-528	-504	-397	-168	-18
Processing Cost	M$	-2,144	—	—	—	—	—	—	-112	-119	-138	-138	-138	-137	-137	-138	-138	-138	-138	-137	-137	-128	-121	-101	-44	-5
G&A Cost	M$	-293	—	—	—	—	—	—	-15	-16	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-17	-16	-14	-6	-1
Total Operating Cost	M$	-11,638	—	—	—	—	—	-68	-566	-678	-780	-756	-776	-753	-760	-753	-747	-752	-738	-725	-721	-673	-641	-512	-217	-23
Royalties	M$	-22	—	—	—	—	—	—	-1	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	—	—
Initial Capex	M$	-2,829	-120	-372	-288	-660	-868	-522	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sustaining Capex	M$	-951	—	—	—	—	—	—	-192	-25	-63	-27	-69	-16	-15	-117	-82	-30	-152	-11	-55	-13	-41	-3	-8	-33
Working Capital	M$	-10	-7	-25	-15	-16	-42	-21	2	40	-9	1	—	1	5	3	2	5	—	1	-1	5	3	7	28	21
Income Tax	M$	-2,713	—	—	—	—	—	—	-171	-187	-210	-229	-270	-276	-224	-192	-173	-125	-127	-116	-129	-98	-92	-80	-13	-1
Net after Tax Cash Flow	M$	5,689	-127	-397	-303	-675	-910	-610	591	719	734	754	656	710	625	469	483	452	333	462	429	427	343	340	181	3
NPV 8%	M$	1,087																								
IRR	%	14																								

24.1.7.4 Sensitivity Analysis

Sensitivities to certain key parameters were undertaken in the financial model to appreciate variations of the cash flow results.

The sensitivity of NPV to silver and zinc price at 8% and 6.5% cost of capital are shown in Table 24-16 and Table 24-17 at 50 ktpd.

Table 24-16: NPV sensitivity of Skarn Project at 8% discount rate

NPV (8%) $ Million	Ag Prices ($/oz)					
Zn prices ($/t)	18.00	20.00	22.00	24.00	26.00	28.00
2,200	75	177	276	376	475	574
2,500	484	583	682	781	880	979
2,800	889	988	1,087	1,186	1,285	1,384
3,100	1,295	1,394	1,493	1,592	1,690	1,789
3,400	1,699	1,798	1,897	1,996	2,094	2,193

Table 24-17: NPV sensitivity of Skarn Project at 6.5% discount rate

NPV (6.5%) $ Million	Ag Prices ($/oz)					
Zn prices ($/t)	18.00	20.00	22.00	24.00	26.00	28.00
2,200	368	489	606	723	840	957
2,500	855	972	1,089	1,206	1,323	1,440
2,800	1,338	1,455	1,572	1,689	1,806	1,923
3,100	1,820	1,937	2,054	2,171	2,288	2,405
3,400	2,302	2,419	2,536	2,652	2,769	2,886

An alternative development scenario based on a 30,000 tpd production rate was considered as another sensitivity and is as shown in Table 24-18. The initial capital was reduced appropriately, and the unit operating costs were increased to reflect the lower throughput. The result was an after-tax NPV(8%) of $498 million and an IRR of 10%. Due to the superior economics, the 50,000 tpd production case was the preferred scenario in this PEA.

Table 24-18: Production Metrics and Financial Analysis based on 30,000 tpd production rate

Construction period	6 years
Production mine life	27 years
Production rate	30,000 tpd (or 10.95 million tonnes per annum)
Mineable inventory	283.9 million tonnes
Average annual silver produced first 10 years	11.1 million ounces
Average annual zinc produced first 10 years	268 thousand tonnes
Average annual lead produced first 10 years	143 thousand tonnes
Unit operating costs	$42.38 per tonne
Total LOM revenue	$23,797 million
Initial capital	$2,642 million
Total LOM sustaining capital	$1,024 million
Total LOM operating cost	$12,035 million
Cumulative after-tax cash flow	$5,663 million
After-tax $NPV_{(5\%)}$	$1,560 million
After-tax $NPV_{(6.5\%)}$	$952 million
After-tax $NPV_{(8\%)}$	$498 million
After-tax IRR	10%

24.1.8 Skarn Project Enhancement Opportunities

24.1.8.1 Geological Model and Mineral Resource Estimation

The current geological model and resource estimation is based on drilling cut-off in late 2022, therefore there is drilling data from the end of 2022 through to December 2023 that could be included. A new model is proposed for 2024 that will incorporate this new drilling, and also an updated structural model. The structural modelling will be required for the dewatering studies, and that data will improve the dewatering estimates and the capital estimates for that activity.

24.1.8.2 Delineation Drilling and Delineation of Low-Grade Zone

To date the drilling has focused on drilling out the known zones, and the extents in all directions still require definition drilling. Sterilization drilling is also required to ensure that the FTSF and any major surface infrastructure is not going to be impacted by any future caving zones that are yet to be defined.

24.1.8.3 Block Caving

Block caving (BC) offers a step change in mine operating costs. Generically speaking, total operating costs in the range of $20/t to $30/t range may be possible. This lower cost has a number of positive consequences. Some of these are incorporating more mineralized material into a larger cave footprint, hence recovering more metal from the resource base. The method is also highly amenable to automation and will enable a substantial reduction in required equipment and personnel compared to sublevel caving. Every step available to reduce the size of the underground workforce is being investigated to remove personnel from potentially hazardous heat and humidity conditions and reduce exposure to seismically active areas.

Block caving also removes the need to drill and blast all of the tonnage, as only the undercut and extraction levels require drill and blast to initiate the caves. Capital cost of block cave setup is a limitation, due to its initial capital-intensive nature and this affects NPV. Should the resource grow in future this effect can be mitigated by starting with sublevel caving whilst developing the BC then mining around and underneath by block caving. Also, the productivity rates with block caving are driven in a similar fashion to sublevel caving in that they are footprint “plan area” dependant. Therefore, a larger BC footprint and larger resource could result in productivities that offset the capital and allow a faster and compelling payback case. It will be recommended to assess and review block caving scenarios at each study stage moving forward.

25 Interpretation and Conclusions

Pan American conducts infill and near mine exploration drilling at the La Colorada Vein Mine to update the mineral resource and mineral reserve estimates on an annual basis following reviews of metal price trends, treatment and refining charge trends for base metal concentrates, operational performance and costs experienced in the previous year, and forecasts of production and costs over the LOM.

The La Colorada Vein Mine geology and mineralization continues to change as the deposit deepens with the structures housed within the limestone and the mineralogy becoming more base metal rich. The deep drilling shows the epithermal veins becoming less continuous and more sporadic. This change is reflected in the current mineral resource and mineral reserve estimates. Previous drilling on Recompensa and NC2 veins has indicated the extension of mineralization to the east. Continuous infill drilling to test vein grades and thickness' is paramount to support efficient production and enable good reconciliation. Surface exploration and drilling has now defined the vein system over a 1.5 km by 3.0 km area and the potential to find additional new veins and extensions to existing veins remains the focus of the geology team on site.

The mining parameters for the La Colorada Vein Mine are well established over many years of mining and are adjusted from time to time as required based on physical measurements in the mine and reconciliation results. The assumptions made for the La Colorada Vein Mine cut-off grade and for the LOM operating cost are based on an expected return to full capacity within a reasonable period of time following the completion of the Guadalupe ventilation shaft and associated ventilation infrastructure. If the anticipated higher production rate is not met, the unit costs can be expected to be higher than those assumed and lead to a reduction in the mineral reserves.

The metallurgical assumption used for the mineral resources and mineral reserves estimates for the La Colorada Vein Mine are based on operational plant performance and are confirmed by bench-scale testing of representative samples of the planned monthly mine feed. This work has confirmed that the optimum processing method is selective lead/zinc sulphide flotation for sulphide ore and cyanidation for oxide ore.

The deep drilling and discovery of the Skarn Project deposit in 2018 highlighted the potential extent of the hydrothermal system and identified an intrusive porphyry (Cu-Mo-Ag-rich), metamorphic endoskarn and exoskarn mineralized zone. The limestone host rock for subsequent sulphide retrograde emplacement of zinc, in the form of sphalerite accompanied by galena, pyrite, chalcopyrite and minor magnetite. Sulphide textures vary from disseminated and patchy to semi massive and massive. The carbonate replacement style high grade mineralization is seen associated to the distal portions of the system. There appears to be multiple pulses of intrusions and differentiation as the system evolved over time.

The skarn mineralization sits between 700 m and 1,900 m below surface, extending some 1,800 m in a NE-SW direction and 650 m in a NW-SE direction. Skarn geometry is dependent on the shape of the causative intrusion, the composition and orientation of the stratigraphy, and the lithological contacts that generate permeability in the host rock. Skarn mineralization is well developed in the retrograde stages in skarn layers ranging from a few centimeters to tens and hundreds of meters thick.

Continued exploration and studies of the La Colorada Vein Mine and the Skarn Project will increase the footprint and knowledge of the respective deposits. Further understanding of the transition between the skarn-CRD and intermediate sulphidation veins could identify vectors in the epithermal environment which could allow for the identification of future exploration targets.

The PEA has shown the Skarn Project to be potentially economic and indicates it could be successfully mined by sublevel caving methods and the materials processed by standard crushing, grinding and flotation techniques to produce high quality saleable concentrates. The mining method involves a top-down sequence and has the benefit to the NPV by delivering the higher margin materials to processing earlier in the mine life. The PEA is preliminary in nature, it includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

The 50 ktpd processing rate, with associated ramp- up and ramp down periods results in a 17-year LOM. 285 Mt of mill feed will be delivered in that 17-year period. Payable quantities of 202 Moz of silver, 5.75 Mt of zinc and 2.64 Mt of lead will be recovered into concentrates. The two main products produced are a zinc concentrate and a silver-rich lead concentrate. The only payable metals are zinc, lead and silver. Although low grades of gold and copper are present in the concentrates, they are not payable at this stage.

The depth and geometry characteristics of the Skarn Project deposit require a six-year pre-production construction and development period to establish the access, ventilation, haulage and processing infrastructure prior to commissioning and establishing steady state operations.

The PEA uses the most recent mineral resource estimate which is based on drilling completed up until November 2022. There are no mineral reserves reported from the Skarn Project at this time, as the current level of studies do not support mineral reserve estimations. A future pre-feasibility study (PFS) would be required (as a minimum) prior to the declaration of any mineral reserve estimates.

The results of the PEA support progressing the exploration to further delineate the lateral and depth extents of the Skarn Project mineral resources. The potential joint venture agreement with respect to certain adjacent mineral concessions would offer an opportunity to incorporate additional materials outside of the current boundaries of the La Colorada Property, and to optimize the PEA mining shapes by expanding the current concession boundaries that constrain and truncate the current geometry.

The LOM plans developed are at a suitable level of detail for a PEA study. The designs and schedules have enabled various trade off studies and scenarios to be analyzed to ensure realistic and appropriate timings and rates were used. The design and schedule scenarios tested the practicality of the mining sequences, production rates, development rates, and highlight the risks and opportunities in areas such as materials handling and ventilation.

Some opportunities exist to optimize the shaft and ramp locations, expand some footprints, and gain more tonnes per vertical metre. There is moderate potential to lower development costs that would be dependent on factors such as ventilation and equipment sizing. Some of the risks highlighted are the quantity of mine lateral development and the required offset from the cave zones, particularly for the ventilation networks. Stress induced from mining, and the associated interaction with the off-footprint development are areas for future studies.

The Skarn Project is in an area with a high geothermal gradient, meaning that the in-situ rock temperatures are high and increase at a steady rate with mining depth. Ventilation and water management processes will need to be adequate to mitigate these conditions and establish a safe working environment.

Based on test work conducted between 2019 and 2023, the Skarn Project is expected to have very good metallurgical performance, producing high-grade zinc and lead concentrates with high metal recoveries. Test samples used in the work programs were representative of the mineralogy and grades of the Skarn Project and the samples used were widely dispersed across the mineralized body. The mineral processing of the materials mined is by standard flotation and there are no known issues with being able to produce saleable concentrates. Zinc and lead concentrates will be the two concentrate products exported from the site and they will contain payable zinc, lead, and silver metal. Tails will be stored in a filtered tailings storage facility adjacent to the processing plant and located entirely on La Colorada Property.

The capital and operating costs are adequate for a PEA level of study. Detailed estimates are required at the next stage of project development. There is opportunity to decrease operating costs with increased mineral resources on each level, however the capital costs are unlikely to have any significant decreases.

The current inflationary climate with respect to costs and the strength of the Mexican Peso are risks and opportunities for the Skarn Project. All costs and revenues for the PEA in Section 24 are expressed in 2023 US dollars, unless expressly stated otherwise. A contingency level of 30% was applied to some areas of the estimate. Other areas, where direct quotes were received, had a lesser contingency applied. Given Pan American's recent history of executing capital projects in Mexico in the past 8 years (two mine shafts, one underground mine, one flotation plant, one agglomeration plant, one refrigeration plant) the capital estimate is considered reasonable for PEA purposes.

Environmental monitoring programs at the current La Colorada Vein Mine provide sound baseline data. Additional baseline studies are being conducted and will evolve as the Skarn Project evolves. The Skarn Project will be developed in accordance with all governmental and regulatory requirements.

The results of the Skarn Project PEA (see Section 24) in this technical report are subject to variations in future development and operational conditions including, but not limited to, the following:

- Assumptions related to commodity prices and foreign exchange rates.
- Unanticipated inflation of capital or operating costs.
- Significant changes in recovery or processing parameters.
- Geological and structural modelling and interpretation of the mineralization.
- Geotechnical assumptions, stress, seismicity, inrush and cavability of the mining zones.
- Inventory dilution or loss, and flow model calibration.
- Throughput and recovery rate assumptions.
- Changes in regulatory requirements that may affect the development, operation, tails disposal or future closure plans.
- Changes in closure plan costs.
- Changes in permitting or approvals requirements.
- Changes in downstream treatment and smelter charges and costs.
- Criminal and organized crime activity in some regions of Mexico.

The PEA economic analysis for the Skarn Project has estimated a positive cash flow, and a positive NPV(8%) after taking into account the operating, capital, and taxation costs. The metals prices used were US$2800/t for zinc, US$2200/t for lead and US$22.00/oz for silver.

In the opinion of the qualified persons, and considering the preliminary nature of the Skarn Project PEA, there are no known or reasonably foreseen issues, risks or impediments that would prevent the Skarn Project from advancing to a PFS study once the mineral resources are further delineated and a new mineral resource model is prepared.

26 Recommendations

Based on the information presented in this technical report, the qualified persons recommend the following action items.

Exploration

Ongoing exploration drilling is of paramount importance to the replacement of mineral resources and mineral reserves and generating new mineral resources. In 2024, Pan American plans to invest between US$10 and US$11 million on drilling between 40,000 m and 50,000 m of drilling on the La Colorada Vein Mine and the Skarn Project. The drilling of the epithermal veins should focus on the extensions east of the current underground La Colorada Vein Mine as well as splay and down dip extensions of known veins within the Estrella and Candelaria mines. The infill and exploration drilling of the Skarn Project should concentrate on the mineralization zones 902, 903, and west-northwest portion of 902 respectively.

The study of mineralization within the limestone lithology units at the Skarn Project above the current mineral resource estimate is required. The geological modeling of the interlayered skarn within the limestone means that logged skarn units are included in the limestone unit. The geological misclassifications are a concern in unmineralized or poorly mineralized lithologies because the geologically misclassified material tends to be associated with significantly higher grades than those typically found in the logging unit assigned to that material (correctly classified). The presence of epithermal veins, which are associated with high grades and cut through all lithologies, also pose modelling challenges. Due to their small size and the unlikelihood of confidently linking intercepts between drill holes. Including these geological misclassifications and vein intercepts without control could potentially result in overestimation of the grade for the unmineralized units. Therefore, additional sampling and modeling of the limestone and the effect of any mineralized material present is required to better understand and develop a modeling strategy which more accurately represents the grade distribution.

The La Colorada Vein Mine

For the La Colorada Vein Mine, it is recommended that once the Guadalupe ventilation shaft is commissioned, and proper ventilation and refrigeration conditions in the deep east zone of the Candelaria mine are restored, production is gradually increased at the La Colorada Vein Mine to design rates.

Once production has been stabilized at sustainable rates and the deeper levels of the Candelaria mine are accessed, the La Colorada Vein Mine cost model and cut-off grade calculations should be updated. This should consider new operational conditions and requirements such as haulage cycles, ground support, ventilation and dewatering; and revenue and cost drivers such metal prices, consumable prices, and salary rates.

Finally, the mineral resources and mineral reserves should be updated considering the new cut-off grades. This will likely impact the reported inventories. However, it will also allow to support a new mine plan that optimizes the La Colorada Vein Mine production strategy for the new operating conditions.

The Skarn Project

Sublevel caving was selected as the mining method at a rate of 50,000 tpd. It is recommended to consider sublevel caving and block caving in the next scenarios when an updated mineral resource model is next completed.

A potential joint venture on the properties not controlled by Pan American offers opportunities to expand the current footprint of the La Colorada Property. Finalization and further development of such a joint venture is recommended to practically unlock more mineable areas.

Drilling programs should focus on delineation of the extents of the mineralized zones to achieve a broader area of inferred or indicated mineral resources classification within an updated mineral resource estimate. Detailed drilling and conversion to a measured mineral resource classification is not recommended or necessary at this stage, primarily due to the nature of the bulk mining methods employed. The focus should be on defining the broader extents of the mineralized zones of the Skarn Project, and this will assist in locating LOM infrastructure and surface facilities.

Mineral resource, structural, hydrology, geotechnical, and cost models should be updated before commencing the next round of mine method selection and optimisation studies.

It is recommended to prepare various trade-off studies in parallel with the preparation of the mineral resource models, including but not limited to mining methods, materials handling, automation, ventilation and key surface infrastructure locations.

Additional metallurgical test work and a trade-off study include pressure filtration testing of additional tailings samples to determine variability, and a future trade-off to study the option of a SAG mill for mineral processing for the Skarn Project are recommended. Concentrate transport options should be studied to include options for rail transport, and options for site road accesses from the main highways.

It is recommended to advance environmental and social baseline and permitting for additional development infrastructure to support feasibility studies and access to the Skarn Project. It is also recommended to continue to implement longer term permitting strategy for the Skarn Project, process plant, filtered tailings storage facility, and associated infrastructure.

It is recommended that Pan American undertakes a PFS once all relevant data is available. The timing of a PFS will depend on the availability of the updated mineral resource model, and the above-mentioned associated trade-off studies. Study costs, including G&A, of US$60M are included in the capital estimates to advance the project to a PFS level of detail and into any potential construction phase.

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28 Certificates of Qualified Persons

Certificate of Qualified Person – Martin Wafforn

I, Martin Wafforn, P.Eng., as an author of this report entitled “Amended NI 43-101 technical report for the La Colorada Property, Zacatecas, Mexico” prepared for Pan American Silver Corp. (the Issuer) and dated effective as of December 18, 2023 (the technical report), do hereby certify the following:

1. I am Senior Vice President, Technical Services and Process Optimization at Pan American Silver Corp., with an office at 2100 - 733 Seymour Street, Vancouver, BC, V6B 0S6, Canada.

2. I graduated with a Bachelor of Science in Mining degree from Camborne School of Mines, England, in 1980. I am a Professional Engineer in good standing with Engineers and Geoscientists British Columbia. I am also a Chartered Engineer in good standing in the United Kingdom. I have worked as an engineer in the mining industry since my graduation from Camborne School of Mines.

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

4. I visited the La Colorada Property on numerous occasions including most recently between September 11 and 12, 2023.

5. I am responsible for Sections 4, 5, 15, 16, 18 (excluding 18.2), 19, 21, 22, and share responsibility for related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 of the technical report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had prior involvement with the property that is the subject of the technical report in my role as Senior Vice President, Technical Services and Process Optimization.

8. I have read NI 43-101, and the sections of technical report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the technical report, to the best of my knowledge, information, and belief, Sections 4, 5, 15, 16, 18 (excluding 18.2), 19, 21, 22, and related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 in the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

“Signed”

Martin Wafforn, P.Eng.

Dated this 22nd day of March, 2024

Certificate of Qualified Person – Christopher Emerson

I, Christopher Emerson, FAusIMM, as an author of this report entitled "Amended NI 43-101 technical report for the La Colorada Property, Zacatecas, Mexico" prepared for Pan American Silver Corp. (the Issuer) and dated effective as of December 18, 2023 (the technical report), do hereby certify the following:

1. I am Vice President, Exploration and Geology at Pan American Silver Corp., with an office at 2100 - 733 Seymour Street, Vancouver, BC, V6B 0S6, Canada.

2. I graduated with a Bachelor of Engineering in Industrial Geology degree from Camborne School of Mines, England, in 1998 and a Master of Science in Mineral Exploration degree from Leicester University, England, in 2000. I am a Fellow of the Australasian Institute of Mining and Metallurgy. I have worked as a geologist in the mining industry since my graduation from Leicester University.

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

4. I visited the La Colorada Property on numerous occasions including most recently between February 8 and 11, 2023.

5. I am responsible for Sections 6 to 11, 14, and 23, and share responsibility for related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 of the technical report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had prior involvement with the property that is the subject of the technical report in my role as Vice President, Exploration and Geology.

8. I have read NI 43-101, and the sections of technical report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the technical report, to the best of my knowledge, information, and belief, Sections 6 to 11, 14, and 23, and related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 in the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

"Signed"

Christopher Emerson, FAusIMM

Dated this 22nd day of March, 2024

Certificate of Qualified Person – Peter Mollison

I, Peter Mollison, P.Eng., as an author of this report entitled "Amended NI 43-101 technical report for the La Colorada Property, Zacatecas, Mexico" prepared for Pan American Silver Corp. (the Issuer) and dated effective as of December 18, 2023 (the technical report), do hereby certify the following:

1. I am Senior Director, Mine Engineering at the Issuer, with an office at 2100 - 733 Seymour Street, Vancouver, BC, V6B 0S6, Canada.

2. I graduated with a Bachelor of Engineering (Mining)(Hons) from the University of Ballarat, Victoria, Australia, in 1995. I am a Professional Engineer in good standing with Engineers and Geoscientists British Columbia. I am a Member and Chartered Professional, MAusIMM(CP)(Mining), in good standing with the Australasian Institute of Mining and Metallurgy. I have worked continuously as a mining engineer in the mining industry since my graduation in 1995 across a variety of open pit and underground mining operations and projects.

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

4. I visited the La Colorada Property on multiple occasions since 2017, and most recently between February 7 and 10, 2023.

5. I am responsible for Section 24 (excluding Sections 24.1.1.5, 24.1.3, 24.1.4, and 24.1.5), and share responsibility for related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 of the technical report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had prior involvement with the property that is the subject of the technical report in my role as Senior Director, Mine Engineering.

8. I have read NI 43-101, and the sections of technical report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the technical report, to the best of my knowledge, information, and belief, Section 24 (excluding Sections 24.1.1.5, 24.1.3, 24.1.4, and 24.1.5), and related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 in the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

"Signed"

Peter Mollison, P.Eng. Dated this 22nd day of March, 2024

Certificate of Qualified Person – Americo Delgado

I, Americo Delgado, P.Eng., as an author of this report entitled "Amended NI 43-101 technical report for the La Colorada Property, Zacatecas, Mexico" prepared for Pan American Silver Corp. (the Issuer) and dated effective as of December 18, 2023 (the technical report), do hereby certify the following:

1. I am Vice President, Mineral Processing, Tailings, and Dams at Pan American Silver Corp., with an office at 2100 - 733 Seymour Street, Vancouver, BC, V6B 0S6, Canada.

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. I have worked as a metallurgist and in mineral processing management in the mining industry 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 – *Standards of Disclosure for Mineral Projects* (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

4. I visited the La Colorada Property on multiple occasions since 2012 and most recently between March 11 and 13, 2020.

5. I am responsible for Sections 13, 17, 18.2, 24.1.1.5, 24.1.3, and 24.1.4 and share responsibility for related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 of the technical report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had prior involvement with the property in my role with the Issuer.

8. I have read NI 43-101, and the sections of technical report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the technical report, to the best of my knowledge, information, and belief, Sections 13, 17, 18.2, 24.1.1.5, 24.1.3, and 24.1.4, and related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 in the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

"Signed"

Americo Delgado, P.Eng. Dated this 22nd day of March, 2024

Certificate of Qualified Person – Matthew Andrews

I, Matthew Andrews, FAusIMM, as an author of this report entitled "Amended NI 43-101 technical report for the La Colorada Property, Zacatecas, Mexico" prepared for Pan American Silver Corp. (the Issuer) and dated effective as of December 18, 2023 (the technical report), do hereby certify the following:

1. I am Vice President, Environment at Pan American Silver Corp., with an office at 2100 - 733 Seymour Street, Vancouver, BC, V6B 0S6, Canada.

2. I graduated with a Bachelor of Chemical Engineering (Hons) from the University of New South Wales, Sydney, Australia, in 1993. I received a Master of Environmental Management from the University of New South Wales in 2005. I am a Fellow in good standing with the Australasian Institute of Mining and Metallurgy (AusIMM). I have 25 years experience in environmental management in the mining and resource industry.

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

4. I visited the La Colorada Property on multiple occasions since 2011 and most recently between September 23 and 24, 2022.

5. I am responsible for Sections 20 and 24.1.5 and share responsibility for related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 of the technical report.

6. I am not independent of the Issuer. I am a full-time employee of the Issuer.

7. I have had prior involvement with the property that is the subject of the technical report in my role as Vice President, Environment .

8. I have read NI 43-101, and the sections of technical report for which I am responsible have been prepared in compliance with NI 43-101 and Form 43-101F1.

9. At the effective date of the technical report, to the best of my knowledge, information, and belief, Sections 20 and 24.1.5 and related disclosure in Sections 1, 2, 3, 12, 25, 26, and 27 in the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

"Signed"

Matthew Andrews, FAusIMM

Dated this 22nd day of March, 2024